

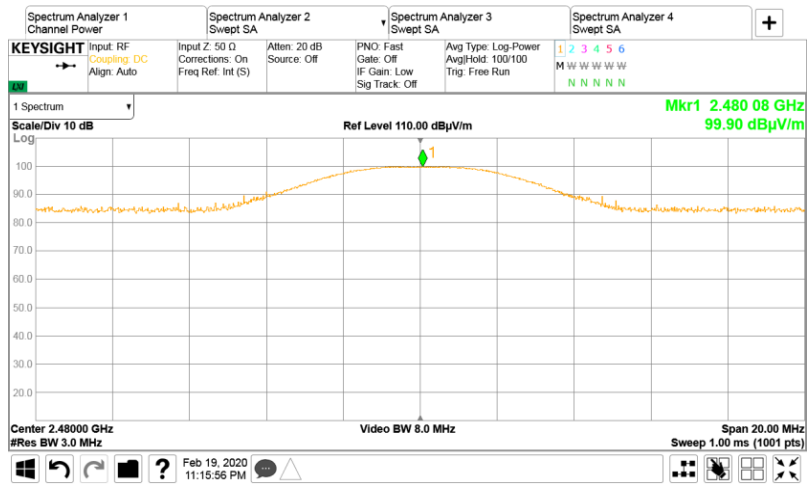


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.4.13 The highest emission level within the assigned band at high carrier frequency ch.26, Antenna 2

ANTENNA POLARIZATION: Horizontal



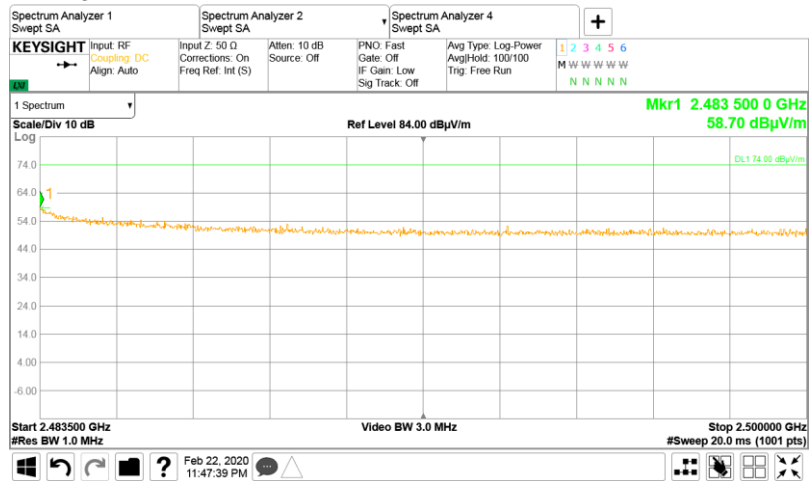


HERMON LABORATORIES

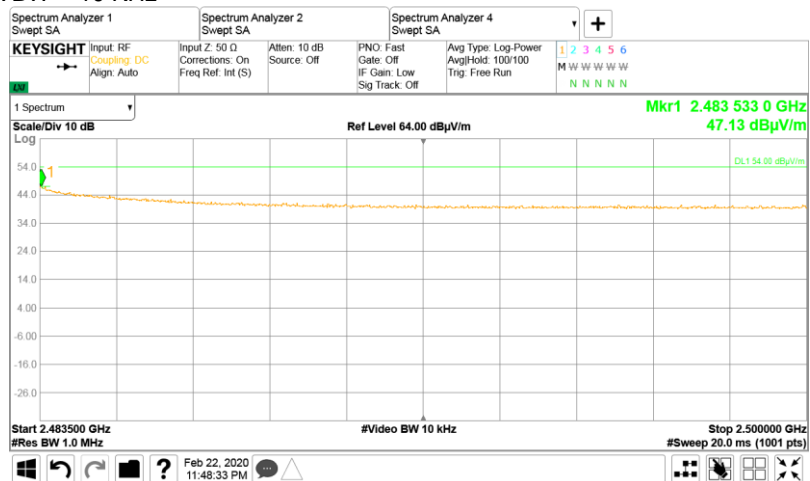
Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.4.14 The highest band edge emission at high carrier frequency ch.26, Antenna 2

FREQUENCY RANGE: 2483.5 – 2500 MHz
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 RBW = 1 MHz VBW = 3 MHz



FREQUENCY RANGE: 2483.5 – 2500 MHz
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 RBW = 1 MHz VBW = 10 KHz





Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

7.5 Peak spectral power density

7.5.1 General

This test was performed to measure the peak spectral power density radiated by the transmitter RF antenna. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*
902.0 – 928.0	3.0	8.0	103.2
2400.0 – 2483.5			
5725.0 – 5850.0			

* - Equivalent field strength limit was calculated from the peak spectral power density as follows: $E = \sqrt{30 \times P} / r$, where P is peak spectral power density and r is antenna to EUT distance in meters.

7.5.2 Test procedure for field strength measurements

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

7.5.2.2 The EUT was adjusted to produce maximum available to end user RF output power.

7.5.2.3 The field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

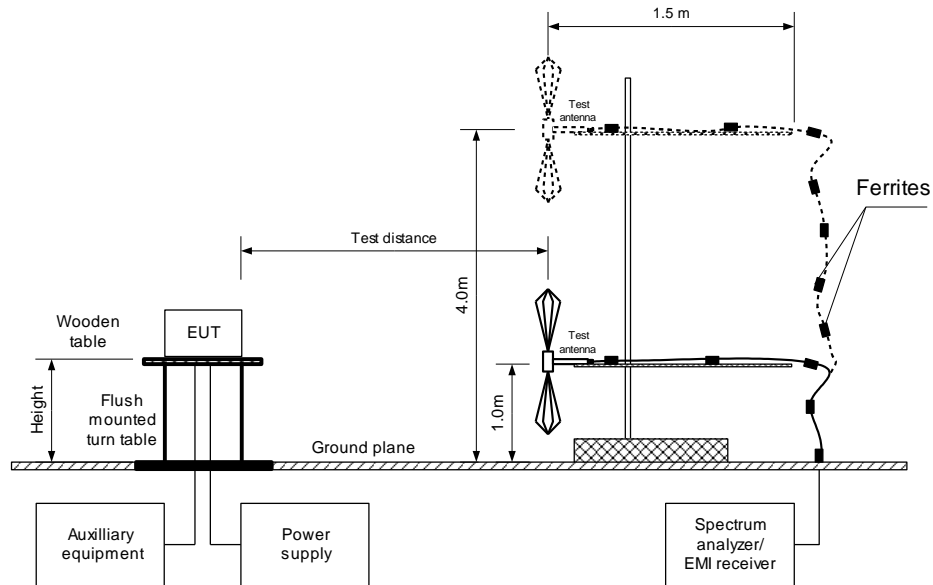
7.5.2.4 The frequency span of spectrum analyzer was set to capture the entire 6 dB band of the transmitter, in peak hold mode with resolution bandwidth set to 3.0 kHz, video bandwidth wider than resolution bandwidth, auto sweep time and sufficient number of sweeps was allowed for trace stabilization.

7.5.2.5 Spectrum analyzer was set in peak hold mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.5.2 and associated plots.



Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Figure 7.5.1 Setup for carrier field strength measurements





Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Table 7.5.2 Field strength measurement of peak spectral power density

ASSIGNED FREQUENCY:	2400 -2483.5 MHz
TEST DISTANCE:	3 m
TEST SITE:	Semi anechoic chamber
EUT HEIGHT:	1.5 m
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	3 kHz
VIDEO BANDWIDTH:	9.1 kHz
TEST ANTENNA TYPE:	Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)
MODULATION:	OQPSK
BIT RATE:	250 Kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
TRANSMITTER OUTPUT POWER:	17.8 dBm at low ch.11 carrier frequency Antenna 1 18.57 dBm at mid ch.19 carrier frequency Antenna 1 17.71 dBm at mid ch.25 carrier frequency Antenna 1 -0.24 dBm at high ch.26 carrier frequency Antenna 1 19.19 dBm at low ch.11 carrier frequency Antenna 2 19.20 dBm at mid ch.19 carrier frequency Antenna 2 18.69 dBm at mid ch.25 carrier frequency Antenna 2 3.70 dBm at high ch.26 carrier frequency Antenna 2 Antenna 1

CONFIGURATION:

Frequency, MHz	Field strength, dB(μV/m)	EUT antenna gain, dBi	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low frequency ch 11							
2405.41875	98.60	1.0	103.2	-5.60	Vertical	1.8	-60
Mid frequency ch 19							
2445.43000	99.33	1.0	103.2	-4.87	Vertical	2.8	-90
Mid frequency ch 25							
2475.41700	98.55	1.0	103.2	-5.65	Vertical	2.9	-100
High frequency ch 26							
2480.42750	80.37	1.0	103.2	-23.83	Vertical	2.25	-105

CONFIGURATION:

Antenna 2

Frequency, MHz	Field strength, dB(μV/m)	EUT antenna gain, dBi	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low frequency ch 11							
2404.52625	98.44	1.0	103.2	-5.76	Horizontal	1.05	-180
Mid frequency ch 19							
2445.42625	98.84	1.0	103.2	-5.36	Horizontal	1.25	-180
Mid frequency ch 25							
2475.40875	98.83	1.0	103.2	-5.37	Horizontal	1.40	-180
High frequency ch 26							
2479.57000	82.69	1.0	103.2	-21.51	Horizontal	1.20	-180

*- Margin = Field strength - EUT antenna gain - calculated field strength limit.

**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

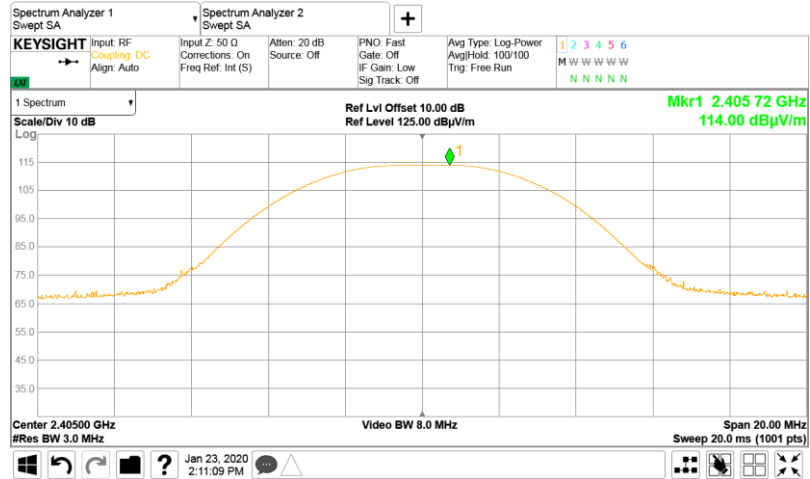
HL 4136	HL 5609	HL 5409	HL 5376	HL 5397	HL 1809		
HL 4360	HL 3903	HL 4011	HL 5311	HL 5309	HL 5665		

Full description is given in Appendix A.

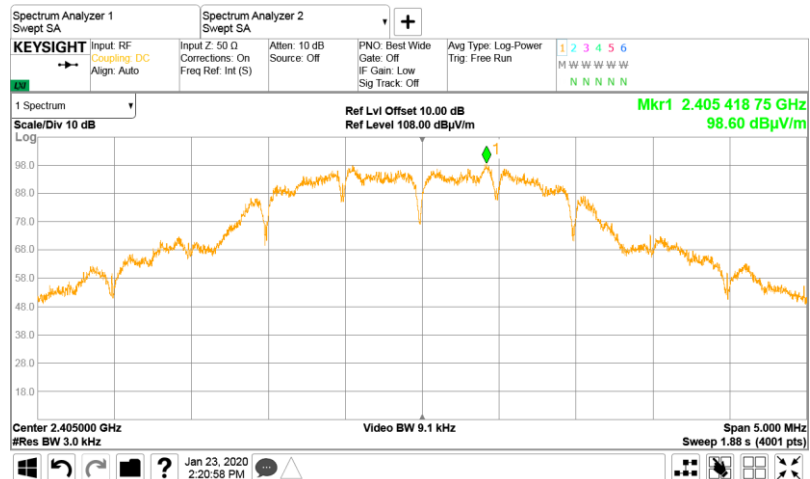


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.1 Peak reference power density at low frequency within 6 dB band ch.11, Antenna 1



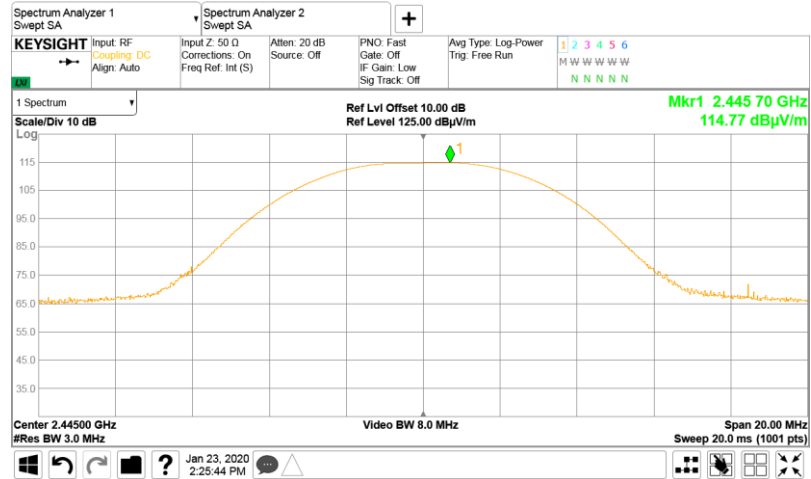
Plot 7.5.2 Peak spectral power density at low frequency within 6 dB band ch.11, Antenna 1



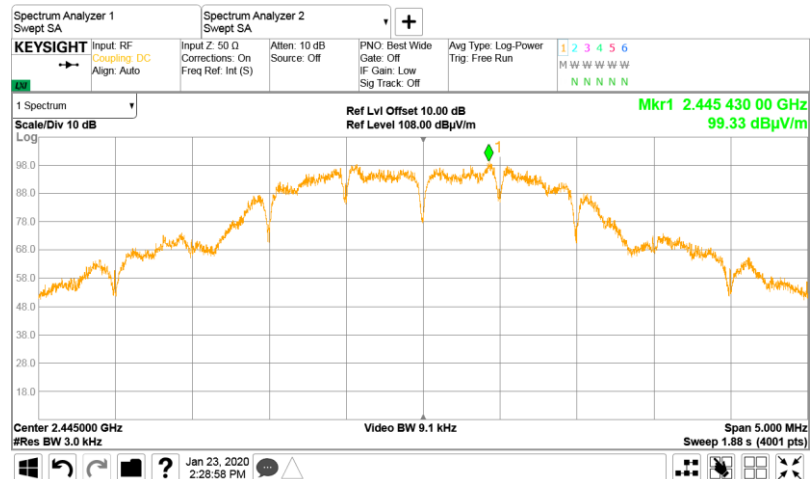


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.3 Peak reference power density at mid frequency within 6 dB band ch.19, Antenna 1



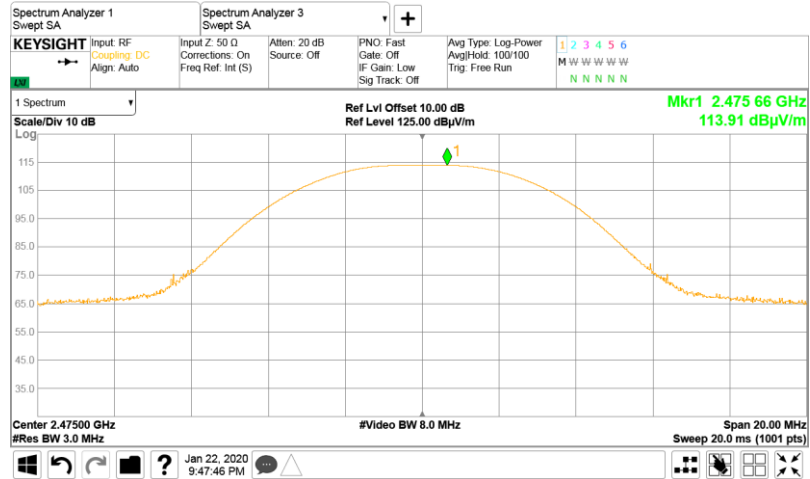
Plot 7.5.4 Peak spectral power density at mid frequency within 6 dB band ch.19, Antenna 1



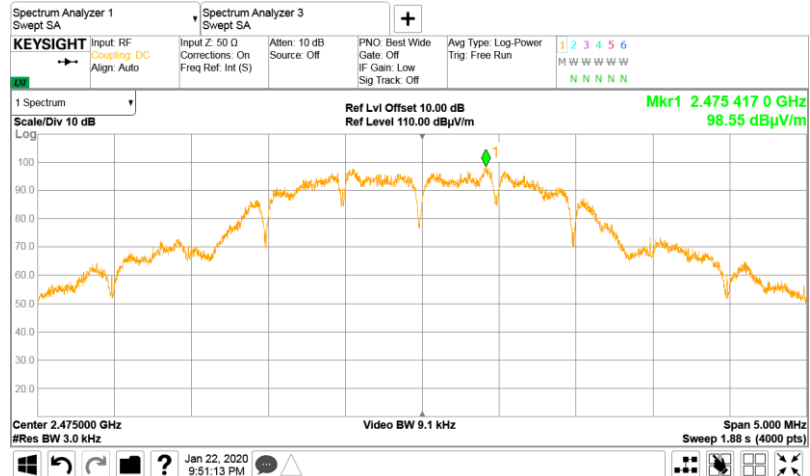


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.5 Peak reference power density at mid frequency within 6 dB band ch.25, Antenna 1



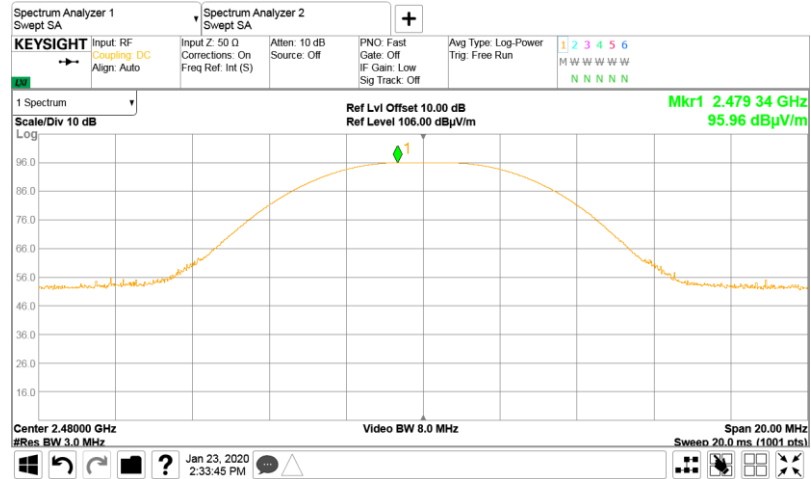
Plot 7.5.6 Peak spectral power density at mid frequency within 6 dB band ch.25, Antenna 1



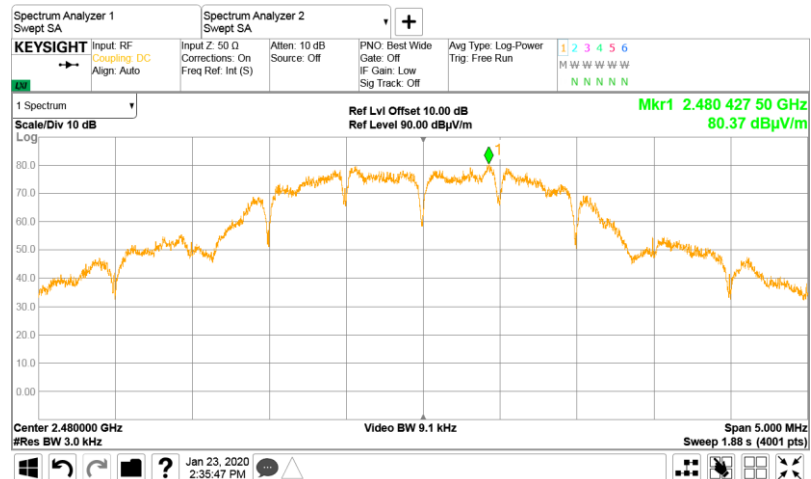


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.7 Peak reference power density at high frequency within 6 dB band ch.26, Antenna 1



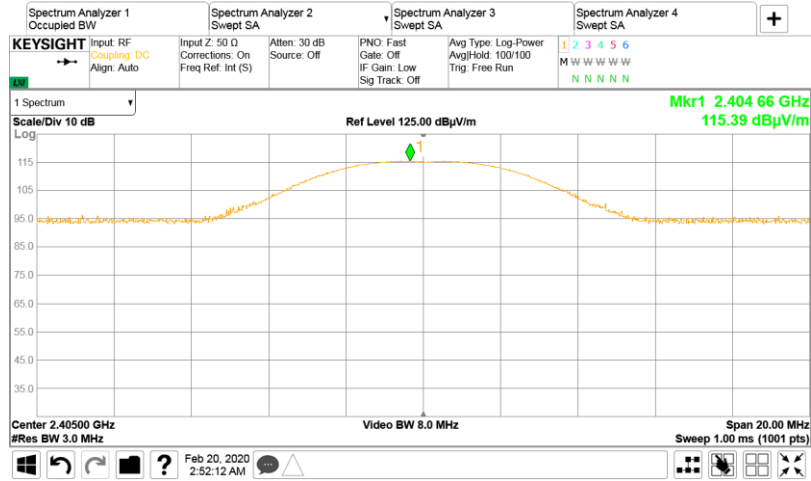
Plot 7.5.8 Peak spectral power density at high frequency within 6 dB band ch.26, Antenna 1



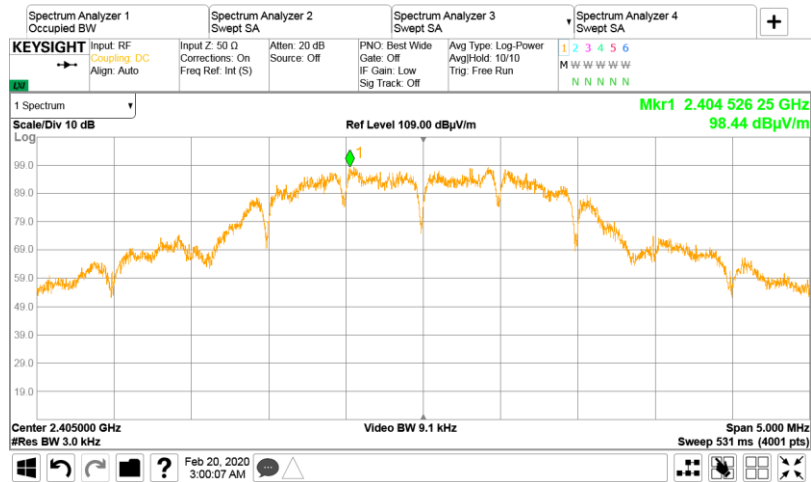


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.9 Peak reference power density at low frequency within 6 dB band ch.11, Antenna 2



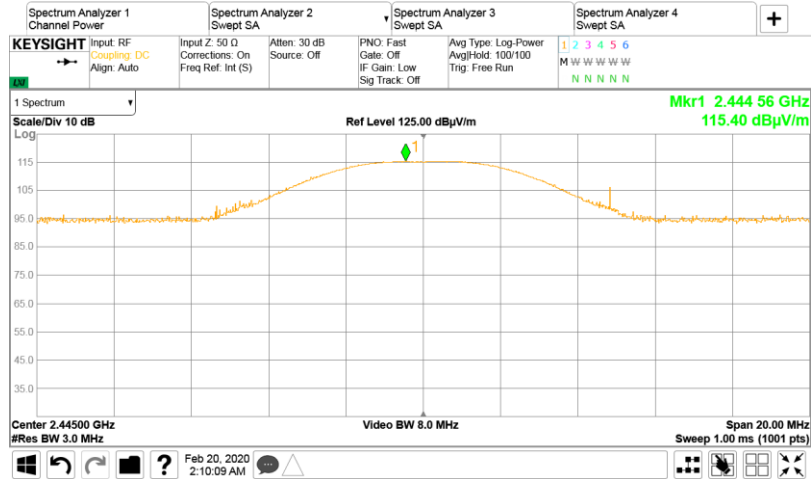
Plot 7.5.10 Peak spectral power density at low frequency within 6 dB band ch.11, Antenna 2



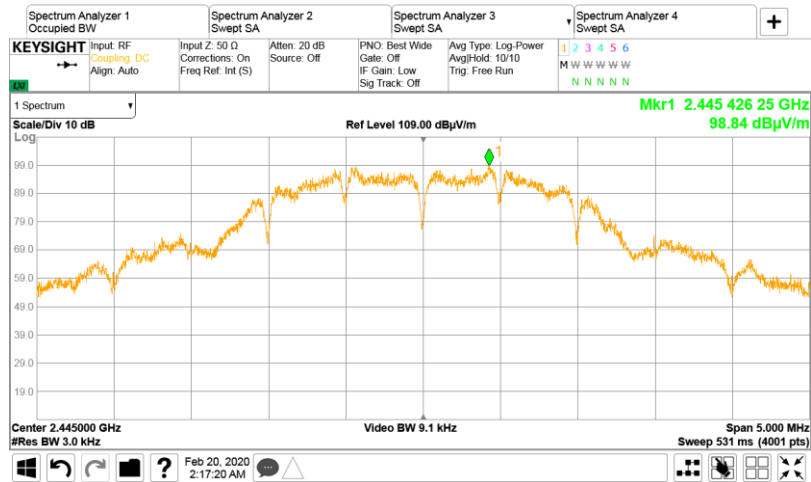


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.11 Peak reference power density at mid frequency within 6 dB band ch.19, Antenna 2



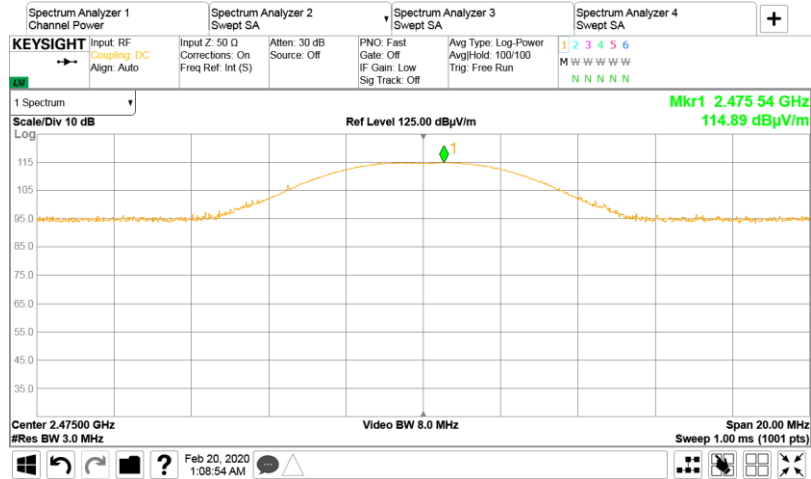
Plot 7.5.12 Peak spectral power density at mid frequency within 6 dB band ch.19, Antenna 2





Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.13 Peak reference power density at mid frequency within 6 dB band ch.25, Antenna 2



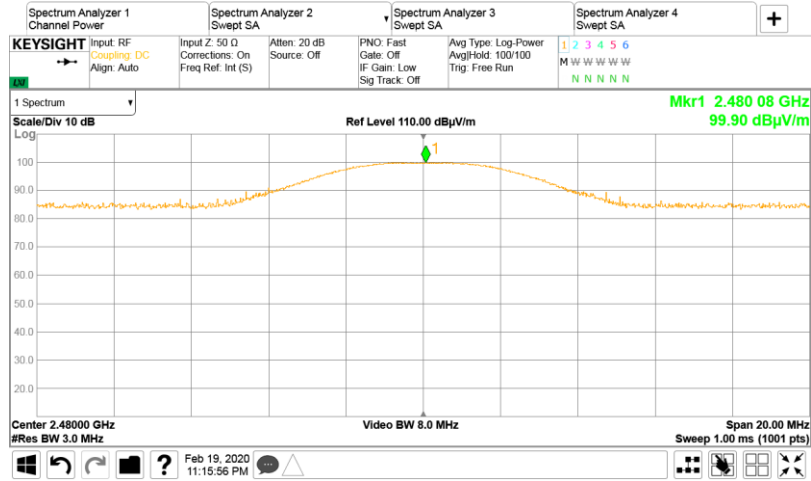
Plot 7.5.14 Peak spectral power density at mid frequency within 6 dB band ch.25, Antenna 2



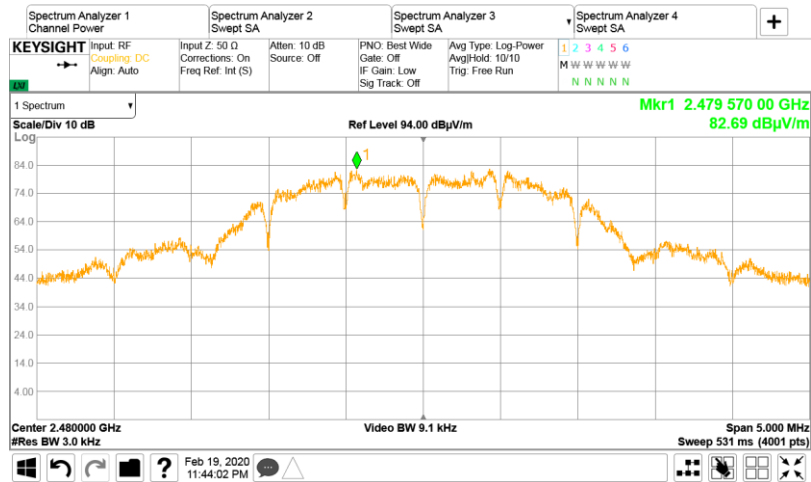


Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak spectral power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Plot 7.5.15 Peak reference power density at high frequency within 6 dB band ch.26, Antenna 2



Plot 7.5.16 Peak spectral power density at high frequency within 6 dB band ch.26, Antenna 2





Test specification: FCC section 15.203, RSS-Gen section 6.8, Antenna requirement			
Test procedure: Visual inspection			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

7.6 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.6.1.

Table 7.6.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Sections 8.3 and 12.2.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

8 Emission tests according to 47CFR part 15 subpart B requirements

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Radiated emission test limits

Frequency, MHz	Class B limit, dB(μV/m)	
	10 m distance	3 m distance
30 - 88	29.5*	40.0
88 - 216	33.0*	43.5
216 - 960	35.5*	46.0
Above 960	43.5*	54.0

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lims_2 = Lims_1 + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.1.2 Test procedure for measurements in semi-anechoic chamber

8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photograph/s, energized and the performance check was conducted.

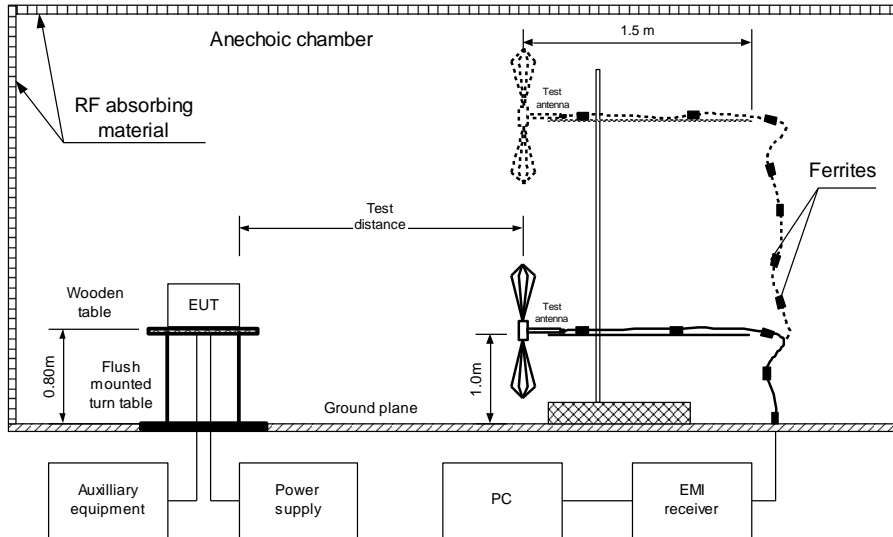
8.1.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.1.2.3 The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Sections 8.3 and 12.2.5			
Test mode: Compliance	Verdict: PASS		
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment





Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Sections 8.3 and 12.2.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

Table 8.1.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Receive
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No emissions were found								Pass

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 13000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No emissions were found										Pass

*- Margin = Measured emission - specification limit.

** - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 3903	HL 4360	HL 4933	HL 5665				
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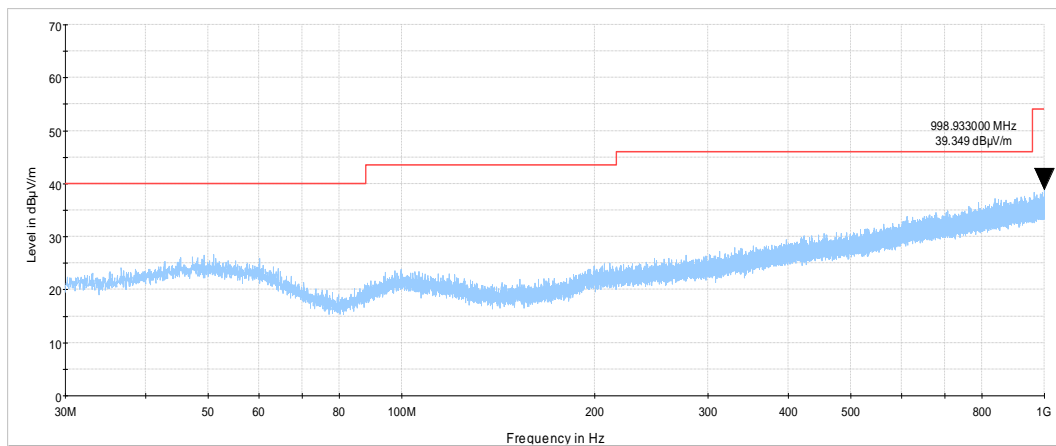
Full description is given in Appendix A.



Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Sections 8.3 and 12.2.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

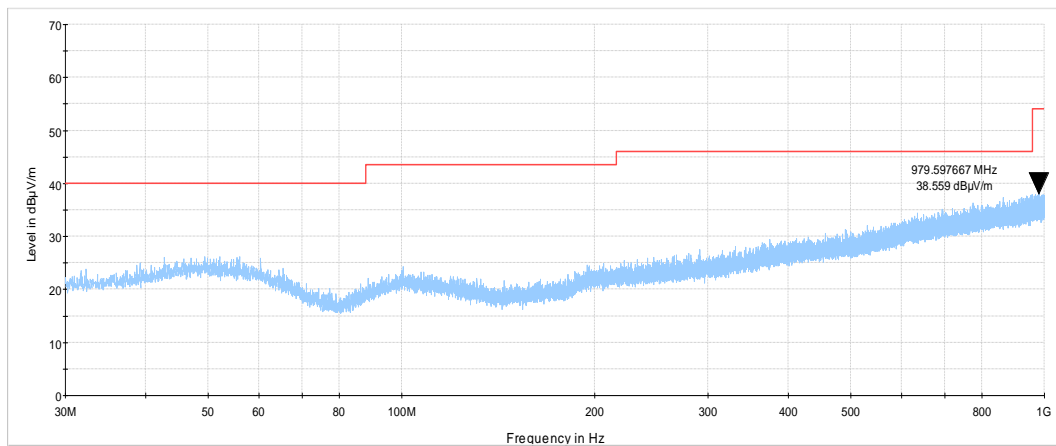
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive
EUT RX ANTENNA: #1



Plot 8.1.2 Radiated emission measurements in 30 - 1000 MHz range, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive
EUT RX ANTENNA: #2

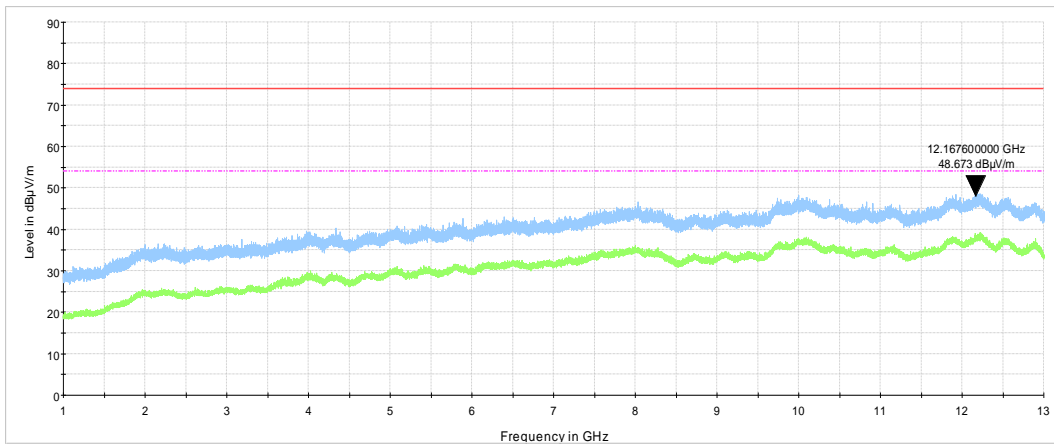




Test specification: FCC 47 CFR, Section 15.109 / ICES-003, Section 6.2, Class B, Radiated emissions			
Test procedure: ANSI C63.4, Sections 8.3 and 12.2.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Dec-19			
Temperature: 22 °C	Relative Humidity: 47 %	Air Pressure: 1020 hPa	Power: 3 VDC
Remarks:			

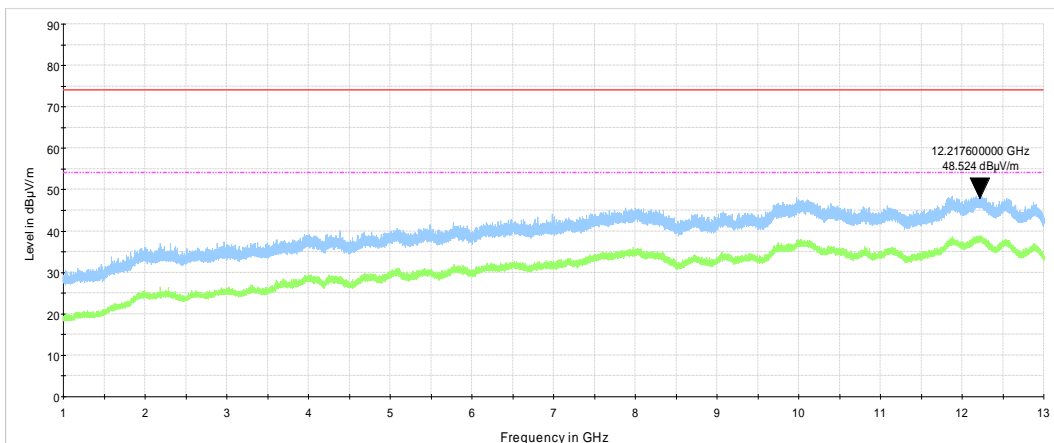
Plot 8.1.3 Radiated emission measurements above 1000 MHz, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive
EUT RX ANTENNA: #1



Plot 8.1.4 Radiated emission measurements above 1000 MHz, vertical and horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive
EUT RX ANTENNA: #2



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 (9) kHz - 30 MHz	EMCO	6502	2857	24-Feb-20	24-Feb-21
1809	HygroThermometer, Min/Max Memory	Delta TRAK	13301	NA	11-Aug-19	11-Aug-20
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	06-Apr-20	06-Apr-21
4011	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99) % RH	Mad Electronics	HTC-1	NA	11-Aug-19	11-Aug-20
4114	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz	ETS Lindgren	3117	00123515	11-May-20	11-May-21
4136	Shield Box	TESCOM CO., LTD	TC-5916A	5916A000137	23-Apr-20	23-Apr-21
4360	EMI Test Receiver, 20 Hz to 40 GHz.	Rohde & Schwarz	ESU40	100322	20-Jan-20	20-Jan-21
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	06-Jan-20	06-Jan-21
4956	Active horn antenna, 18 to 40 GHz	COM-POWER CORPORATION	AHA-840	105004	29-Jan-20	29-Jan-21
5112	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK /11SK/5500MM	502494/2EA	18-Apr-19	18-Apr-20
5309	Antenna Mast, 1-4 meter, Pneumatic polarization	Dolev Ltd	FMB 1-4	NA	23-Apr-20	23-Apr-21
5311	Controller	Dolev Ltd	FC-06	FC06.1-2016-024	23-Apr-20	23-Apr-21
5376	EXA Signal Analyzer, 10 Hz - 32 GHz	Keysight Technologies	N9010B	MY57470404	18-Mar-20	18-Mar-21
5397	H-field near field probe, 3 cm	ETS Lindgren	7405-902	NA	31-Jul-18	31-Jul-20
5409	RF cable, 40 GHz, SMA-SMA, 2 m	Huber-Suhner	SF102EA/11SK /11SK/2000MM	503973/2EA	11-Aug-19	11-Aug-20
5609	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini Circuits	BW-S10W5+	NA	24-Sep-19	24-Sep-20
5665	Cable SF118/11N(x2)/6M, 18 GHz, 11N/11N	Huber-Suhner	SF118	501644/118	19-Apr-20	19-Apr-21



10 APPENDIX B Test equipment correction factors

HL 0446: Active Loop Antenna
EMCO, model: 6502, s/n 2857

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
10	-33.4	±1.0
20	-37.8	±1.0
50	-40.5	±1.0
75	-41.0	±1.0
100	-41.2	±1.0
150	-41.2	±1.0
250	-41.1	±1.0
500	-41.2	±1.0
750	-41.3	±1.0
1000	-41.3	±1.0

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
2000	-41.4	±1.0
3000	-41.4	±1.0
4000	-41.5	±1.0
5000	-41.5	±1.0
10000	-41.7	±1.0
15000	-42.1	±1.0
20000	-42.7	±1.0
25000	-44.2	±1.0
30000	-45.8	±1.0

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ A/m.



HL 4114: Double-Ridged Waveguide Horn Antenna
ETS Lindgren, model: 3117, s/n: 00123515

Frequency, MHz	Antenna factor, dB/m
1000	27.4
1500	27.6
2000	30.7
2500	32.5
3000	32.7
3500	33.0
4000	33.4
4500	33.8
5000	33.9
5500	34.5
6000	34.8
6500	35.4
7000	35.6
7500	35.7
8000	35.8
8500	35.8
9000	36.2
9500	36.6

Frequency, MHz	Antenna factor, dB/m
10000	37.2
10500	37.7
11000	37.9
11500	38.2
12000	38.8
12500	39.0
13000	39.1
13500	38.8
14000	38.7
14500	39.9
15000	40.3
15500	40.5
16000	40.9
16500	41.5
17000	41.9
17500	40.8
18000	41.8

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 4933: Active Horn Antenna
COM-POWER CORPORATION, model: AHA-118, s/n 701046

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
1000	-16.1
1500	-15.1
2000	-10.9
2500	-11.9
3000	-11.1
3500	-10.6
4000	-8.6
4500	-8.3
5000	-5.9
5500	-5.7
6000	-3.3
6500	-4.0
7000	-2.2
7500	-1.7
8000	1.1
8500	-0.8
9000	-1.5
9500	-0.2

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
10000	1.8
10500	1.0
11000	0.3
11500	-0.5
12000	3.1
12500	1.4
13000	-0.3
13500	-0.4
14000	2.5
14500	2.2
15000	1.9
15500	0.5
16000	2.1
16500	1.2
17000	0.6
17500	3.1
18000	4.2

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 4956: Active horn antenna
COM-POWER Corp., model: AHA-840, s/n 105004

Frequency, MHz	Measured antenna factor, dB/m
18000	5.1
18500	3.6
19000	2.2
19500	0.7
20000	0.7
20500	0.8
21000	0.5
21500	-1.3
22000	-2.1
22500	-2.0
23000	-1.6
23500	-2.9
24000	-2.3
24500	-2.6
25000	-1.8
25500	-1.2
26000	-0.5
26500	-1.2
27000	-0.1
27500	-1.0
28000	-0.7
28500	0.5

Frequency, MHz	Measured antenna factor, dB/m
29500	1.4
30000	2.9
30500	2.9
31000	2.9
31500	1.2
32000	0.7
32500	0.2
33000	-1.7
33500	-2.2
34000	2.3
34500	-1.1
35000	0.7
35500	-1.1
36000	0.1
36500	1.4
37000	3.7
37500	5.8
38000	6.6
38500	7.3
39000	6.5
39500	7.3
40000	7.1

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 5112 RF cable, 40 GHz, 5.5 m, K-type,
Huber-Suhner, SF102EA/11SK/11SK/5500MM, s/n 502494/2EA, HL 5112

Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
100	0.70	±0.07
200	0.99	±0.08
300	1.21	±0.08
500	1.55	±0.08
1000	2.18	±0.08
1500	2.67	±0.08
2000	3.09	±0.08
2500	3.46	±0.10
3000	3.80	±0.10
3500	4.12	±0.10
4000	4.41	±0.10
4500	4.69	±0.10
5000	4.95	±0.10
5500	5.20	±0.10
6000	5.45	±0.10
6500	5.68	±0.10
7000	5.91	±0.10
7500	6.13	±0.10
8000	6.34	±0.10
8500	6.56	±0.10
9000	6.76	±0.10
9500	6.95	±0.10
10000	7.16	±0.10
10500	7.33	±0.10
11000	7.51	±0.10
11500	7.68	±0.10
12000	7.85	±0.10
12500	8.02	±0.13
13000	8.17	±0.13
13500	8.31	±0.13
14000	8.46	±0.13
14500	8.61	±0.18
15000	8.76	±0.18
15500	8.91	±0.18
16000	9.07	±0.18
16500	9.22	±0.18
17000	9.36	±0.18
17500	9.51	±0.18
18000	9.66	±0.18
18500	9.81	±0.23
19000	9.95	±0.23
19500	10.10	±0.23

Set / Applied, MHz	Measured, dB	Uncertainty, dB
20000	10.25	±0.23
20500	10.38	±0.23
21000	10.52	±0.23
21500	10.67	±0.23
22000	10.84	±0.23
22500	11.00	±0.29
23000	11.10	±0.29
23500	11.20	±0.29
24000	11.32	±0.29
24500	11.42	±0.29
25000	11.59	±0.23
25500	11.70	±0.23
26000	11.85	±0.23
26500	11.97	±0.23
27000	12.07	±0.33
27500	12.17	±0.33
28000	12.26	±0.40
28500	12.38	±0.40
29000	12.50	±0.40
29500	12.63	±0.40
30000	12.75	±0.40
30500	12.82	±0.33
31000	12.93	±0.33
31500	13.09	±0.33
32000	13.22	±0.33
32500	13.35	±0.33
33000	13.48	±0.33
33500	13.60	±0.33
34000	13.72	±0.33
34500	13.80	±0.40
35000	13.92	±0.40
35500	14.01	±0.40
36000	14.12	±0.40
36500	14.23	±0.40
37000	14.34	±0.33
37500	14.44	±0.33
38000	14.57	±0.33
38500	14.72	±0.33
39000	14.82	±0.33
39500	14.94	±0.33
40000	15.08	±0.47



HERMON LABORATORIES

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.

Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for 1, 2, 15, 18 parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; registered by Industry Canada for electromagnetic emissions, file number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-10808 for OATS, R-1082 for anechoic chamber, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).

The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

Address: P.O. Box 23, Binyamina 3055001, Israel
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC and radio group manager



12 APPENDIX D Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.



13 APPENDIX E

Specification references

FCC 47CFR part 15: 2019
ANSI C63.10: 2013
ANSI C63.4: 2014
RSS-247 Issue 2: 2017
RSS-Gen Issue 5: 2019
ICES-003: 2016, Issue 6

Radio Frequency Devices
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
General Requirements for Compliance of Radio Apparatus
Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement



HERMON LABORATORIES

14 APPENDIX F Manufacturer's declaration



Visonic Ltd.
24 Habarzel Street
P.O.Box 22020
Tel-Aviv 69710, Israel

Tele: +972 3 645 6789
Fax: +972 3 645 6788
www.visonic.com

Declaration of Identity

We, the undersigned,

Company: Visonic
Address: 24 Habarzel Street
Country: Israel
Telephone number: +972 36456789
Fax number: +9723 6456788

Declare under our sole responsibility that the following equipment:

Brand/Item	Type/Model	Short Product description
Visonic	90-209582 MP-843 (2.4GHz) NA	ZigBee 3.0 Wireless Digital Pet Immune PIR Motion Detector

Is electronically/electrically/mechanically identical to the following equipment (including Software/Hardware version(s)):

Brand/Item	Type/Model	Short Product description
OEM	90-209242 MP-843 (2.4GHz) XHM2	ZigBee 3.0 Wireless Digital Pet Immune PIR Motion Detector

The difference between 2 products are product labels and the stamp at the mounting bracket.

The reason for name change is: use Visonic product for OEM brand.

10.6.2020

Zuri Rubin

Certification Manager - Visonic



15 APPENDIX G Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT