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RADIO REPORT FOR CERTIFICATION

47 CFR PART 15 SUBPART C (SECTION 15.247)

CLIENT: AUTOMATIC TECHNOLOGY (AUSTRALIA) PTY LTD
DEVICE UNDER TEST / PMN: WIRELESS SMART HUB
MODEL NUMBER / HVIN: HUB200

REPORT NUMBER: M180310-1R2
DATE OF ISSUE: 12 June 2019

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RADIO REPORT
CERTIFICATE OF COMPLIANCE

Device under Test / PMN:	Wireless Smart Hub
Model Number / HVIN:	HUB200
Manufacturer:	Automatic Technology (Australia) Pty Ltd
FCC ID:	X4K-HUB1F89BSM02
Tested for:	Automatic Technology (Australia) Pty Ltd
Address:	6-8 Fiveways Boulevard, Keysborough, VIC 3173, Australia
Phone:	+61 3 9791 0200
Contact:	Nikolai Klepikov
Email:	Nikolai.Klepikov@ata-aust.com.au
Standards:	**47 CFR Part 15 –** Radio Frequency Devices **Subpart C –** Intentional Radiators **Section 15.247 –** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
Test Dates:	21 March to 25 June 2018
Issued by:	**EMC TECHNOLOGIES PTY. LTD.,** 176 Harrick Road, Keilor Park, VIC 3042, Australia. FCC Accredited: Designation AU0001 Phone: +61 3 9365 1000, Web: www.emctech.com.au
Issue Date:	12 June 2019
Test Officer(s):	**William Alam**

Authorised Signatory:

Chris Zombolas
Technical Director
EMC Technologies Pty Ltd

RADIO REPORT FOR CERTIFICATION
to
47 CFR Part 15 Subpart C (section 15.247)

1.0 INTRODUCTION

Radio tests were performed on the HUB200 Wireless Smart Hub in accordance with the applicable requirements of 47 CFR, Part 15 Subpart C – Section 15.247 for a Frequency Hopping System operating within the band: 902 MHz to 928 MHz.

1.1 Test Procedure

Radio measurements were performed in accordance with the appropriate procedures of ANSI C63.10: 2013.

The measurement instrumentation conformed to the requirements of ANSI C63.2: 2009.

1.2 Summary of 47 CFR Part 15 Subpart C Results

FCC	Test Performed	Results
15.203	Antenna requirement	**Complied**
15.205	Restricted bands of operation	**Complied**
15.207	Conducted limits	**Complied**
15.209	Radiated emissions limits; general requirements	**Complied**
15.247 (a)	Channel Separation Number of channels and time of occupancy	**Complied**
15.247 (b)	Peak Output Power	**Complied**
15.247 (c)	Antenna Gain > 6 dBi	**Not Applicable**
15.247 (d)	Out of Band Emissions	**Complied**
15.247 (e)	Peak Power Spectral Density	**Not Applicable**
15.247 (f)	Hybrid Systems	**Not Applicable**
15.247 (g)	Frequency hopping channel selection	**Complied**
15.247 (h)	Adaptivity	**Not Applicable**
15.247 (i)	Radio Frequency Hazard	**Complied**
15.215	Occupied Bandwidth	**Complied**

2.0 GENERAL INFORMATION
(Information supplied by the Client)

2.1 Equipment Under Test (EUT) - Transmitter Details

Radio:	Frequency Hopping device
Frequency Band:	902-928 MHz
Frequency Range:	910 to 928 MHz Ch. Low: 912.5 MHz Ch. Mid: 919.7 MHz Ch. High: 926.9 MHz
Modulation:	2GFSK
Emission Designator:	314KGXW
Antenna type and gain:	monopole antenna, 0 dBi
Minimum separation distance:	20 cm (7.87in)

2.2 EUT - Host Details

Device under Test / PMN:	Wireless Smart Hub
Model Number / HVIN:	HUB200
Manufacturer:	Automatic Technology (Australia) Pty Ltd
Power Supply:	Model: FJ-SW1260502000DS Input: 100-240 VAC, 50/60Hz Output: 5 VDC, 0.4 A

Wireless Smart Hub with the Automatic Technology Smart Hub, allow customer to control his garage door and gate on his smart phone while they are at home or away from home. According to HUB200 user manual, the device is not intended to be operated within 20cm of user or nearby person.

2.3 Test Configuration

Testing was performed with the EUT set to continuously transmit (with modulation applied).

2.4 Modifications by EMC Technologies

No modifications were performed.

2.5 Test Facility

2.5.1 General

EMC Technologies Pty Ltd has been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies indoor open are test site (iOATS) has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS-Gen, Issue 8 - **Industry Canada number - IC 3569B**

Measurements in this report were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.5.2 NATA Accreditation

EMC Technologies is accredited in Australia by the National Association of Testing Authorities (NATA). All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation.

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to IEC/ISO17025. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires documented test procedures, continued calibration of measurement equipment, traceable to the National Standard at the National Measurements Institute (NMI). NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A^2LA).

The current full scope of accreditation can be found on the NATA website: www.nata.com.au

2.6 Test Equipment

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-3-2 (R-144)	17/06/2017	17/06/2018	1 Year*1
	Frankonia SAC-10-2 (R-139)	22/03/2017	22/03/2018	1 Year*1,3
EMI Receiver	R&S ESW26 Sn: 101306 (R-143)	31/03/2017 22/05/2018	31/03/2018 22/05/2019	1 Year*2,3
	R&S ESU40 Sn: 100392 (R-140)	19/3/2018	19/3/2019	1 Year*2
LISN	EMCO 3810/2NM Sn: 9607-1505	1/05/2017	1/05/2019	2 Year*1
Antennas	EMCO 6502 Active Loop 9 kHz – 30 MHz Sn. 9311-2801 (A-231)	20/07/2015	20/07/2018	3 Year*2
	SUNOL JB1 Sn. A061917 (A-425)	21/07/2017	21/07/2019	2 Year*2
	EMCO 3115 Double Ridge Horn Sn: 9501-4398 (A-406)	15/07/2016	15/07/2019	3 Year*1
Cables	Room 12 inbuilt cable Panel 1 to 10 m (C-422)	31/05/2017	31/05/2018	1 Year*1,3
	Rojone CA-02013A13A700-08R Sn: Lot 64602 (C-437)	31/05/2017	31/05/2018	1 Year*1,3
	Huber & Suhner Sucoflex 104A Sn: 503055 (C-457)	02/01/2018	02/01/2019	1 Year*1
	Huber & Suhner Sucoflex 104A Sn: 503056 (C-458)	03/01/2018	03/01/2019	1 Year*1
	Huber & Suhner Sucoflex 104A Sn: 503061 (C-463)	03/01/2018	03/01/2019	1 Year*1
Attenuator	Weinschel 2 Sn: ASS-2353 (A-291)	27/04/2018	27/04/2019	1 Year*1
Preamp	Electronic Development Sales SG18-B3015 Sn: 1 (A-288)	04/08/2017	04/08/2018	1 Year*1

Note *1. Internal NATA calibration.
Note *2. External NATA / A2LA calibration
Note *3. Calibration date was valid during the time of testing.

3.0 TEST RESULTS

3.1 §15.203 Antenna Requirement

The antenna was fixed to the device ensuring that it could not be replaced.

3.2 §15.207 Conducted Limits

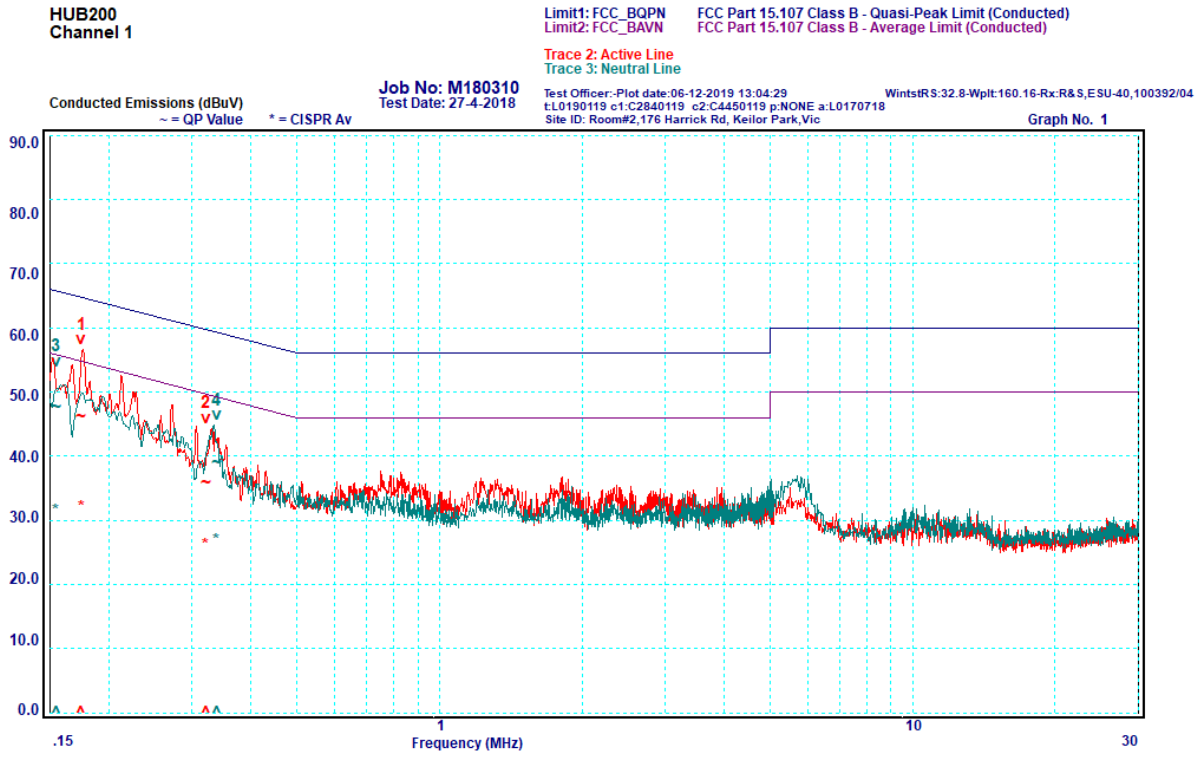
The arrangement specified in ANSI C63.10: 2013 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2: 2009 was used to perform the measurements.

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

$$V_{EMI} = V_{Rx} + L$$

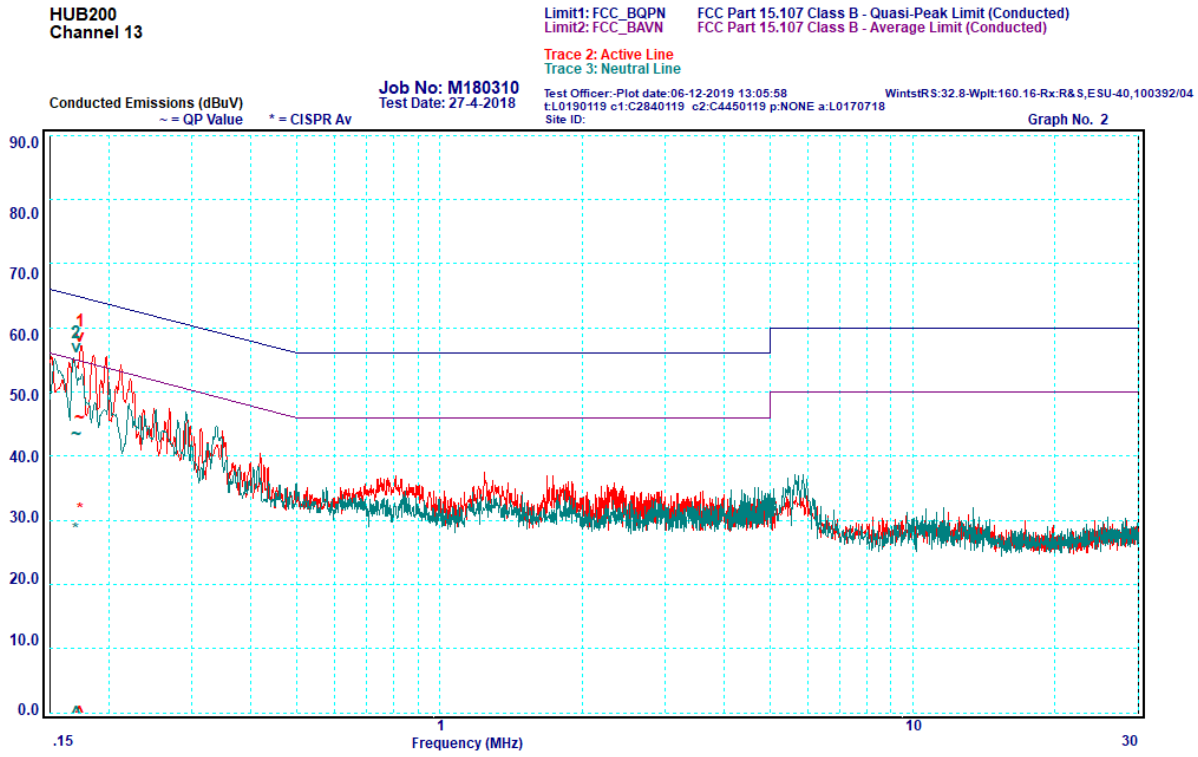
Where:
V_{EMI}= The Measured EMI voltage in dBµV to be compared to the limit.
V_{Rx} = The Voltage in dBµV read directly at the EMI receiver.
L = The insertion loss in dB of the LISN, cables and transient Limiter.

Active and Neutral Line, Lowest Channel, 0.15-30MHz



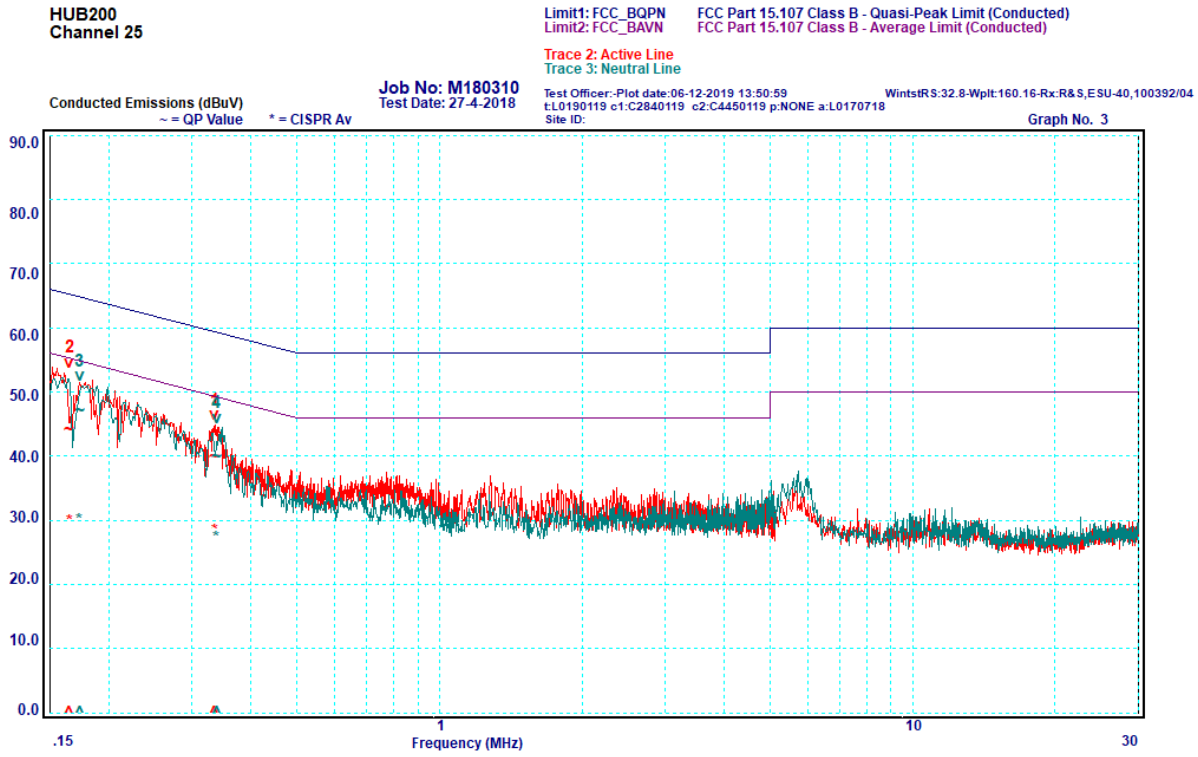
Frequency [MHz]	Line	Quasi-Peak			Average		
		Level [dBµV]	Limit [dBµV]	Margin [±dB]	Level [dBµV]	Limit [dBµV]	Margin [±dB]
0.338	Neutral	39.0	59.2	-20.2	26.8	49.2	-22.4
0.175	Active	46.1	64.7	-18.6	32	54.7	-22.7
0.322	Active	35.8	59.7	-23.9	26.1	49.7	-23.6
0.155	Neutral	47.6	65.7	-18.1	31.4	55.7	-24.3

Active and Neutral Line, Middle Channel, 0.15-30MHz



Frequency [MHz]	Line	Quasi-Peak			Average		
		Level [dBµV]	Limit [dBµV]	Margin [±dB]	Level [dBµV]	Limit [dBµV]	Margin [±dB]
0.174	Active	45.9	64.7	-18.8	31.6	54.7	-23.1
0.171	Neutral	43.4	64.9	-21.5	28.4	54.9	-26.5

Active and Neutral Line, Highest Channel, 0.15-30MHz



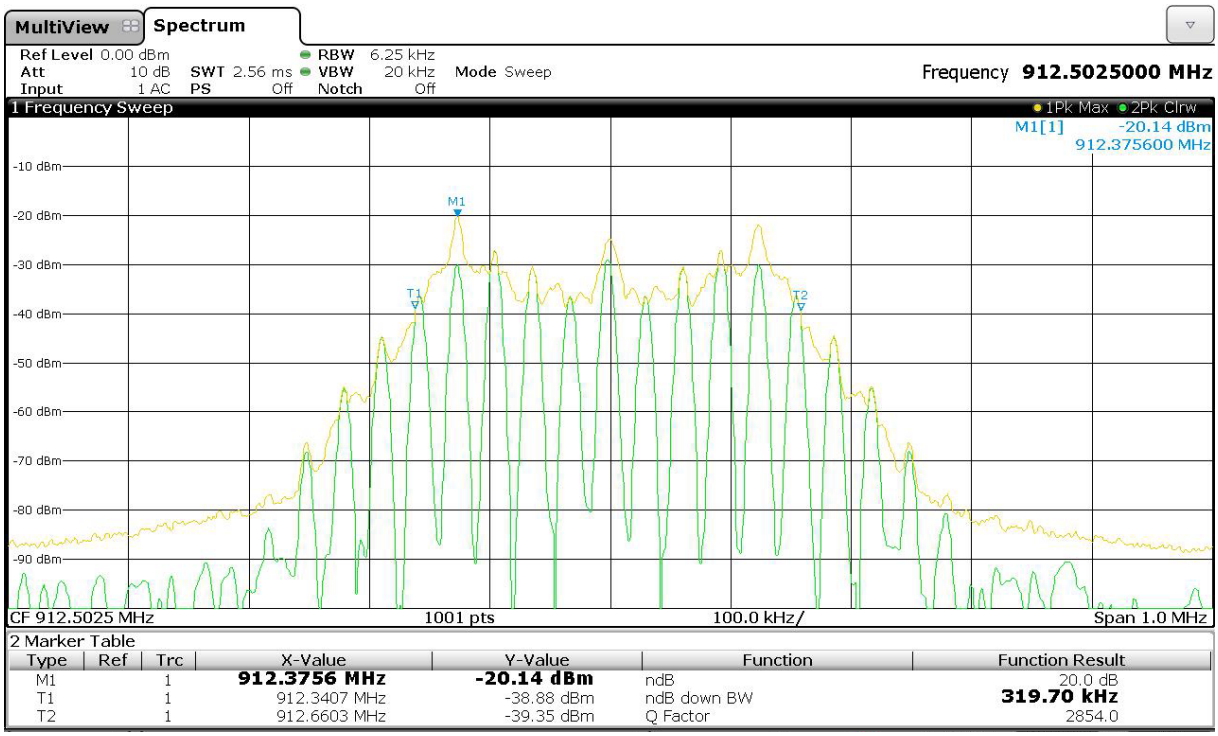
Frequency [MHz]	Line	Quasi-Peak			Average		
		Level [dBµV]	Limit [dBµV]	Margin [±dB]	Level [dBµV]	Limit [dBµV]	Margin [±dB]
0.335	Active	39.9	59.3	-19.4	28.3	49.3	-21.0
0.339	Neutral	39.9	59.2	-19.3	27.1	49.2	-22.1
0.174	Neutral	47.1	64.8	-17.7	30	54.8	-24.8
0.166	Active	44.1	65.2	-21.1	29.7	55.2	-25.5

3.3 §15.247(a1)(g) Hopping parameters

3.3.1 Channel Separation and Number of Hopping Channel

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The 20 dB bandwidth was measured while the device was transmitting with typical modulation applied. The resolution bandwidth of 6.25 kHz and the video bandwidth of 20 kHz were utilised when measuring the bandwidth.

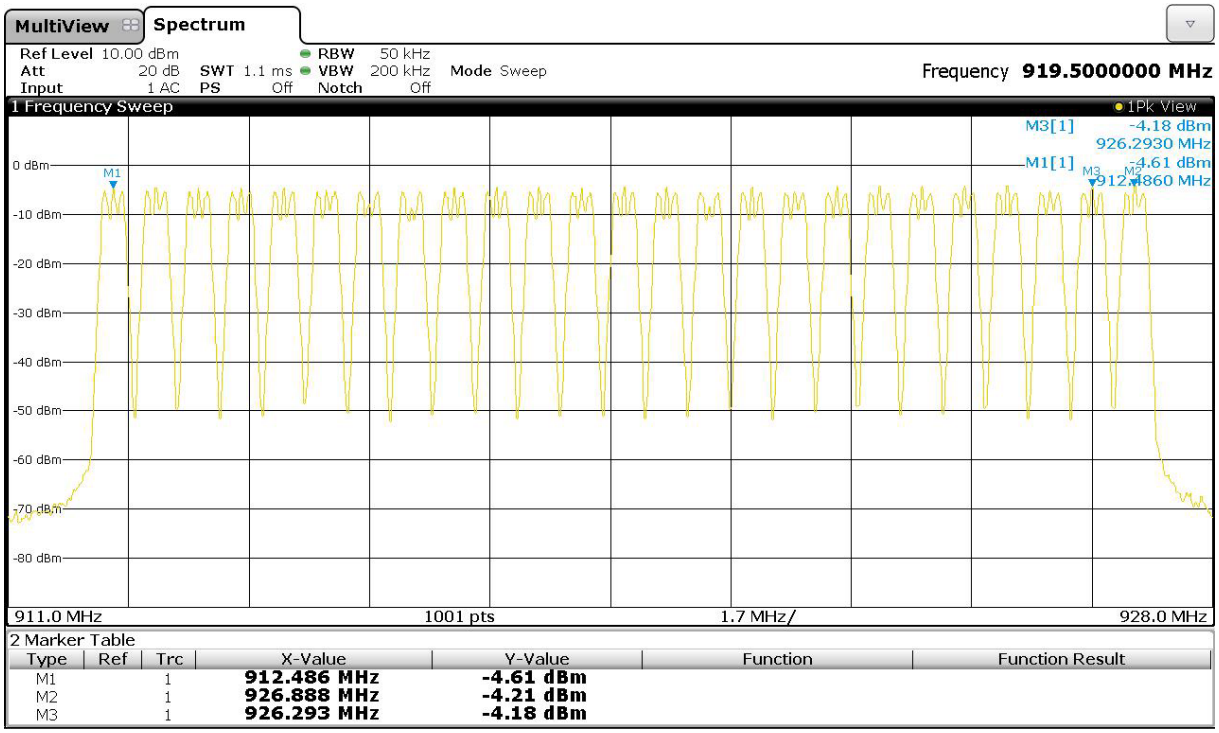
Results:



Centre Frequency [MHz]	20 dB Bandwidth [kHz]
912.5	319.7
919.7	319.7
926.9	319.7

Channel Separation [kHz]	Limit [kHz]	Result
597.9	> 319.7	Complied

As the measured 20 dB bandwidth was greater than 250 kHz, the EUT shall have at least 25 hopping frequencies.



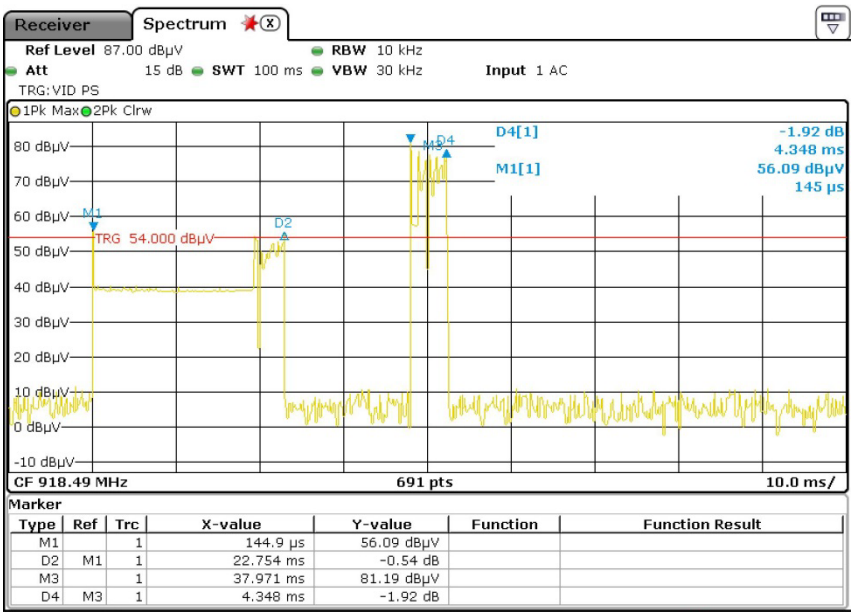
Number of hopping channels	Result
25	Complied

3.3.2 Time of Occupancy

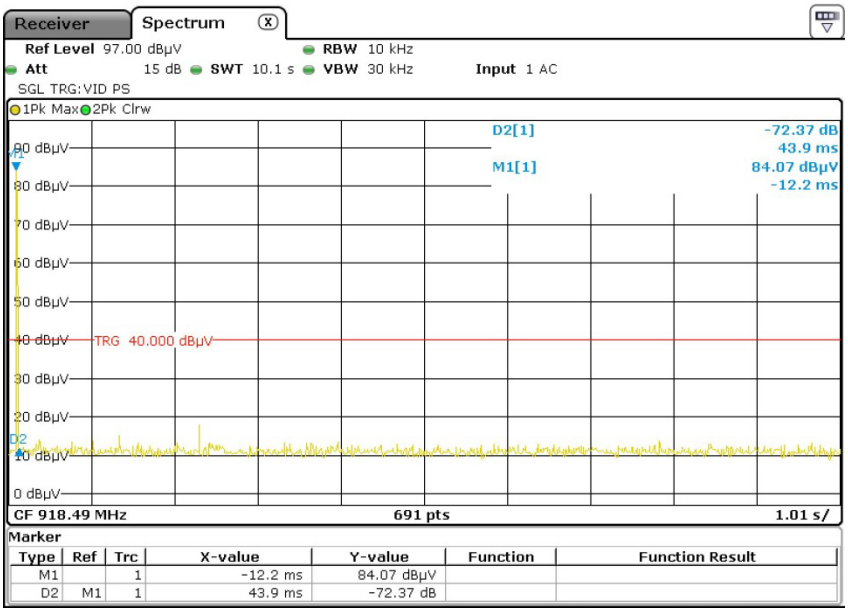
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10 second period.

Time of occupancy in 0.4 × 79 = 31.6 seconds ≤ 0.4 seconds.

On time of one pulse = 22.754 ms + 4.348 ms = 27.102 ms
Number of pulses in 10 seconds = 1
Total on time in 10 seconds = 1 × 27.102 ms = **27.102 ms** (limit = 400 ms)



Duration of one pulse



Pulses in 10 seconds

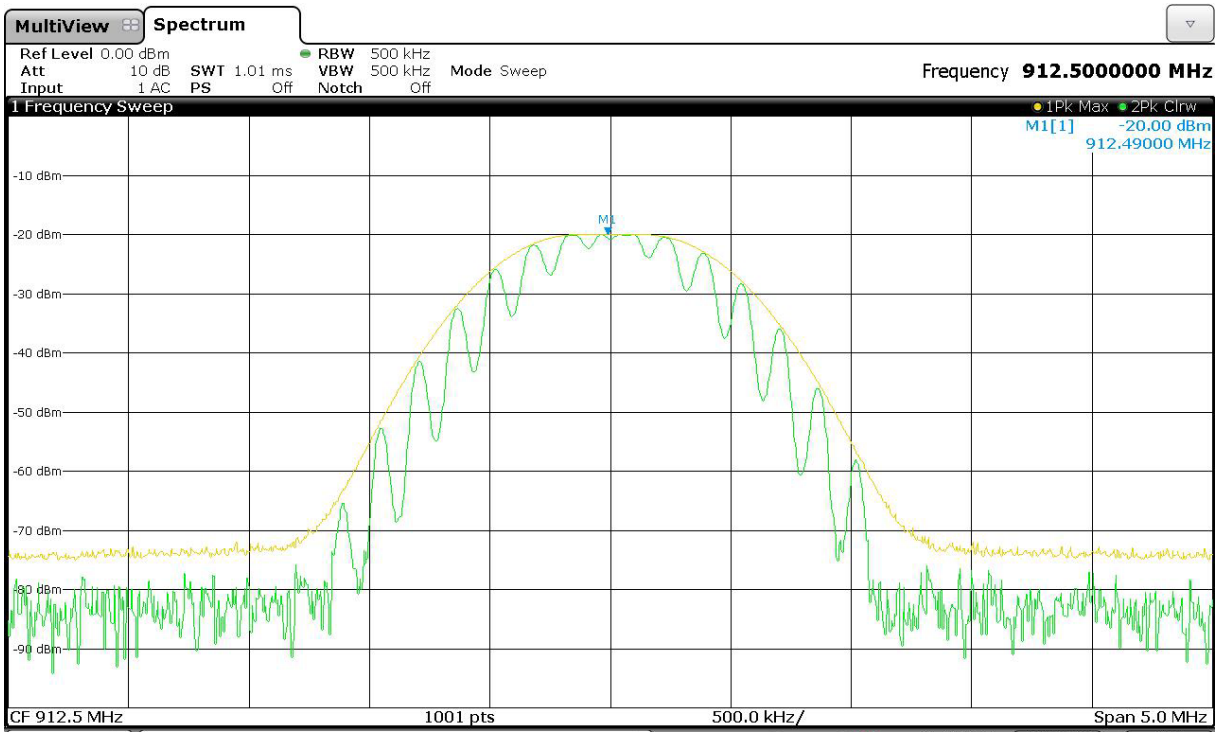
3.4 §15.247(b3) Peak Output power

Testing was performed conductively. Different configurations of EUT and antenna polarization were investigated to produce highest emission EIRP and the EUT was set to transmit in continuous transmission mode.

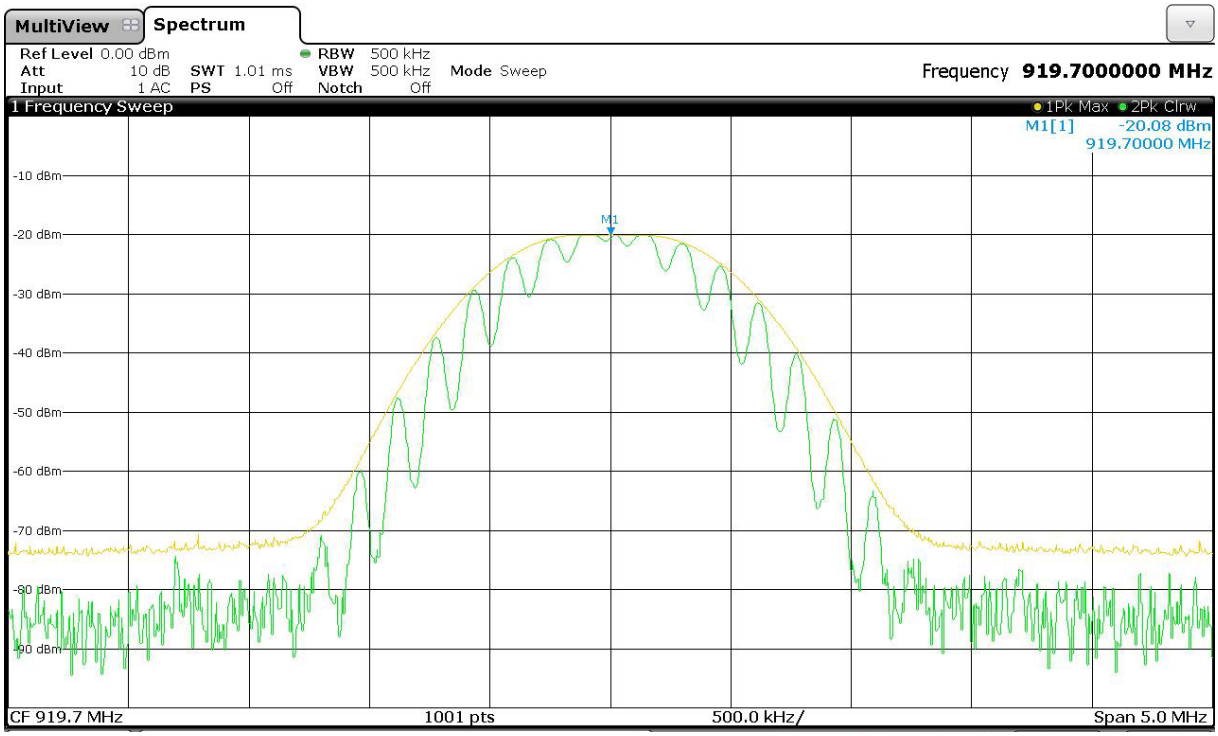
Results:

Antenna Gain = 0 dBi					
Channel	Peak (dBm)	Conducted power		Limit (W)	Margin (W)
		(dBm)	(W)		
Low	-20.00*1	20.00	0.100	0.250	0.150
Middle	-20.08*1	19.92	0.098	0.250	0.152
High	-20.18*1	19.82	0.095	0.250	0.155

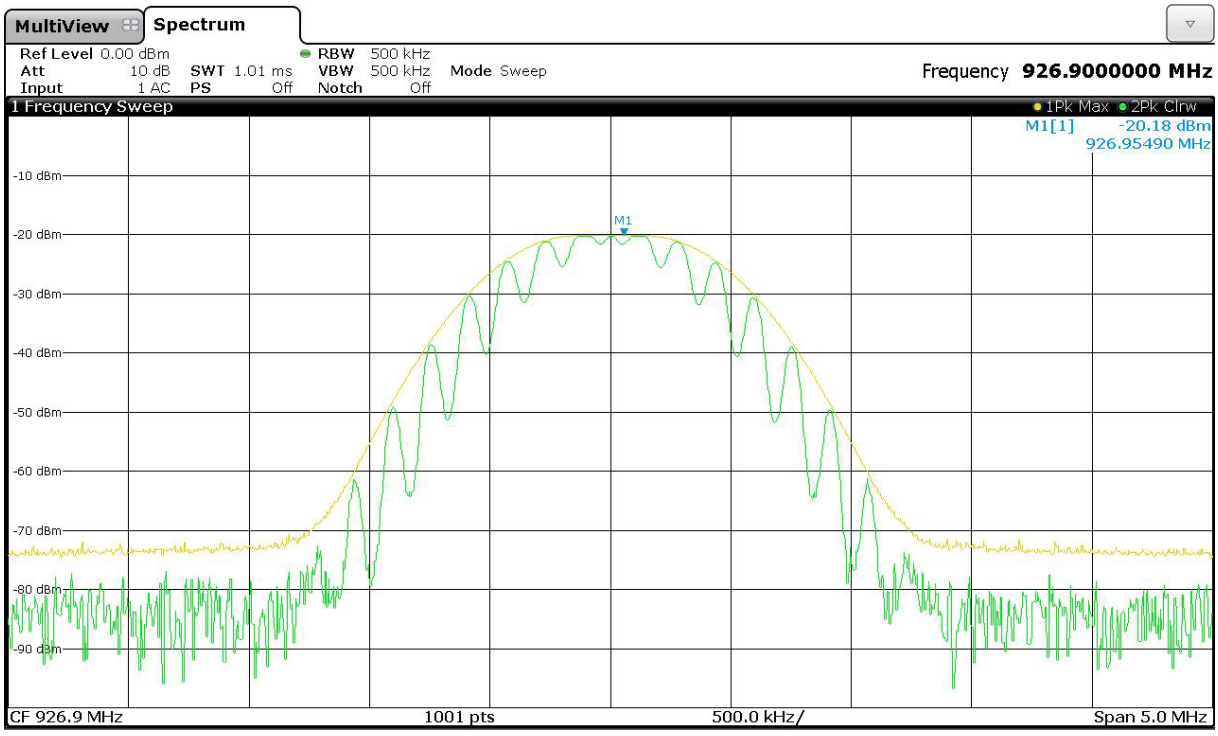
*1 Value does not include transducer factor



Maximum peak conducted output power - Lowest Channel



Maximum peak conducted output power - Middle Channel



Maximum peak conducted output power - Highest Channel

3.5 §15.205 Restricted Bands of Operation

The restricted band limits were applied across the applicable spectrum and it was found to comply with the restricted band requirements.

3.6 §15.209 Radiated emission limits; general requirements

The limits given in §15.247 applied, however attenuation below the general levels was not required.

3.7 §15.247(d) Out of Band Emissions

3.7.1 Radiated Spurious Measurements

Radiated spurious emission measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	10	0.6 metre loop antenna
0.150 to 30	9	10	
30 to 1000	120	10	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broad band horns
18 000 to 40 000	1000	1	

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. Devices design for a fixed position were tested in that position, portable devices were tested in three orthogonal orientations.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

Calculation of field strength

The field strength was calculated automatically by the software using the pre-stored calibration data. The method of calculation is shown below:

$$\boldsymbol{E = V + AF - G + L}$$

Where: E = Radiated Field Strength in dBµV/m.
V = EMI Receiver Voltage in dBµV/m.
AF = Antenna Factor in dB. (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

Field strength conversion over distance

To convert a limit given at a certain distance to a limit at the measurement distance or vice-versa the following equation was applied:

$$E_x = 20 \times \log\left(\frac{d_y \times 10^{E_y/20}}{d_x}\right)$$

Where: E_x = Electric field at x metres (dBµV/m)
E_y = Electric field at y metres (dBµV/m)
d_x = Measurement distance of x metres
d_y = Measurement distance of y metres

Duty cycle correction factor

Based on the results obtained in section 3.3, the duty cycle correction factor is calculated as follows:

$$\delta(dB) = 20\log(\Delta)$$

Where: δ = duty cycle correction factor in dB
Δ = duty cycle

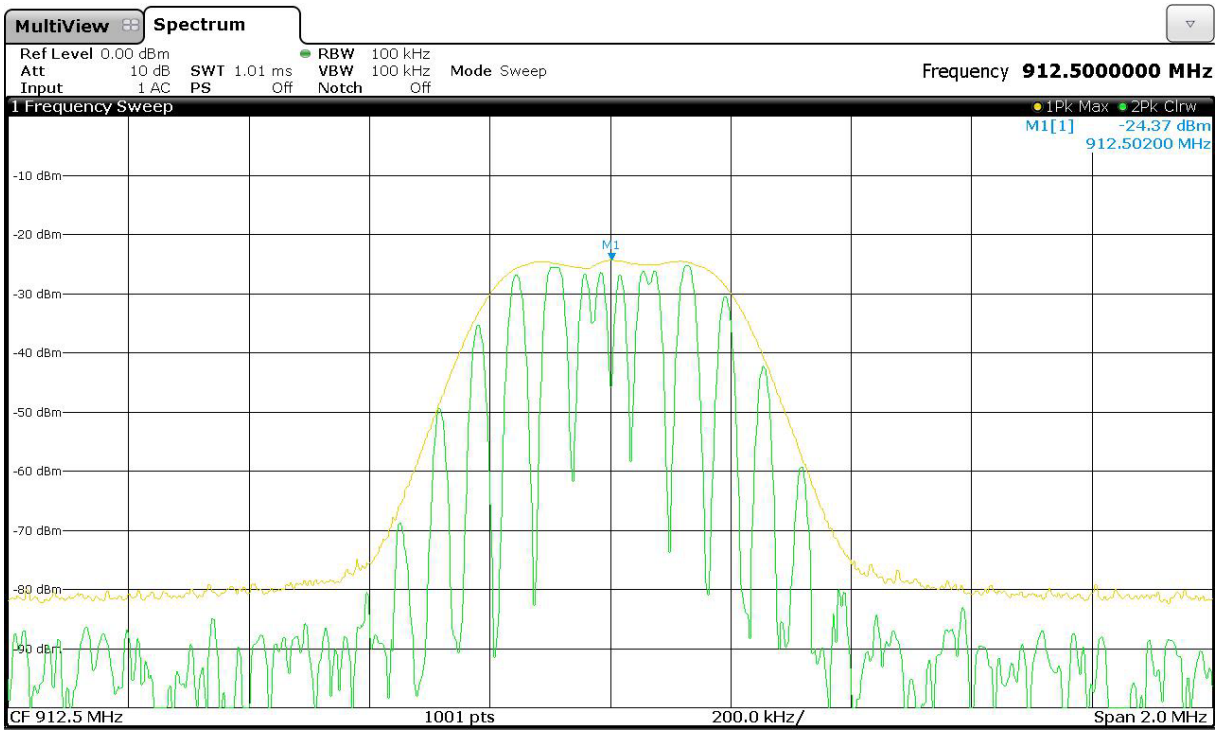
Duty cycle correction factor = 20 log (27.102/100)
= -11.34 dB

Average value was calculated according to ANSI C63.10 clause 4.1.4.2.4.

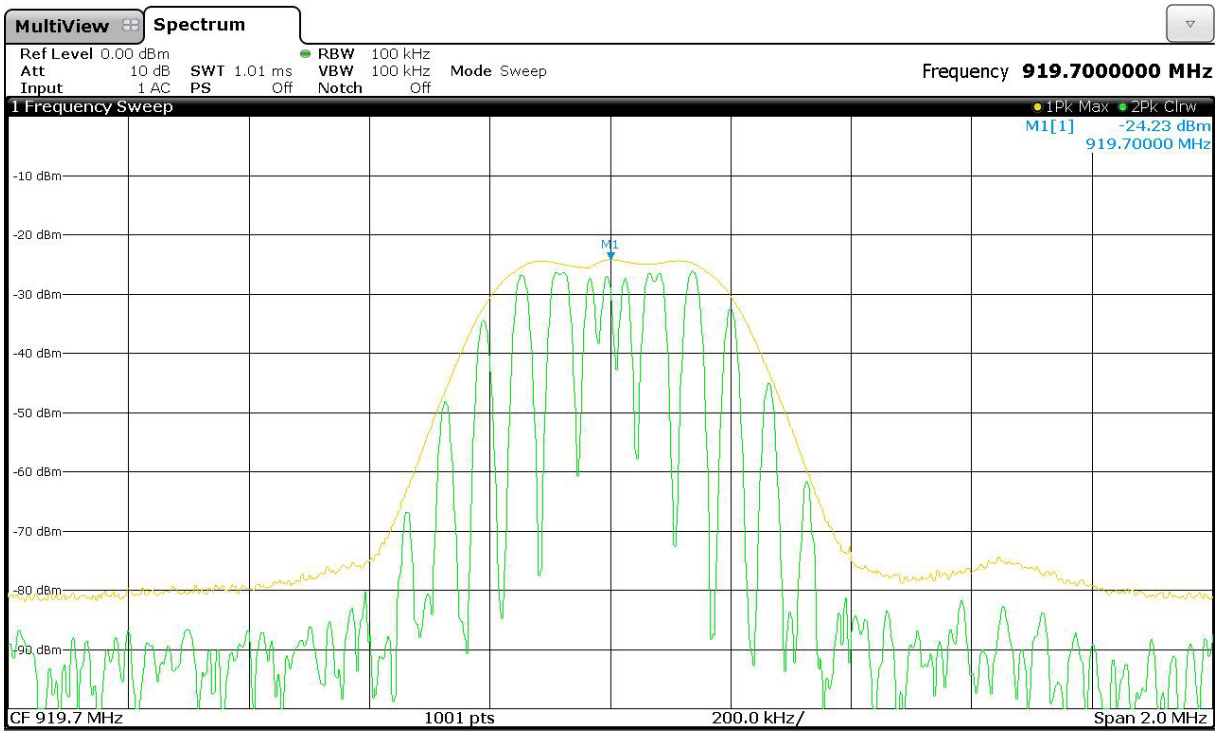
3.7.2 Spurious Emission Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

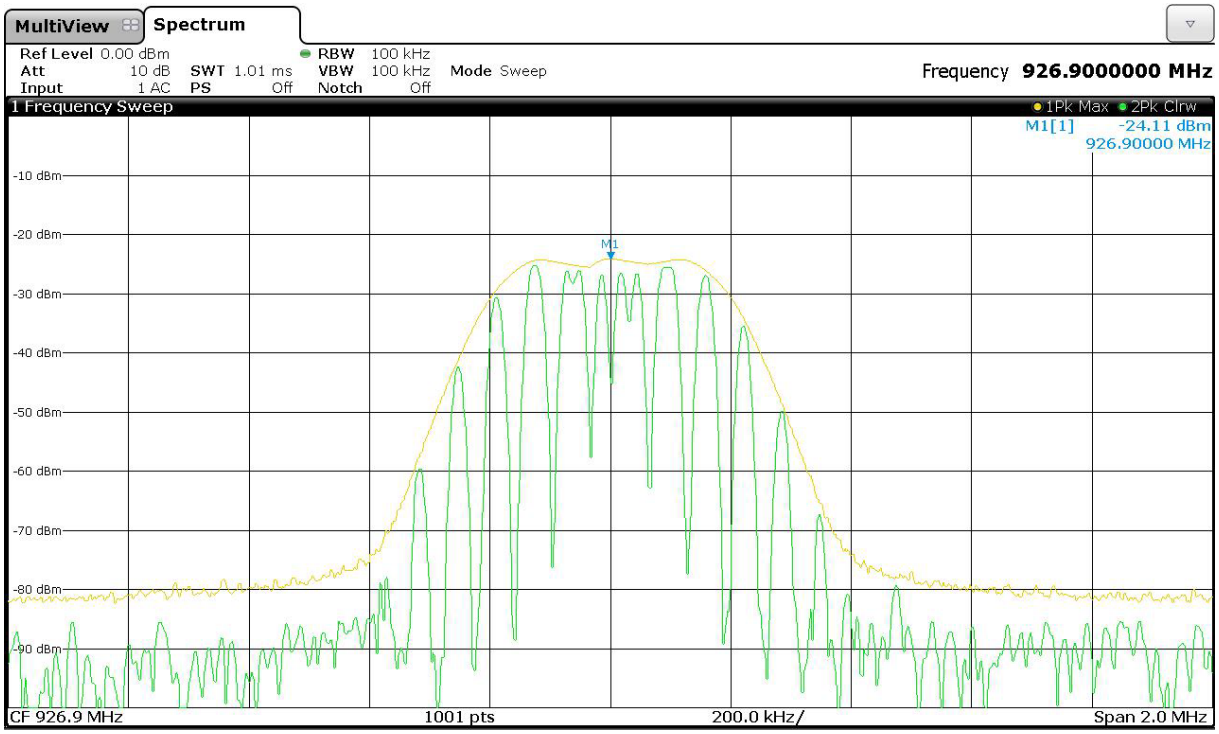
Channel	Peak [dBm]	EIRP [dBm]	Limit [dBµV/m]		
			10 m	3 m	1 m
Low	-24.37	15.63	80.4	90.9	100.4
Middle	-24.23	15.77	80.5	91.0	100.5
High	-24.11	15.89	80.4	90.9	100.4



100 kHz bandwidth- lowest channel



100 kHz bandwidth- middle channel

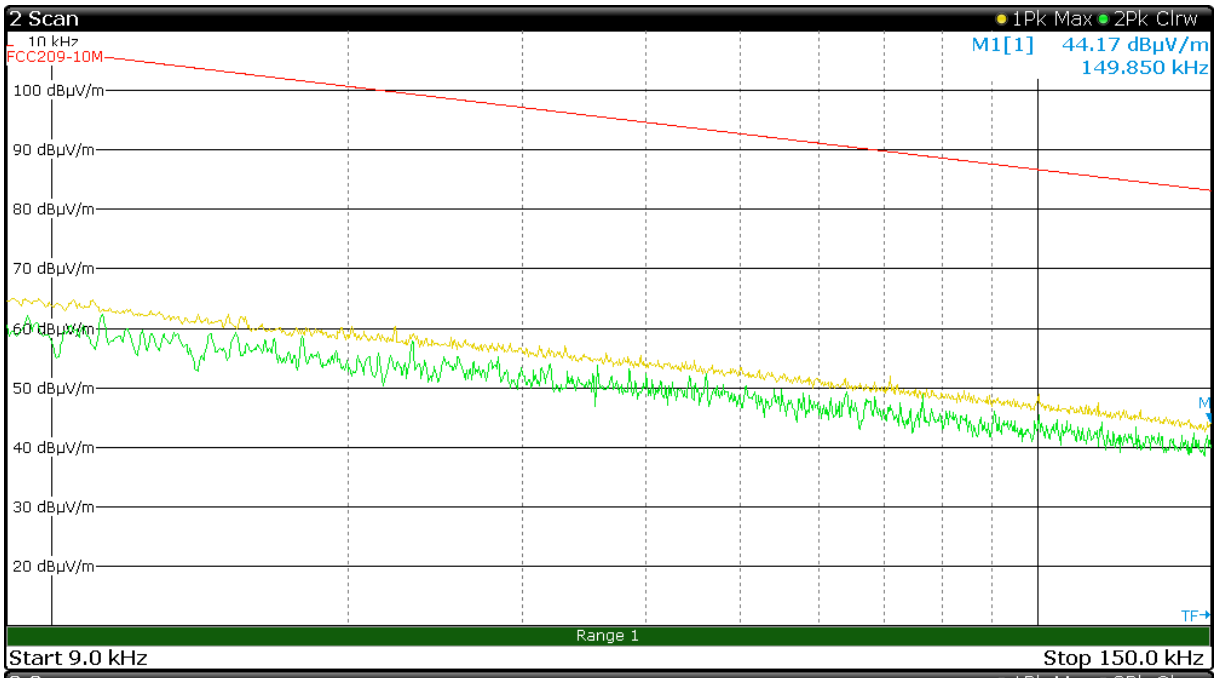


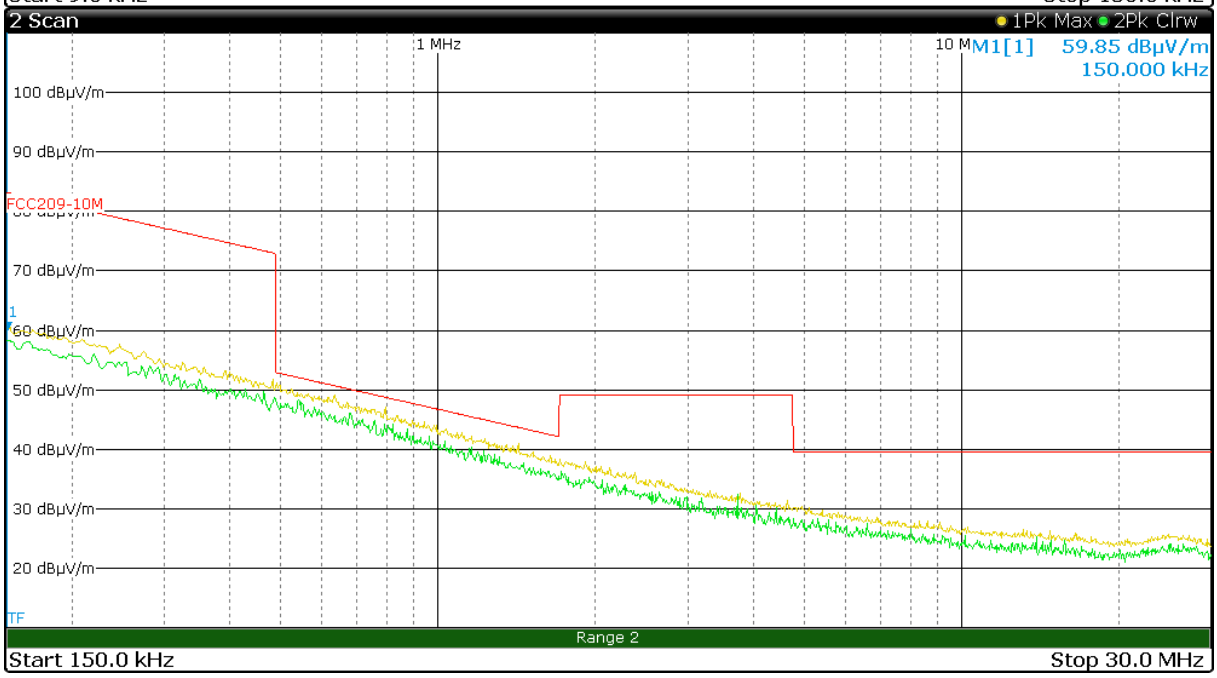
100 kHz bandwidth- highest channel

3.7.3 Radiated Spurious Emission Tabulated Results

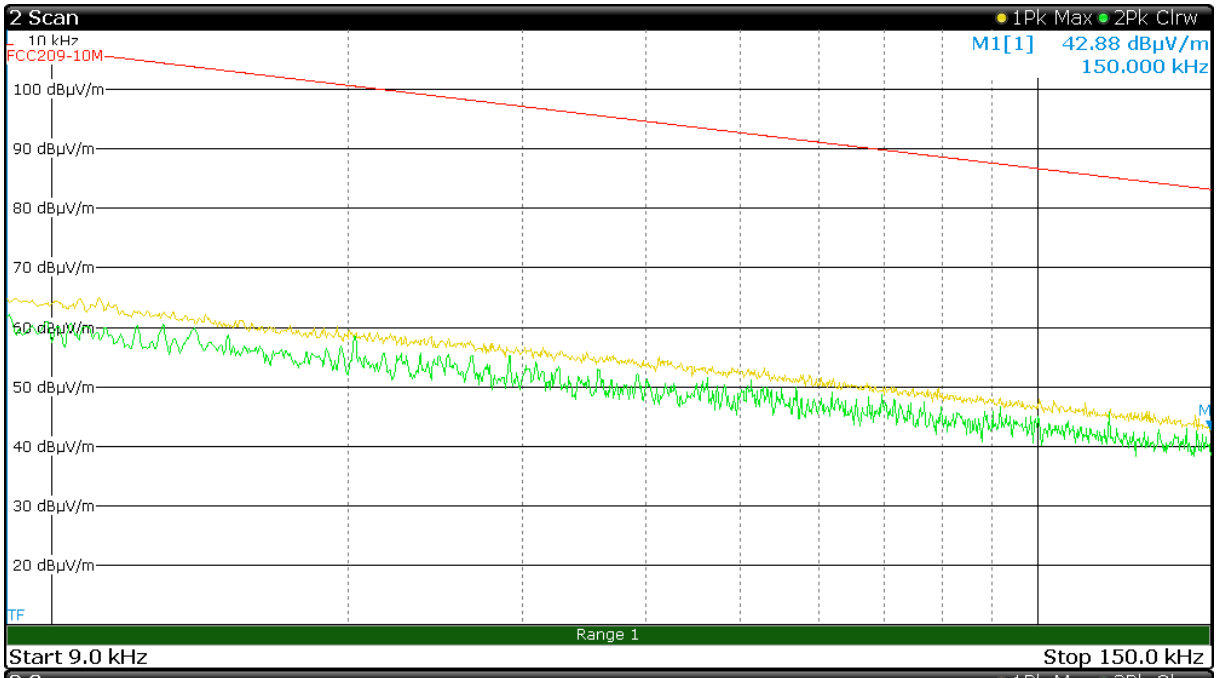
Radiated Emission Frequency Band: 9 kHz - 30 MHz

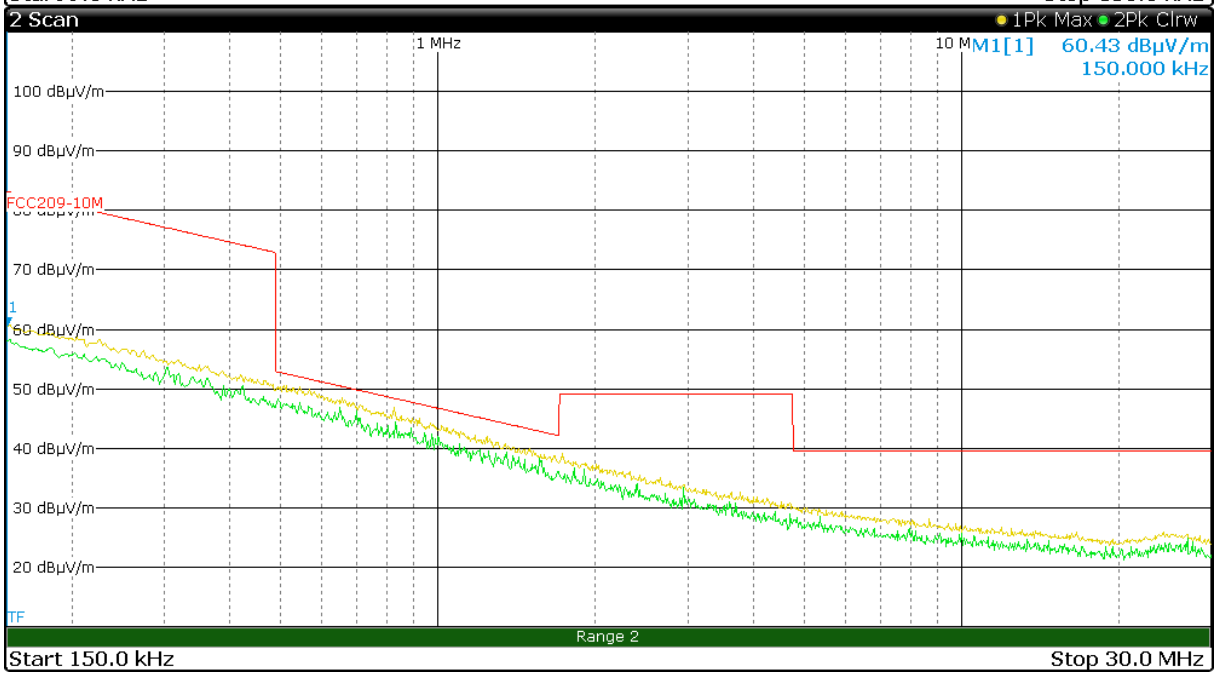
Measurements were made at a distance of 10 metres. The measurement of emissions between 9 kHz – 150 kHz were made with a resolution bandwidth (RBW) of 200 Hz and the video bandwidth (VBW) of 3 kHz, 150 kHz – 30 MHz were measured with the resolution bandwidth (RBW) of 9 kHz and the video bandwidth (VBW) of 30 kHz. Measurements were made with the loop antenna oriented perpendicular, parallel and ground-parallel with respect to the sample. Only the maximum graphs have been reported. No emissions detected above the measurement system noise floor.



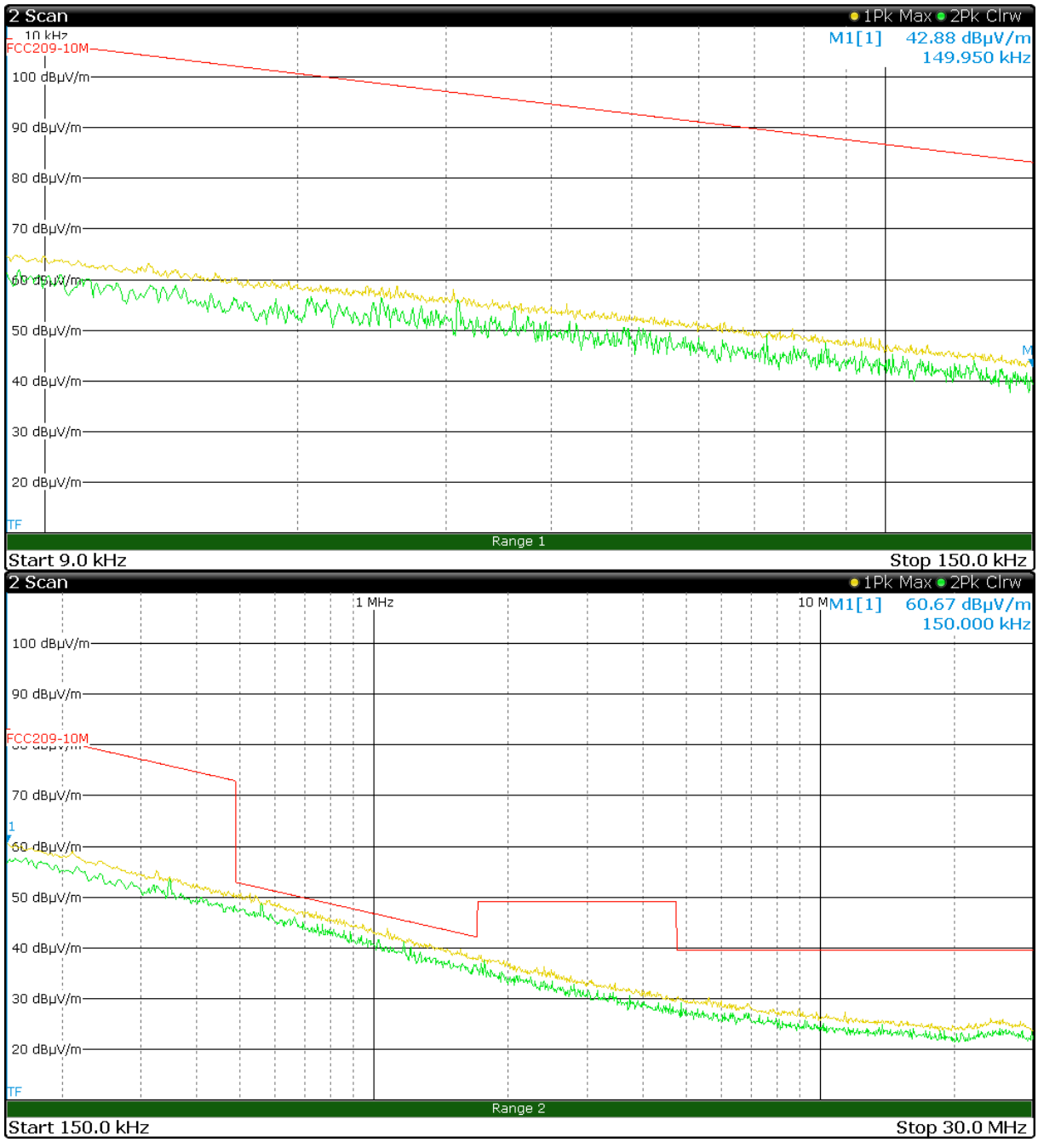


9 kHz to 30 MHz - Lowest Channel





9 kHz to 30 MHz - Middle Channel



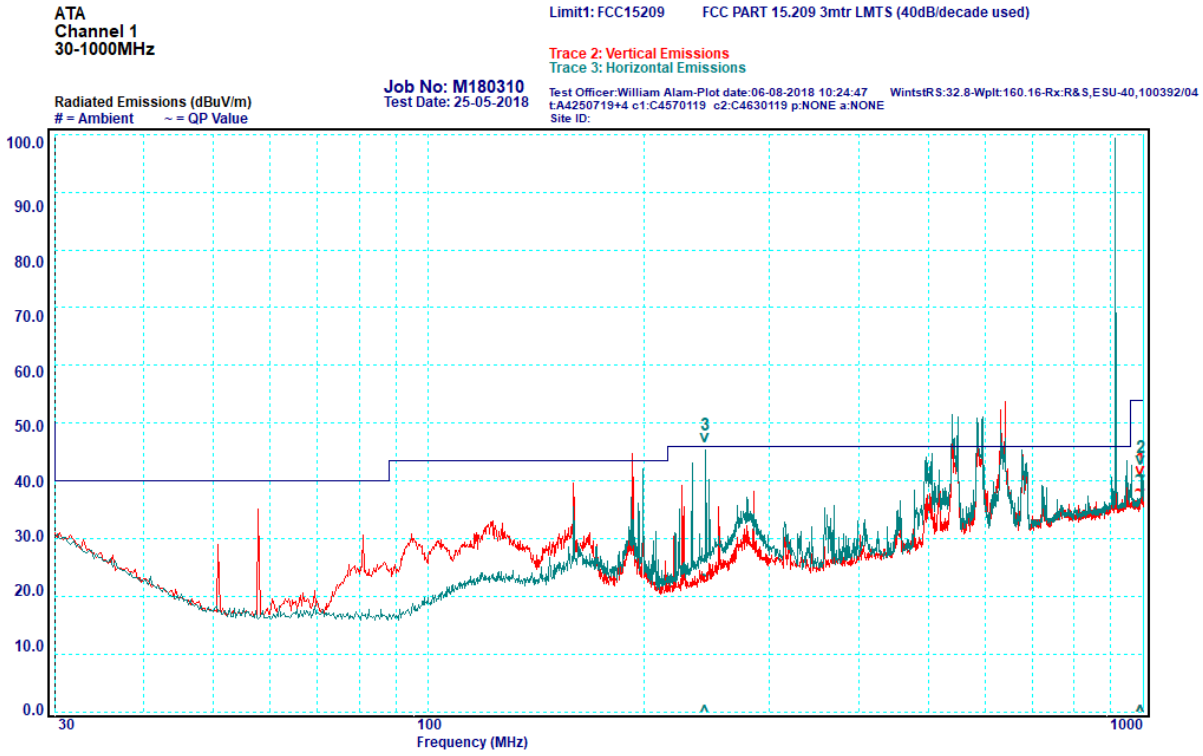
9 kHz to 30 MHz - Highest Channel

Radiated Cabinet Emission
Frequency Band: 30 - 1000 MHz

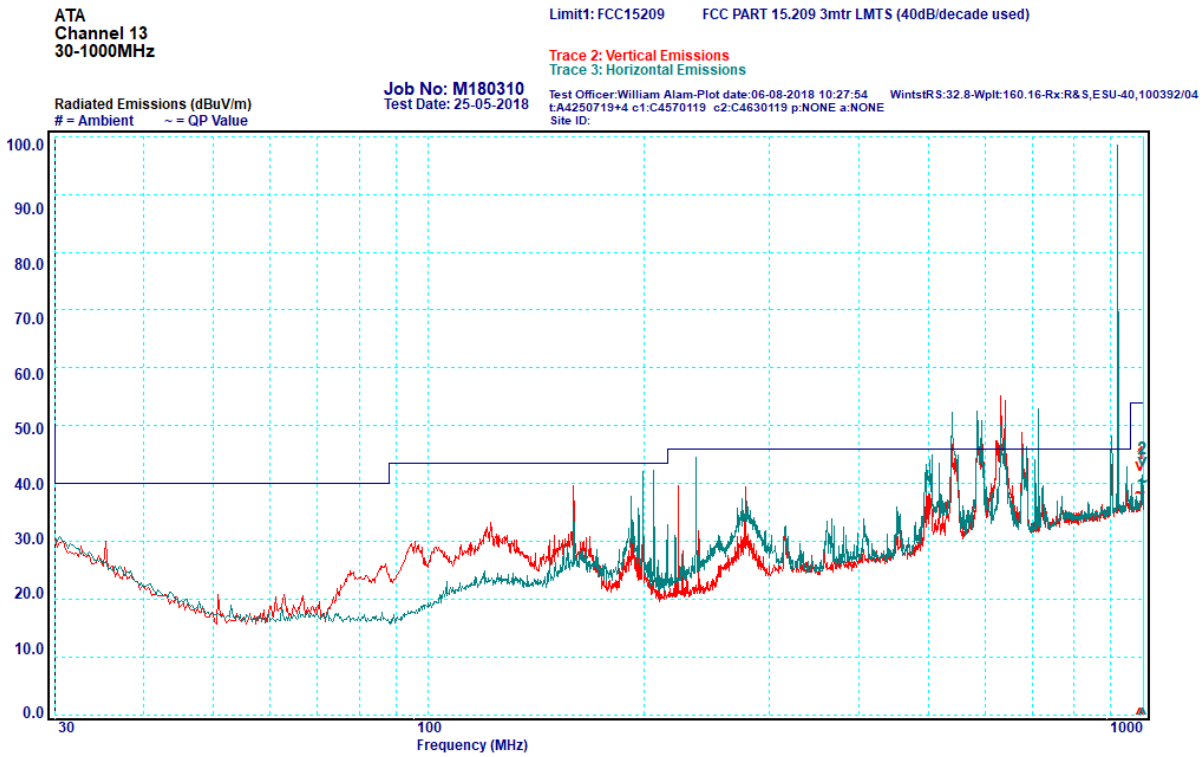
Measurements were made at a distance of 10 metres. The measurement of emissions between 30 - 1000 MHz was made with a resolution bandwidth (RBW) of 120 kHz and the video bandwidth (VBW) of 300 kHz. EUT transmit antenna was replaced with termination matching the impedance of the antenna.

The §15.209 limits were applied.

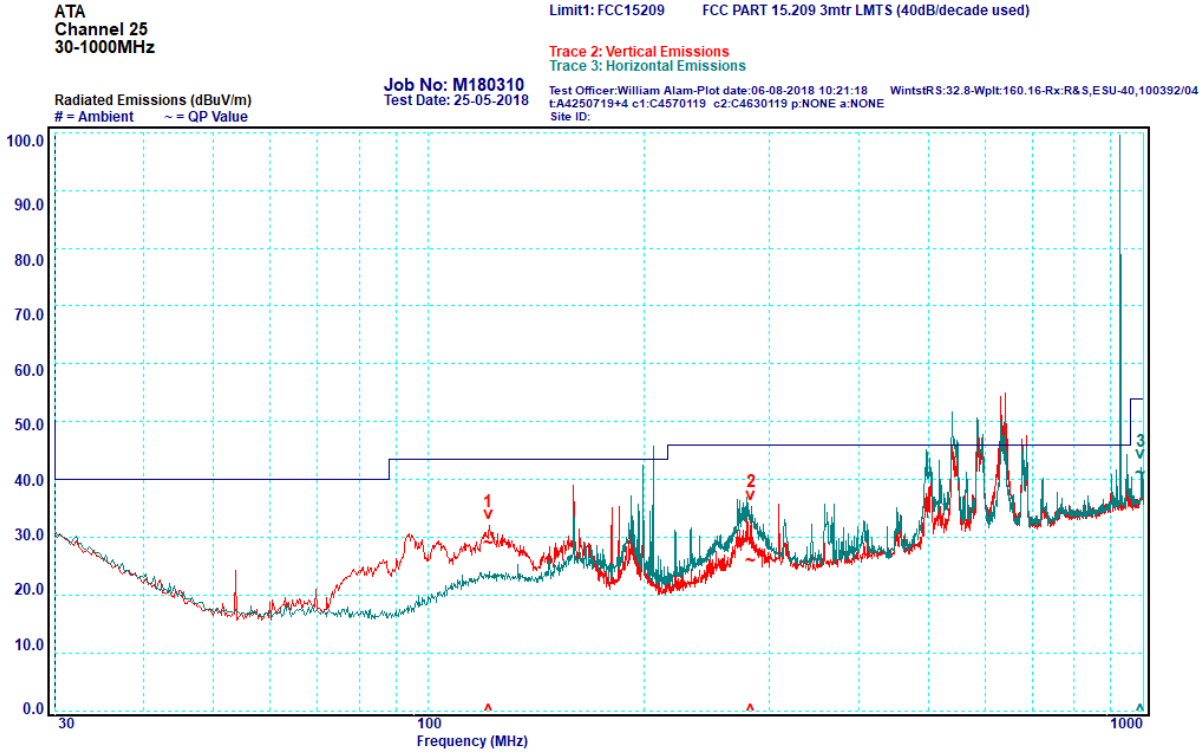
Channel	Frequency [GHz]	Polarity	QP [dBµV/m]	Limit [dBµV/m]	Margin [dB]
Low	991.830	Horizontal	41.0	54.0	-13.0
Middle	991.840	Horizontal	40.6	54.0	-13.4
High	996.110	Horizontal	40.2	54.0	-13.8
Low	121.420	Vertical	28.9	43.5	-14.6
Middle	991.840	Vertical	38.2	54.0	-15.8
High	991.840	Vertical	38.2	54.0	-15.8
Low	282.600	Vertical	25.9	46.0	-20.1
Middle	243.900	Horizontal	23.4	46.0	-22.6



30 MHz to 1000 MHz - Lowest Channel



30 MHz to 1000 MHz - Middle Channel



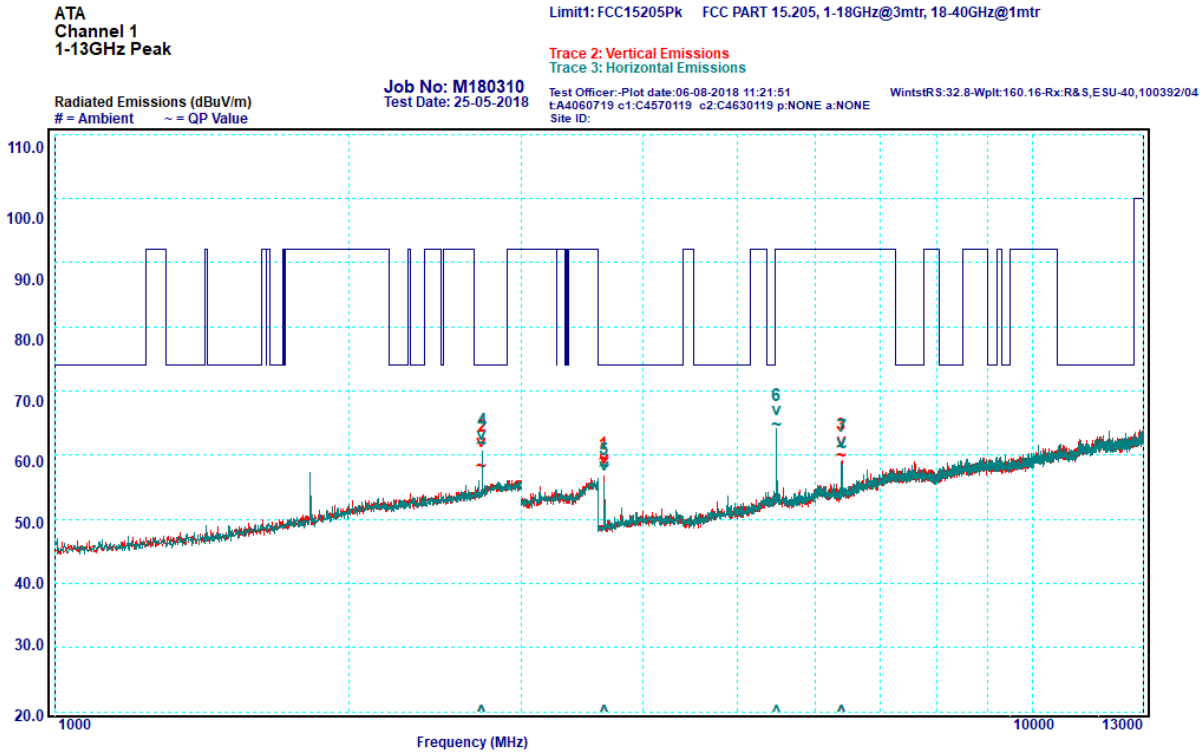
30 MHz to 1000 MHz - Highest Channel

Radiated Cabinet Emission
Frequency Band: 1 000 – 13 000 MHz

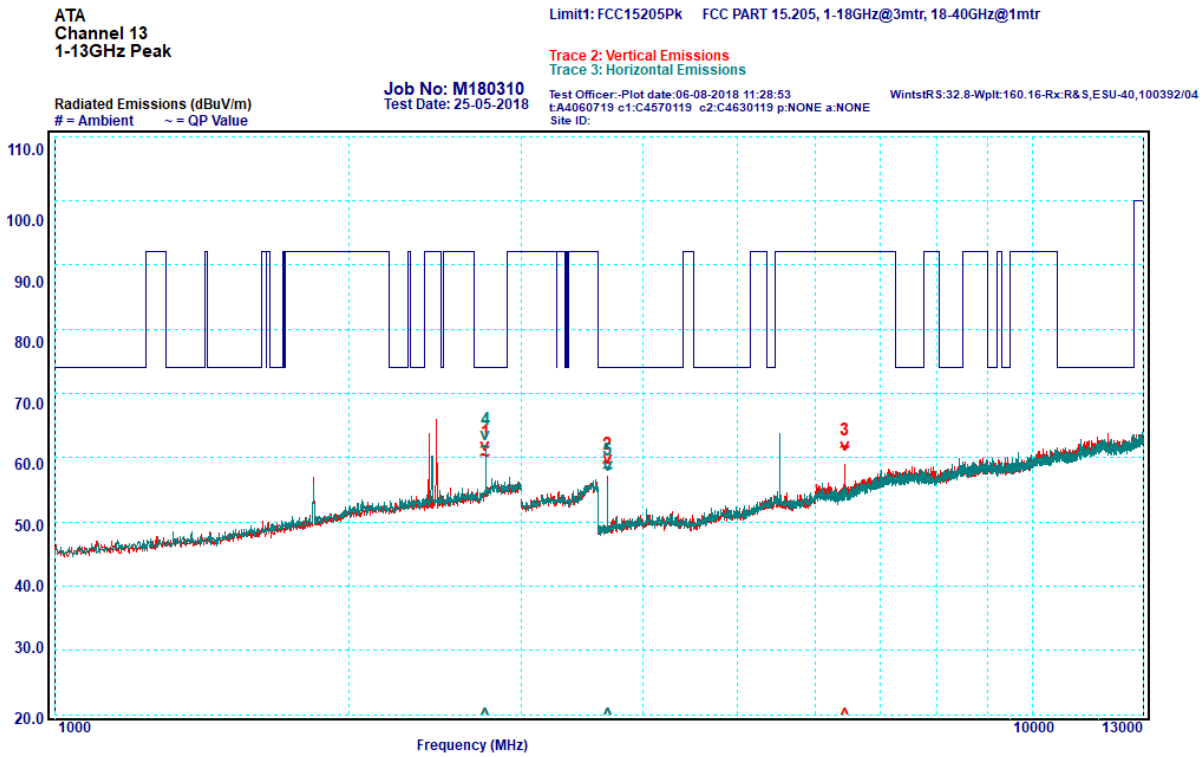
Measurements to 13 GHz were made at a distance of 3 metres. The measurements were made with a resolution bandwidth (RBW) of 1000 kHz and the video bandwidth (VBW) of 1000 kHz. EUT transmit antenna was replaced with termination matching the impedance of the antenna.

The §15.209 limits were applied.

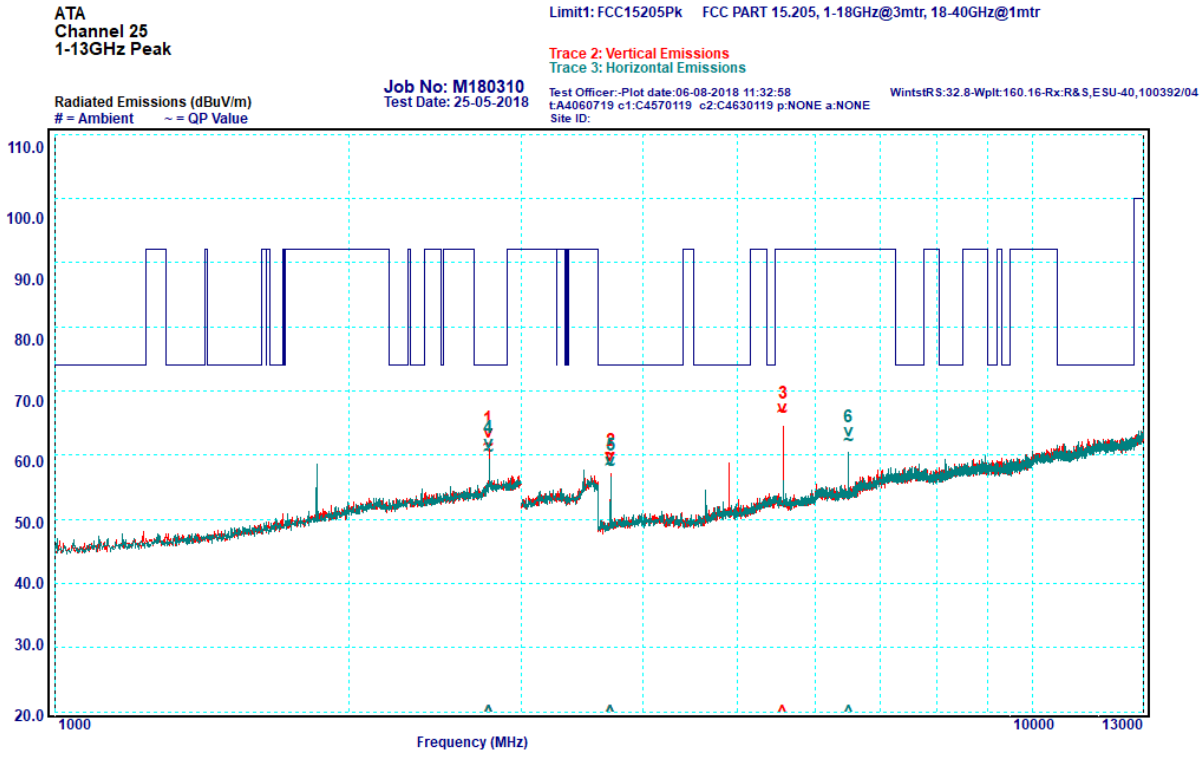
Channel	Frequency [MHz]	V/H	Peak			Average		
			Peak [dBµV/m]	Limit [dBµV/m]	Δ [dB]	AV [dBµV/m]	Limit [dBµV/m]	Δ [dB
Low	2737.72	H	61.7	74	-12.3	50.4	54	-3.6
Middle	2758.63	H	61.6	74	-12.4	50.3	54	-3.7
High	2780.5	V	61.6	74	-12.4	50.3	54	-3.7
High	2780.44	H	60.6	74	-13.4	49.3	54	-4.7
Middle	2759.14	V	60.3	74	-13.7	49.0	54	-5.0
High	3707.19	V	60.1	74	-13.9	48.8	54	-5.2
Low	3649.64	V	59.4	74	-14.6	48.1	54	-5.9
Middle	3678.34	V	59.1	74	-14.9	47.8	54	-6.2
High	3707.22	H	58.3	74	-15.7	47.0	54	-7.0
Low	2737.88	V	58.2	74	-15.8	46.9	54	-7.1
Low	3649.78	H	58.2	74	-15.8	46.9	54	-7.1
Middle	3678.52	H	58.2	74	-15.8	46.9	54	-7.1



1 to 13 GHz – Lowest Channel



1 to 13 GHz – Middle Channel

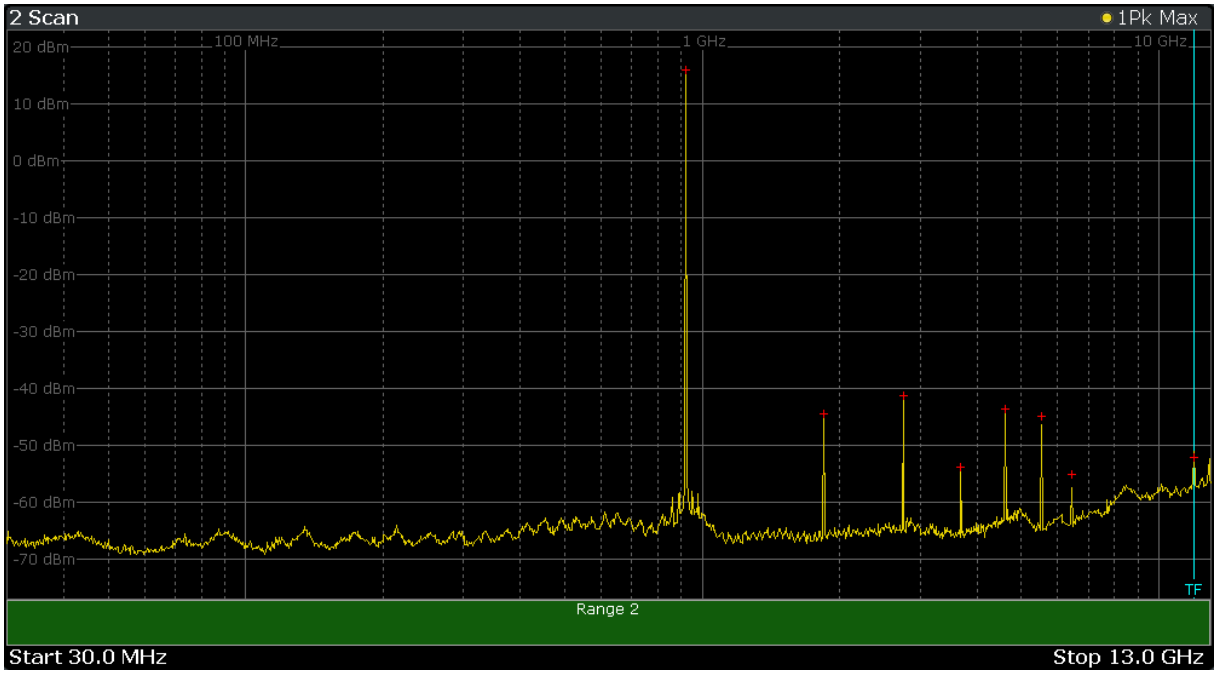


1 to 13 GHz – Highest Channel

Conducted Spurious Emission
Frequency Band: 30 – 13 000 MHz

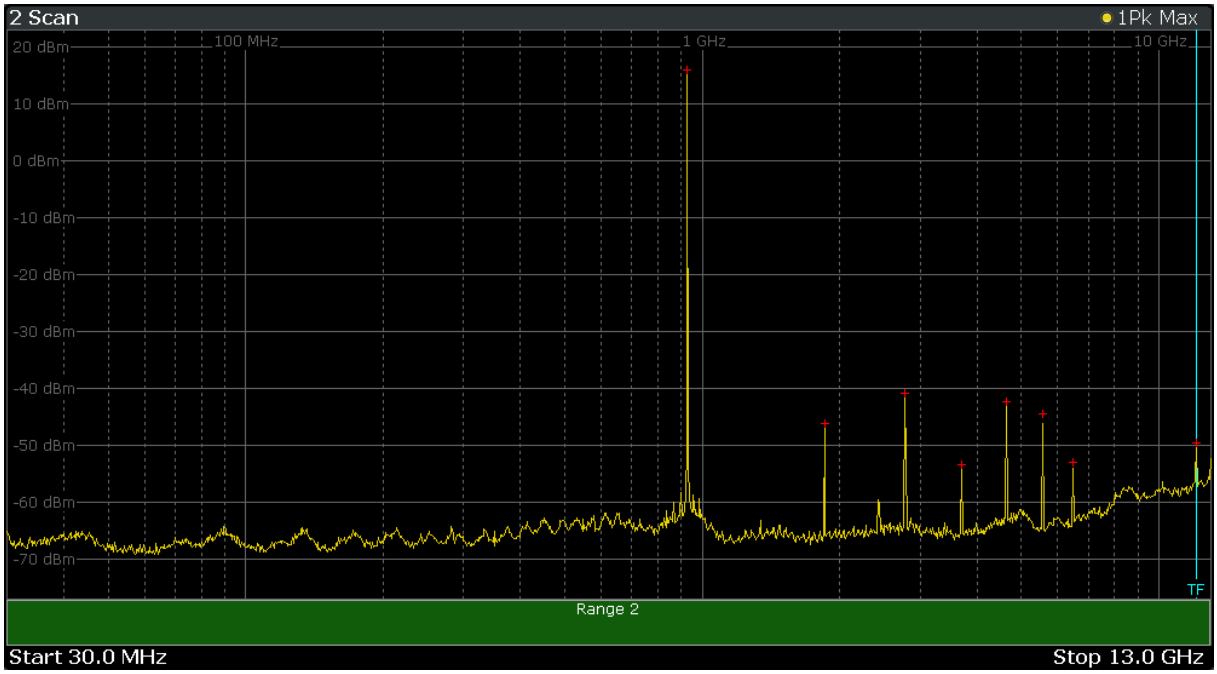
Additional measurements from 30 MHz to 13 GHz were made conductively. The measurements were made with the same RBW and VBW with radiated measurement. EUT transmit antenna was connected to dummy load and Spectrum Analyser.

The §15.209 limits were applied.



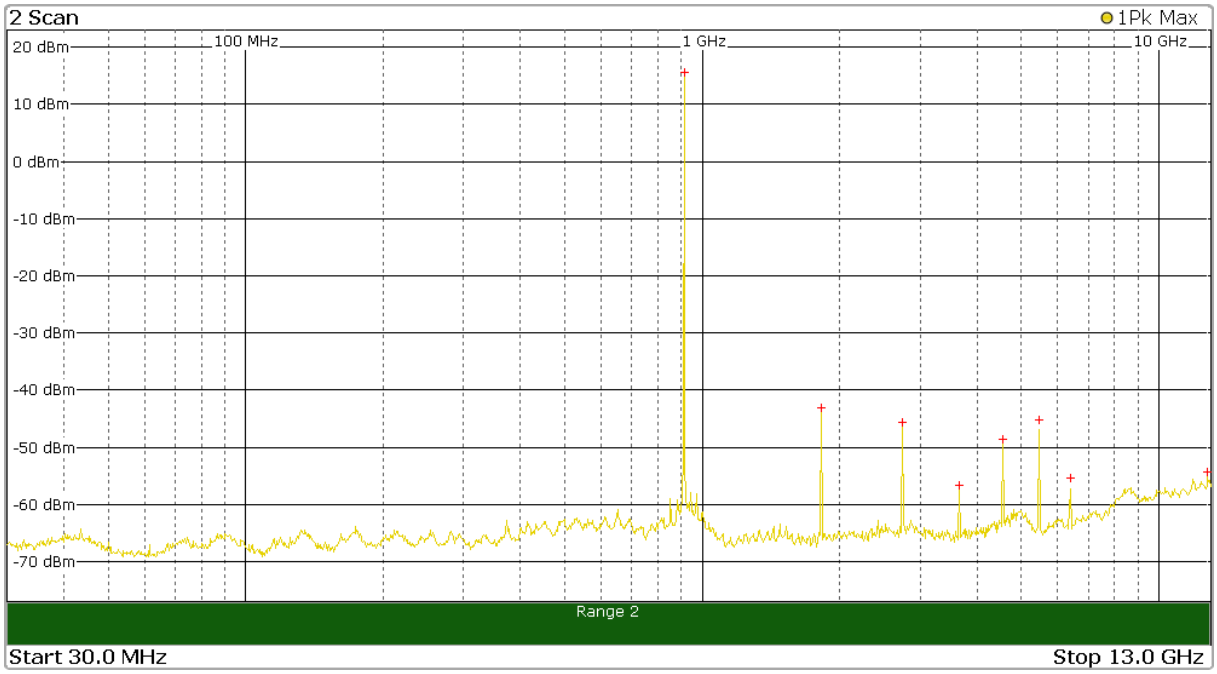
30 MHz – 13 GHz Lowest Channel

Frequency [GHz]	Peak [dBm]	Peak			Average		
		EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]	EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2.761	-41.28	53.95	74	-20.05	42.61	54	-11.39
4.602	-43.61	51.62	74	-22.38	40.28	54	-13.72
1.841	-44.44	50.79	74	-23.21	39.45	54	-14.55
5.522	-44.81	50.42	74	-23.58	39.08	54	-14.92
11.96	-52.19	43.04	74	-30.96	31.70	54	-22.30
3.681	-53.74	41.49	74	-32.51	30.15	54	-23.85
6.441	-55.07	40.16	74	-33.84	28.82	54	-25.18



30 MHz – 13 GHz Middle Channel

Frequency [GHz]	Peak [dBm]	Peak			Average		
		EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]	EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2.781	-40.89	54.34	74	-19.66	43.00	54	-11.00
4.635	-42.24	52.99	74	-21.01	41.65	54	-12.35
5.561	-44.41	50.82	74	-23.18	39.48	54	-14.52
1.854	-46.2	49.03	74	-24.97	37.69	54	-16.31
12.05	-49.62	45.61	74	-28.39	34.27	54	-19.73
6.487	-53.01	42.22	74	-31.78	30.88	54	-23.12
3.707	-53.47	41.76	74	-32.24	30.42	54	-23.58



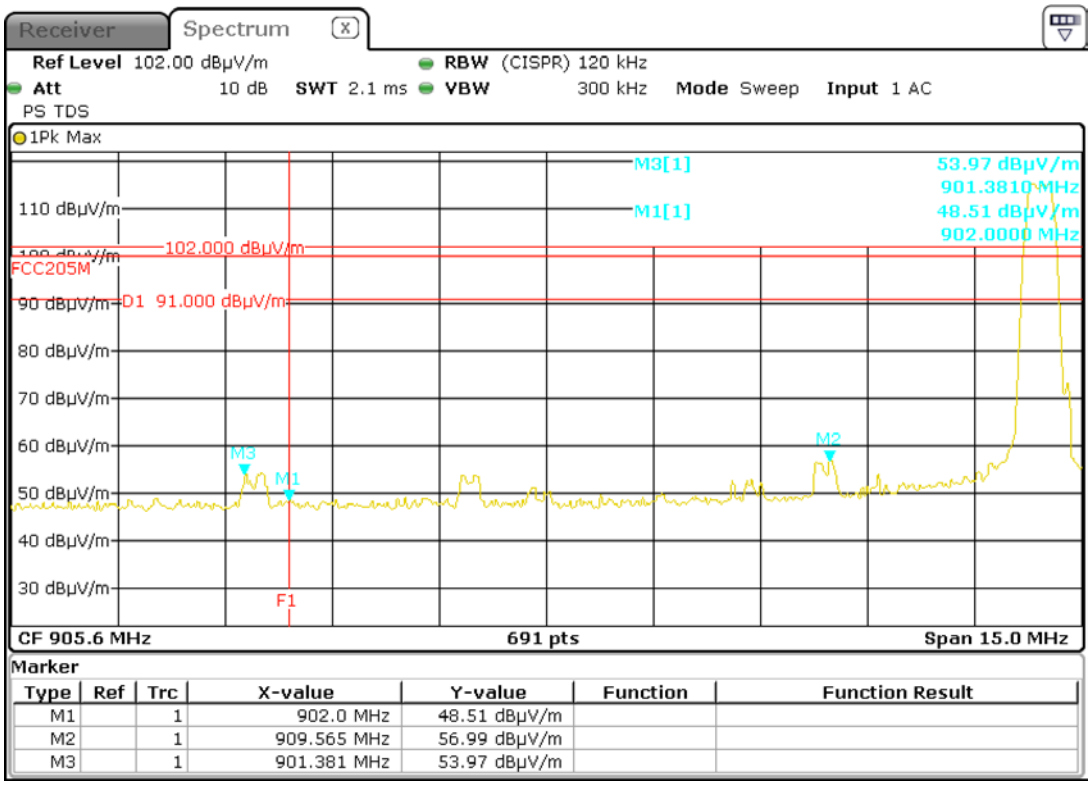
30 MHz – 13 GHz Highest Channel

Frequency [GHz]	Peak [dBm]	Peak			Average		
		EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]	EIRP [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1.825	-43.01	52.22	74	-21.78	40.88	54	-13.12
5.474	-45.26	49.97	74	-24.03	38.63	54	-15.37
2.738	-45.66	49.57	74	-24.43	38.23	54	-15.77
4.563	-48.63	46.60	74	-27.40	35.26	54	-18.74
12.78	-54.42	40.81	74	-33.19	29.47	54	-24.53
6.387	-55.29	39.94	74	-34.06	28.60	54	-25.40
3.650	-56.67	38.56	74	-35.44	27.22	54	-26.78

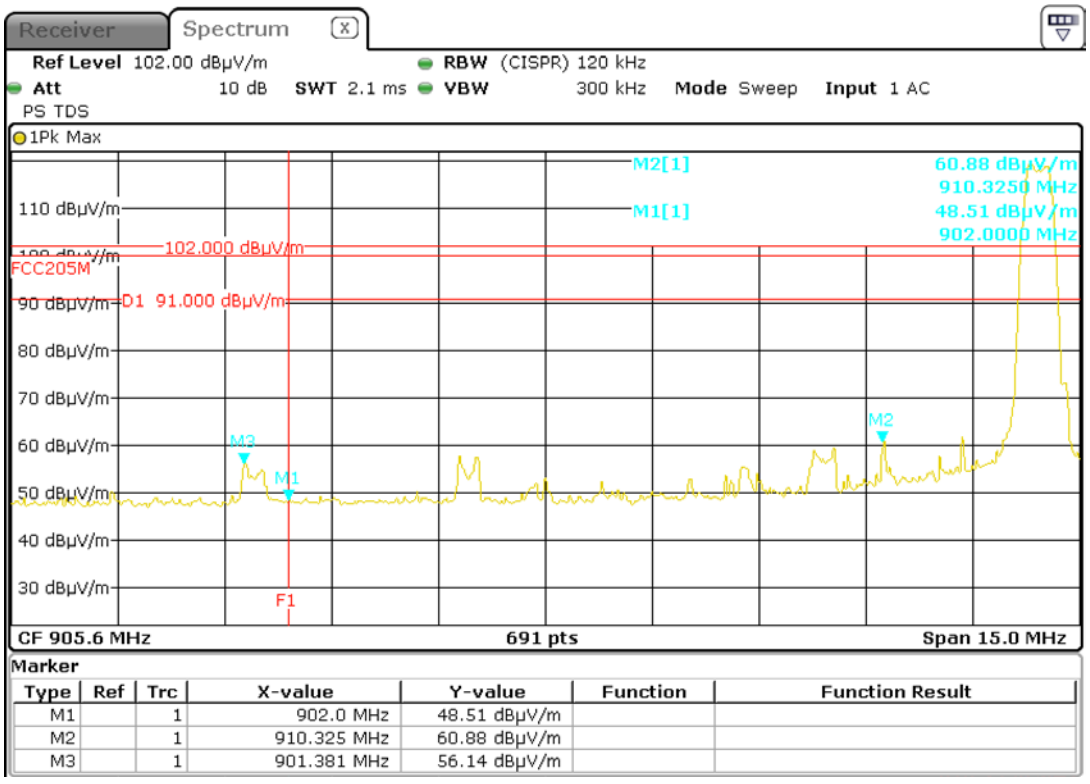
Band-Edge Emission Measurements

Measurements were made at a distance of 3 metres. The measurement of emissions between 30 - 1000 MHz was made with a resolution bandwidth (RBW) of 120 kHz and the video bandwidth (VBW) of 300 kHz. Emissions within 10 MHz of an authorised band edge were measured. Highest emission was found on vertical polarisation. Only emissions in this orientation are reported.

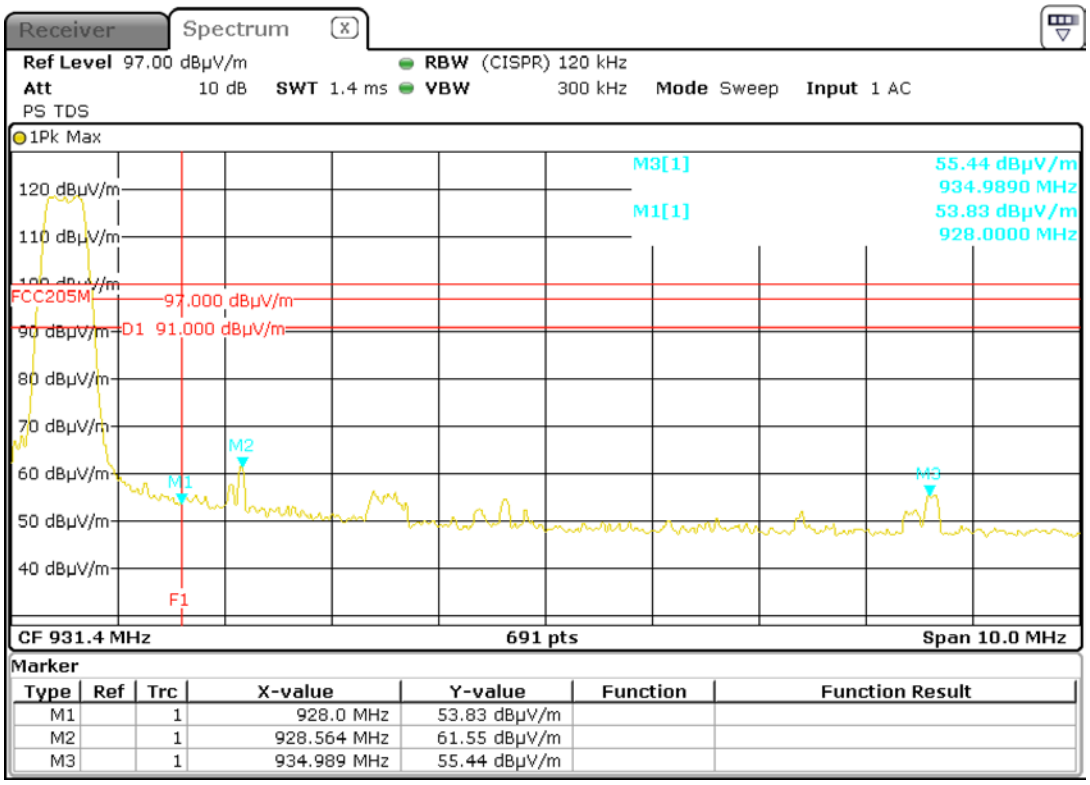
Channel	Frequency [GHz]	QP [dBµV/m]	Limit [dBµV/m]	Margin [dB]
High	928.564	61.55	91	-29.45
Low	909.565	56.99	91	-34.01
High	934.989	55.44	91	-35.56
Low	901.381	53.97	91	-37.03
High	928.000	53.83	91	-37.17
Low	902.000	48.51	91	-42.49
Hopping ON				
Low	910.325	60.88	91	-30.12
High	928.000	57.50	91	-33.50
Low	901.381	56.14	91	-34.86
High	929.996	56.02	91	-34.98
High	934.786	55.29	91	-35.71
Low	902.000	48.51	91	-42.49



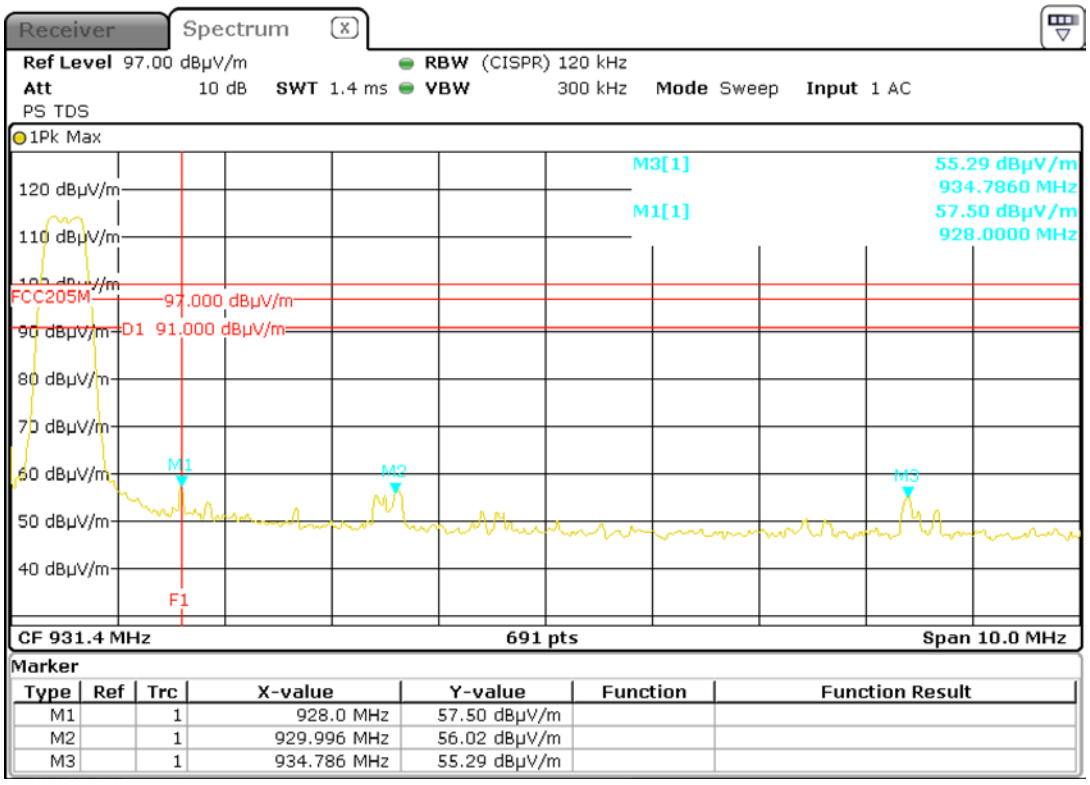
Channel 912.5 MHz, Lower Band Edge



Channel 912.5 MHz, Lower Band Edge Hopping ON



Channel 926.9 MHz, Upper Band Edge



Channel 926.9 MHz, Upper Band Edge Hopping ON

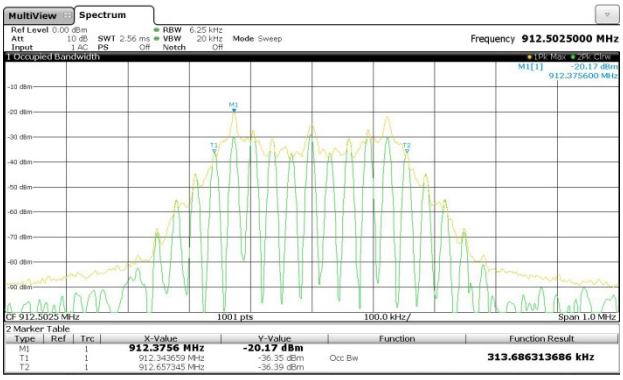
3.8 §15.247(i) Maximum Permissible Exposure

The EUT complied with the applicable maximum permissible exposure levels. Refer to EMC Technologies report M180310-3.

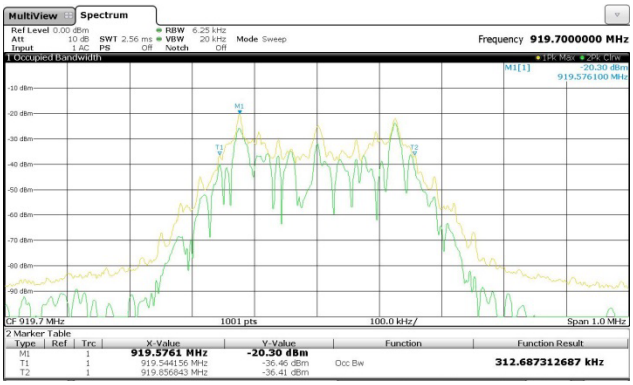
3.9 §15.215 Occupied bandwidth – 99% power

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

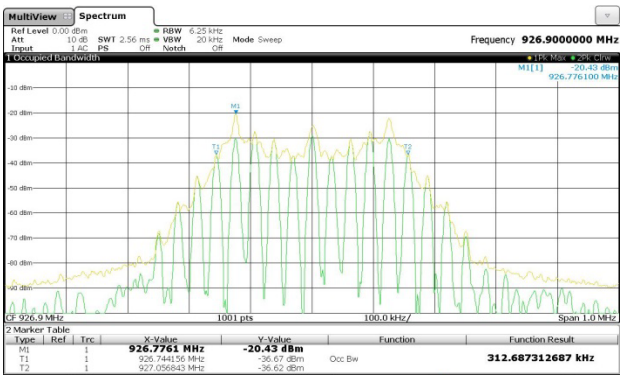
Channel	99% Bandwidth [MHz]	Low Frequency [MHz]	High Frequency [MHz]
Low	0.31368	912.343659	912.657345
Middle	0.31268	919.544156	919.856843
High	0.31268	926.744156	927.056843



Occupied Bandwidth – lowest channel



Occupied Bandwidth – middle channel



Occupied Bandwidth – highest channel

4.0 COMPLIANCE STATEMENT

The HUB200 Wireless Smart Hub tested on behalf of Automatic Technology (Australia) Pty Ltd **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators) for a Frequency Hopping System operating within the band: 902 MHz to 908 MHz.

5.0 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	9 kHz to 30 MHz	±4.1 dB
	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB
Peak Output Power:		±1.5 dB
Peak Power Spectral Density:		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.