FCC / ISED Test Report

For:
Smith & Nephew Medical, Ltd.

Model No:
66802146

Product Description:
The VERSAJET III Hydrosurgery System is intended for applications that in the healthcare professionals' judgment, require sharp debridement.

FCC ID: 2AWH9-VJIII
IC ID: 26135-VJIII

Applied Rules and Standards:
47 CFR Part 15.209 and 15.225
RSS-210 Issue 10 & RSS-Gen Issue 5

REPORT #: EMC_SMITH-014-20001_FCC_15.225_Rev1

DATE: 2022-04-16

A2LA Accredited

IC recognized # 3462B-1

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TABLE OF CONTENTS

1 Assessment

The following device was evaluated against the applicable radiated emissions criteria specified in FCC rules Parts 15.209, and 15.225 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-210 Issue 10, and RSS-Gen Issue 5.

Company	Description	Model #
Smith & Nephew Medical, Ltd.	The VERSAJET III Hydrosurgery System is intended for applications that in the healthcare professionals' judgment, require sharp debridement.	66802146

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2022-04-16	Compliance	Kevin Wang (EMC Lab Manager)	kevin.wang@cetecom.com Digitally signed by: kevin.wang@cetecom.com DN: CN = kevin.wang@cetecom.com Date: 2022.04.18 17:03:48 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2022-04-16	Compliance	Cheng Song (EMC Engineer)	cheng.song@cetecom.com Digitally signed by: cheng.song@cetecom.com DN: CN = cheng.song@cetecom.com Date: 2022.04.16 18:39:12 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Kevin Wang
Responsible Project Leader:	Cathy Palacios

2.2 Identification of the Client

Client's Name:	Smith & Nephew Medical, Ltd.
Street Address:	101 Hessle Road
City/Zip Code	Hull, HU3 2BN
Country	United Kingdom

2.3 Identification of the Manufacturer

Manufacturer's Name:	Flextronics Manufacturing (S) Pte Ltd. Singapore.
Manufacturers Address:	1 Kallang Place
City/Zip Code	339211
Country	Singapore

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	66802146
HW Version :	121-A2-000508-A
SW Version :	121-SWE-000002-1.15.A01318
FCC ID:	2AWH9-VJIII
IC ID:	26135-VJIII
Product Description:	The VERSAJET III Hydrosurgery System is intended for applications that in the healthcare professionals' judgment, require sharp debridement.
Radio Information:	RFID: Texas Instruments TRF7970A
Antenna Information:	NFC Loop Antenna 13.56MHz: 10 dBi gain
Power Supply/ Rated Operating Voltage Range:	Vmin: 100 VAC, Vmax: 240 VAC
Operating Temperature Range	Tmin: 10 ºC / Tmax: 32 ºC
Sample Revision	☐Prototype Unit; ☐Production Unit; ■Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	FWAK210014	121-A2-000508-A	121-SWE-000002-1.15.A01318	-

3.3 Accessory Equipment (AE) details

AE #	Type	Manufacturer	Serial Number
1	Hand Piece	Smith & Nephew Medical, Ltd.	-
2	Foot Switch	Smith & Nephew Medical, Ltd.	-
3	Ferrite	Wurth Elektronik	74271112

Note: The ferrite clamped on foot switch cable during testing

3.3 Test Sample Configuration

EUT Set-up #	EUT / AE used for set-up	Comments
1	EUT#1 + AE#1 + AE#2 + AE#3	-

3.4 Mode of Operation details

Mode of Operation	Description	Details
Op. 1	RFID	-

3.5 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle possible. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant radiated emissions requirements specified in FCC rules part 15.209 and 15.225 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-210 Issue 10 of ISED Canada.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	PASS	NA	NP	Result
§15.225(d); §15.209 RSS-210 I10; RSS-Gen I5 8.9	TX Spurious emissions-Radiated	Nominal	RFID	■	☐	☐	Complies
§15.225(a,b,c); RSS-210 I10 B6 a;	Field strength in band mask	Nominal	RFID	■	☐	☐	Complies
§15.225(e); RSS-210 I10 B6 b);	Frequency stability	Nominal and Extreme Voltage and Temperature	RFID	■	☐	☐	Complies
§15.207(a) RSS Gen I5 8.8	AC Conducted Emissions	Nominal	RFID	■	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Measurement System	EMC 1	EMC 2
Conducted Emissions (mains port)	1.12 dB	0.46 dB
Radiated Emissions		
(<30 MHz)	3.66 dB	3.88 dB
(30 MHz – 1 GHz)	3.17 dB	3.34 dB
(1 GHz – 3 GHz)	5.01 dB	4.45 dB
(> 3 GHz)	4.0 dB	4.79 dB

RF conducted measurement ±0.5 dB

6.1 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 Dates of Testing:

12/13/2021 - 12/23/2021

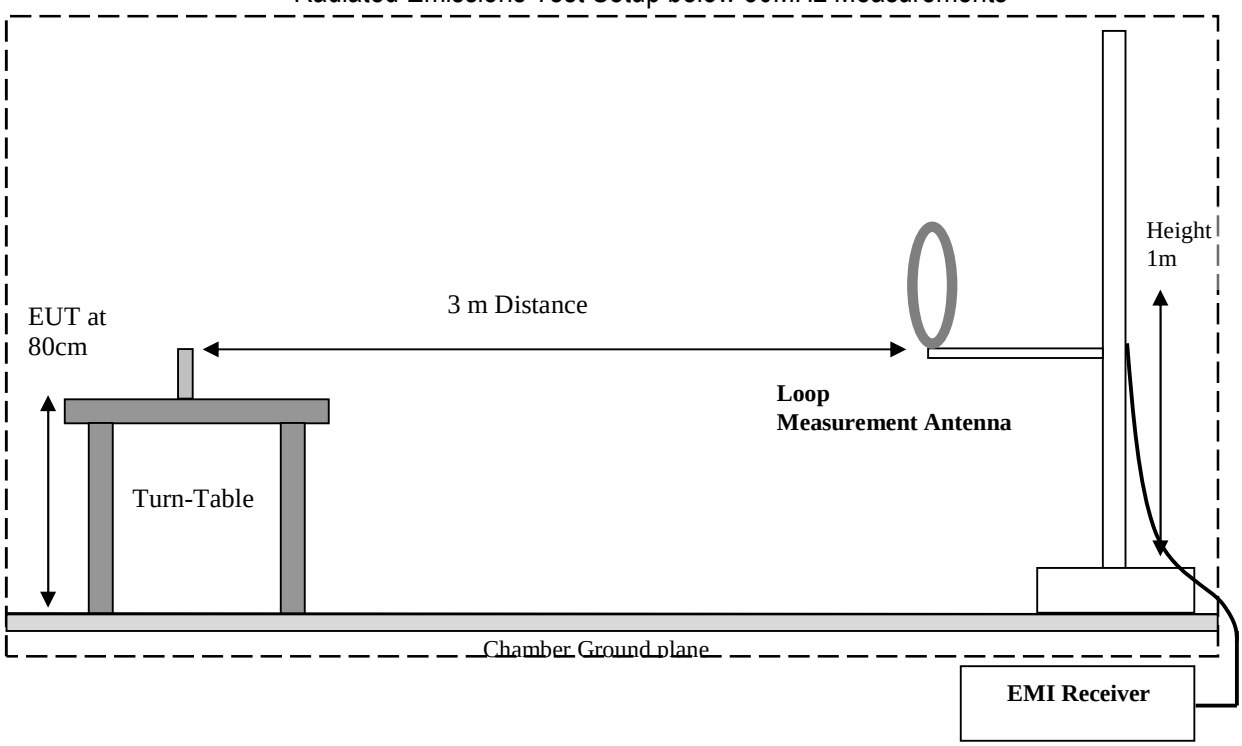
7 Measurement Procedures

7.1 Radiated Measurement

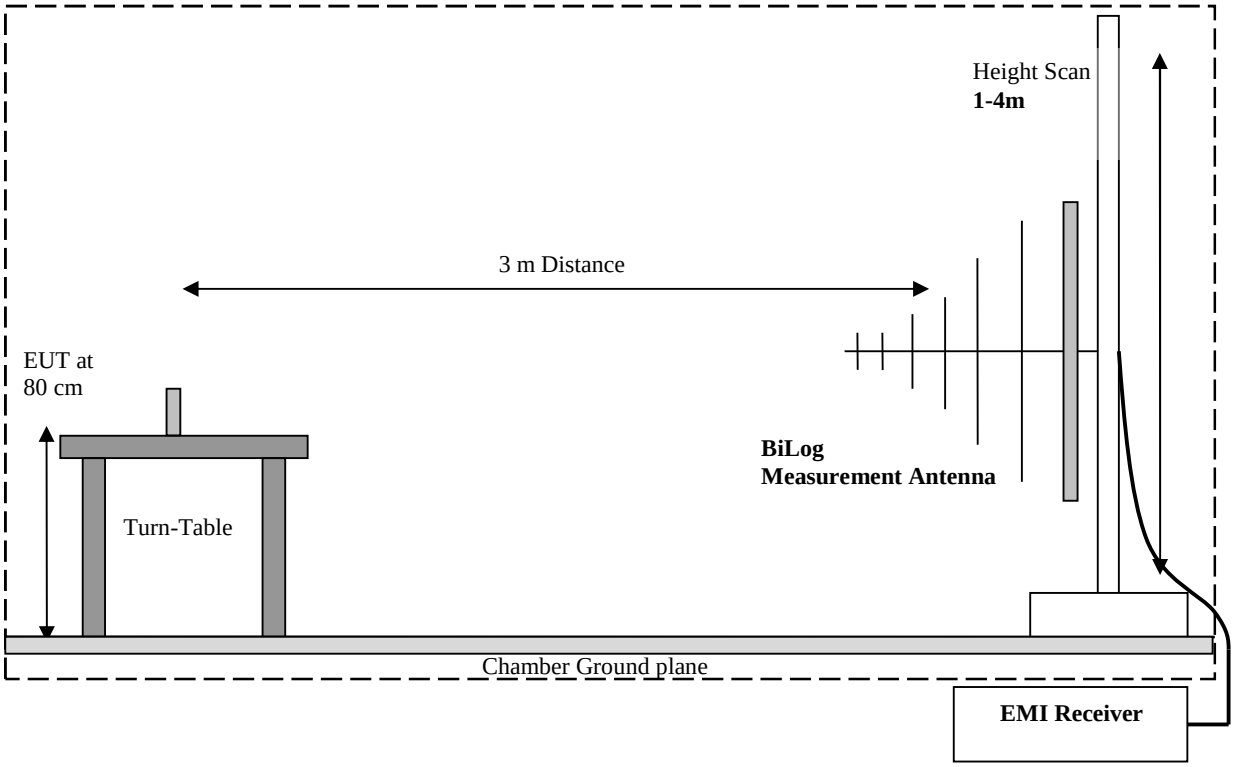
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

To correct for distance when measuring at a distance other than the specification distance;

- For measurements below 30 MHz, Distance Factor = 40log(SpecDistance/TestDistance)
- For measurements above 30 MHz, Distance Factor = 20log(SpecDistance/TestDistance).

Example:

Frequency (MHz)	FCC 15.209 limit @ 30m (uV/m)	FCC 15.209 limit @ 30m (dBuV/m)	FCC 15.209 limit @ 3m (dBuV/m)
10	30	29.54	69.54

8 Test Result Data

8.1 Radiated Transmitter Spurious Emissions and Restricted Bands

8.1.1 Measurement according to ANSI C63.10

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

8.1.2 Limits:

FCC §15.225

- The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

FCC §15.209 & RSS-210 / RSS-Gen 8.9

- 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 of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009–0.490	2400/F(kHz) / ---------	300	-
0.490–1.705	24000/F(kHz) / --------	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBµV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, 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	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
  *PEAK LIMIT= 74 dBµV/m
  *AVG. LIMIT= 54 dBµV/m

8.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	RFID	120 VAC

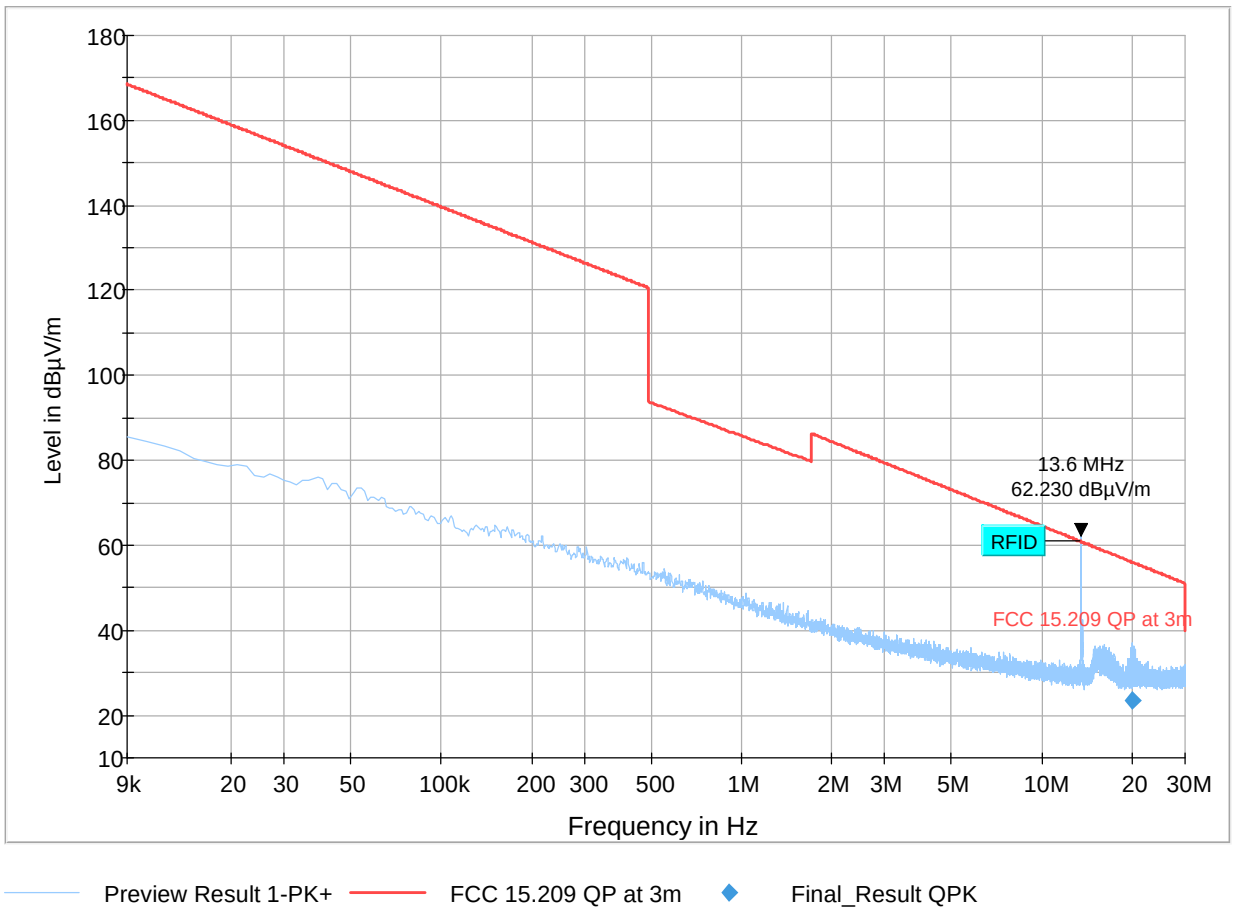
8.1.4 Measurement result:

Plot #	Operating Mode	Scan Frequency	Limit	Result
1	RFID	9 kHz – 30 MHz	See section 8.1.2	Pass
2	RFID	30 MHz – 1 GHz	See section 8.1.2	Pass
3	RFID	13.11 – 14.01 MHz	13.553-13.567 MHz:15,848 uV/m @ 30 m 13.410-13.553 MHz: 334 uV/m @ 30 m 13.567-13.710 MHz: 334 uV/m @ 30 m 13.110-13.410 MHz: 106 uV/m @ 30 m 13.710-14.010 MHz: 106 uV/m @ 30 m Measurement done with 10dB margin	Pass

8.1.5 Measurement Plots:

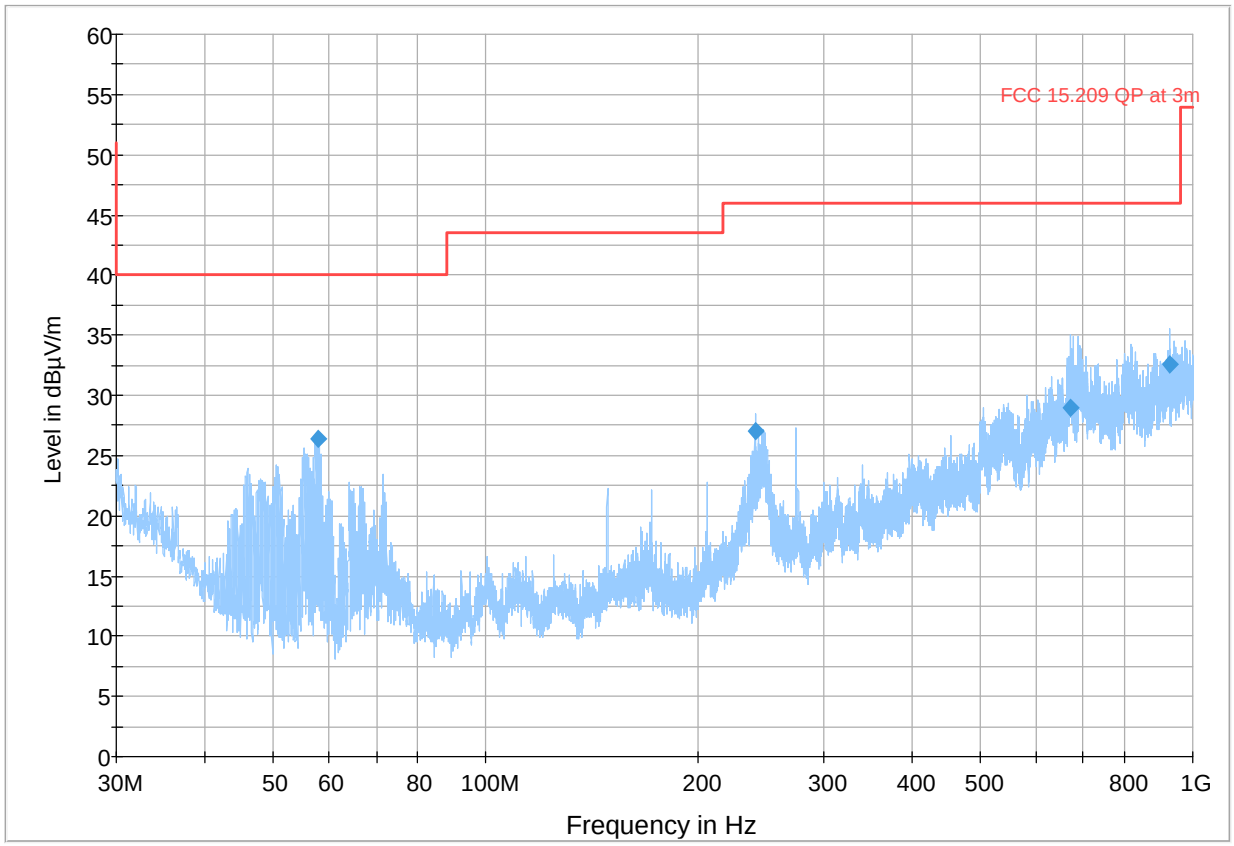
Plot # 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
20.133	23.57	55.95	32.38	500.0	0.200	150.0	V	216.0	16.4	



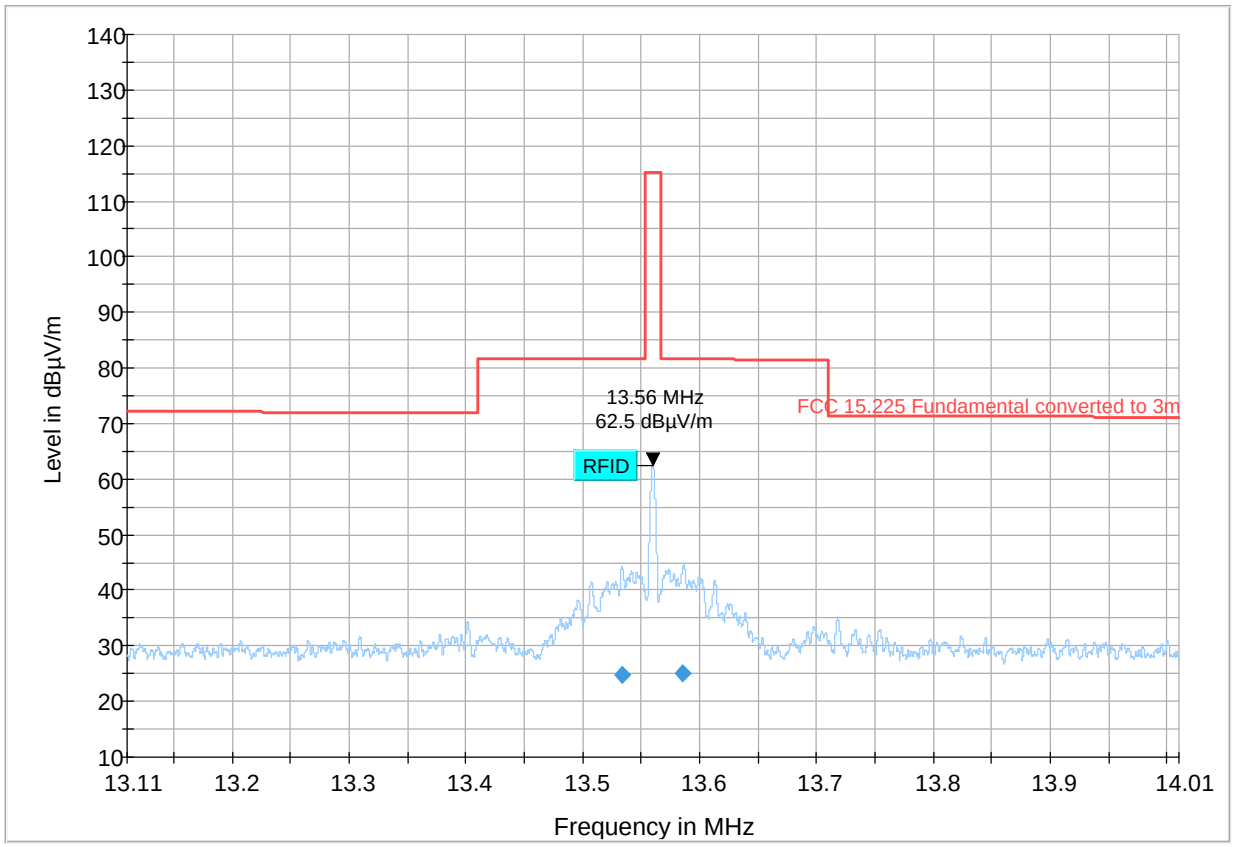
Plot # 2

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
57.886	26.42	40.00	13.58	500.0	120.000	210.0	V	115.0	10.1	
240.021	26.98	46.02	19.04	500.0	120.000	187.0	H	269.0	17.0	
670.714	28.92	46.02	17.10	500.0	120.000	315.0	H	235.0	27.8	
925.732	32.58	46.02	13.44	500.0	120.000	248.0	H	164.0	30.2	



Plot # 3

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
13.533	24.73	81.67	56.94	500.0	0.200	150.0	H	181.0	16.8	
13.586	25.07	81.61	56.54	500.0	0.200	150.0	H	181.0	16.8	



8.2 AC Power Line Conducted Emissions

8.2.1 Measurement according to ANSI C63.4

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Detector: Peak / Average for Pre-scan
- Quasi-Peak/Average for Final Measurements

8.2.2 Limits:

FCC §15.207(a) & RSS-Gen 8.8

- Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.2.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22° C	1	RFID	Line & Neutral	120 VAC

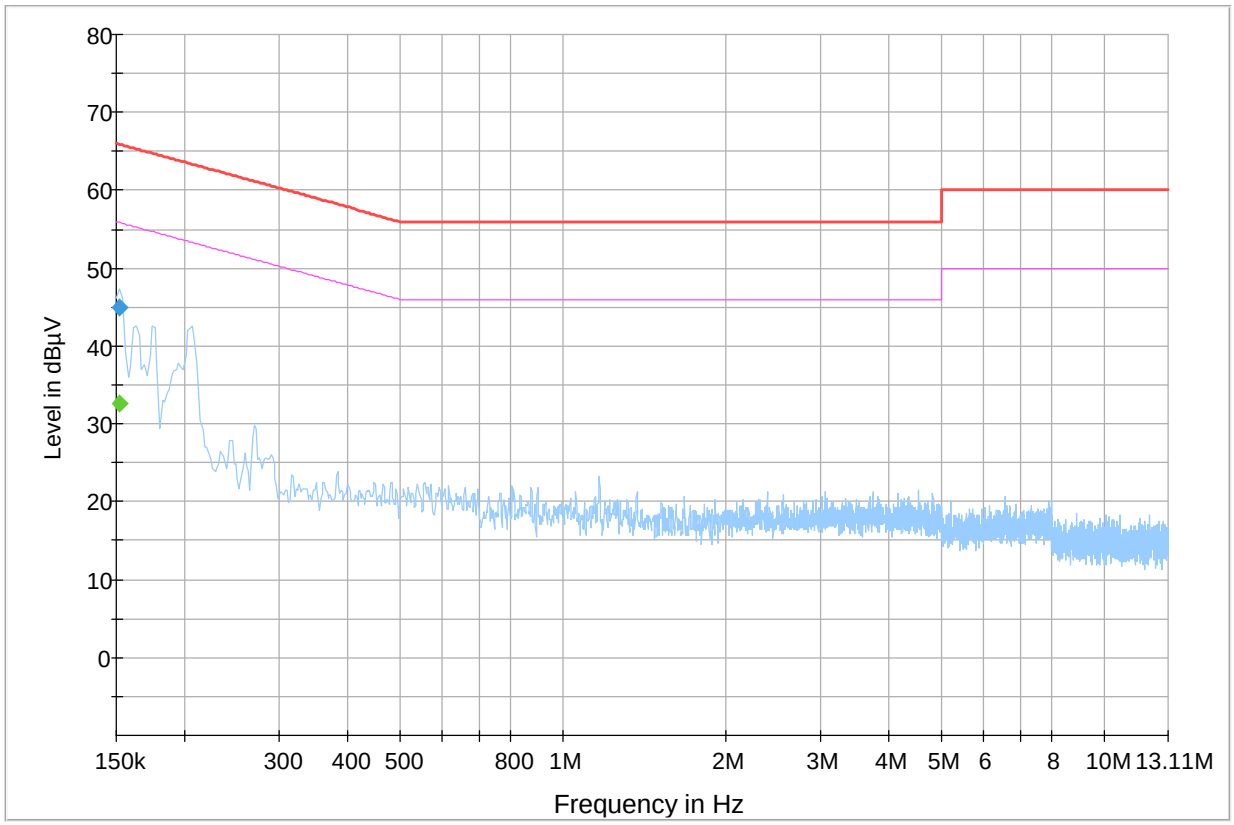
8.2.4 Measurement Result:

Plot #	Port	EUT Set-Up #:	EUT operating mode	Scan Frequency	Result
1	AC Mains	1	RFID	150 kHz – 13.110 MHz	Pass
2	AC Mains	1	RFID	13.110 MHz – 14.010 MHz	Pass
3	AC Mains	1	RFID	14.010 MHz – 30 MHz	Pass

8.2.5 Measurement Plots:

Plot # 1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
0.152	---	32.57	55.90	23.33	500.0	9.000	N	GND	10.4	
0.152	44.94	---	65.90	20.95	500.0	9.000	N	GND	10.4	



Plot # 2

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
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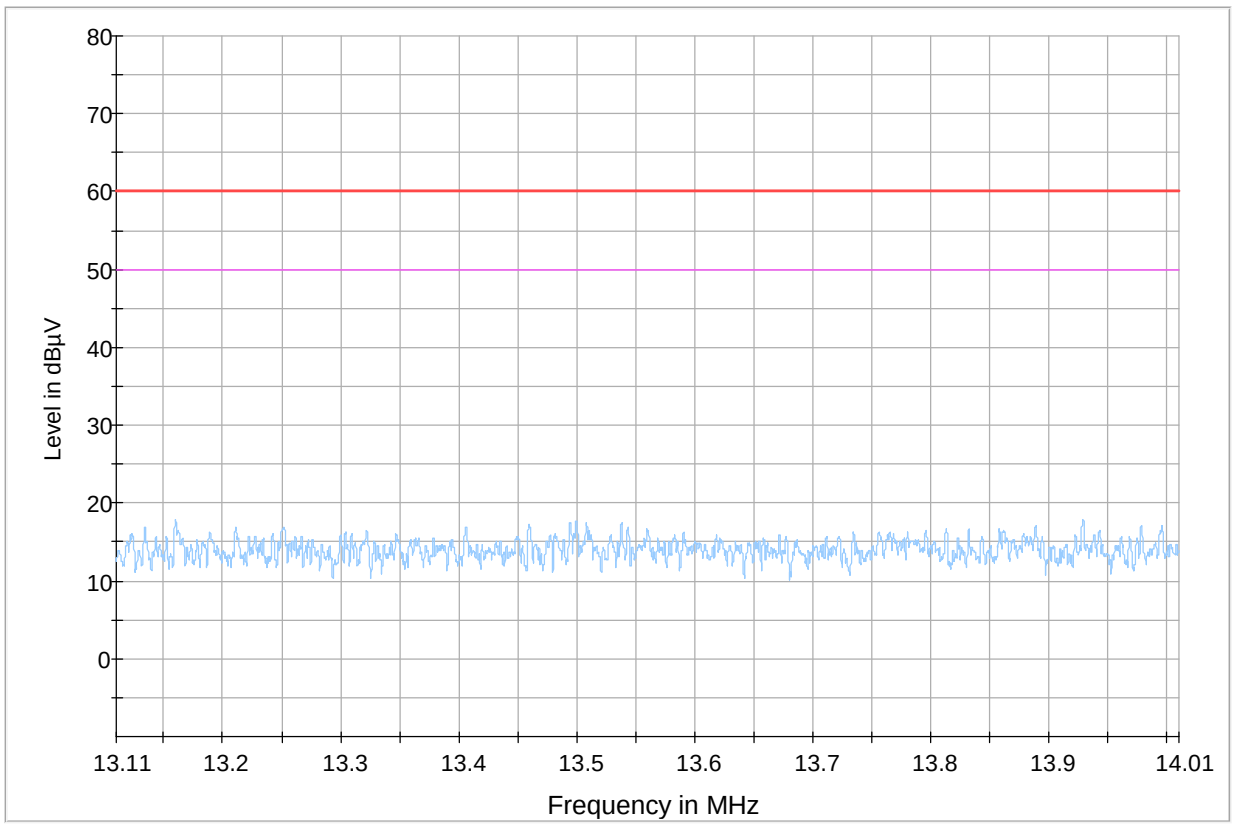
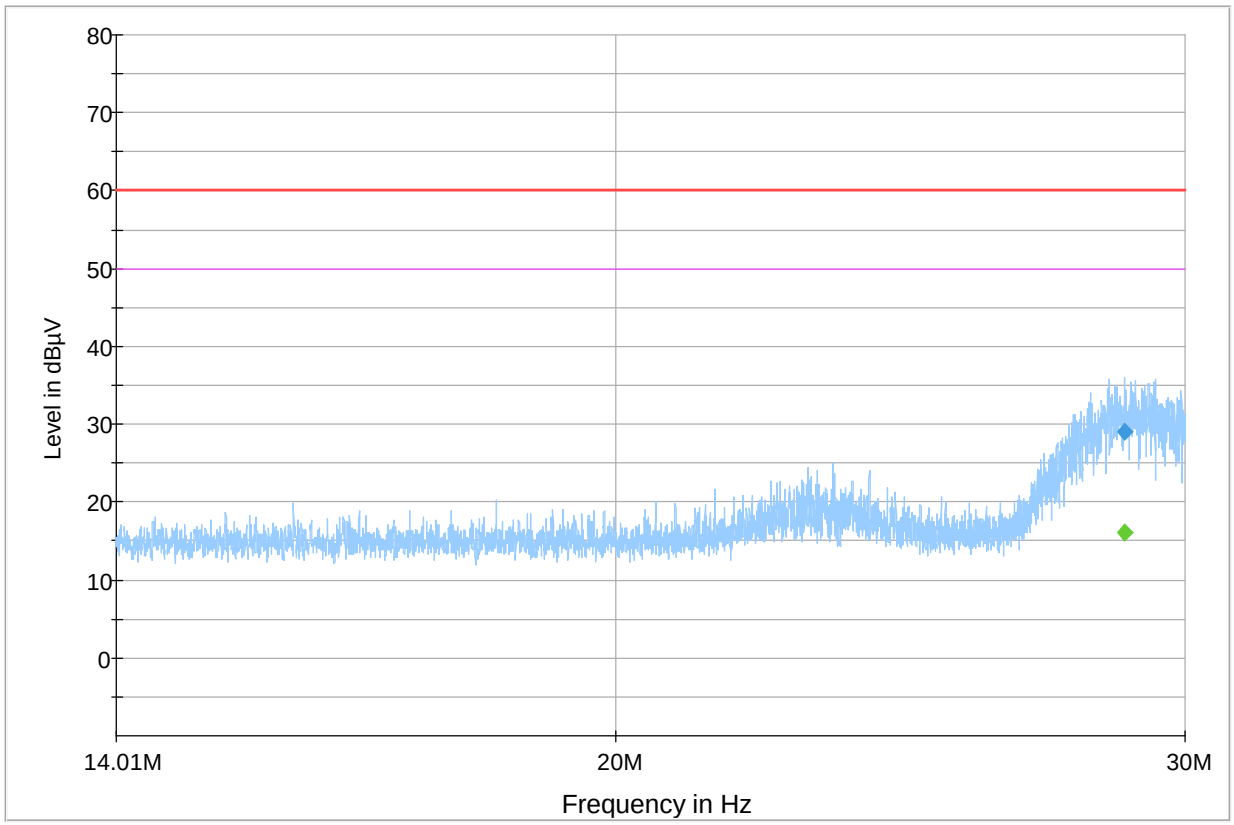


Plot # 3

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
28.737	---	16.01	50.00	33.99	500.0	9.000	L1	GND	10.5	
28.737	29.07	---	60.00	30.93	500.0	9.000	L1	GND	10.5	



8.3 Frequency Stability

8.3.1 Measurement according to ANSI C63.10

8.3.2 Limits:

Deviation: 0.01%

8.3.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	RFID	120 VAC

8.3.4 Measurement Result:

Temp (°C)	Measured Frequency (MHz)	Test Voltage (V AC)	Frequency Error (Hz)	Limit (+/- Hz)	Result
20	13.559808	120	192	1356	Pass
20	13.559810	102	190	1356	Pass
20	13.559809	138	191	1356	Pass
-20	13.559799	120	201	1356	Pass
-10	13.559800	120	200	1356	Pass
0	13.559804	120	196	1356	Pass
10	13.559808	120	192	1356	Pass
30	13.559808	120	192	1356	Pass
40	13.559808	120	192	1356	Pass
50	13.559805	120	195	1356	Pass

9 Test setup photos

Setup photos are included in supporting file name: "EMC_SMITH-014-20001_FCC_15.225_Setup_Photos_Rev1"

10 Test Equipment And Ancillaries Used For Testing

Equipment Name/Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Biconilog Antenna	A.H. Systems	BiLA2G	569343	2 years	12/01/2020
Active Loop Antenna	ETS Lindgren	6507	161344	2 years	10/30/2020
Spectrum Analyzer	R&S	ESU40	100251	2 years	09/13/2021
LISN	FCC	FCC-LISN-50-25-2-08	8014	2 years	08/31/2021
Thermometer Humidity Monitor	CONTROL COMPANY	36934-164	191871986	2 years	10/20/2021
Temperature Humidity Chamber	TestEquity	123H	246902000003		

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 History

Date	Template Revision	Changes to report	Prepared by
2022-01-13	EMC_SMITH-014-20001_FCC_15.225	Initial Version	Cheng Song
2022-04-16	EMC_SMITH-014-20001_FCC_15.225_Rev1	Updated section 3.3 with ferrite details Updated section 7.1.1 distance correction factor on field strength calculation Updated section 8.2 AC Power Line Conducted Emissions result Updated Section 8.3 reference standard and result	Cheng Song

<<< The End >>>