



CERTIFICATION TEST REPORT

Report Number. : 13593618B

Applicant : Signify North America Corporation
O'Hare International Center
10275 W. Higgins Rd
US

Model : SNH210 MC
SNH210 IA

FCC ID : 2AF2N-SHMC

IC : 20659-SHMC

EUT Description : Lighting Control

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5 + A1

Date Of Issue:
2021-01-29

Prepared by:
UL LLC
333 Pfingsten Road
Northbrook, IL 60062
US



REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	--	Initial Issue	

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	4
2. TEST RESULTS SUMMARY	5
3. TEST METHODOLOGY	6
4. FACILITIES AND ACCREDITATION	6
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	7
5.1. METROLOGICAL TRACEABILITY	7
5.2. DECISION RULES.....	7
5.3. MEASUREMENT UNCERTAINTY.....	7
5.4. SAMPLE CALCULATION	7
6. EQUIPMENT UNDER TEST	8
6.1. EUT DESCRIPTION	8
6.2. MAXIMUM OUTPUT POWER.....	8
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
6.4. SOFTWARE AND FIRMWARE.....	8
6.5. WORST-CASE CONFIGURATION AND MODE.....	8
6.6. DESCRIPTION OF TEST SETUP.....	9
7. MEASUREMENT METHOD.....	10
8. TEST AND MEASUREMENT EQUIPMENT	11
9. ANTENNA PORT TEST RESULTS	12
9.1. ON TIME AND DUTY CYCLE.....	12
9.2. 99% BANDWIDTH.....	13
9.2.1. ZigBee	13
9.3. 6 dB BANDWIDTH.....	14
9.3.1. ZigBee	14
9.4. OUTPUT POWER.....	15
9.4.1. ZigBee	16
9.5. POWER SPECTRAL DENSITY	17
9.5.1. ZigBee	17
9.6. CONDUCTED SPURIOUS EMISSIONS.....	18
9.6.1. ZigBee	19
10. RADIATED TEST RESULTS	23
10.1. LIMITS AND PROCEDURE.....	23
10.2. TRANSMITTER ABOVE 1 GHz.....	25
10.2.1. ZigBee	25
11. AC POWER LINE CONDUCTED EMISSIONS	40
12. SETUP PHOTOS	43

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Signify North America Corporation
O'Hare International Plaza
10275 W. Higgins Rd
Rosemount, IL 60018
US

EUT DESCRIPTION: Lighting Control

MODEL: SNH210 MC
SNH210 IA

SERIAL NUMBER: F3

SAMPLE RECEIPT DATE: 2020-12-03

DATE TESTED: 2020-12-03 - 2020-12-14

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released For
UL LLC By:



Jeff Moser
Operations Manager
Consumer Technology Division
UL LLC

Prepared By:



Bart Mucha
Test Engineer
Consumer Technology Division
UL LLC

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Compliant	None.
15.247 (e)	RSS-247 5.2 (b)	PSD	Compliant	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Compliant	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Compliant	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, Illinois, USA.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building: 333 Pfingsten Road Northbrook, IL 60062	US0065	2180A	152210

UL NBK is accredited by NVLAP, Laboratory Code 100414-0

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	3.31 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Conducted Antenna Port Emission	3.05 dB

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a ceiling mount wireless light controller with Bluetooth and ZigBee radios. This report is for the ZigBee radio only. See report number 13593618A for Bluetooth data. Simultaneous operation between the two radios is not possible.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405 - 2480	ZigBee	5.63	3.66

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 2.5dBi

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v1.1.5.1607

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, and power line conducted emission were performed with the EUT set to transmit at the middle channel.

Band edge and radiated emissions between 1GHz and 25GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

EUT is installed in single orientation only

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer/Brand	Model	Serial Number	FCC ID
Ballast	Philips	XI040C110V054VP	-	-

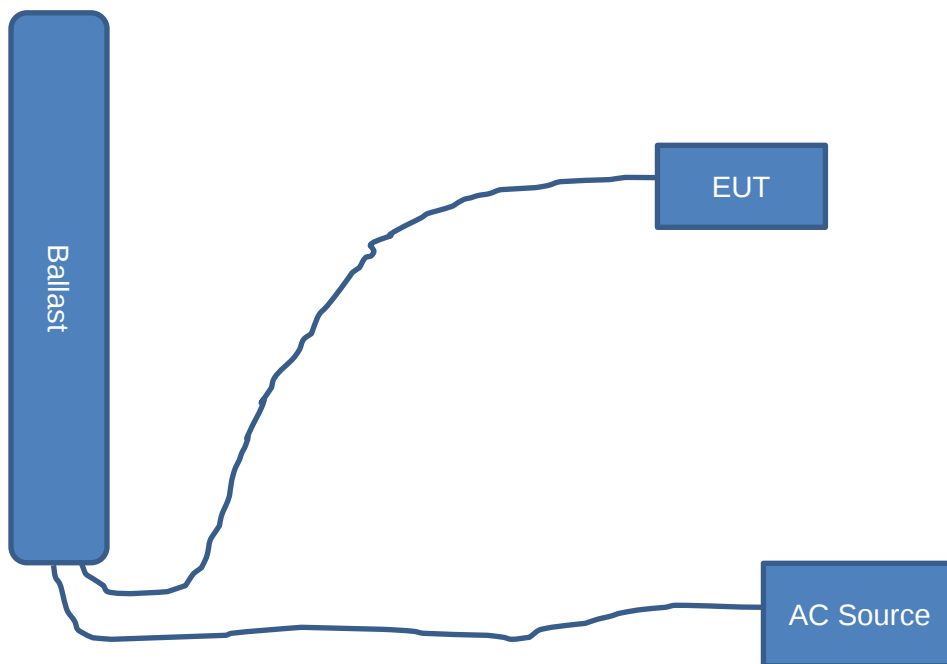
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Power	1	push in	2 wire	1 m	n/a
2	AC	1	push in	3 wire	1.5 m	n/a

TEST SETUP

The EUT is programmed with NFC device to specific operating mode. NFC programmer is removed and is not needed during testing.

SETUP DIAGRAMS



7. MEASUREMENT METHOD

6 dB BW: ANSI C63.10 Subclause -11.8.1 $RBW \geq DTS \text{ BW}$

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.1.1 $RBW \geq DTS \text{ bandwidth}$

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Conducted emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11, 6.10.4

Radiated emissions restricted frequency bands and bandedges: ANSI C63.10 Subclause -11.12.1, 6.10.5

Radiated Spurious Emissions: ANSI C63.10-2013 Section 6.3-6.6

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 15, 2019
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	2019-12-28	2020-12-31
Bicon Antenna	Electro-Metrics	EM6912A	EMC4070	2019-12-31	2020-12-31
Log-P Antenna	Chase	UPA6109	EMC4258	2019-12-31	2020-12-31
Loop Antenna	EMCO	6502/1	EMC4026	2020-01-28	2021-01-31
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	2019-12-26	2020-12-31
Antenna Array	UL	BOMS	EMC4276	2020-07-02	2021-07-31
Signal Analyzer	Aglient	N9030A PXA	EMC4360	2019-12-22	2020-12-31

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

The EUT was set to 100% duty cycle and it was verified that it operates at 100% duty cycle.

9.2. 99% BANDWIDTH

LIMITS

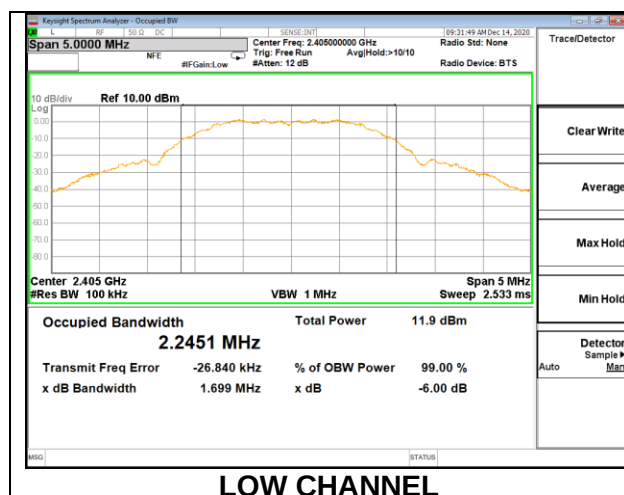
None; for reporting purposes only.

RESULTS

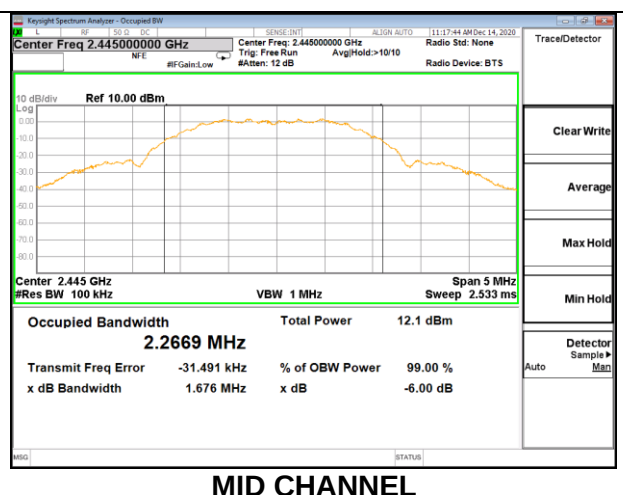
Tested By:	bm06740
Date:	2020-12-14

9.2.1. ZigBee

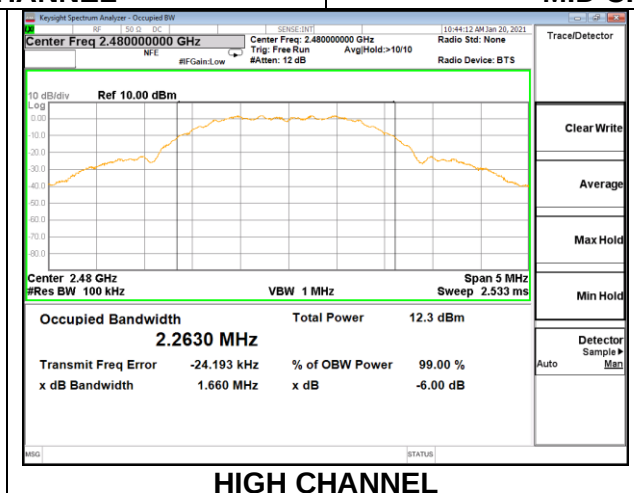
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	2.2451
Middle	2445	2.2669
High	2480	2.2630



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
RSS-247 5.2 (a)

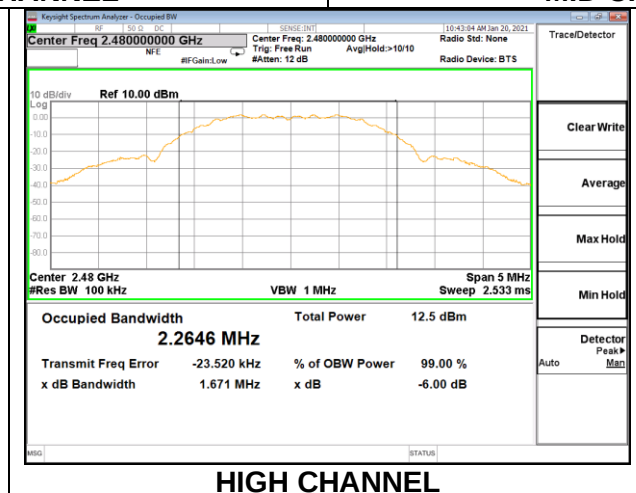
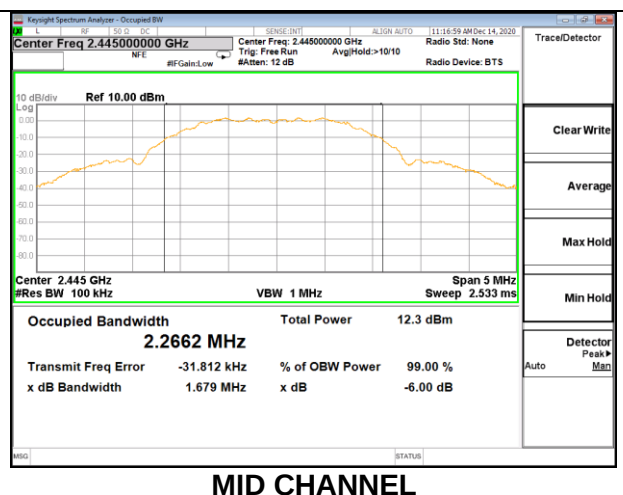
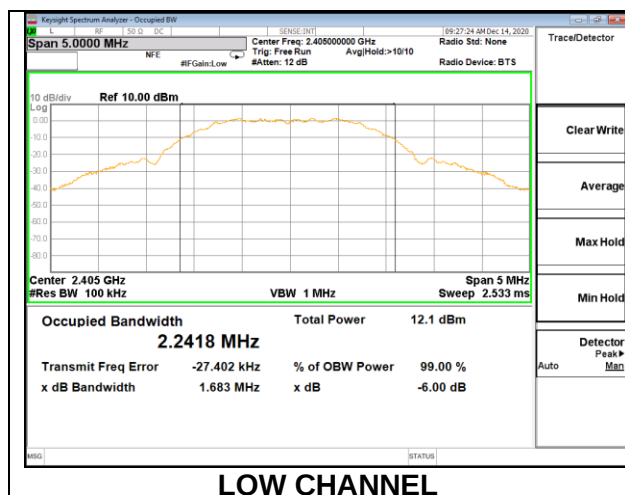
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Tested By:	bm06740
Date:	2020-12-14

9.3.1. ZigBee

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2405	1.6830	0.5
Middle	2445	1.6790	0.5
High	2480	1.6710	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

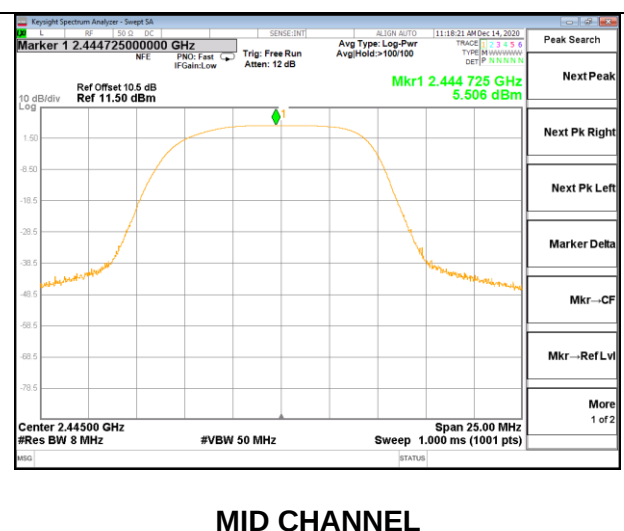
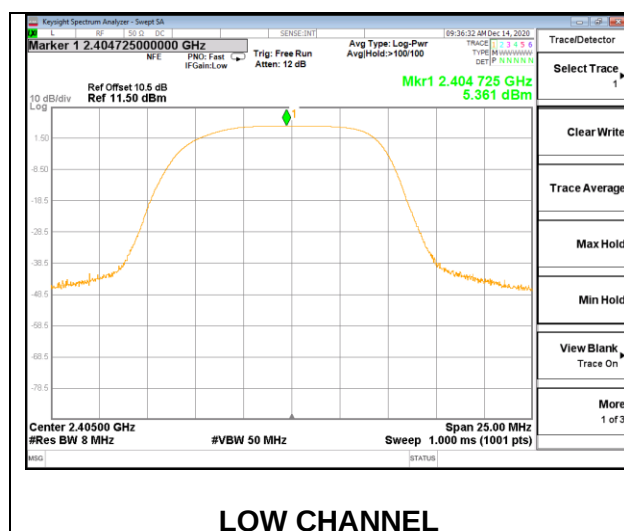
The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the spectrum analyzer to allow for a gated peak reading of power.

RESULTS

Tested By:	bm06740
Date:	2020-12-14

9.4.1. ZigBee

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2405	5.361	30	-24.639
Middle	2445	5.506	30	-24.494
High	2480	5.632	30	-24.368



9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
RSS-247 (5.2) (b)

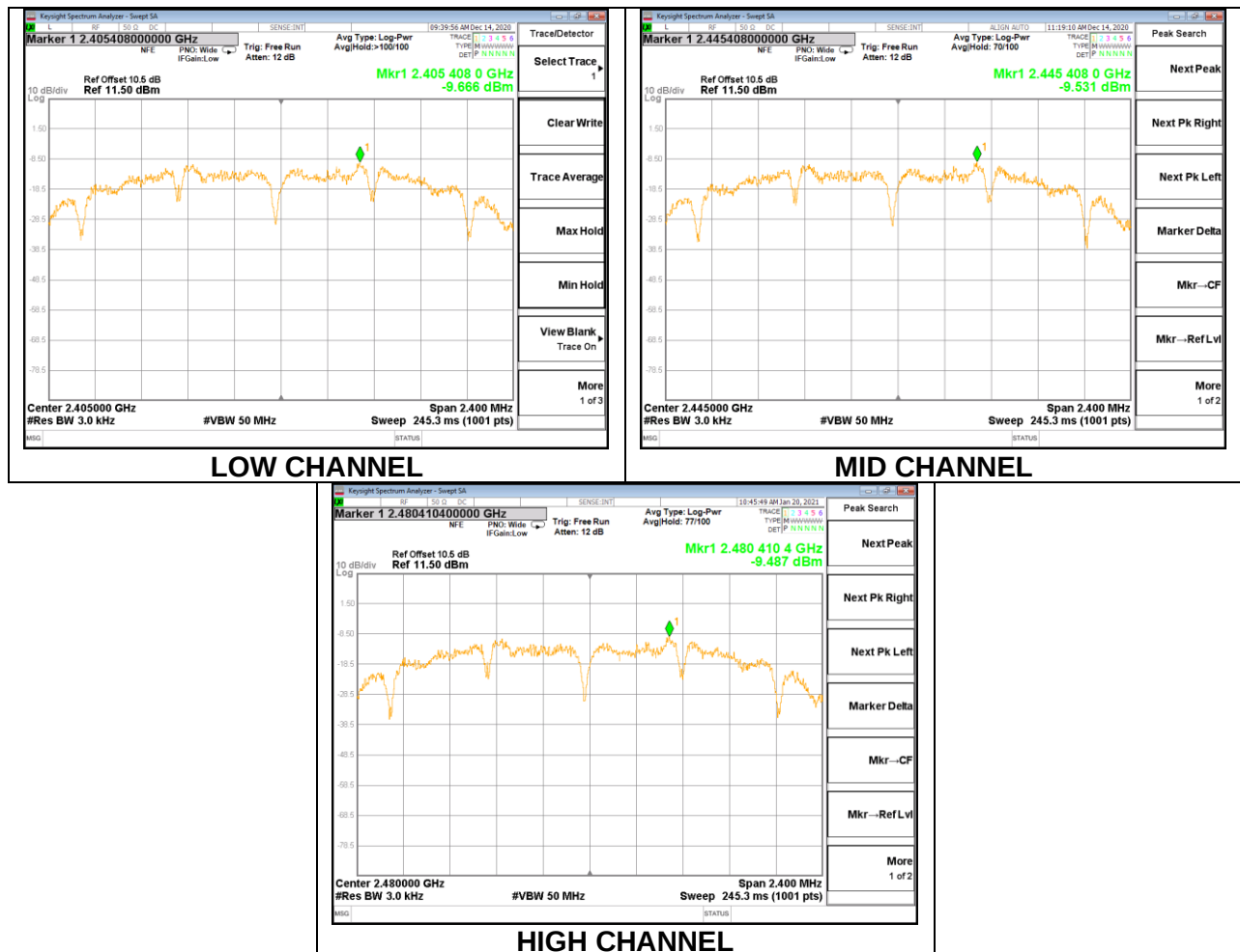
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

Tested By:	bm06740
Date:	2020-12-14

9.5.1. ZigBee

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2405	-9.67	8	-17.67
Middle	2445	-9.53	8	-17.53
High	2480	-9.49	8	-17.49



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

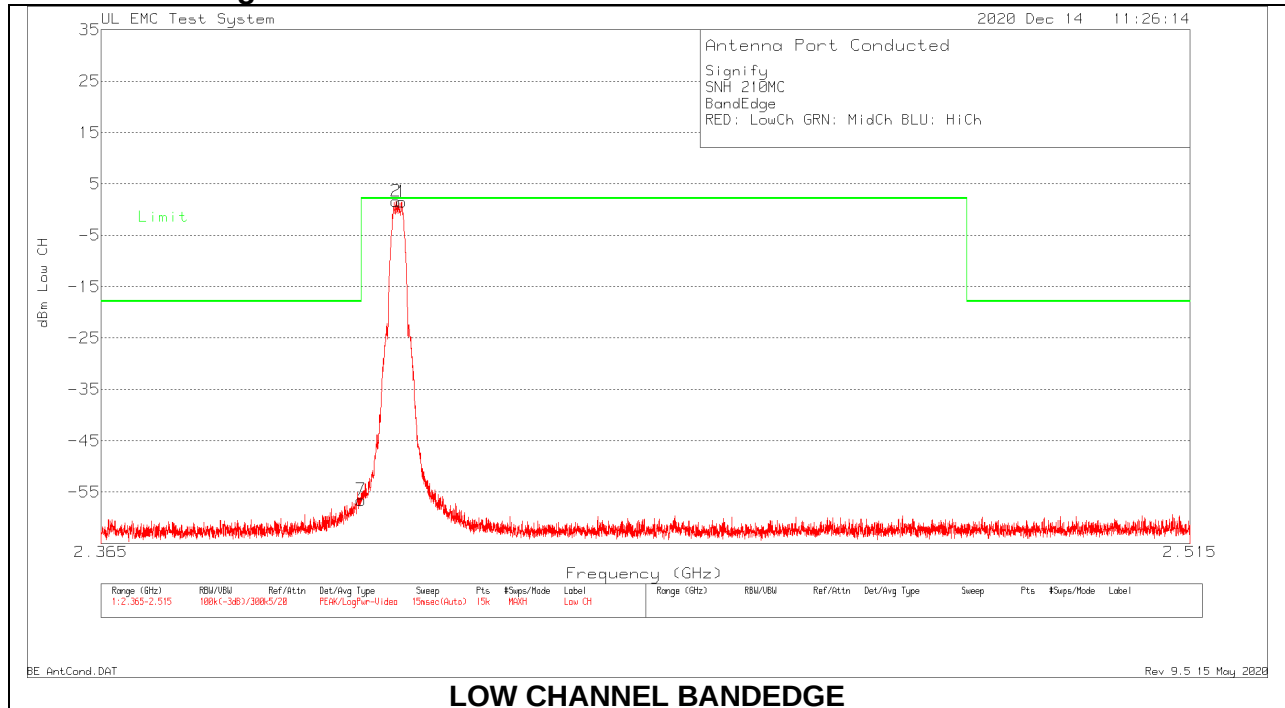
RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

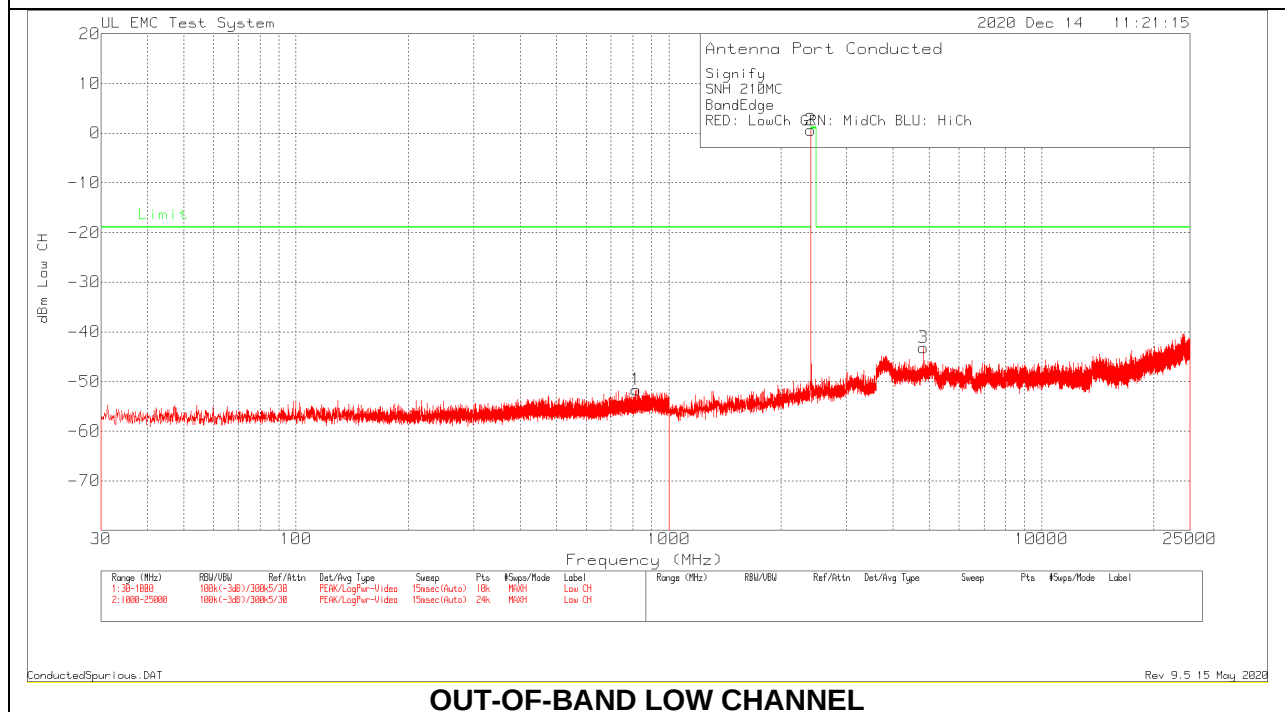
RESULTS

Tested By:	bm06740
Date:	2020-12-14

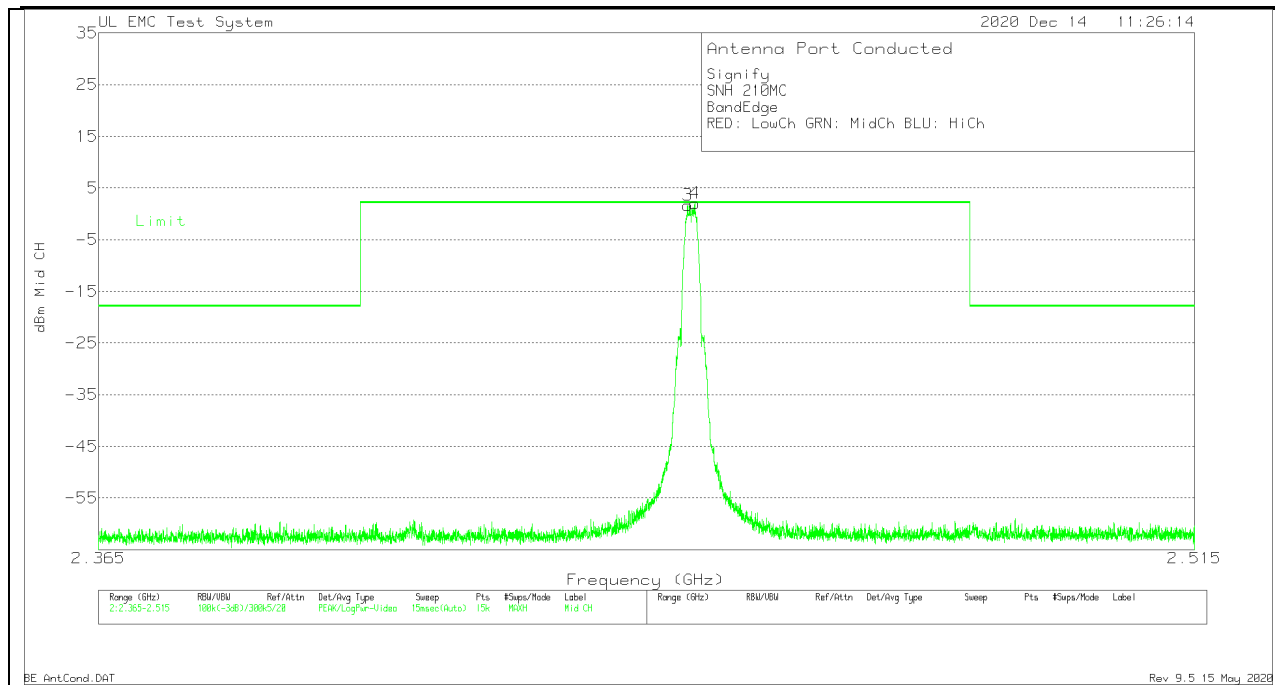
9.6.1. ZigBee



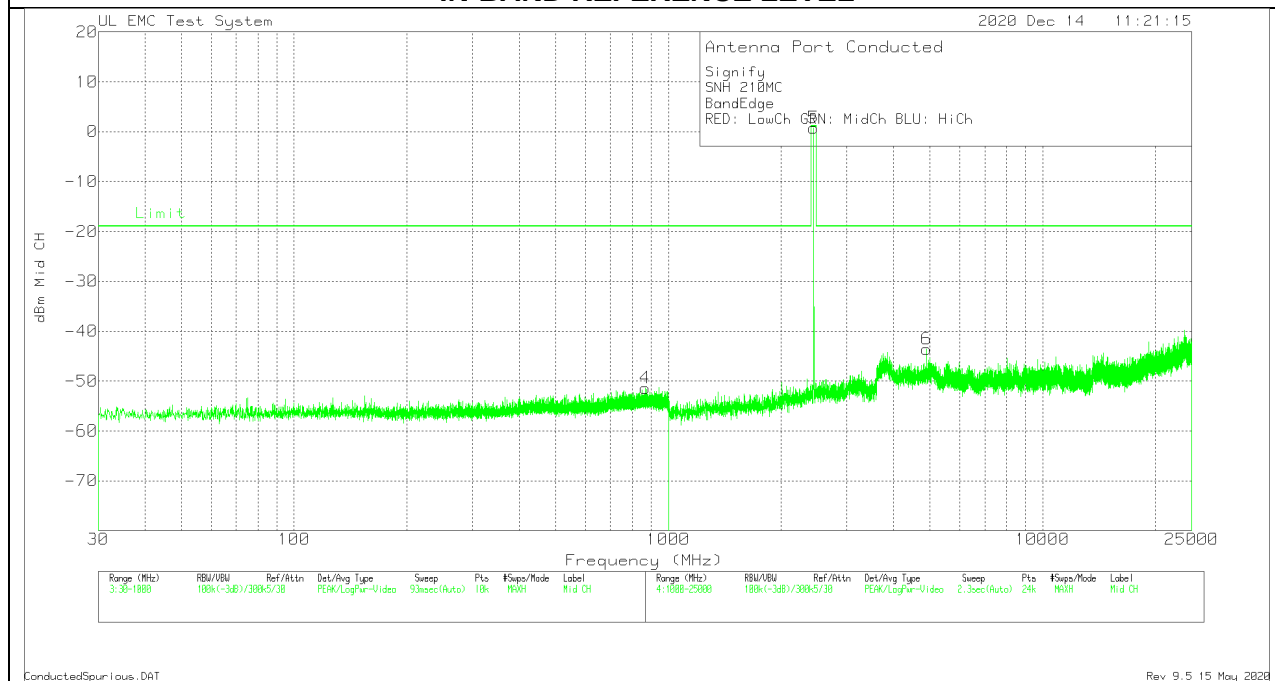
LOW CHANNEL BANDEDGE



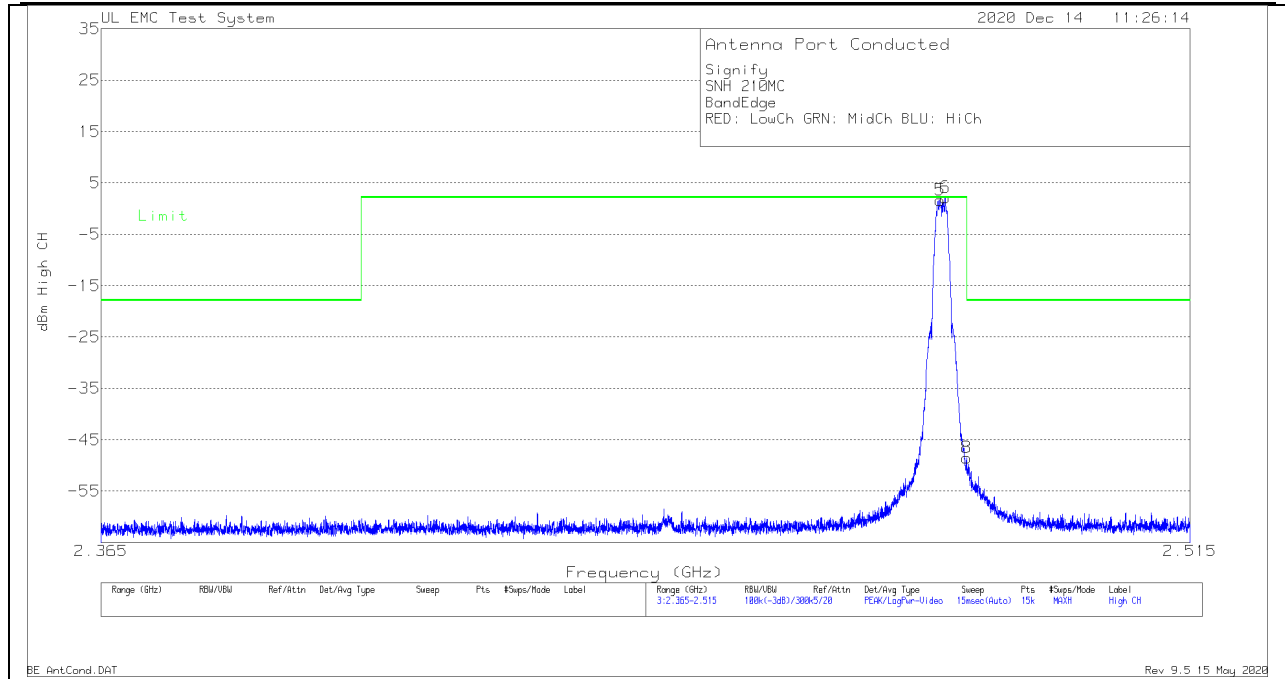
OUT-OF-BAND LOW CHANNEL



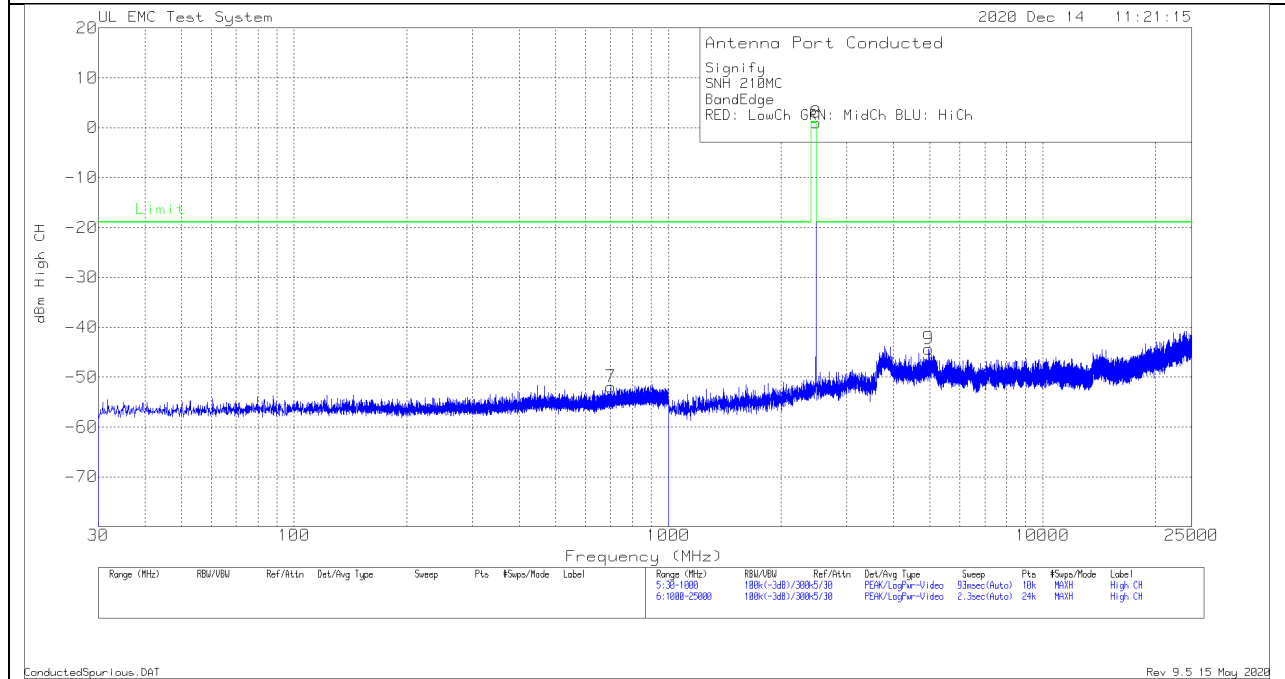
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

Bandedge Tabular Data

Signify								
SNH 210MC								
BandEdge								
RED: Low Ch GRN: MidCh BLU: HiCh								
Trace Markers								
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Attenuator dB	Corrected Reading dBm	Limit dBm	Margin (dB)
Low Channel								
1	2.4055	-8.93	Pk	0.6	9.9	1.57	2.16	-0.59
2	2.4047	-8.85	Pk	0.6	9.9	1.65	2.16	-0.51
7	2.4	-67.02	Pk	0.6	9.9	-56.52	-17.84	-38.68
Middle Channel								
3	2.4445	-8.83	Pk	0.6	9.9	1.67	2.16	-0.49
4	2.4455	-8.51	Pk	0.6	9.9	1.99	2.16	-0.17
High Channel								
5	2.4797	-8.9	Pk	0.6	9.9	1.6	2.16	-0.56
6	2.4805	-8.34	Pk	0.6	9.9	2.16	2.16	0
8	2.4835	-59.03	Pk	0.6	9.9	-48.53	-17.84	-30.69
Pk - Peak detector								

Conducted Spurious Tabular Data

Signify								
SNH 210MC								
BandEdge								
RED: Low Ch GRN: MidCh BLU: HiCh								
Trace Markers								
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Attenuator dB	Corrected Reading dBm	Limit dBm	Margin (dB)
Low Channel								
1	817.5272	-61.71	Pk	0.3	9.8	-51.61	-18.97	-32.64
2	2404	-9.9	Pk	0.6	9.9	0.6	1.03	-0.43
3	4811	-54.1	Pk	0.8	10.1	-43.2	-18.97	-24.23
Middle Channel								
4	867.6814	-61.5	Pk	0.3	9.8	-51.4	-18.97	-32.43
5	2444	-9.74	Pk	0.6	9.9	0.76	1.03	-0.27
6	4889	-54.44	Pk	0.8	10.1	-43.54	-18.97	-24.57
High Channel								
7	701.7943	-61.97	Pk	0.3	9.8	-51.87	-18.97	-32.9
8	2479	-9.47	Pk	0.6	9.9	1.03	1.03	0
9	4959	-55.2	Pk	0.8	10.1	-44.3	-18.97	-25.33
Pk - Peak detector								

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters for 9kHz-30MHz, 10 meters for 30MHz-1GHz, and 3 meters for 1GHz-25GHz. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements. For this test program, average measurements were made using RMS average detection with the resolution bandwidth set to 1 MHz; the video bandwidth set to 3 MHz.

The spectrum from 1 GHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz testing was conducted on middle channel only.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

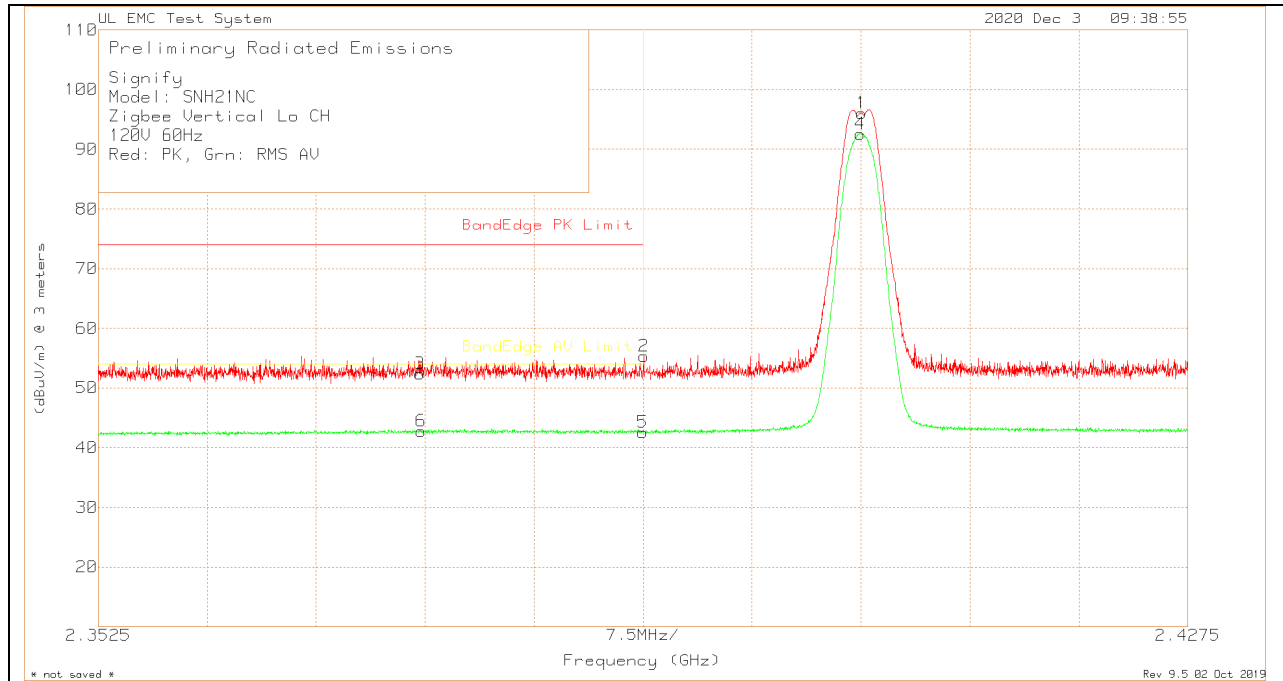
2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

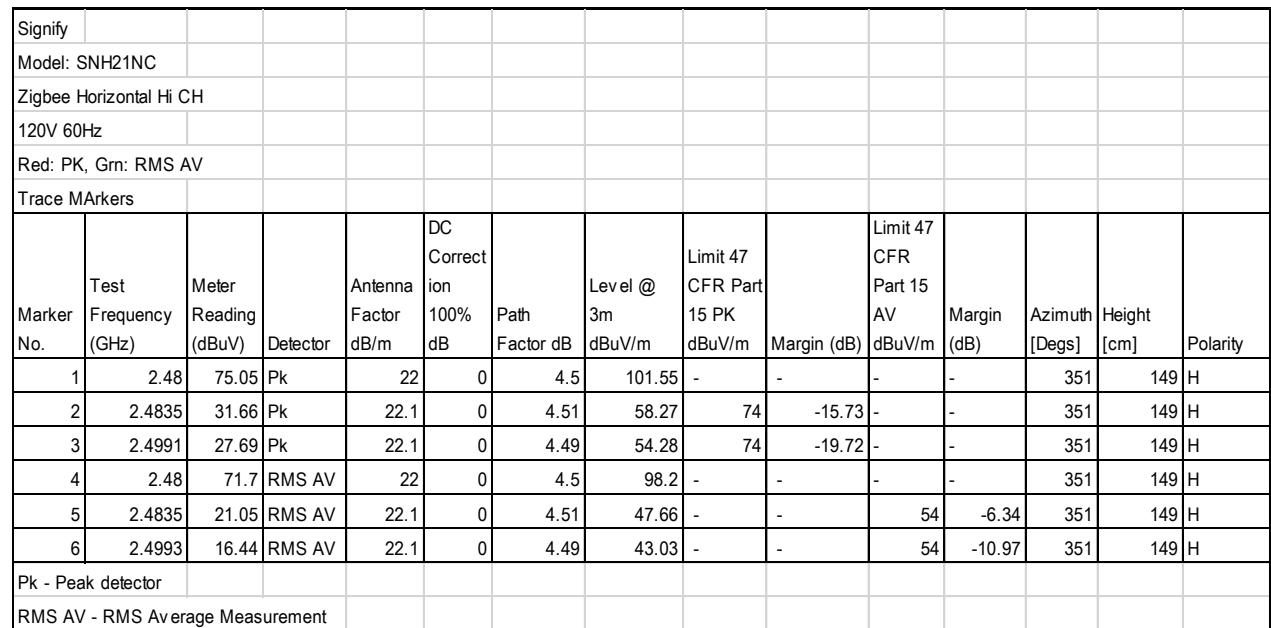
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

VERTICAL RESULT



Signify															
Model:	SNH21NC														
Zigbee Vertical Lo CH															
120V 60Hz															
Red: PK, Grn: RMS AV															
Trace Markers															
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	DC Correction 100% dB	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
1	2.4051	69.51	Pk	21.8	0	4.73	96.04	-	-	-	-	299	327	V	
2	2.39	28.86	Pk	21.8	0	4.71	55.37	74	-18.63	-	-	299	327	V	
3	2.3746	25.72	Pk	21.8	0	4.85	52.37	74	-21.63	-	-	299	327	V	
4	2.405	66.06	RMS AV	21.8	0	4.73	92.59	-	-	-	-	299	327	V	
5	2.39	16	RMS AV	21.8	0	4.71	42.51	-	-	54	-11.49	299	327	V	
6	2.3747	16.1	RMS AV	21.8	0	4.85	42.75	-	-	54	-11.25	299	327	V	
Pk - Peak detector															
RMS AV - RMS Average Measurement															

HORIZONTAL RESULT



UL EMC Test System

2020 Dec 3 09:23:19

Preliminary Radiated Emissions

Signify
Model: SNH21NC
Zigbee Vertical Hi CH
120V 60Hz
Red: PK, Grn: RMS AV

(dBuV/m) @ 3 meters

BandEdge PK Limit

BandEdge AV Limit

2.446 7.5MHz/ 2.521

Frequency (GHz)

* not saved *

Rev 9.5 02 Oct. 2019

Signify															
Model: SNH21NC															
Zigbee Vertical Hi CH															
120V 60Hz															
Red: PK, Grn: RMS AV															
Trace MArkers															
Marker No.	Test Frequency (GHz)	Meter Reading (dBUV)	Antenna Factor dB/m	DC Correct ion 100% dB	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity		
1	2.4799	70.56	Pk	22	0	4.5	97.06	-	-	-	228	309	V		
2	2.48	70.64	Pk	22	0	4.5	97.14	-	-	-	228	309	V		
3	2.4835	29.78	Pk	22.1	0	4.51	56.39	74	-17.61	-	228	309	V		
4	2.5019	26.14	Pk	22.1	0	4.51	52.75	74	-21.25	-	228	309	V		
5	2.48	67.36	RMS AV	22	0	4.5	93.86	-	-	-	228	309	V		
6	2.4835	19.04	RMS AV	22.1	0	4.51	45.65	-	-	54	-8.35	228	309	V	
7	2.5021	16.39	RMS AV	22.1	0	4.51	43	-	-	54	-11	228	309	V	
Pk - Peak detector															
RMS AV - RMS Average Measurement															

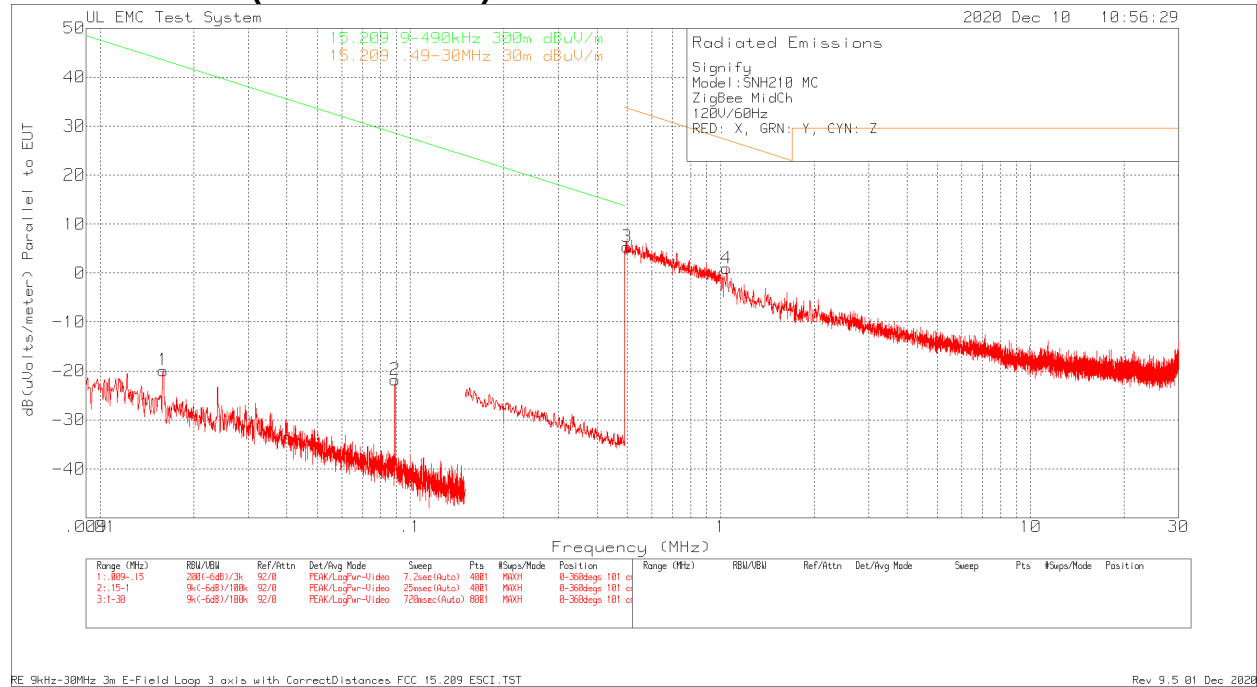
HARMONICS AND SPURIOUS EMISSIONS

9kHz – 30MHz Middle Channel (worst case)

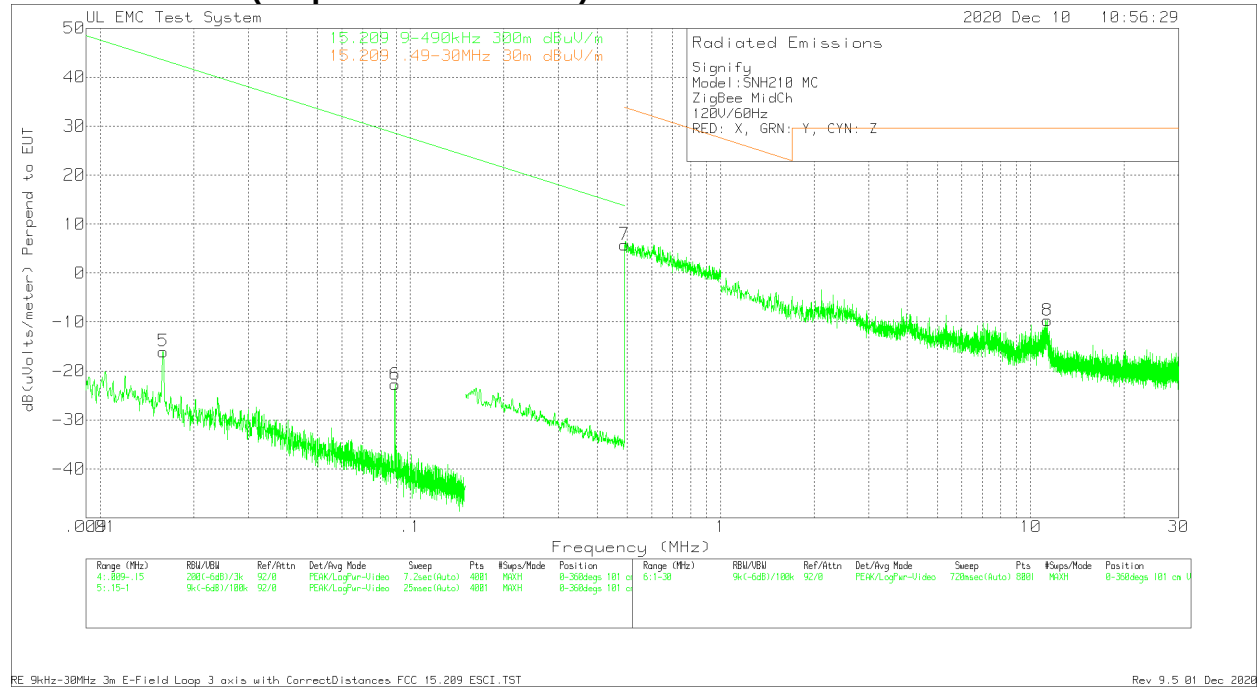
Note for below 30 MHz scans: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were $40 \cdot \log(\text{test distance} / \text{specification distance})$.

The below 30 MHz limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency 15.93 KHz resulted in a level of -19.87 dBuV/m, which is equivalent to $-19.87 - 51.5 = -71.37$ dBuA/m, which has the same margin, -63.42 dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

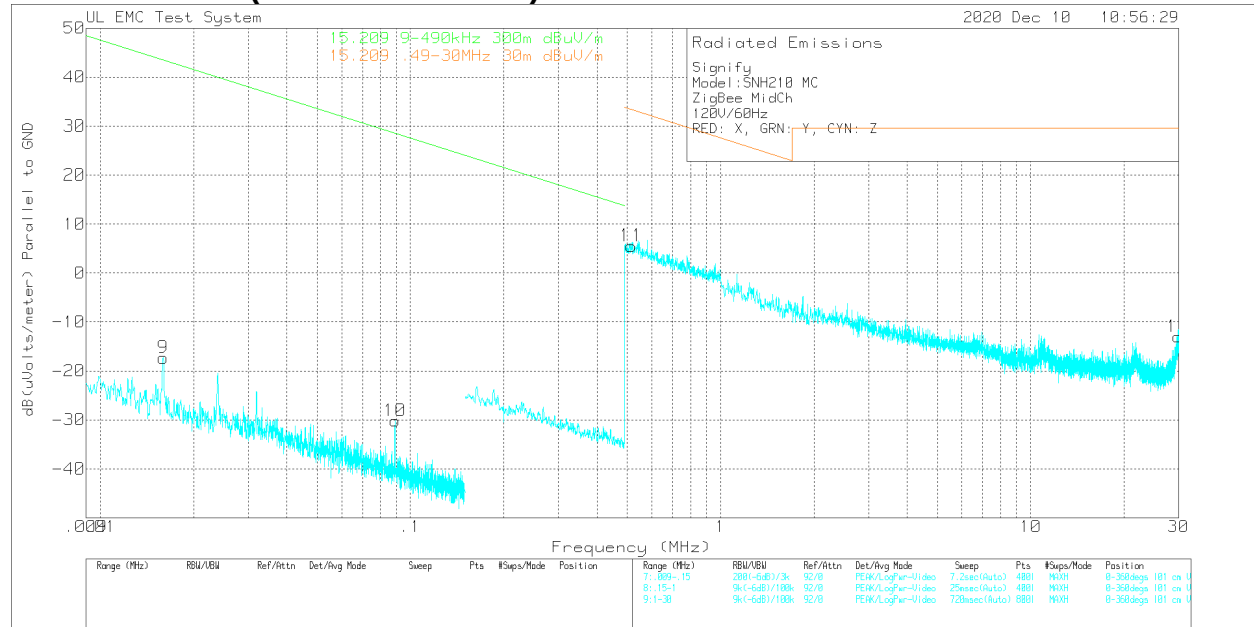
Antenna X-Axis (Parallel to EUT)



Antenna Y-Axis (Perpendicular to EUT)



Antenna Z-Axis (Parallel to Ground)

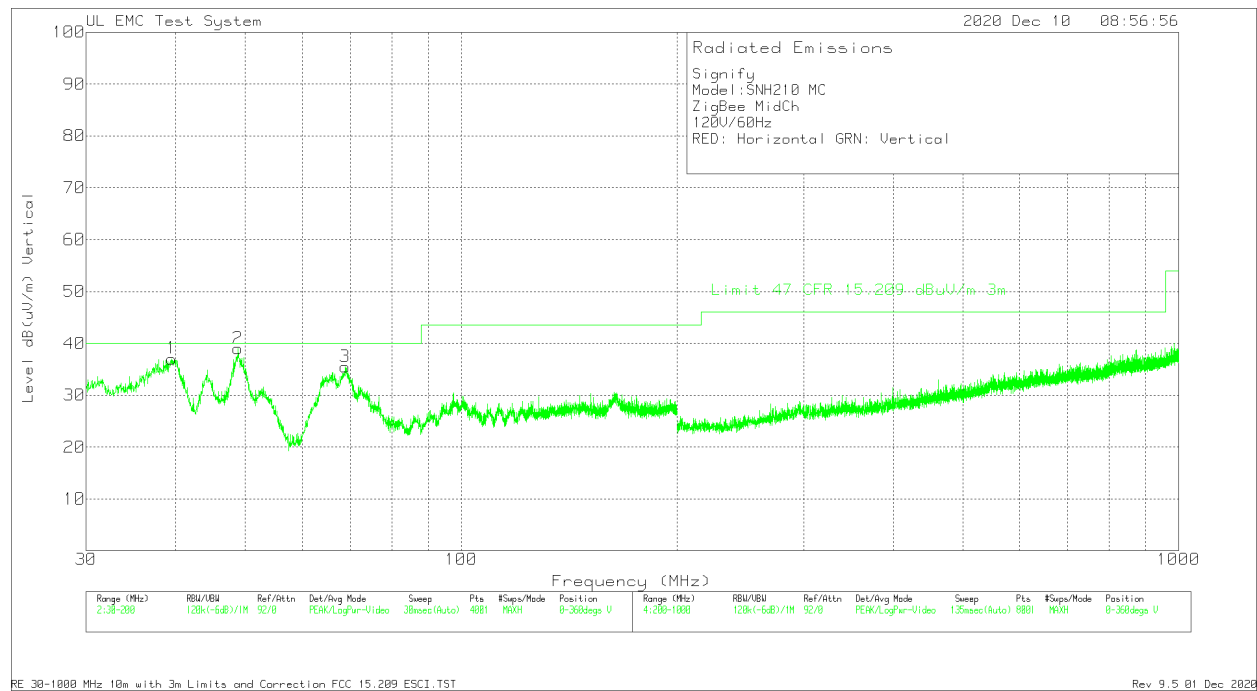
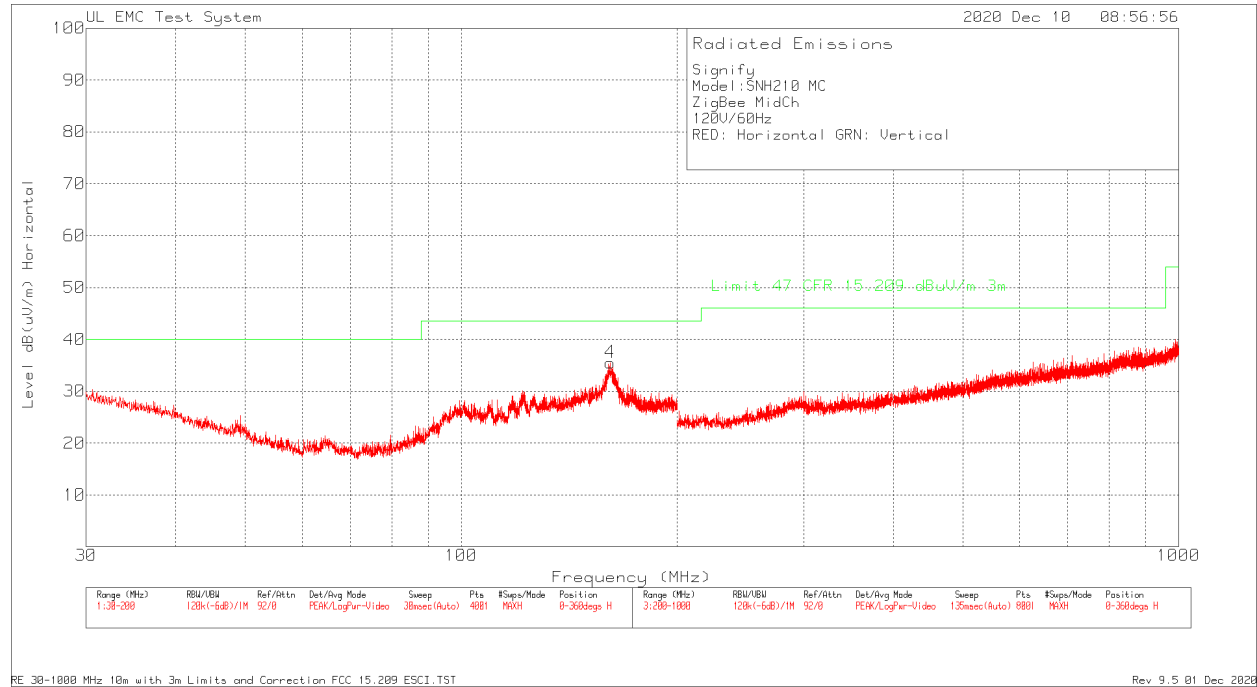


RE 9kHz-30MHz 3m E-Field Loop 3 axis with CorrectDistances FCC 15.209 ESCI.TST

Rev 9.5 01 Dec 2020

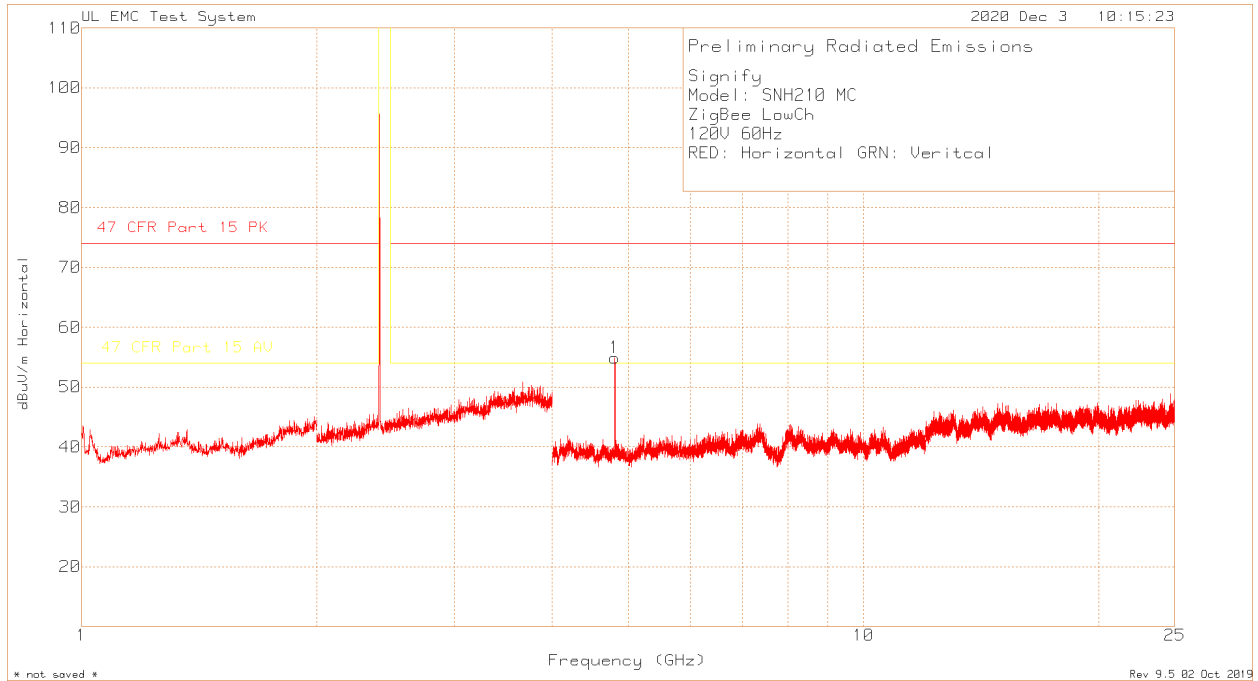
Signify												
Model:SNH210 MC												
ZigBee MidCh												
120V/60Hz												
RED: X, GRN: Y, CYN: Z												
Trace MARKers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	300mTo3m & 30mTo3m dB	Level dBuV/m	15.209 9-490kHz 300m dBuV/m	Margin (dB)	15.209 .49-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
Parallel to EUT												
1	0.01593	39.13	Pk	20.9	0.1	-80	-19.87	43.55	-63.42	-	-	0-360
2	0.08915	45.28	Pk	12.8	0.1	-80	-21.82	28.6	-50.42	-	-	0-360
3	0.50007	33.43	Pk	11.8	0.1	-40	5.33	-	-	33.62	-28.29	0-360
4	1.04713	28.76	Pk	12.1	0.1	-40	0.96	-	-	27.2	-26.24	0-360
Perpendicular to EUT												
5	0.01593	42.99	Pk	20.9	0.1	-80	-16.01	43.55	-59.56	-	-	0-360
6	0.08915	44.36	Pk	12.8	0.1	-80	-22.74	28.6	-51.34	-	-	0-360
7	0.49059	33.9	Pk	11.8	0.1	-40	5.8	-	-	33.79	-27.99	0-360
8	11.33488	18.31	Pk	11.6	0.4	-40	-9.69	-	-	29.54	-39.23	0-360
Parallel to Ground												
9	0.01593	41.68	Pk	20.9	0.1	-80	-17.32	43.55	-60.87	-	-	0-360
10	0.08915	36.88	Pk	12.8	0.1	-80	-30.22	28.6	-58.82	-	-	0-360
11	0.51572	33.63	Pk	11.8	0.1	-40	5.53	-	-	33.36	-27.83	0-360
12	29.87675	17.18	Pk	9.2	0.6	-40	-13.02	-	-	29.54	-42.56	0-360
Pk - Peak detector												

30MHz – 1GHz Middle Channel



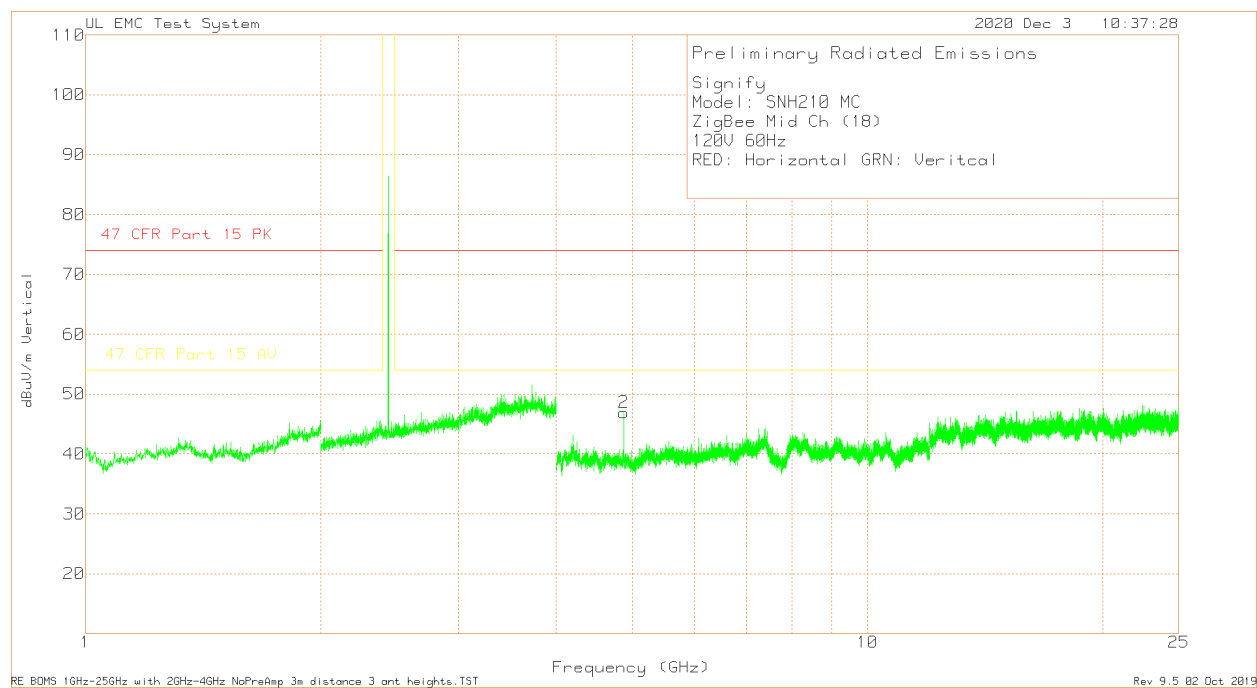
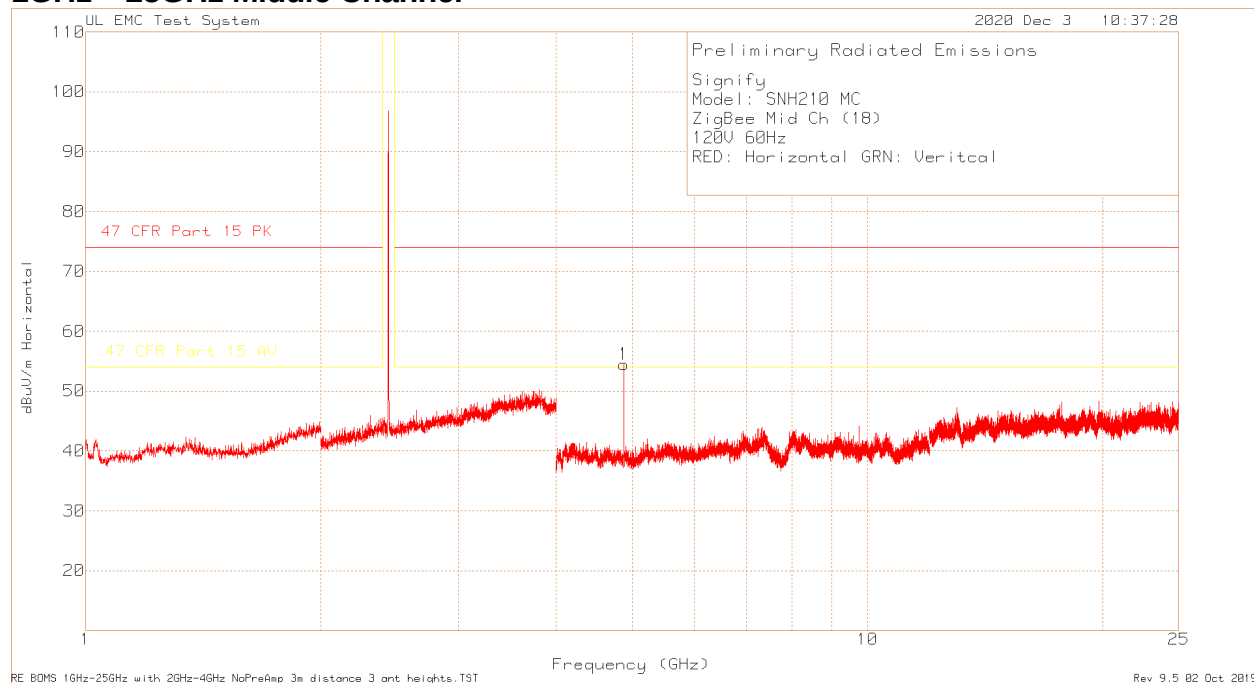
Page 33 of 48

1GHz – 25GHz Low Channel



Signify Model: SNH210 MC ZigBee LowCh 120V 60Hz RED: Horizontal GRN: Veritcal Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	4.809	77.87	Pk	27.7	-50.73	54.84	74	-19.16	54	0.84	0-360	167	H
2	4.808	69.89	Pk	27.7	-50.52	47.07	74	-26.93	54	-6.93	0-360	158	V
Radiated Emission Data													
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	4.811	77.75	Pk	27.7	-50.63	54.82	74	-19.18	-	-	43	149	H
	4.8089	72.64	RMS AV	27.7	-50.72	49.62	-	-	54	-4.38	43	149	H
Pk - Peak detector RMS AV - RMS Average Measurement													

1GHz – 25GHz Middle Channel



Signify

Model: SNH210 MC

ZigBee Mid Ch (18)

120V 60Hz

RED: Horizontal GRN: Vertical

Trace Markers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	4.881	76.52	Pk	27.7	-49.73	54.49	74	-19.51	54	0.49	0-360	149	H
2	4.879	69.02	Pk	27.7	-49.83	46.89	74	-27.11	54	-7.11	0-360	140	V

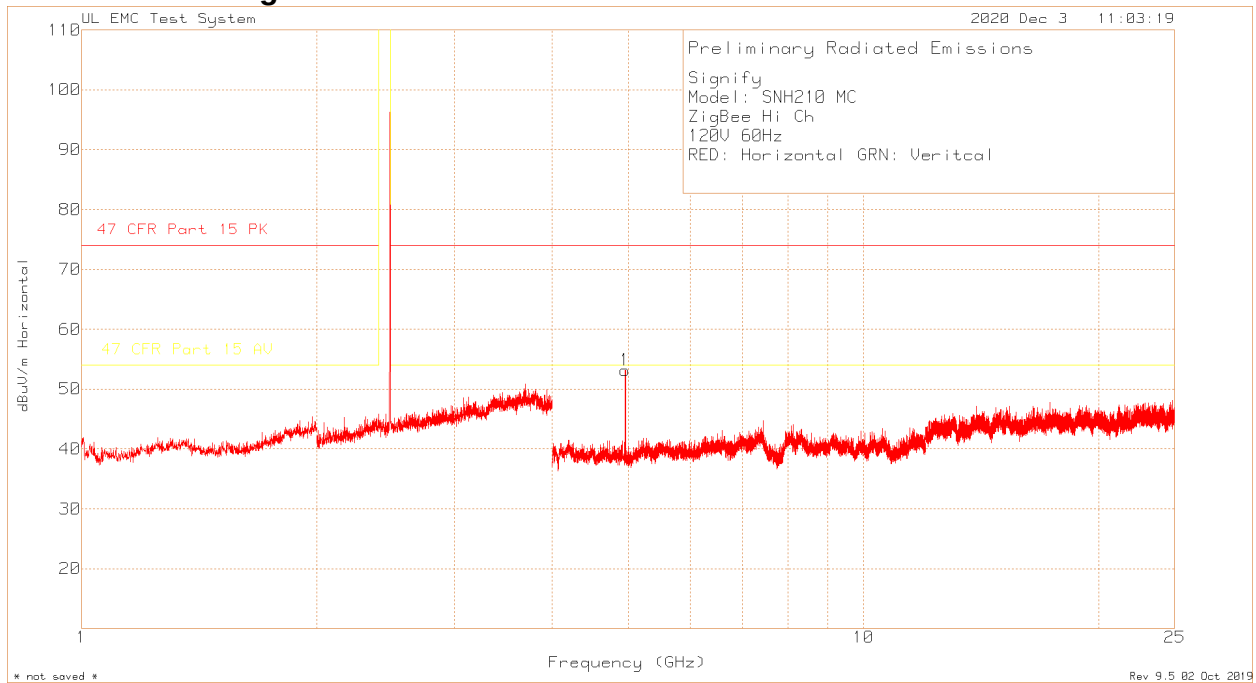
Radiated Emission Data

Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.8789	76.75	Pk	27.7	-49.81	54.64	74	-19.36	-	-	358	173	H
4.8789	71.03	RMS AV	27.7	-49.81	48.92	-	-	54	-5.08	358	173	H

Pk - Peak detector

RMS AV - RMS Average Measurement

1GHz – 25GHz High Channel



Signify													
Model: SNH210 MC													
ZigBee Hi Ch													
120V 60Hz													
RED: Horizontal GRN: Veritcal													
Trace Markers													
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	4.959	74.71	Pk	27.8	-49.33	53.18	74	-20.82	54	-0.82	0-360	173	H
2	4.961	68.86	Pk	27.8	-49.1	47.56	74	-26.44	54	-6.44	0-360	164	V
Radiated Emission Data													
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Level @ 3m dBuV/m	Limit 47 CFR Part 15 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	4.9611	74.39	Pk	27.8	-49.12	53.07	74	-20.93	-	-	41	180	H
	4.961	69.61	RMS AV	27.8	-49.1	48.31	-	-	54	-5.69	41	180	H
Pk - Peak detector													
RMS AV - RMS Average Measurement													

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

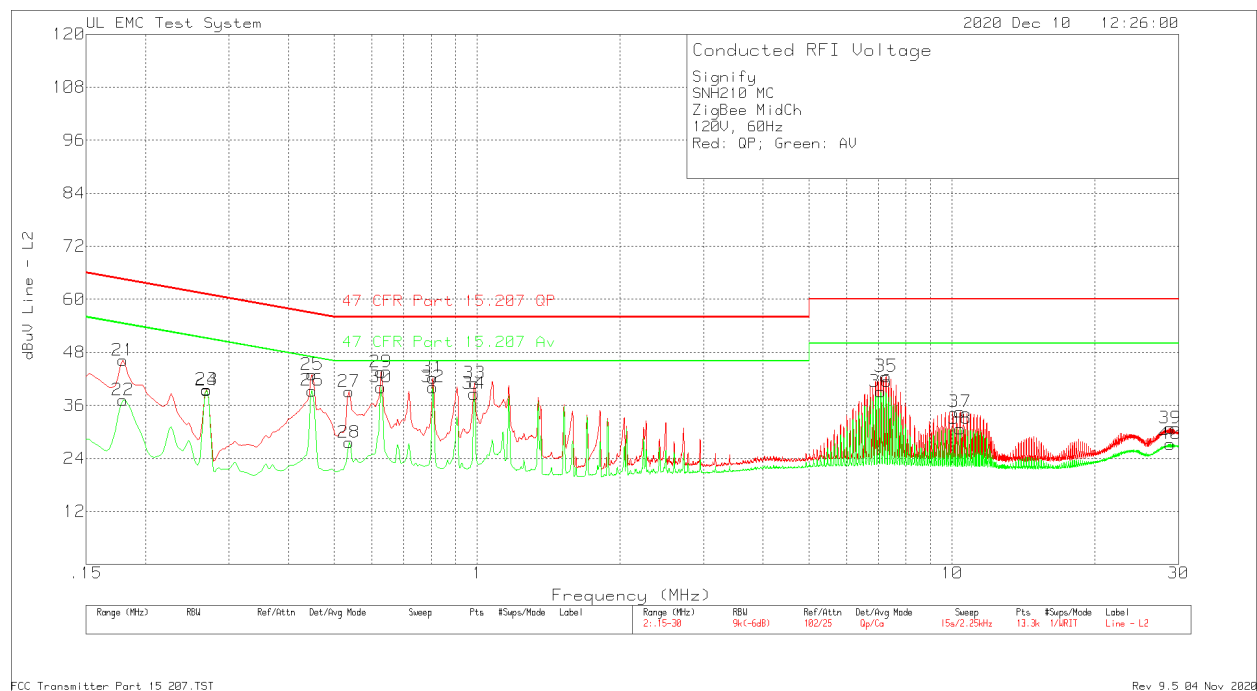
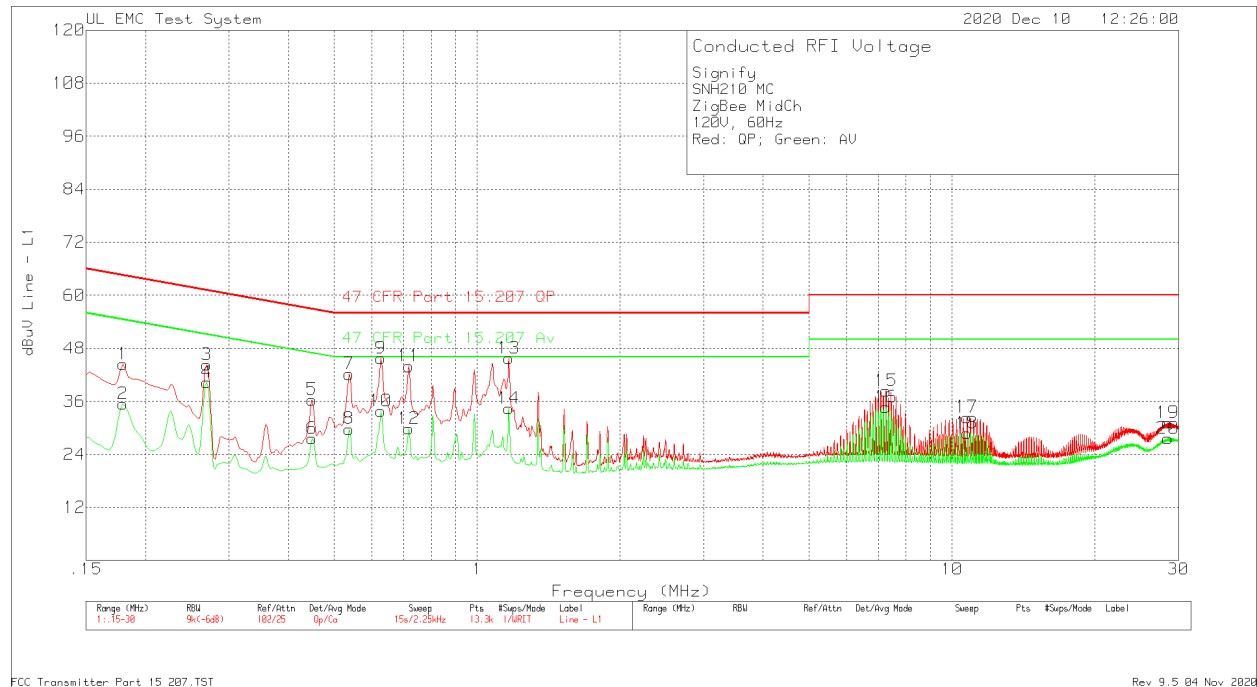
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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.

RESULTS

Line Conducted Emissions Data



Signify										
SNH210 MC										
ZigBee MidCh										
120V, 60Hz										
Red: QP; Green: AV										
Trace Markers										
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Level dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1										
1	0.17925	32.49	Qp	0	11.9	44.39	64.52	-20.13	-	-
2	0.17925	23.49	Ca	0	11.9	35.39	-	-	54.52	-19.13
3	0.26925	33.28	Qp	0	11	44.28	61.14	-16.86	-	-
4	0.26925	29.26	Ca	0	11	40.26	-	-	51.14	-10.88
5	0.44925	25.78	Qp	0	10.6	36.38	56.89	-20.51	-	-
6	0.44925	16.99	Ca	0	10.6	27.59	-	-	46.89	-19.3
7	0.537	31.56	Qp	0	10.6	42.16	56	-13.84	-	-
8	0.537	19.15	Ca	0	10.6	29.75	-	-	46	-16.25
9	0.627	35.28	Qp	0	10.5	45.78	56	-10.22	-	-
10	0.627	23.29	Ca	0	10.5	33.79	-	-	46	-12.21
11	0.717	33.43	Qp	0	10.5	43.93	56	-12.07	-	-
12	0.717	19.35	Ca	0	10.5	29.85	-	-	46	-16.15
13	1.16475	35.26	Qp	0	10.5	45.76	56	-10.24	-	-
14	1.16475	23.93	Ca	0	10.5	34.43	-	-	46	-11.57
15	7.25775	27.61	Qp	0	10.8	38.41	60	-21.59	-	-
16	7.2555	23.87	Ca	0	10.8	34.67	-	-	50	-15.33
17	10.74975	21.38	Qp	0	11	32.38	60	-27.62	-	-
18	10.74975	17.81	Ca	0	11	28.81	-	-	50	-21.19
19	28.473	19.4	Qp	-0.1	11.8	31.1	60	-28.9	-	-
20	28.47863	15.89	Ca	-0.1	11.8	27.59	-	-	50	-22.41
Neutral										
21	0.17925	34.29	Qp	0	11.9	46.19	64.52	-18.33	-	-
22	0.17925	25.25	Ca	0	11.9	37.15	-	-	54.52	-17.37
23	0.26925	28.56	Qp	0	11	39.56	61.14	-21.58	-	-
24	0.26925	28.46	Ca	0	11	39.46	-	-	51.14	-11.68
25	0.44925	32.38	Qp	0	10.6	42.98	56.89	-13.91	-	-
26	0.44925	28.73	Ca	0	10.6	39.33	-	-	46.89	-7.56
27	0.537	28.52	Qp	0	10.6	39.12	56	-16.88	-	-
28	0.537	17.01	Ca	0	10.6	27.61	-	-	46	-18.39
29	0.627	33.02	Qp	0	10.5	43.52	56	-12.48	-	-
30	0.627	29.59	Ca	0	10.5	40.09	-	-	46	-5.91
31	0.807	31.79	Qp	0	10.5	42.29	56	-13.71	-	-
32	0.807	29.59	Ca	0	10.5	40.09	-	-	46	-5.91
33	0.987	30.51	Qp	0	10.5	41.01	56	-14.99	-	-
34	0.98475	28.12	Ca	0	10.5	38.62	-	-	46	-7.38
35	7.25775	31.75	Qp	0	10.8	42.55	60	-17.45	-	-
36	7.0755	28.3	Ca	0	10.8	39.1	-	-	50	-10.9
37	10.392	23.52	Qp	0	11	34.52	60	-25.48	-	-
38	10.392	19.71	Ca	0	11	30.71	-	-	50	-19.29
39	28.77	19.02	Qp	-0.1	11.9	30.82	60	-29.18	-	-
40	28.77225	15.45	Ca	-0.1	11.9	27.25	-	-	50	-22.75
Qp - Quasi-Peak detector										
Ca - CISPR Average detection										