

FCC - TEST REPORT

Report Number : **60.790.19.003.01R01** Date of Issue : April 16, 2019

Model : Connect Hub

Product Type : Connect Hub Gateway

Applicant : Mobile Technologies Inc.

Address : 1050 NE 67th Ave, Hillsboro, OR 97124

Production Facility : Hualun Technology Co., LTD

Address : 3F No. 82-4 Dongshun St. Shulin Dist. New Taipei City, Taiwan

Test Result : Positive Negative

Total pages including Appendices : 35

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2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	Connect Hub Gateway
Model no.:	Connect Hub
FCC ID:	2AA2X-16500361
Rating:	Adapter input: 100-240V DC 1.0A, 50-60Hz, output:5.2V DC 3.0A Connect Hub input: Max 5.2V DC, Max 5A. Internal Rechargeable Battery:3.7V DC Internal Backup Battery:3V DC
Frequency:	2405MHz-2480MHz (Tx and Rx)
Antenna gain:	Internal Chip Antenna: -1.5 dBi External Whip Antenna:2 dBi
Number of operated channel:	16
Modulation:	O-QPSK

3 Summary of Test Standards

Test Standards
FCC Part 15 Subpart C 10-1-17 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators

All the tests were performed using the procedures from ANSI C63.4(2014) and ANSI C63.10 (2013).

4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin, Hong Kong

Site 2

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13 Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2,
Shenzhen 518052, P.R.China
FCC Registration Number: 502708

Emission Tests	
Test Item	Test Site
FCC Part 15 Subpart C	
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	Site 2
FCC Title 47 Part 15.207 Conduct Emission	Site 2
FCC Title 47 Part 15.247(a)(1) 6dB & 99% Bandwidth	Site 2
FCC Title 47 Part 15.247(b) Peak Output Power	Site 2
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	Site 2
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	Site 2
FCC Title 47 Part 15.247(e) Power Spectral Density	Site 2
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	Site 2

4.1 Test Equipment Site List

Radiated emission Test – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Signal Analyzer	Rohde & Schwarz	FSV40	101031	2019-7-6
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-6-28
Horn Antenna	Rohde & Schwarz	HF907	102294	2019-6-28
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2019-7-12
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Pre-amplifier	Rohde & Schwarz	SCU 40A	100432	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

Conducted Emission Test – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
LISN	Rohde & Schwarz	ENV432	101318	2019-7-6
LISN	Rohde & Schwarz	ENV216	100326	2019-7-6
ISN	Rohde & Schwarz	ENY81	100177	2019-7-6
ISN	Rohde & Schwarz	ENY81-CA6	101664	2019-7-6
High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	9420-584	2019-6-30
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2019-6-30
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

20dB & 99% Bandwidth, Peak Output Power, Spurious Emissions at Antenna Terminals, 100kHz Bandwidth of band edges, Power Spectral Density – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6
Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2019-7-6
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2019-7-6

4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.46dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz	3.21dB
Uncertainty for Conducted RF Power	2.13dB
Uncertainty for frequency test	0.6×10 ⁻⁷

5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	10-13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.207 Conduct Emission	14-15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(a)(2) 6dB & 99% Bandwidth	16-18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(b) Peak Output Power	19-21	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	22-27	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	28-30	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(e) Power Spectral Density	31-33	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	34	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6 General Remarks

Remarks

This submittal(s) (test report) is intended for **FCC ID: 2AA2X-16500361**, complies with Section 15.203, 15.205, 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules for the DTS grant

The TX and RX range is 2405MHz-2480MHz.

EUT has an internal antenna and an external, as manufacture declared, there is an RF switch that selects the internal antenna or the external antenna. Never both at the same time. And actually the internal antenna is not used under normal operation.

Testing was performed on both setting of using external antenna and internal antenna to make sure both could comply with standard's requirement. While this report final only shows the data of testing on external antenna, which we found it is the worst case.

SUMMARY:

- All tests according to the regulations cited on page 8 were

■ - Performed

□ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

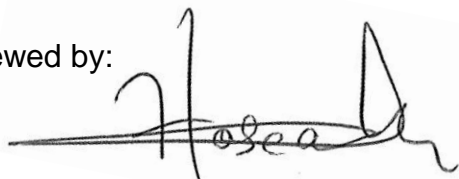
□ - **Does not** fulfill the general approval requirements.

Sample Received Date: January 30, 2019

Testing Start Date: February 26, 2019

Testing End Date: March 6, 2019

Reviewed by:



Hosea CHAN
EMC Project Engineer

Prepared by:



Eric LI
EMC Senior Project Engineer

7 Emission Test Results

7.1 Spurious Radiated Emission

EUT: Connect Hub
 Op Condition: Operated, TX Mode
 (Worst case lies on 2480MHz channel)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 120V AC
 Remark: 9kHz to 1GHz

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
108.623889	17.98	43.50	-25.52	Peak	H	-27.6
541.675000	30.73	46.00	-15.27	Peak	H	-21.1
583.385000	32.40	46.00	-13.60	Peak	H	-20.1
50.639444	24.99	40.00	-15.01	Peak	V	-24.7
64.542778	23.94	40.00	-16.06	Peak	V	-29.1
874.654444	31.78	46.00	-14.22	Peak	V	-15.9

Remark:

- As the measured peak value not exceeded the Quasi peak limit, Quasi peak value no need to be measured.

Spurious Radiated Emission

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 120V AC
 Remark: 1GHz to 25GHz

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
1200.250000	38.37	54.00	-15.63	Peak	H	-12.3
1253.250000	35.23	54.00	-18.77	Peak	H	-12.0
4809.906250	38.74	54.00	-15.26	Peak	H	2.8
7061.718750	38.90	54.00	-15.10	Peak	H	5.8
9482.343750	40.15	54.00	-13.85	Peak	H	9.1
1200.000000	40.35	54.00	-13.65	Peak	V	-12.3
1786.312500	25.96	54.00	-28.04	Peak	V	-10.1
4808.906250	37.20	54.00	-16.80	Peak	V	2.8
8257.968750	38.25	54.00	-15.75	Peak	V	6.0
11404.687500	40.61	54.00	-13.39	Peak	V	8.7

Remark:

1.As the measured peak value not exceeded the average limit, average value no need to be measured.

Spurious Radiated Emission

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 120V AC
 Remark: 1GHz to 25GHz

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
1200.250000	37.49	54.00	-16.51	Peak	H	-12.3
1253.437500	34.41	54.00	-19.59	Peak	H	-12.0
4890.062500	40.38	54.00	-13.62	Peak	H	2.9
7456.406250	38.67	54.00	-15.33	Peak	H	6.1
11874.843750	41.03	54.00	-12.97	Peak	H	10.4
1200.250000	40.13	54.00	-13.87	Peak	V	-12.3
1598.625000	29.03	54.00	-24.97	Peak	V	-10.8
4890.937500	40.62	54.00	-13.38	Peak	V	2.9
7227.656250	38.91	54.00	-15.09	Peak	V	4.9
9513.750000	41.62	54.00	-12.38	Peak	V	9.1

Remark:

- 1.As the measured peak value not exceeded the average limit, average value no need to be measured.

Spurious Radiated Emission

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: 120V AC
 Remark: 1GHz to 25GHz

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
1255.937500	34.52	54.00	-19.48	Peak	H	-12.0
1596.437500	29.22	54.00	-24.78	Peak	H	-10.8
4959.906250	40.48	54.00	-13.52	Peak	H	3.3
9340.312500	41.03	54.00	-12.97	Peak	H	8.4
13112.343750	43.86	54.00	-10.14	Peak	H	13.8
1200.250000	39.74	54.00	-14.26	Peak	V	-12.3
2399.500000	37.05	54.00	-16.95	Peak	V	-6.0
4960.781250	40.73	54.00	-13.27	Peak	V	3.3
8193.281250	39.29	54.00	-14.71	Peak	V	5.6
13095.937500	43.75	54.00	-10.25	Peak	V	13.8

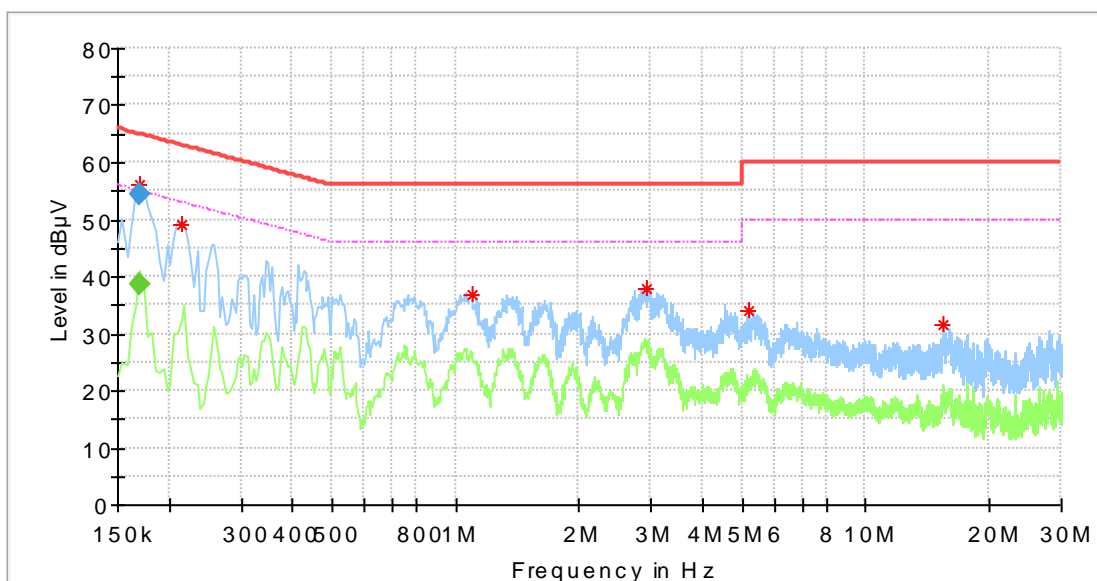
Remark:

- As the measured peak value not exceeded the average limit, average value no need to be measured.

7.2 Conducted Emission at AC Power line

EUT: Connect Hub
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.207
 Comment: 120V AC
 Remark: L Line

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)
0.169500	56.19	---	64.96	-8.77
0.214000	49.02	---	63.05	-14.03
1.098000	36.88	---	56.00	-19.12
2.914000	37.98	---	56.00	-18.02
5.198000	34.18	---	60.00	-25.82
15.434000	31.48	---	60.00	-28.52

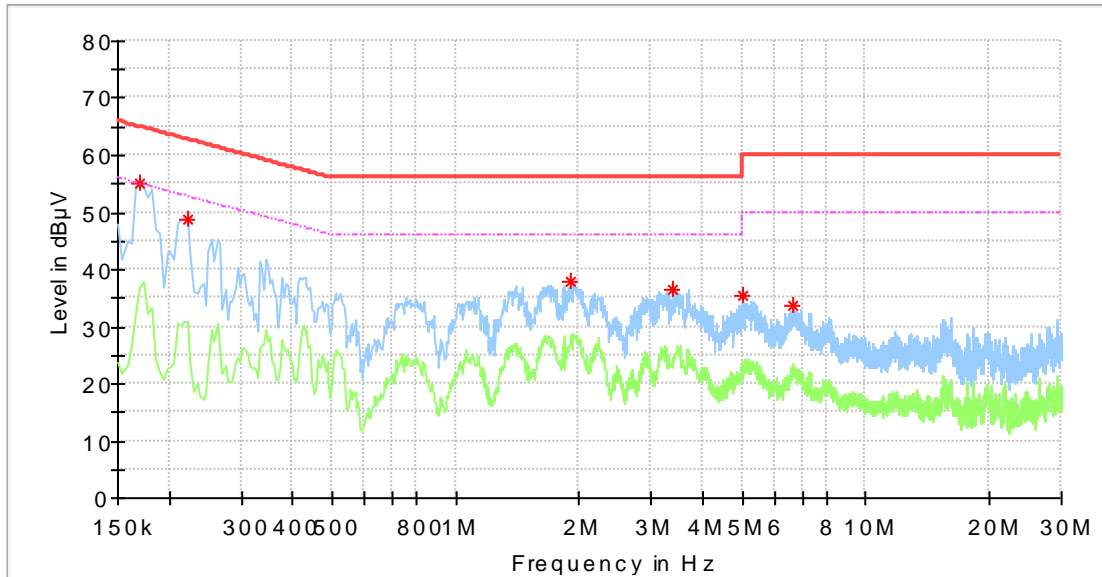
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)
0.169500	---	38.61	54.98	-16.37
0.169500	54.43	---	64.98	-10.55

Conducted Emission at AC Power line

EUT: Connect Hub
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.207
 Comment: 120V AC
 Remark: N Line

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



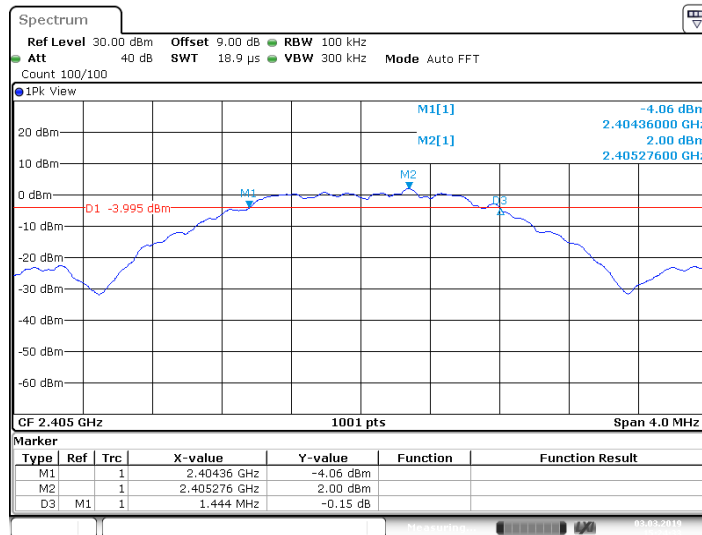
Final Result

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)
0.170000	55.22	---	64.96	-9.74
0.222000	48.93	---	62.74	-13.82
1.906000	37.95	---	56.00	-18.05
3.398000	36.57	---	56.00	-19.43
5.014000	35.36	---	60.00	-24.64
6.614000	33.65	---	60.00	-26.35

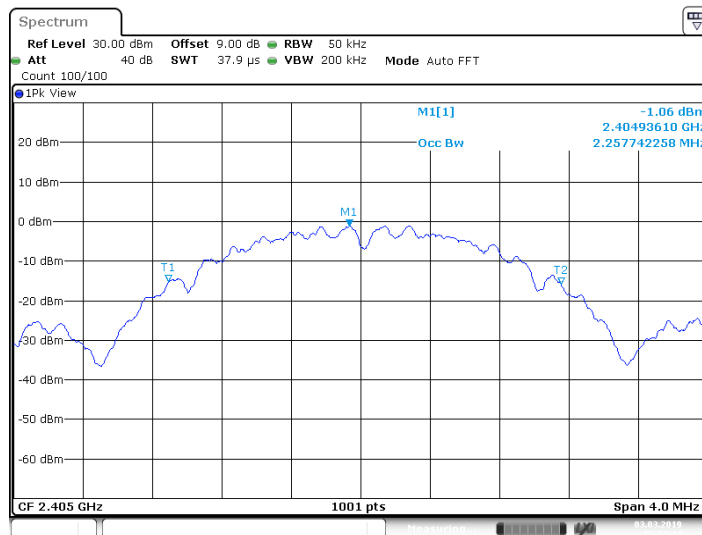
7.3 6dB & 99% Bandwidth

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:24:33



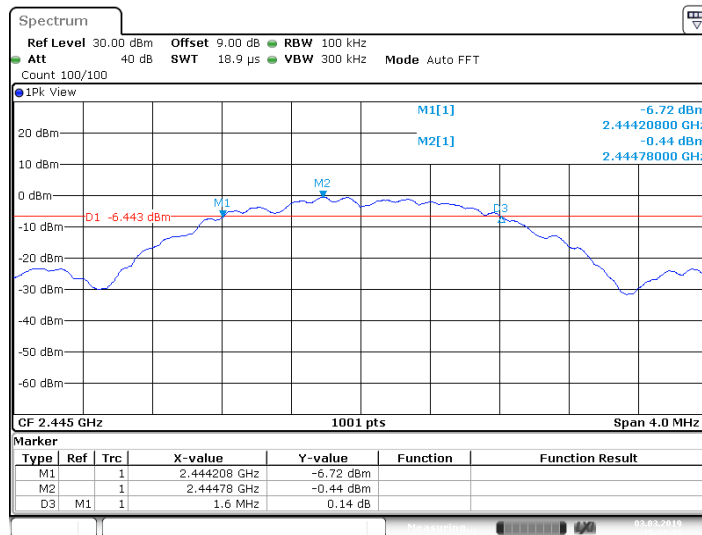
Date: 3 MAR 2019 15:24:44

Bandwidth	Measured Value	Limit
6dB bandwidth	1.444MHz	> 0.5MHz
99% OCB	2.258MHz	NA

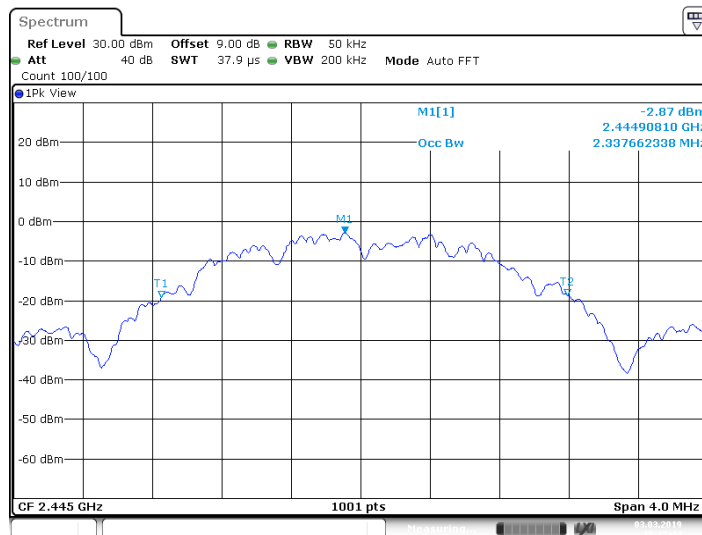
6dB & 99% Bandwidth

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:27:33



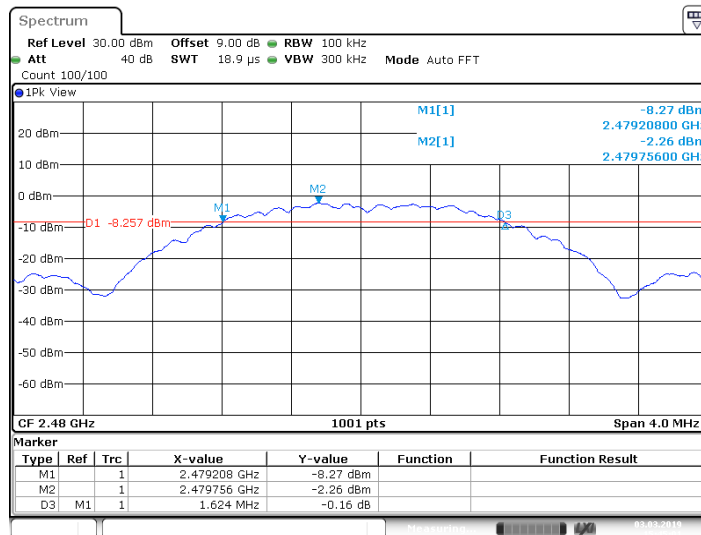
Date: 3 MAR 2019 15:27:44

Bandwidth	Measured Value	Limit
6dB bandwidth	1.600 MHz	> 0.5 MHz
99% OCB	2.338 MHz	NA

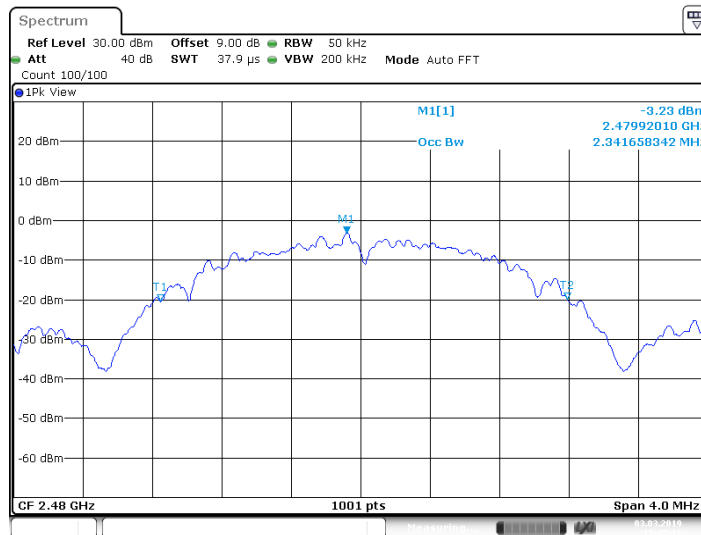
6dB & 99% Bandwidth

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:45:01



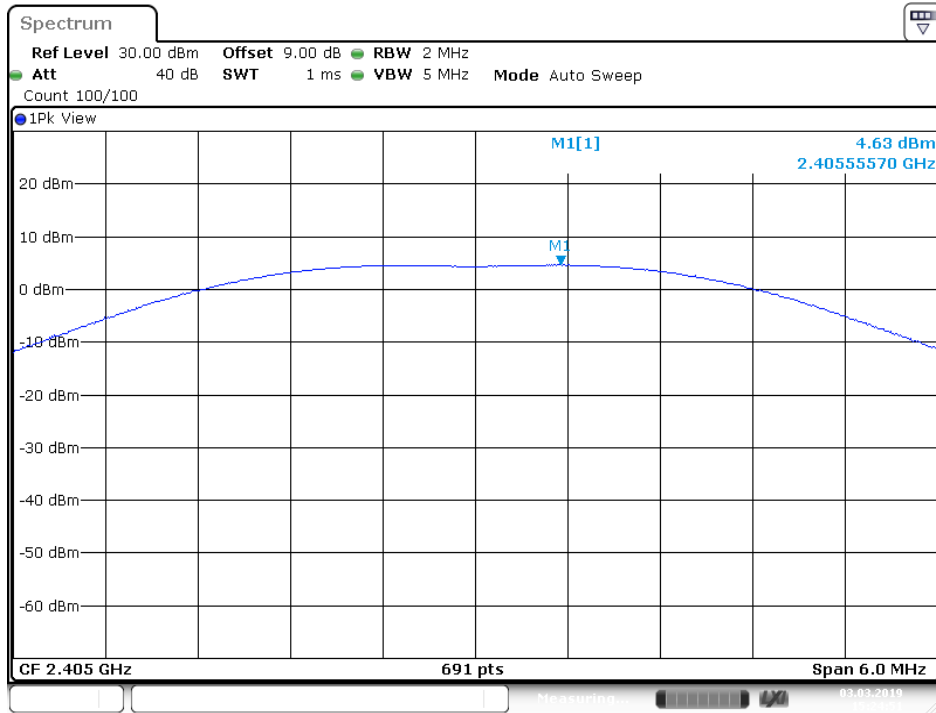
Date: 3 MAR 2019 15:45:12

Bandwidth	Measured Value	Limit
6dB bandwidth	1.624 MHz	> 0.5 MHz
99% OCB	2.342 MHz	NA

7.4 Peak Output Power

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC15.247(b)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



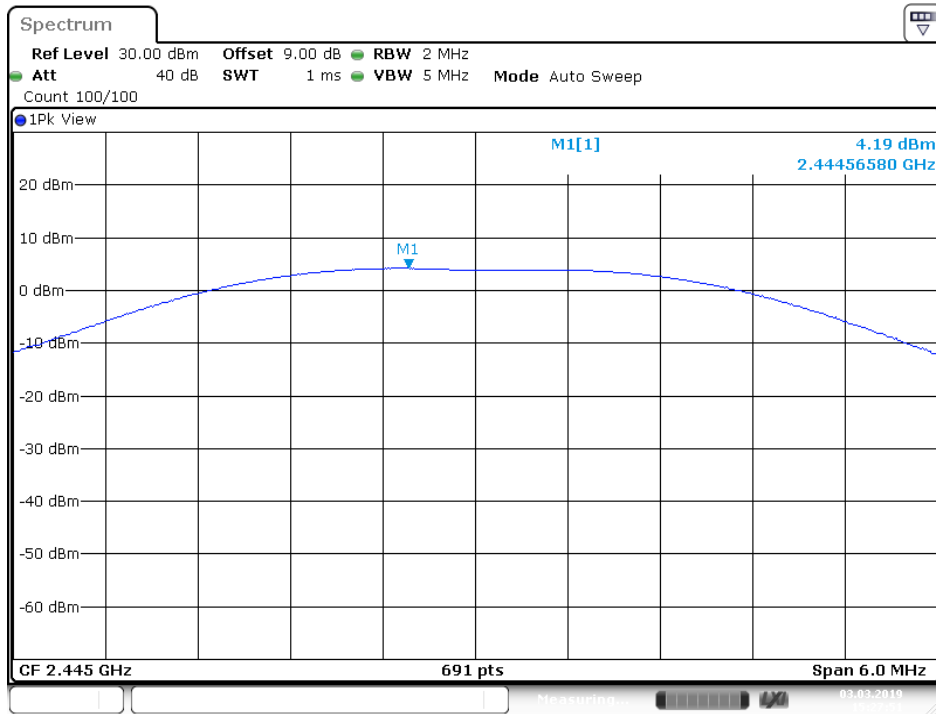
Date: 3 MAR 2019 15:24:51

Conducted Output Power	Limit
4.63 dBm	< 30dBm

Peak Output Power

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC15.247(b)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



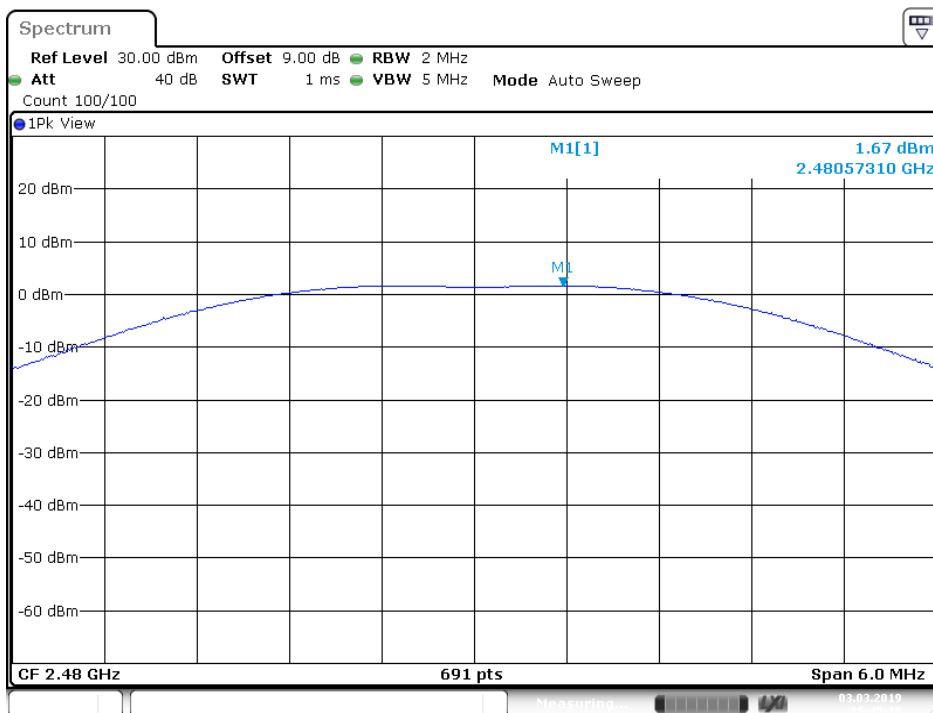
Date: 3 MAR 2019 15:27:51

Conducted Output Power	Limit
4.19 dBm	< 30dBm

Peak Output Power

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(b)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:45:20

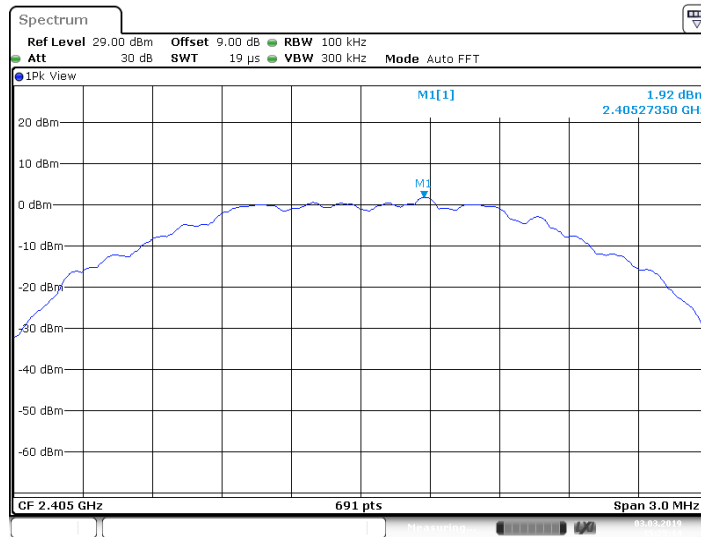
Conducted Output Power	Limit
1.67 dBm	< 30dBm

7.5 Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Channel	FreqRange	RefLevel	Result	Limit	Verdict
2405	Reference	1.92	1.92	---	PASS
2405	30~1000	1.92	-61.07	-18.08	PASS
2405	1000~26500	1.92	-44.67	-18.08	PASS

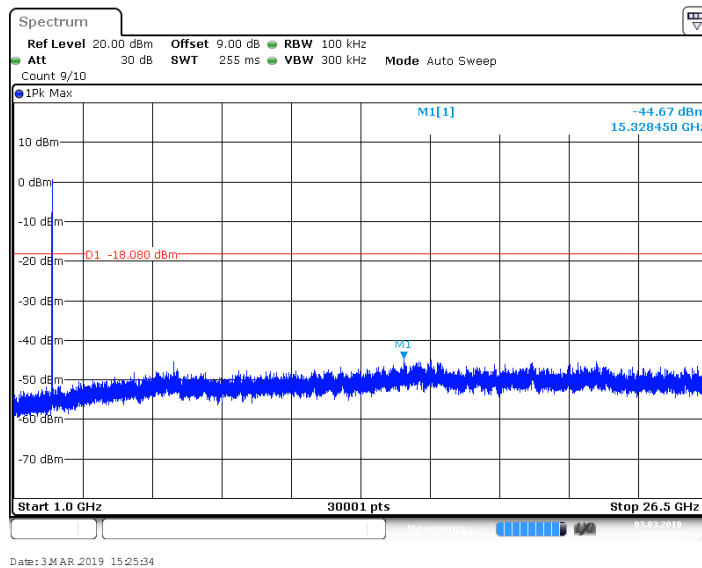
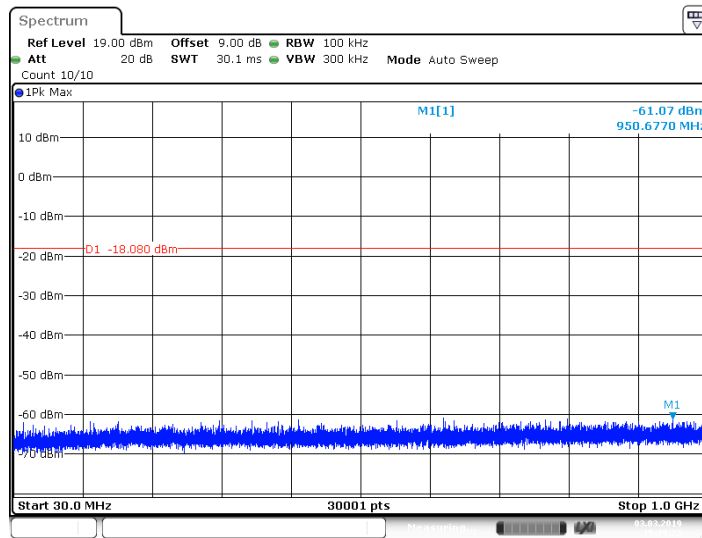


Date: 3 MAR 2019 15:25:14

Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

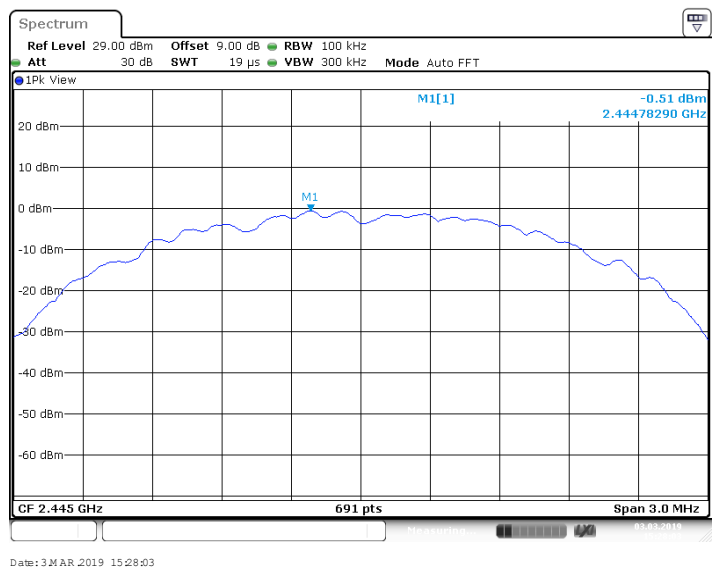


Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Channel	FreqRange	RefLevel	Result	Limit	Verdict
2445	Reference	-0.51	-0.51	---	PASS
2445	30~1000	-0.51	-60.91	-20.51	PASS
2445	1000~26500	-0.51	-45.15	-20.51	PASS

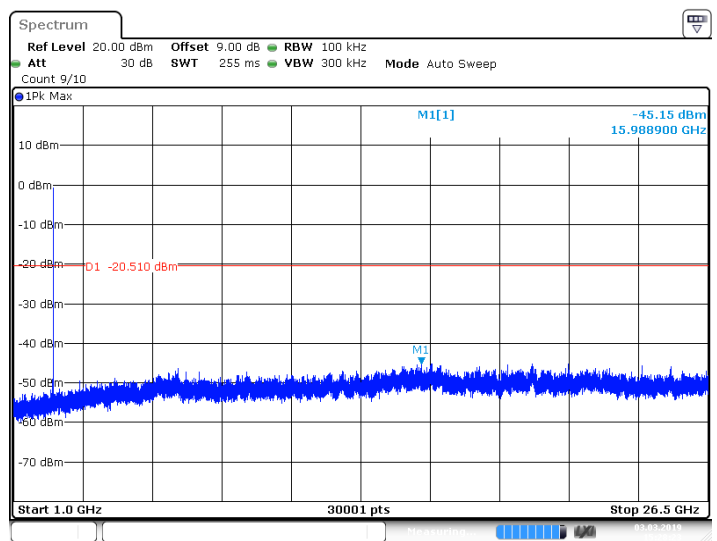
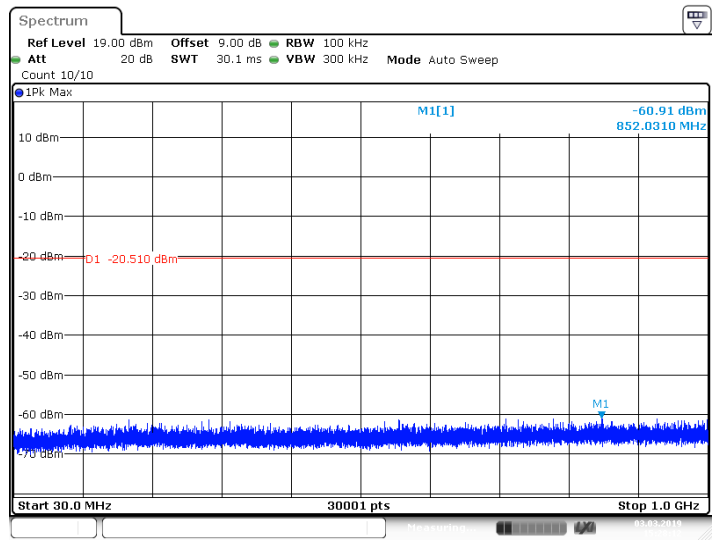


Date: 3 MAR 2019 15:28:03

Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

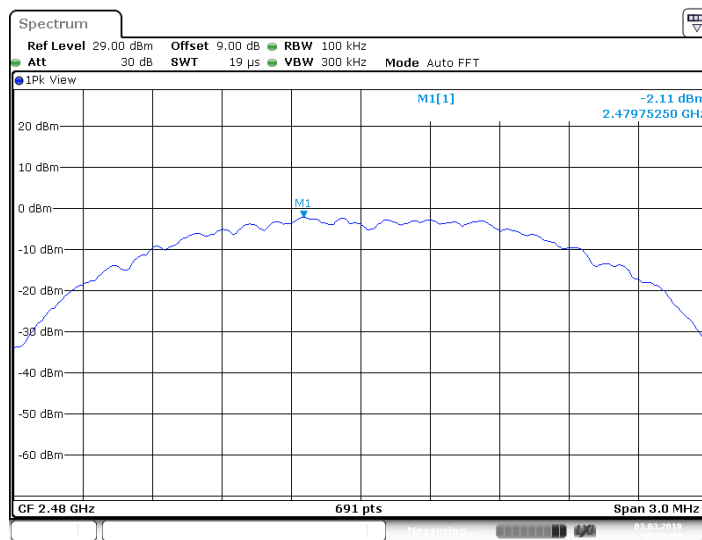


Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

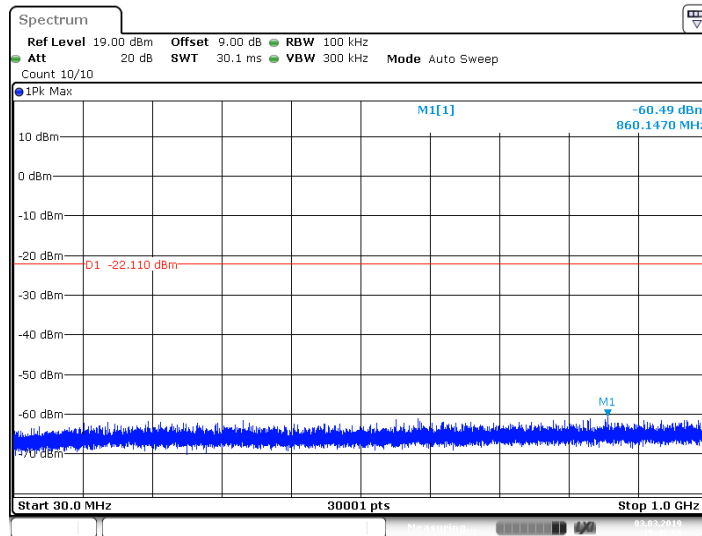
Channel	FreqRange	RefLevel	Result	Limit	Verdict
2480	Reference	-2.11	-2.11	---	PASS
2480	30~1000	-2.11	-60.49	-22.11	PASS
2480	1000~26500	-2.11	-45.26	-22.11	PASS



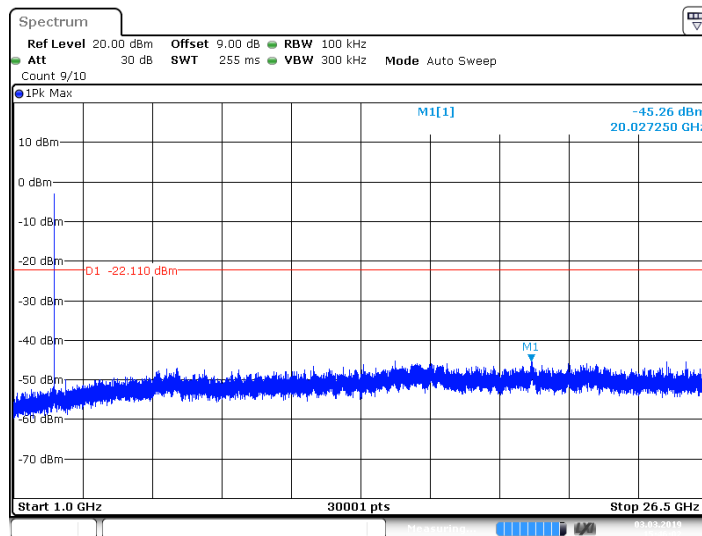
Spurious Emissions at Antenna Terminals

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:45:50

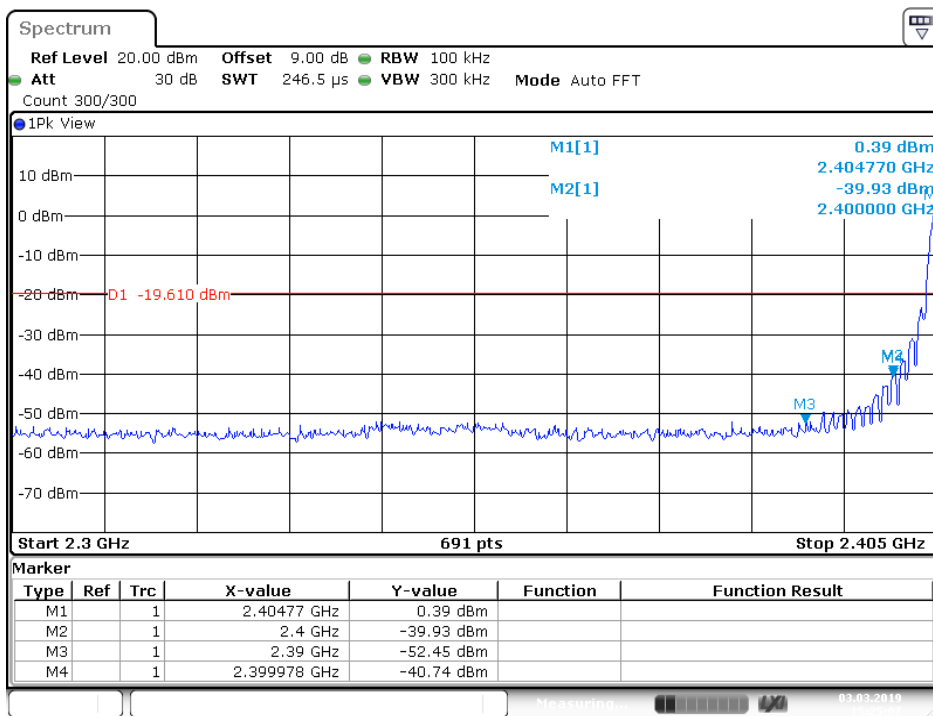


Date: 3 MAR 2019 15:46:02

7.6 100kHz Bandwidth of band edges

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC15.247(d), Conducted
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



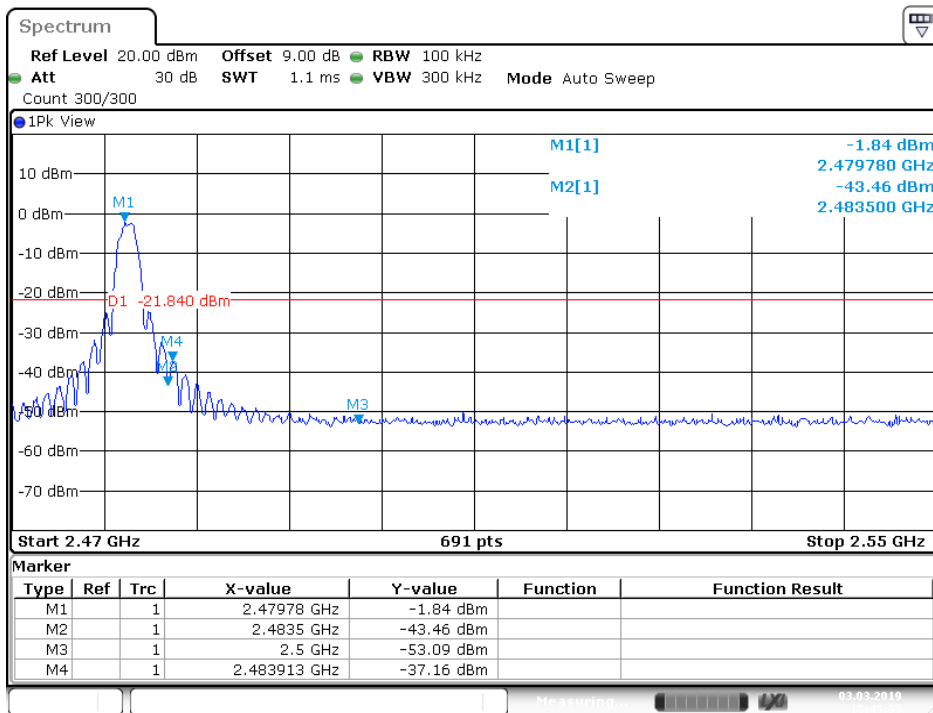
Date: 3 MAR 2019 15:25:07

Band edges	Limit
40.32 dB	> 20dB

100kHz Bandwidth of band edges

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(d), Conducted
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:45:35

Band edges	Limit
41.62 dB	> 20dB



China

100kHz Bandwidth of band edges

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz & 2480MHz)
 Test Specification: FCC15.247(d), Radiated
 Comment: 120V AC

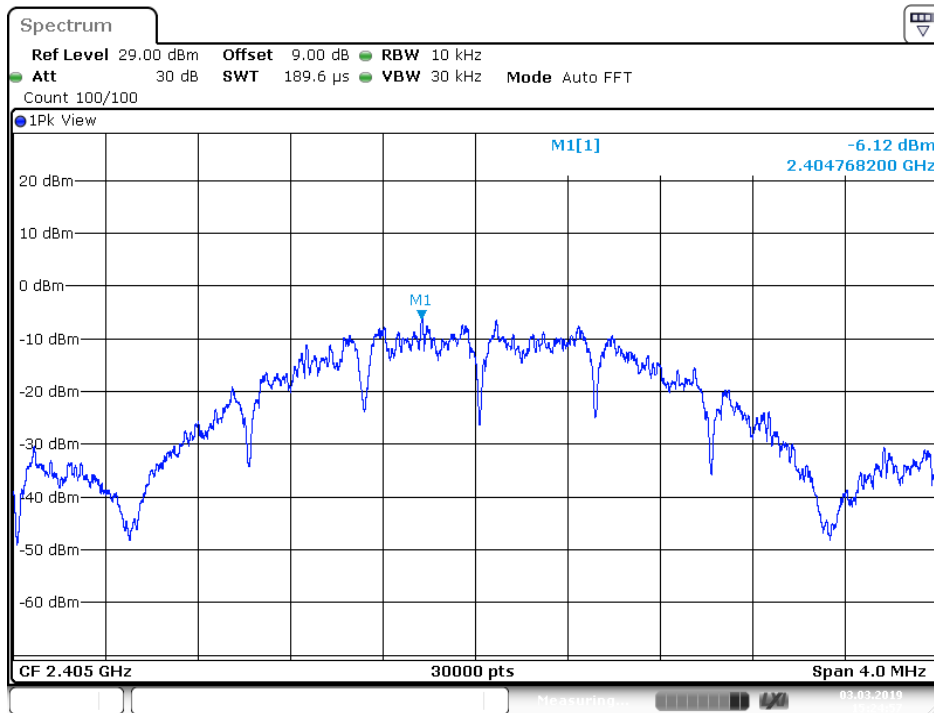
Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Channel	Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector PK /AV	Ant. Polarity H/V	Corr. (dB)
2405	2400.00	43.62	74.00	-30.38	Peak	H	-5.5
2405	2400.00	35.81	54.00	-18.19	Average	H	-5.5
2405	2400.00	42.47	74.00	-31.53	Peak	V	-5.5
2405	2400.00	33.48	54.00	-20.52	Average	V	-5.5
2480	2483.50	46.23	74.00	-27.77	Peak	H	-4.8
2480	2483.50	36.77	54.00	-17.23	Average	H	-4.8
2480	2483.50	48.13	74.00	-25.87	Peak	V	-4.8
2480	2483.50	37.25	54.00	-16.75	Average	V	-4.8

7.7 Power Spectral Density

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2405MHz)
 Test Specification: FCC15.247(e)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



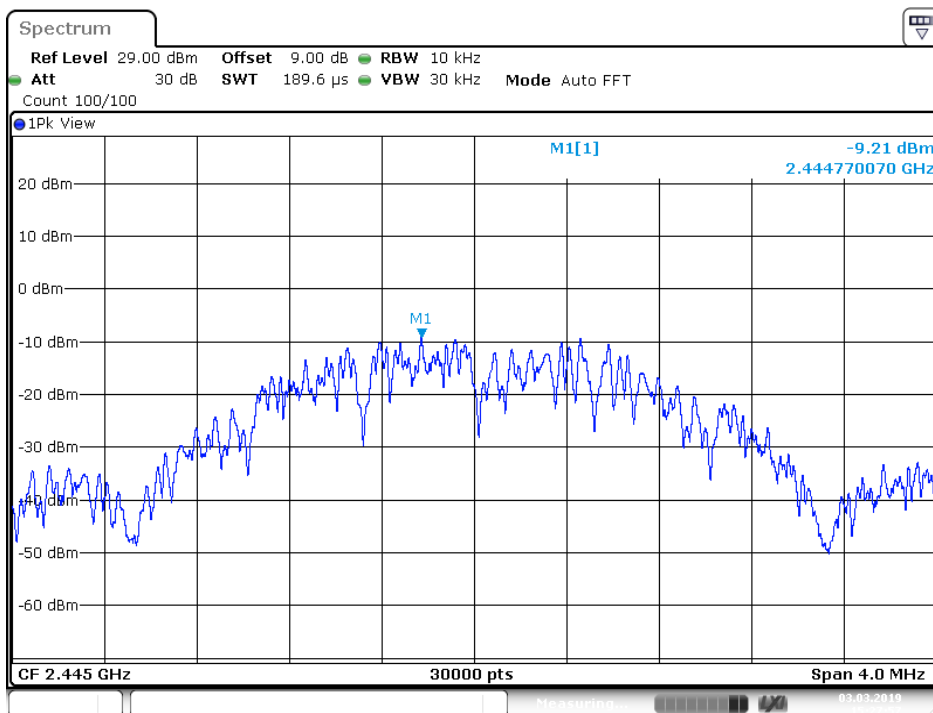
Date: 3 MAR 2019 15:24:58

PSD	Limit
-6.12 dBm	< 8 dBm

Power Spectral Density

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2445MHz)
 Test Specification: FCC15.247(e)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



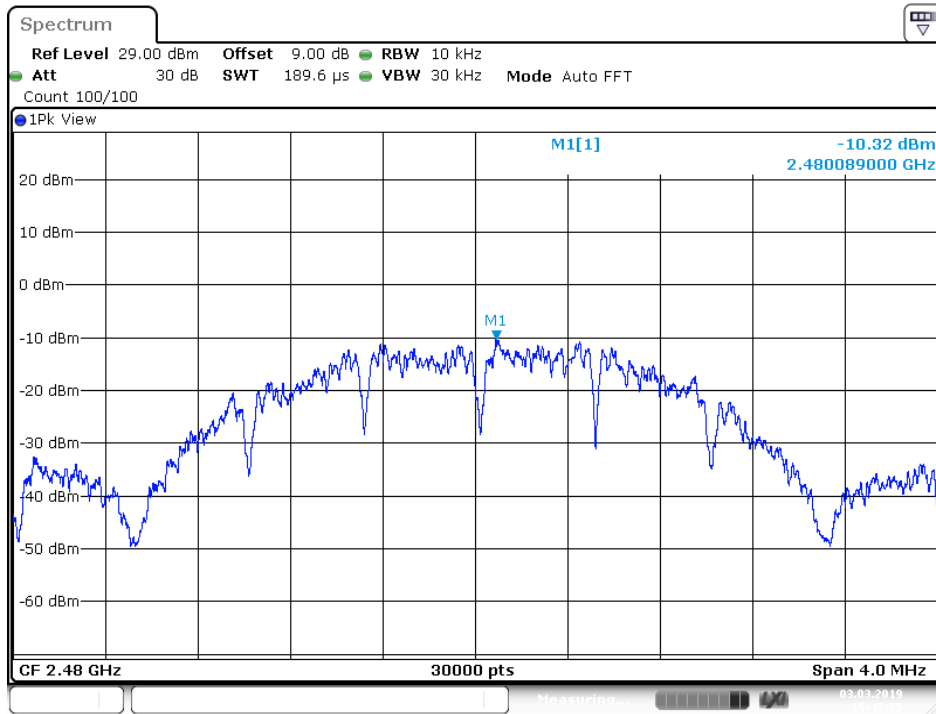
Date: 3 MAR 2019 15:27:57

PSD	Limit
-9.21 dBm	< 8 dBm

Power Spectral Density

EUT: Connect Hub
 Op Condition: Operated, TX Mode (2480MHz)
 Test Specification: FCC15.247(e)
 Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



Date: 3 MAR 2019 15:45:26

PSD	Limit
-10.32 dBm	< 8 dBm

7.8 Antenna Requirement

EUT: Connect Hub
Op Condition: Operated, TX Mode
Test Specification: FCC15.203 & 15.247(b)
Comment: 120V AC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Limit

For intentional device, according to FCC Title 47 Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC Title 47 Part 15.247(b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

EUT has two antennas, one is on-board chip antenna, another is external whip antenna with SMA connector. Chip antenna maximum gain is -1.5 dBi, Whip antenna maximum gain is 2dBi. So EUT fulfill with 15.203 requirements.

8 Appendix A - General Product Information

Radiofrequency radiation exposure evaluation

This exposure evaluation is intended for **FCC ID: 2AA2X-16500361**.

According to KDB 447498 D01v06 section 4.3.1, For frequencies between 100 MHz to 6GHz and test separation distances ≤ 50 mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

>> The fundamental frequency of the EUT is 2405-2480MHz,
the test separation distance is ≤ 50 mm.
(Manufacturer specified the separation distance is: 20mm)

Step a)

>> Numeric threshold (2405MHz), $\text{mW} / 20\text{mm} \cdot \sqrt{2.402\text{GHz}} \leq 3.0$
Numeric threshold (2405MHz) $\leq 38.713\text{mW}$

>> Numeric threshold (2445MHz), $\text{mW} / 20\text{mm} \cdot \sqrt{2.440\text{GHz}} \leq 3.0$
Numeric threshold (2445MHz) $\leq 38.411\text{mW}$

>> Numeric threshold (2480MHz), $\text{mW} / 20\text{mm} \cdot \sqrt{2.480\text{GHz}} \leq 3.0$
Numeric threshold (2480MHz) $\leq 38.100\text{mW}$

>> The power of EUT measured (2405MHz) is: 4.63dBm = 2.904mW
The power of EUT measured (2445MHz) is: 4.19dBm = 2.624mW
The power of EUT measured (2480MHz) is: 1.67dBm = 1.469mW

Which is smaller than the Numeric threshold.

Therefore, the device is exempt from stand-alone SAR test requirements.