ACCREDITED
TESTING LABORATORY
CERTIFICATE#4323.01

BACL
Bay Area Compliance Labs Corp.

FCC PART 15.407

TEST REPORT

For

SWIT Electronics Co., Ltd.

10 Heng Tong Road, Xin'gang Economic and Technological Development Zone, Nanjing 210038 China

FCC ID: 2AFFCS-FLOW2000TX

Report Type:	Product Type:
Original Report	2000ft Wireless HD

Test Engineer:	Sam Ye
Report Number:	RSHA191012007-00A
Report Date:	2019-11-13
Reviewed By:	Oscar Ye EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	SWIT Electronics Co., Ltd.
Tested Model	FLOW2000 Tx
Series Model	FLOW500 Tx, S-6160 Tx, S-6115 Tx, FLOW10K Tx, FLOW6500 Tx, S-6230P Tx, S-6220P Tx
Model Difference	Model names
Product Type	2000ft Wireless HD
Operating Frequency	5180~5220MHz, 5760~5820MHz
Power Supply	DC 7V~34V
Modulation Type	OFDM
Antenna Type	Omni Antenna
Maximum Antenna Gain	2.0dBi

**All measurement and test data in this report was gathered from production sample serial number: 20191012007. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-10-12)*

Objective

This type approval report is prepared on behalf of *SWIT Electronics Co., Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions' rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.407 NII and FCC Part 15B JAB submissions with FCC ID: 2AFFCS-FLOW2000RX.
FCC Part 15B JAB submissions with FCC ID: 2AFFCS-FLOW2000TX.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Kunshan).

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01), the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The channel list is as below, Channel 00, 01, 02, 03, 04, 06 were tested.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	5180	04	5780
01	5200	05	5800
02	5220	06	5820
03	5760	/	/

EUT Exercise Software

RF test tool: ARSiriusPCTool_V1.0.1.exe

Pre-scan with all the data rates, and the worst case was performed as below:

5180-5220MHz

Frequency (MHz)	Data Rate	Power Setting
5180	MCS 0	14
5200		14
5220		14

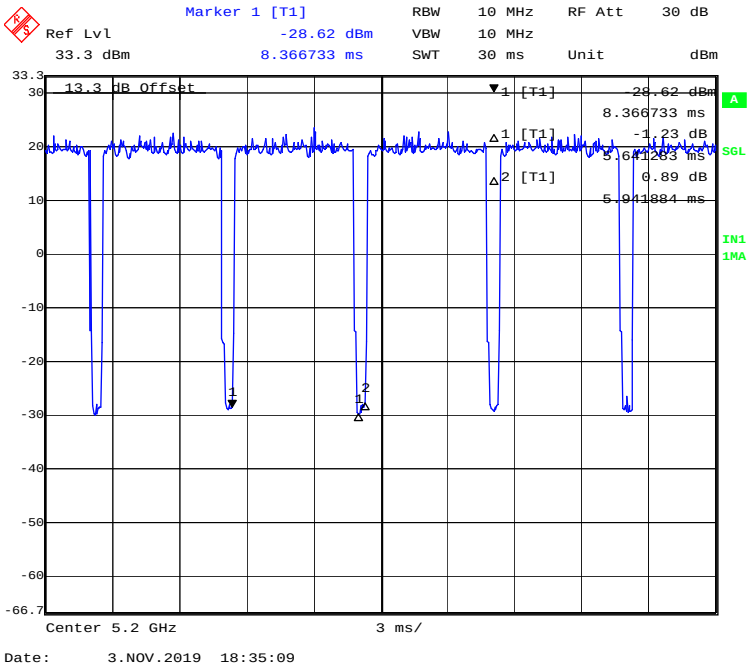
5760-5820MHz

Frequency (MHz)	Data Rate	Power Setting
5760	MCS 0	17
5780		17
5820		17

Duty Cycle

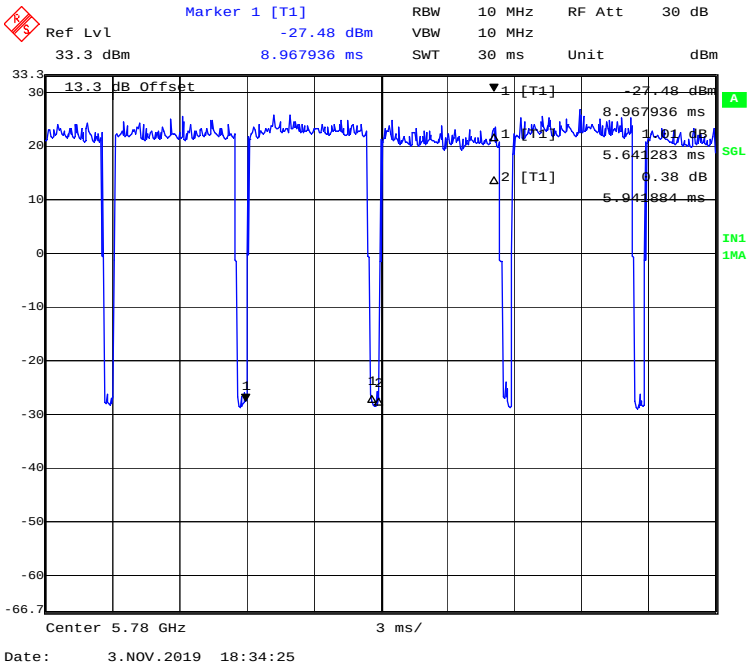
5180MHz-5220MHz:

Frequency: 5200MHz



5760MHz-5820MHz:

Frequency: 5780MHz



Frequency Range (MHz)	Duty Cycle (%)	T (ms)	1/T (kHz)	10log(1/x)
5180-5220	94.94	5.64	0.177	0.23
5760-5820	94.94	5.64	0.177	0.23

Note: "x" means duty cycle.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

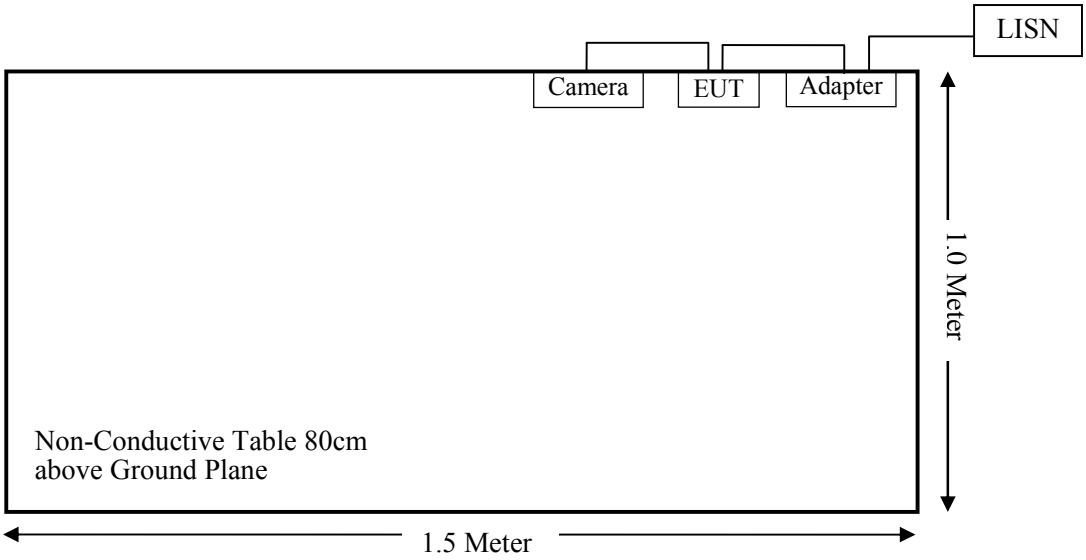
Manufacturer	Description	Model	Serial Number
SWIT	Camera	/	/
SWIT	Adapter	SW-120100	/

External I/O Cable

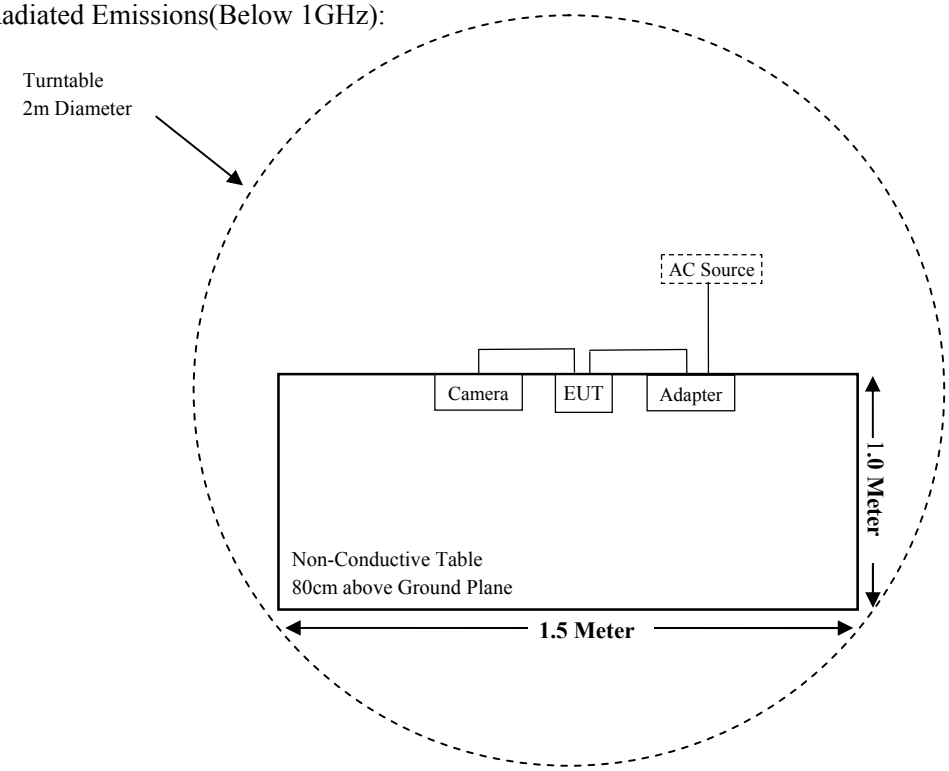
Cable Description	Length (m)	From Port	To
Power Cable	1.0	EUT	Adapter
SDI Cable	0.4	EUT	Camera

Block Diagram of Test Setup

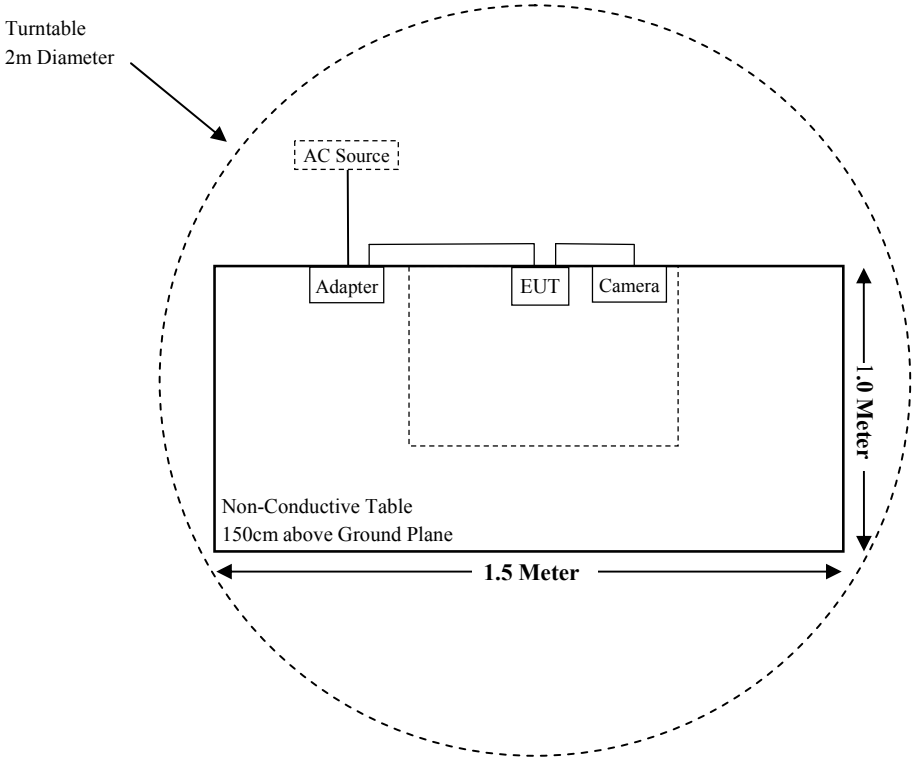
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 & §15.407(b) (6)	AC Power Line Conducted Emissions	Compliant
§ 15.205 & §15.209 & §15.407(b) (1), (2), (3),(6),(7)	Undesirable Emission & Restricted Bands	Compliant
§§15.407(a) &§15.407(e)	Emission Bandwidth	Compliant
§15.407(a) (1) (3)	Conducted Transmitter Output Power	Compliant
§15.407(a) (1) (3)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test receiver	ESR	1316.3003K03-102454-Qd	2019-06-25	2020-06-24
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-15	2020-08-14
Audix	Test Software	e3	V9	-	-
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2019-05-30	2020-05-29
ETS-LINDGREN	Horn Antenna	3115	6229	2019-01-11	2022-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2019-10-18	2022-10-17
Mini-Circuits	Amplifier	ZVA-183W-S+	220701818	2019-05-20	2020-05-19
SELECTOR	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
MICRO-TRONICS	Band Reject Filter	BRC50703	G094	2019-08-05	2020-08-04
MICRO-TRONICS	Band Reject Filter	BRC50705	G085	2019-08-05	2020-08-04
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2018-11-12	2019-11-11
Agilent	Power Meter	N1912A	MY5000492	2018-11-18	2019-11-17
Agilent	Power Sensor	N1921A	MY54210024	2018-11-18	2019-11-17
Narda	Attenuator/10dB	10dB	/	2019-01-10	2020-01-09
BACL	Temperature & Humidity Chamber	BTH-150	30023	2018-12-20	2019-12-19
SWIT	RF Cable	SWIT C01	C01	Each Time	/

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2019-07-11	2020-07-10
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2018-11-12	2019-11-11
Audix	Test Software	e3	V9	--	--
Narda	Attenuator/6dB	10690812-2	26850-6	2019-01-10	2020-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2019-08-15	2020-08-14

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f^2)	30
30-300	27.5	0.073	0.2	30
300-1500	/		f/1500	30
1500-100,000	/		1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data (worst case):

Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
5180~5220	2.00	1.58	16.50	44.67	20	0.0140	1.00
5760~5820	2.00	1.58	19.50	89.13	20	0.0280	1.00

Note:

The Tune-up conducted power was declared by the Manufacturer.

Conclusion: The device meets MPE at distance 20cm.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407, if the transmitting antennas of directional gain greater than 6dBi 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

The EUT has two Omni antennas which the antenna gain are 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

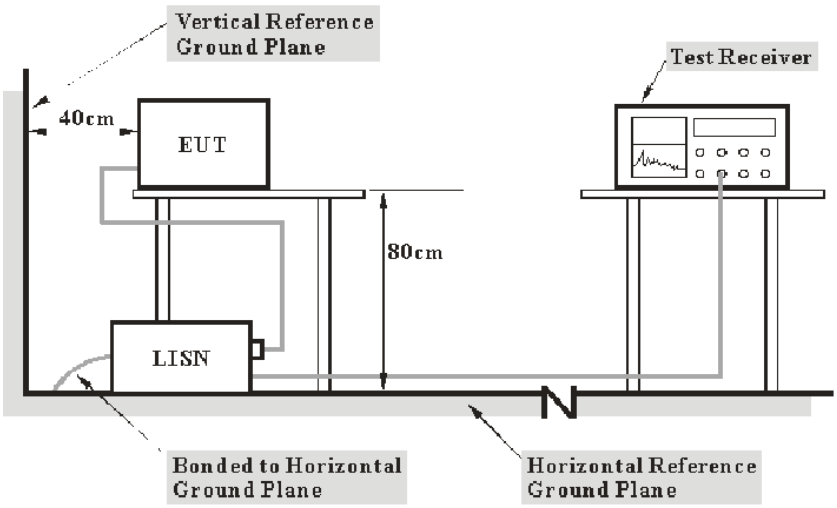
Result: Compliant.

FCC §15.407 (b) (6) §15.207 (a) – AC POWER LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a), §15.407(b) (6)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Over Limit Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

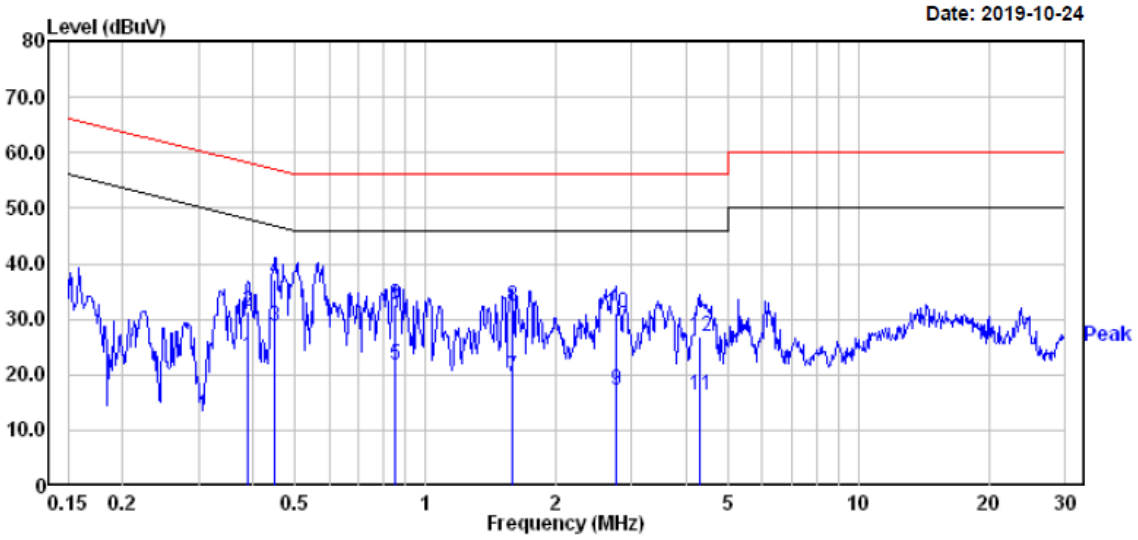
Environmental Conditions

Temperature:	20.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Sam Ye on 2019-10-24.

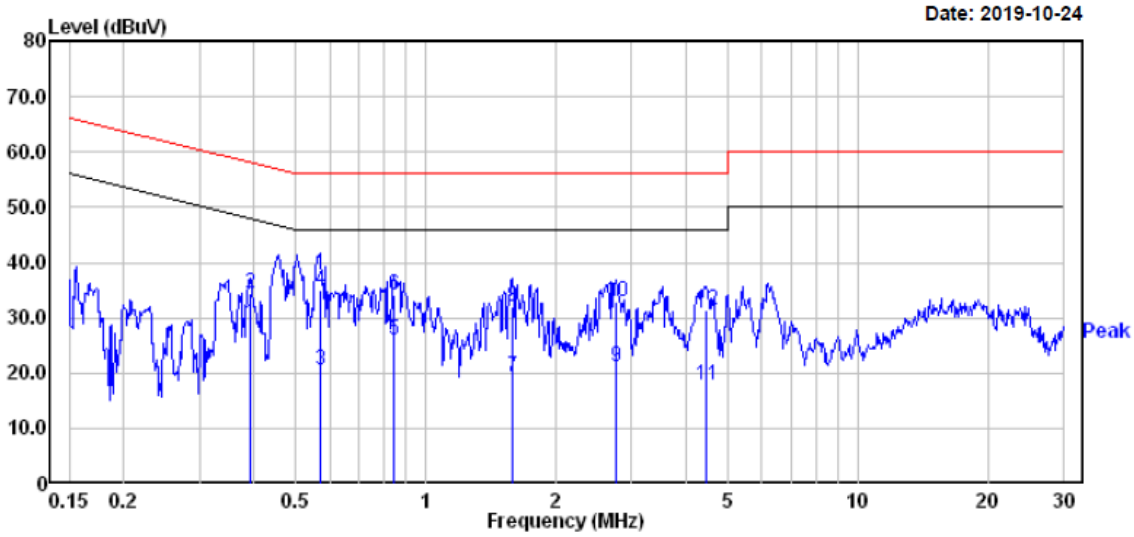
EUT operation mode: Transmitting in middle channel of 5760-5820MHz (worst case)

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.389	3.40	19.75	23.15	48.08	-24.93	Average
2	0.389	11.50	19.75	31.25	58.08	-26.83	QP
3	0.449	8.80	19.75	28.55	46.89	-18.34	Average
4	0.449	17.30	19.75	37.05	56.89	-19.84	QP
5	0.853	1.91	19.71	21.62	46.00	-24.38	Average
6	0.853	12.81	19.71	32.52	56.00	-23.48	QP
7	1.585	-0.31	19.85	19.54	46.00	-26.46	Average
8	1.585	12.59	19.85	32.44	56.00	-23.56	QP
9	2.765	-2.30	19.47	17.17	46.00	-28.83	Average
10	2.765	11.60	19.47	31.07	56.00	-24.93	QP
11	4.292	-3.09	19.47	16.38	46.00	-29.62	Average
12	4.292	7.51	19.47	26.98	56.00	-29.02	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.391	9.10	19.75	28.85	48.03	-19.18	Average
2	0.391	14.80	19.75	34.55	58.03	-23.48	QP
3	0.573	0.80	19.75	20.55	46.00	-25.45	Average
4	0.573	15.40	19.75	35.15	56.00	-20.85	QP
5	0.844	6.40	19.71	26.11	46.00	-19.89	Average
6	0.844	14.50	19.71	34.21	56.00	-21.79	QP
7	1.593	-0.61	19.85	19.24	46.00	-26.76	Average
8	1.593	12.29	19.85	32.14	56.00	-23.86	QP
9	2.750	1.70	19.47	21.17	46.00	-24.83	Average
10	2.750	13.40	19.47	32.87	56.00	-23.13	QP
11	4.454	-1.79	19.47	17.68	46.00	-28.32	Average
12	4.454	11.81	19.47	31.28	56.00	-24.72	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

§15.205 & §15.209 & §15.407(B) (1), (2), (3),(6),(7) – UNDESIRABLE EMISSION & RESTRICTED BANDS

Applicable Standard

FCC §15.407 (b) (1), (2), (3), (6), (7); §15.209; §15.205;

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

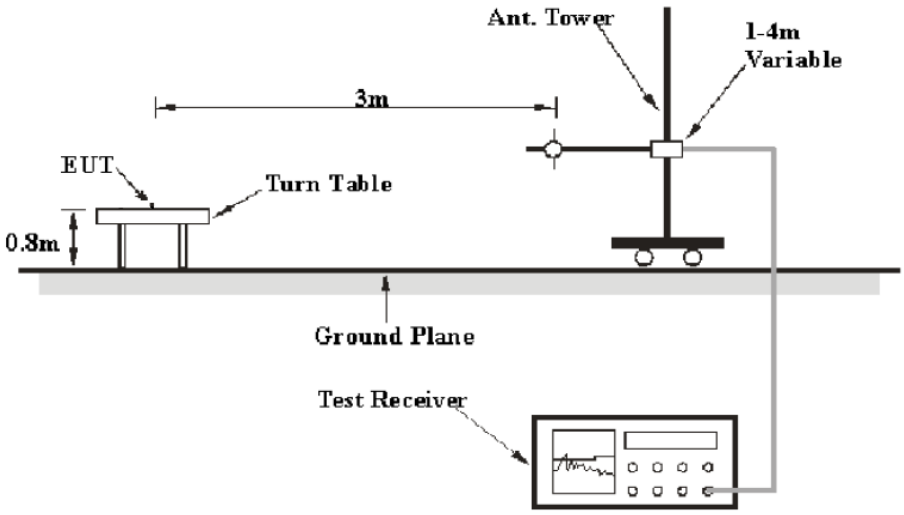
For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

As per FCC §15.35(d):Unless otherwise specified, on any frenquency or frequencies above 1000MHz,the radiated emission limits are based on the use of measurement instrunmentation employing an average detector function. Unless otherwise specified, measurements above 1000MHz shall be performed using a minimum resolution bandwidth of 1MHz.

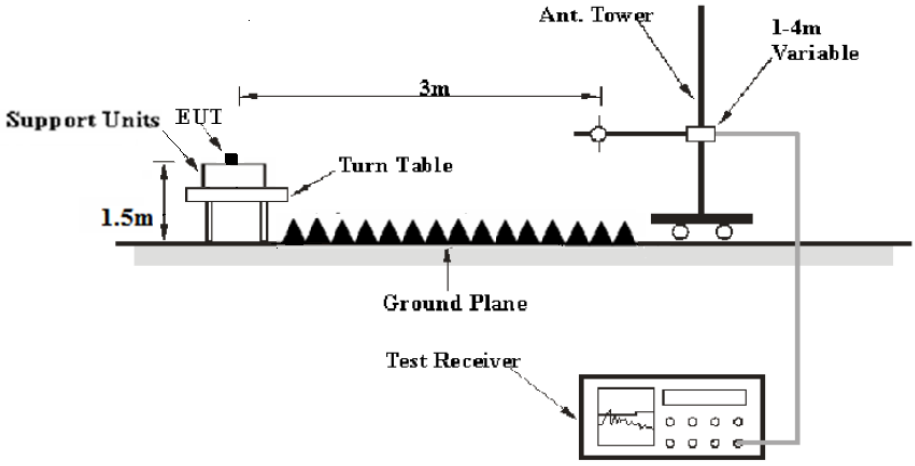
According to 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP [dBm] + 95.2, for d = 3 meters.

EUT Setup

Below 1 GHz:



1 GHz-40GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave.

Test Procedure

During the radiated emission test, the adapter was connected to AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

Factor & Over Limit Calculation (for Below 1GHz)

The factor is calculated by adding Antenna Factor, Cable Loss and Amplifier Gain. The basic equation is as follows:

Factor (dB) =Antenna Factor (dB/m) + Cable Loss (dB) + Amplifier Gain (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over Limit of 7dB means the emission is 7 dB above the limit. The equation for over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Corrected Amplitude & Margin Calculation (for Above 1GHz)

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Data

Environmental Conditions

Temperature:	20.2~23.8 ℃
Relative Humidity:	48~51 %
ATM Pressure:	101.1~101.3 kPa

The testing was performed by Sam Ye from 2019-10-24 to 2019-11-13.

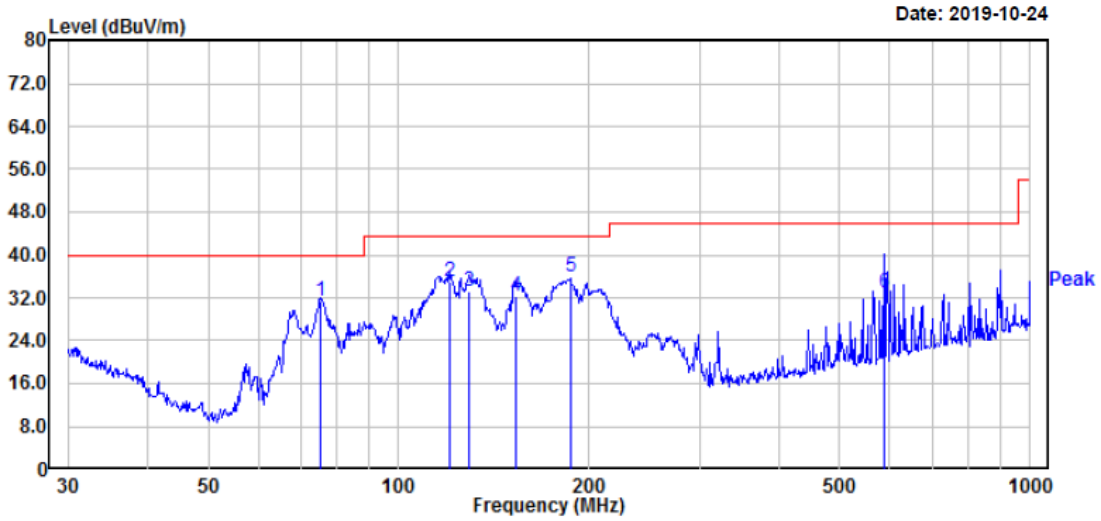
Test Mode: Transmitting

Spurious Emission Test

30MHz-1GHz(5180-5220MHz):

Horizontal

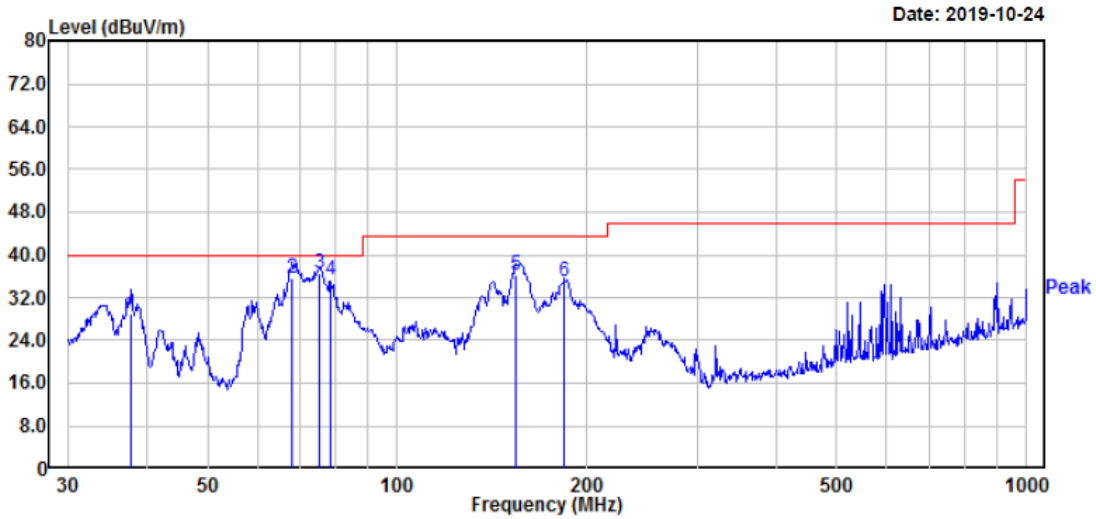
*Pre-scan in the X, Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded*



	Freq	Read Level	Level	Limit Line	Over Limit	APos	TPos	Remark	Factor
	MHz	dBuV	dBuV/m	dBuV/m	dB	cm	deg		dB/m
1	75.45	48.40	31.36	40.00	-8.64	200	228	QP	-17.04
2	120.28	45.60	34.93	43.50	-8.57	200	348	QP	-10.67
3	129.47	44.30	33.10	43.50	-10.40	200	354	QP	-11.20
4	153.74	44.29	32.35	43.50	-11.15	100	44	QP	-11.94
5	187.10	48.30	35.80	43.50	-7.70	100	25	QP	-12.50
6	586.84	37.19	33.01	46.00	-12.99	200	6	QP	-4.18

Vertical

*Pre-scan in the X, Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded*

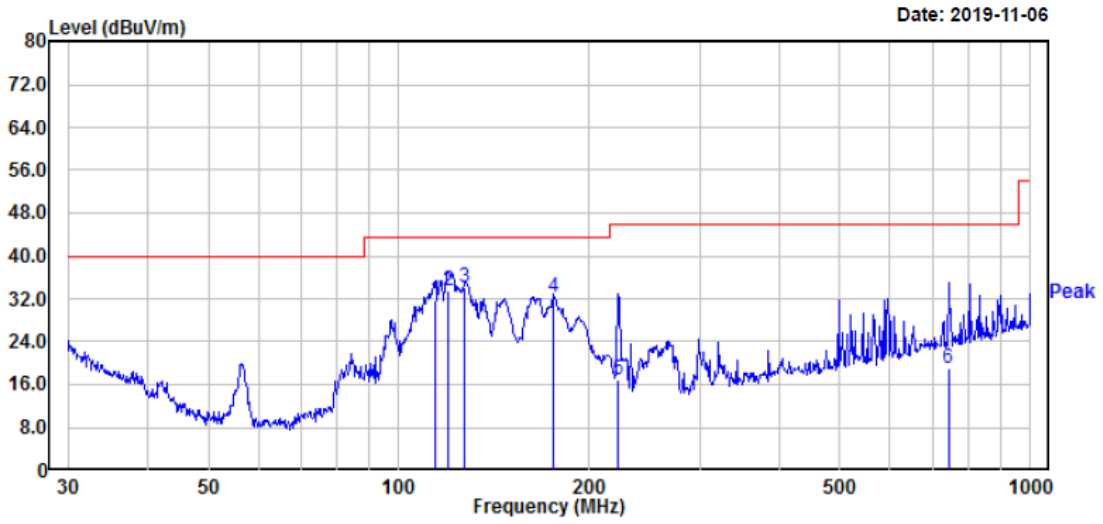


	Freq	Read Level	Level	Limit Line	Over Limit	APos	TPos	Remark	Factor
	MHz	dBuV	dBuV/m	dBuV/m	dB	cm	deg		dB/m
1	37.68	38.39	28.88	40.00	-11.12	100	125	QP	-9.51
2	68.15	52.71	35.69	40.00	-4.31	100	3	QP	-17.02
3	75.45	53.50	36.46	40.00	-3.54	100	313	QP	-17.04
4	78.41	52.29	35.17	40.00	-4.83	100	288	QP	-17.12
5	154.28	48.11	36.15	43.50	-7.35	100	319	QP	-11.96
6	184.49	47.71	35.01	43.50	-8.49	100	56	QP	-12.70

30MHz-1GHz((5760-5820MHz)):

Horizontal

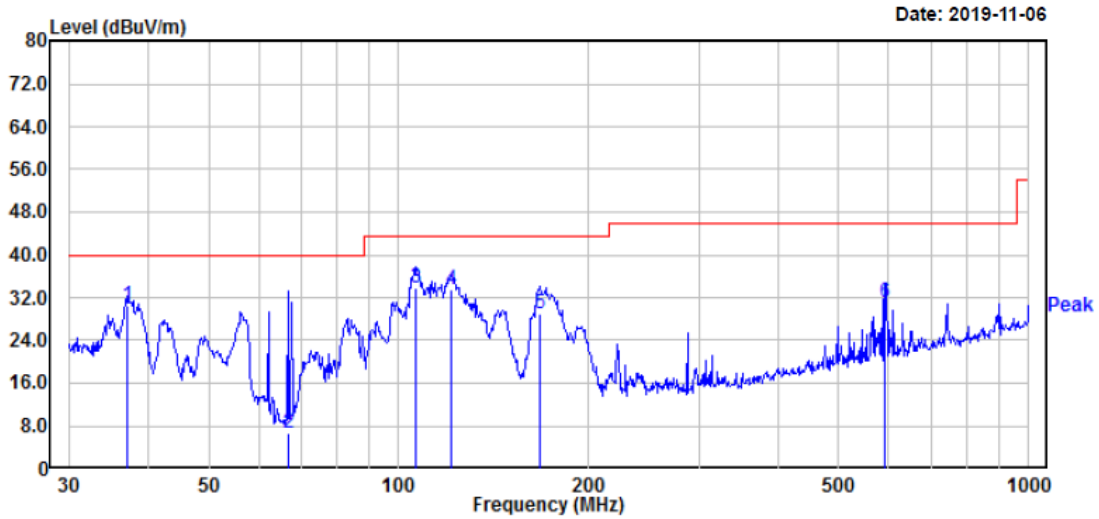
*Pre-scan in the X, Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	114.11	43.41	-11.82	31.59	43.50	-11.91	200	13	QP
2	119.86	44.20	-10.68	33.52	43.50	-9.98	200	6	QP
3	127.22	45.10	-11.07	34.03	43.50	-9.47	200	360	QP
4	176.27	45.19	-12.83	32.36	43.50	-11.14	100	185	QP
5	222.95	30.40	-13.37	17.03	46.00	-28.97	200	6	QP
6	742.26	20.60	-1.48	19.12	46.00	-26.88	100	332	QP

Vertical

*Pre-scan in the X, Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	37.03	39.60	-8.97	30.63	40.00	-9.37	100	203	QP
2	66.73	23.90	-17.11	6.79	40.00	-33.21	100	73	QP
3	106.39	47.20	-13.34	33.86	43.50	-9.64	100	150	QP
4	121.55	44.40	-10.74	33.66	43.50	-9.84	100	306	QP
5	167.24	41.50	-12.40	29.10	43.50	-14.40	100	306	QP
6	593.05	35.10	-4.09	31.01	46.00	-14.99	100	294	QP

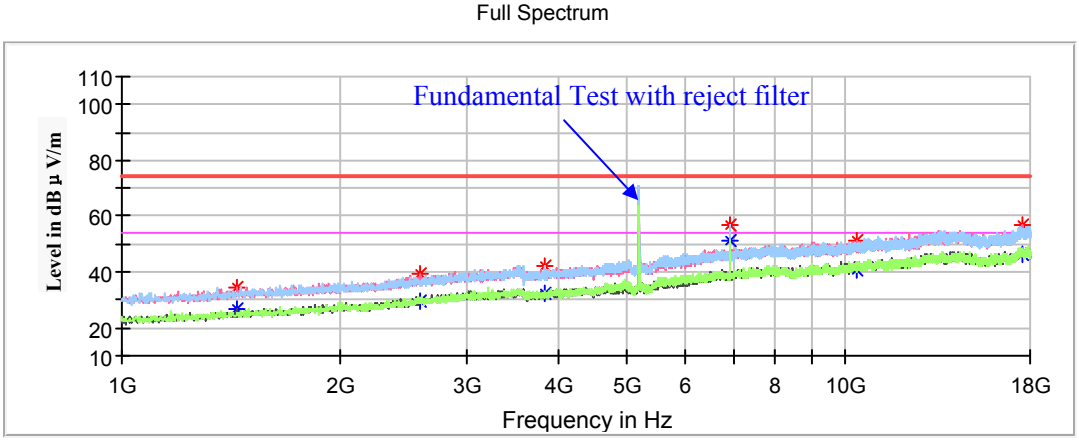
Note:
1) Factor (dB) =Antenna Factor (dB/m) + Cable Loss (dB) + Amplifier Gain (dB)
2) Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

1GHz-18GHz (5180-5220MHz):

*(Pre-scan in the X, Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded.)*

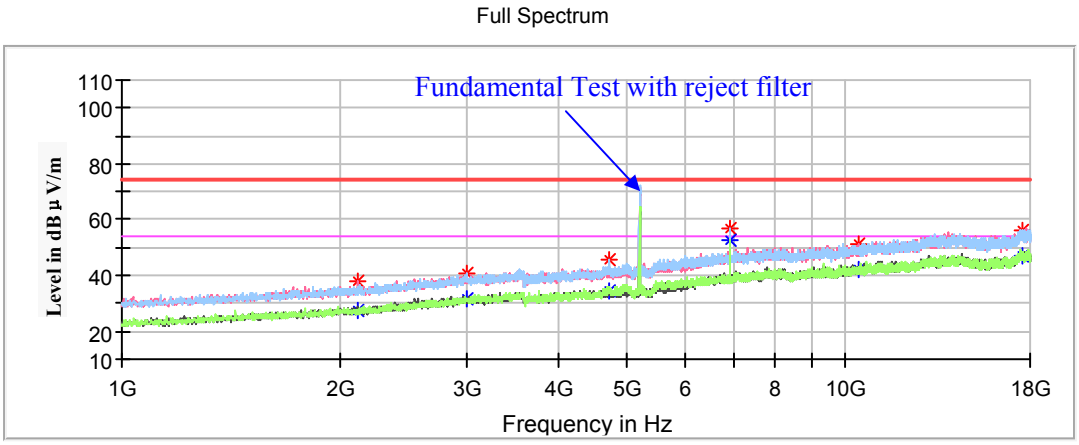
Note:
1. This test was performed with the 5150-5250MHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit - Corrected. Amplitude

Low Channel: 5180MHz



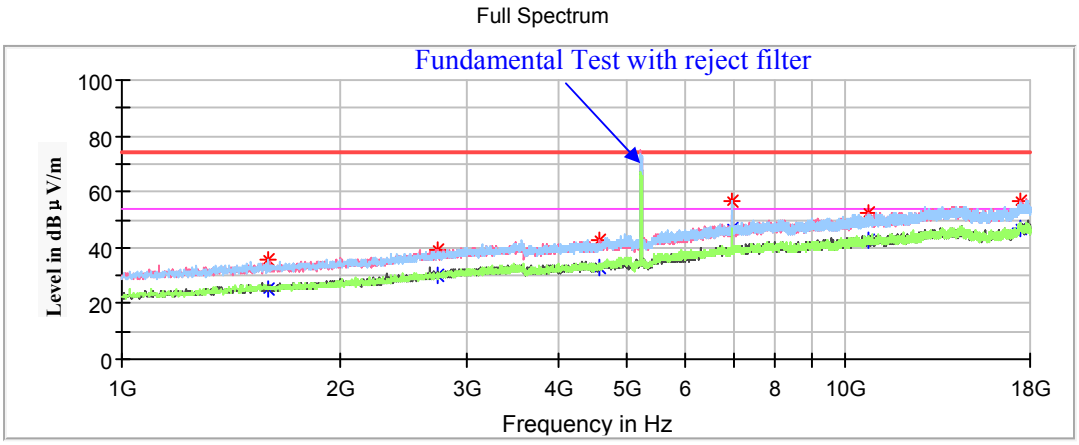
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1442.00	---	27.08	150	V	217	-10.2	54.00	26.92
1442.00	34.68	---	150	V	143	-10.2	74.00	39.32
2589.50	39.23	---	200	V	216	-6.5	68.20	28.97
3845.80	---	32.72	200	H	190	-2.4	54.00	21.28
3845.80	42.08	---	200	H	257	-2.4	74.00	31.92
6905.80	56.60	---	100	H	122	5.2	68.20	11.60
10373.80	51.11	---	150	V	294	8.8	68.20	17.09
17546.10	56.57	---	150	V	290	14.2	68.20	11.63

Middle Channel: 5200MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
2120.30	37.69	---	200	V	175	-7.9	68.20	30.51
2990.70	40.46	---	200	V	355	-4.4	68.20	27.74
4702.60	---	34.62	200	H	38	-0.7	54.00	19.38
4702.60	40.96	---	200	H	305	-0.7	74.00	33.04
6933.00	56.96	---	150	H	138	5.2	68.20	11.24
10433.30	51.1	---	150	V	39	8.9	68.20	17.10
17563.10	56.39	---	200	V	57	14.2	68.20	11.81

High Channel: 5220MHz



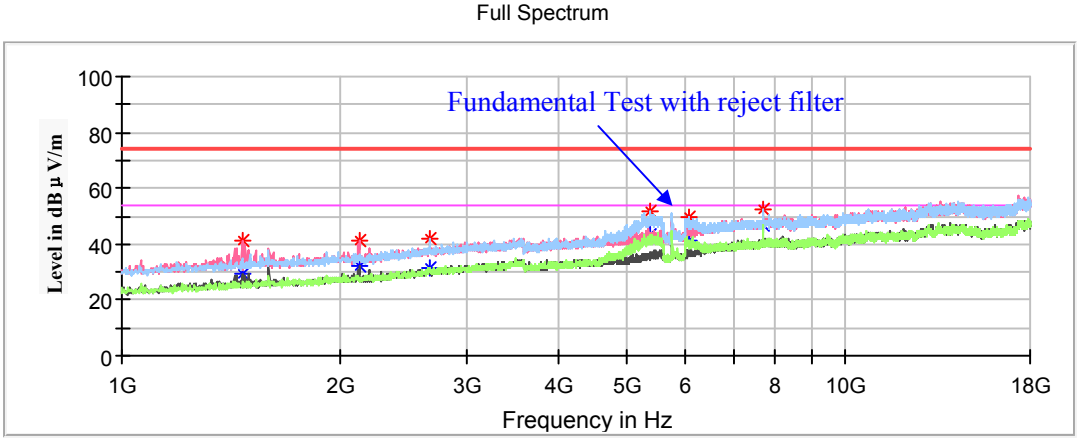
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1595.00	35.36	---	150	H	324	-9.6	74.00	38.64
1595.00		25.32	150	H	324	-9.6	54.00	28.68
2723.80	---	29.75	150	V	234	-5.8	54.00	24.25
2723.80	39.50	---	150	V	320	-5.8	74.00	34.50
4566.60	---	32.84	200	V	278	-0.9	54.00	21.16
4566.60	42.56	---	200	V	223	-0.9	74.00	31.44
6958.50	56.54	---	200	H	345	5.3	68.20	11.66
10725.70	---	42.78	200	V	357	9.3	54.00	11.22
10725.70	54.41	---	200	V	280	9.3	74.00	19.59
17478.10	56.75	---	200	V	264	14.2	68.20	11.45

5760-5820MHz:

*Pre-scan with X,Y and Z axes of orientation, the worst case **Z-axis of orientation** was recorded*

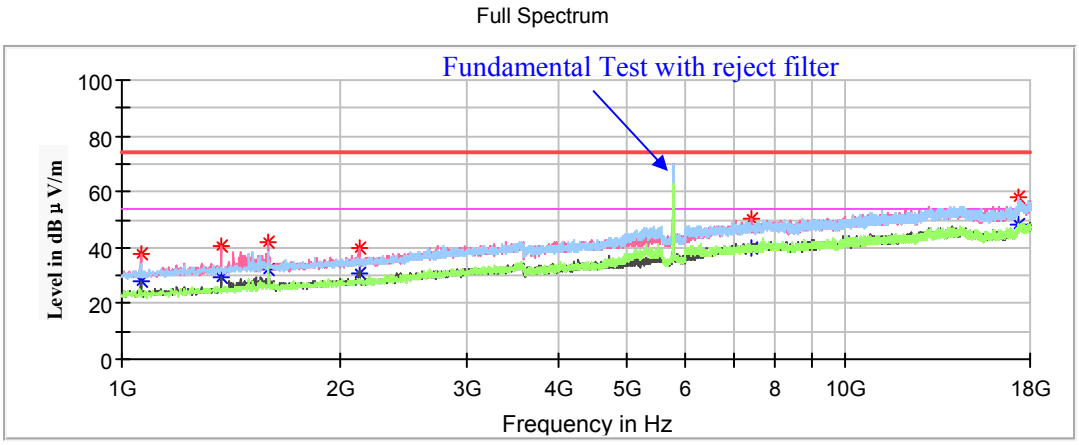
Note:
1. This test was performed with the 5725-5850MHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit - Corrected. Amplitude

Low Channel: 5760MHz



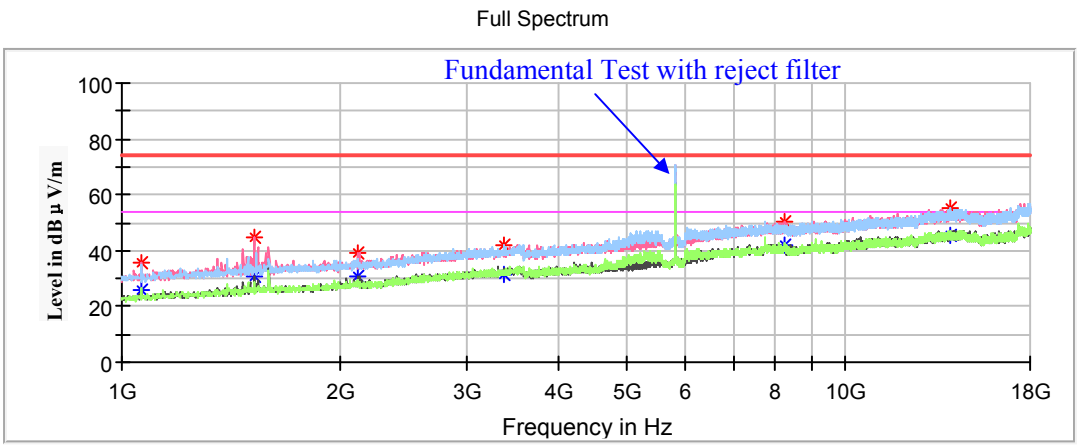
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1465.80	---	29.26	200	V	248	-10.1	54.00	24.74
1465.80	41.41	---	200	V	248	-10.1	74.00	32.59
2130.50	40.92	---	200	V	130	-7.9	68.20	27.28
2659.20	41.76	---	200	H	135	-6.1	68.20	26.44
5358.80	---	43.32	100	H	232	0.9	54.00	17.30
5358.80	51.90	---	100	H	232	0.9	74.00	22.10
6076.20	49.34	---	150	H	219	2.6	68.20	18.86
7679.30	---	47.03	150	H	138	6.5	54.00	6.97
7679.30	52.10	---	150	H	138	6.5	74.00	21.90

Middle Channel: 5780MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1061.20	---	28.20	150	V	200	-12.3	54.00	25.80
1061.20	38.10	---	150	V	200	-12.3	74.00	35.90
1372.30	---	29.07	200	V	208	-10.6	54.00	24.93
1372.30	40.44	---	200	V	208	-10.6	74.00	33.56
1591.60	---	32.42	200	V	55	-9.6	54.00	21.58
1591.60	41.64	---	200	V	55	-9.6	74.00	32.36
2125.40	40.15	---	200	V	102	-7.9	68.20	28.05
7417.50	---	39.77	100	V	331	6.0	54.00	14.23
7417.50	50.15	---	100	V	331	6.0	74.00	23.85
17393.10	57.79	---	200	H	150	13.70	68.20	10.41

High Channel: 5820MHz

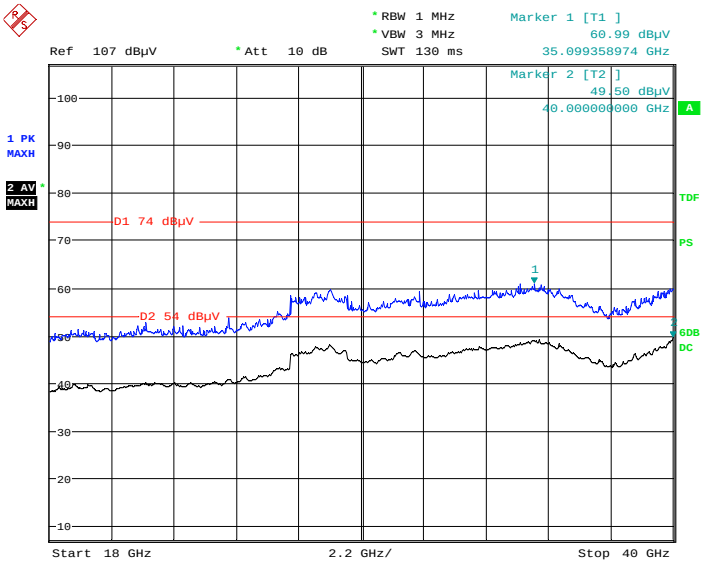


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1062.90	---	26.68	200	V	84	-12.3	54.00	27.32
1062.90	35.43	---	200	V	84	-12.3	74.00	38.57
1521.90	---	30.62	150	V	81	-9.9	54.00	23.38
1521.90	44.60	---	150	V	81	-9.9	74.00	29.40
2123.70	39.12	---	150	V	355	-7.9	68.20	29.08
3366.40	41.79	---	150	H	279	-3.8	68.20	26.41
8250.50	---	42.00	150	V	138	6.7	54.00	12.00
8250.50	50.31	---	150	V	138	6.7	74.00	23.69
13994.80	55.31	---	100	H	31	12.5	68.20	12.89

18GHz-40GHz (5180-5220MHz):

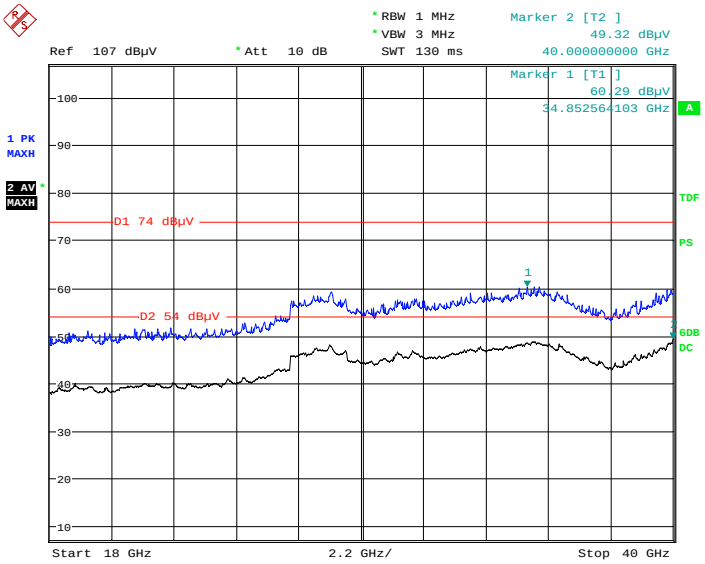
(Pre-scan in the X, Y and Z axes of orientation, the worst case 5180MHz in Z-axis of orientation was recorded)

Horizontal



Date: 7.NOV.2019 00:09:26

Vertical

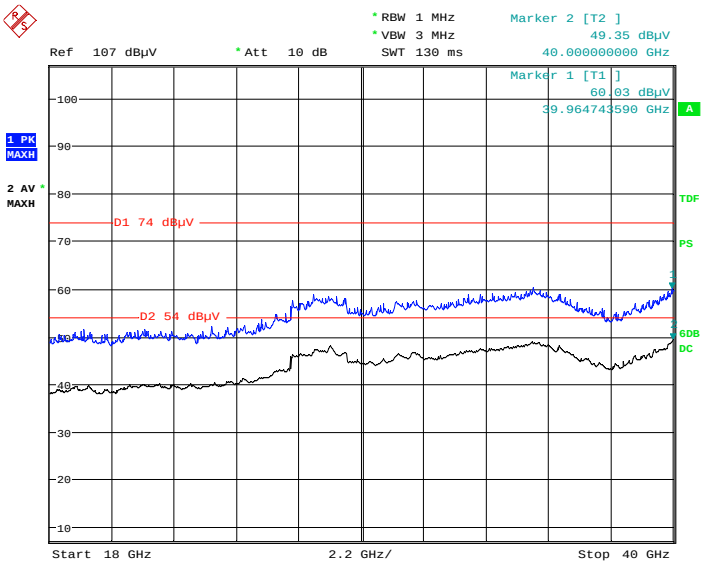


Date: 7.NOV.2019 00:45:38

18GHz-40GHz (5760-5820):

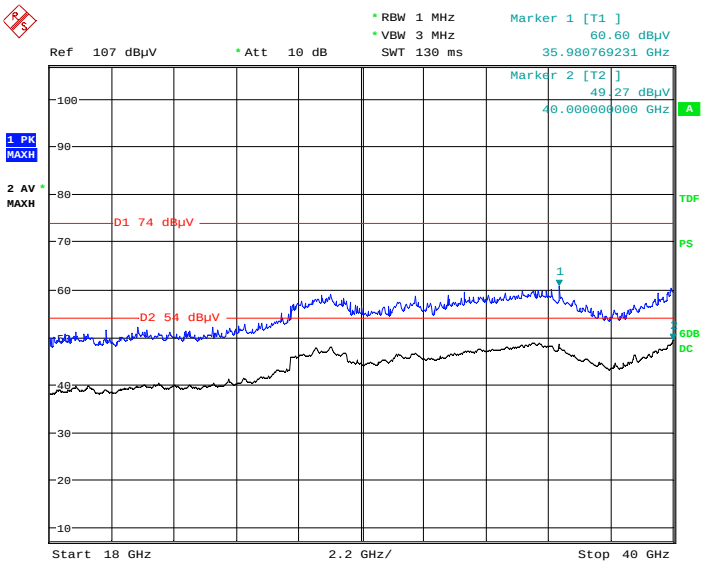
(Pre-scan in the X, Y and Z axes of orientation, the worst case 5780MHz in Z-axis of orientation was recorded)

Horizontal



Date: 13.NOV.2019 13:52:23

Vertical



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Restricted Bands Emissions Test (5180-5220MHz):

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

(Pre-scan in the X, Y and Z axes of orientation, the worst case in Z-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 5180MHz								
5150.00	---	47.43	200	H	125	10.2	54	6.57
5150.00	55.05	---	200	H	125	10.2	74	18.95
5150.00	---	45.63	150	H	321	10.2	54	8.37
5150.00	52.47	---	150	H	321	10.2	74	21.53
High Channel: 5220MHz								
5350.00	---	42.32	100	H	19	10.9	54	11.68
5350.00	52.16	---	100	H	19	10.9	74	21.84
5350.00	---	44.55	150	H	107	10.9	54	9.45
5350.00	54.95	---	150	H	107	10.9	74	19.05

Restricted Bands Emissions Test (5760-5820MHz):

Note:
1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
2. Corrected Amplitude = Corrected Factor + Reading
3. Margin = Limit - Corrected. Amplitude

(Pre-scan in the X, Y and Z axes of orientation, the worst case in Z-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Correct Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 5760MHz								
5650.00	57.62	---	200	H	286	11.7	68.2	10.58
5700.00	58.45	---	200	H	286	11.7	105.2	46.75
5720.00	59.14	---	250	H	153	11.7	110.8	51.66
5725.00	58.96	---	250	H	153	11.7	122.2	63.24
High Channel: 5825MHz								
5850.00	58.33	---	150	H	154	12.2	122.2	63.87
5855.00	59.12	---	150	H	154	12.2	110.8	51.68
5875.00	60.27	---	150	H	154	12.2	105.2	44.93
5925.00	59.74	---	150	H	154	12.2	68.2	8.46

FCC §15.407(a) &§15.407(e)–EMISSION BANDWIDTH

Applicable Standard

.
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz band is made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

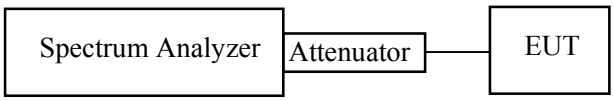
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. **Minimum Emission Bandwidth for the band 5.725-5.85 GHz**
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Sam Ye on 2019-11-03.

Test Result: Pass.

5180-5220 MHz:

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5180	20.040	18.517
Middle	5200	20.200	18.517
High	5220	20.120	18.517

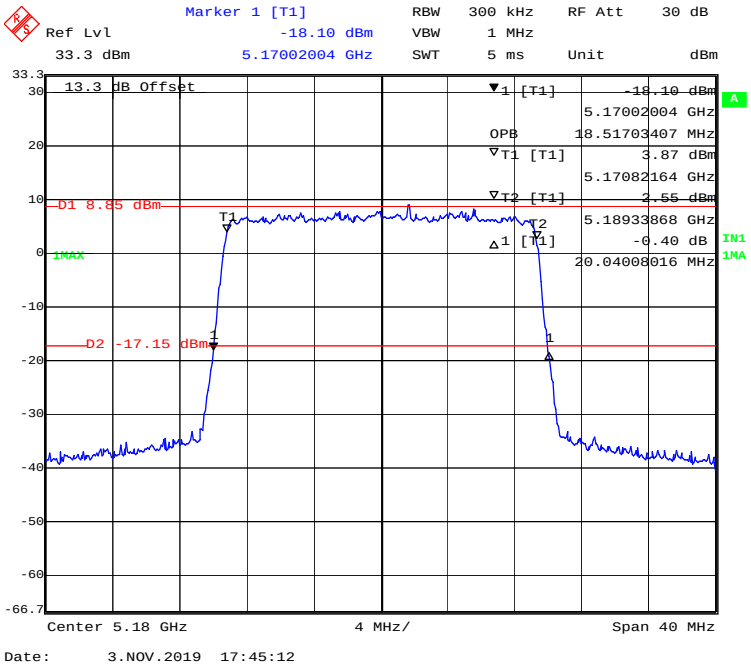
5760-5820MHz:

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5760	18.196	18.597
Middle	5780	18.397	18.517
High	5820	18.357	18.597

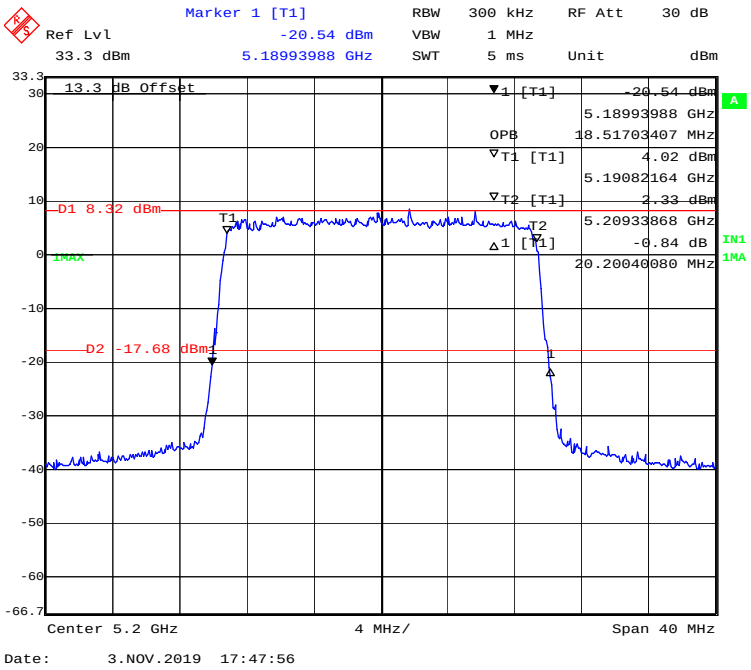
5180-5220 MHz:

26 Bandwidth&99% Occupied Bandwidth

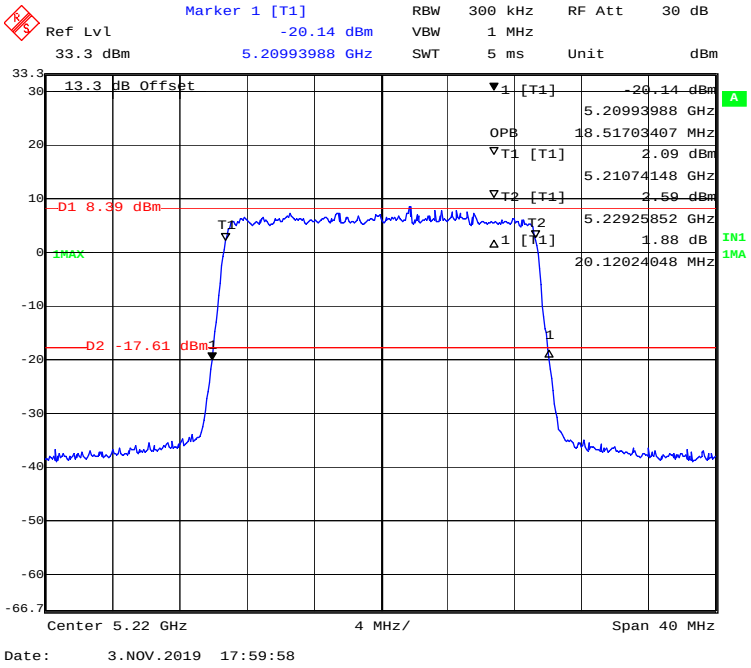
Frequency: 5180MHz



Frequency: 5200MHz



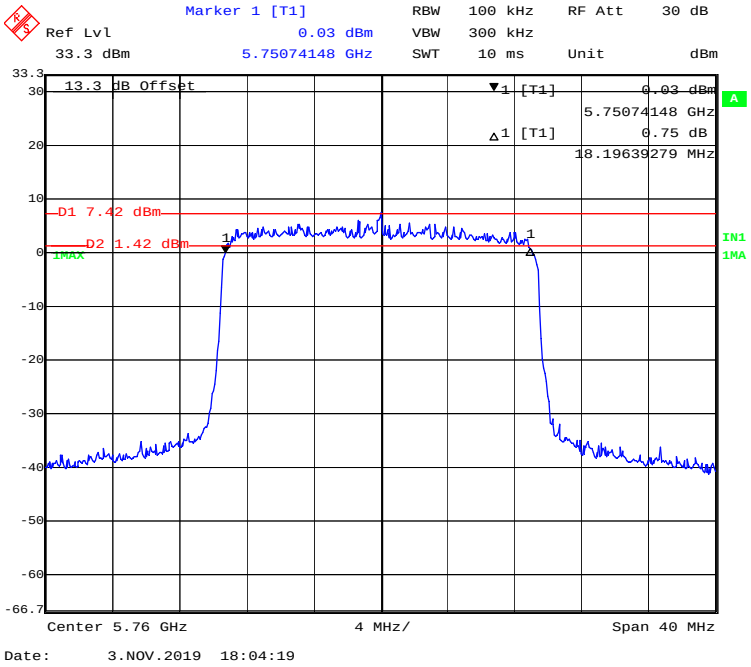
Frequency: 5220MHz



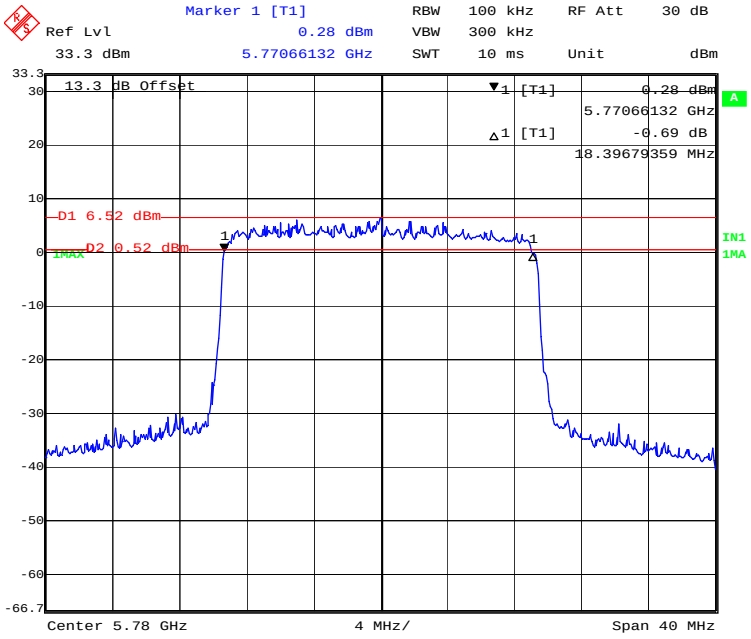
5760-5820MHz

6 Bandwidth

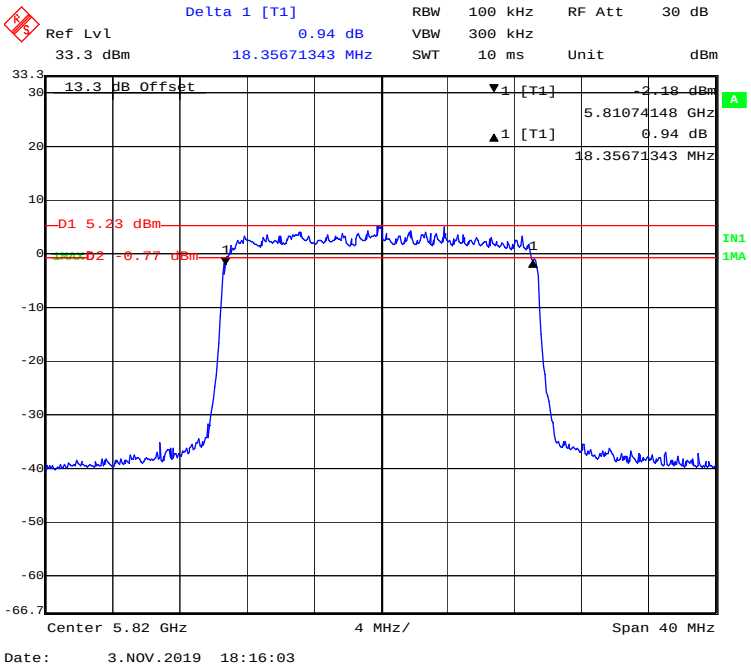
Frequency: 5760MHz



Frequency: 5780MHz

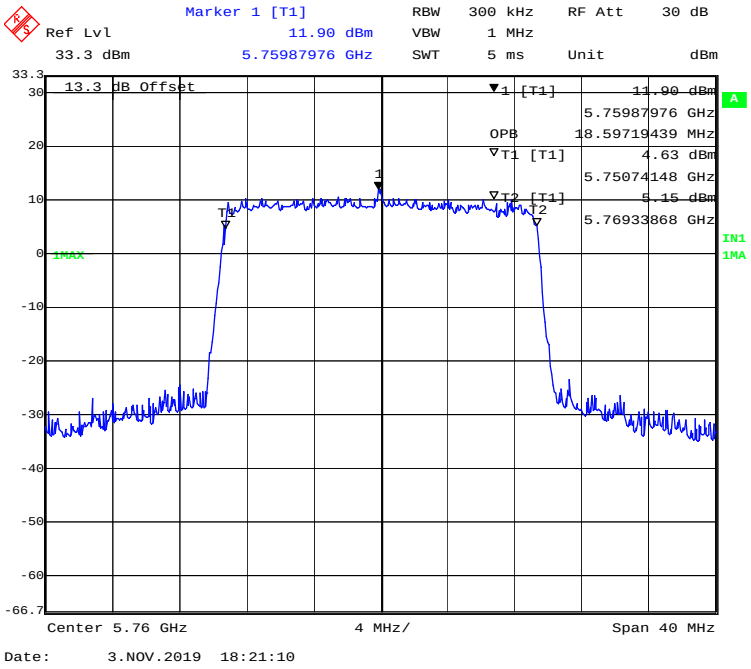


Frequency: 5820MHz

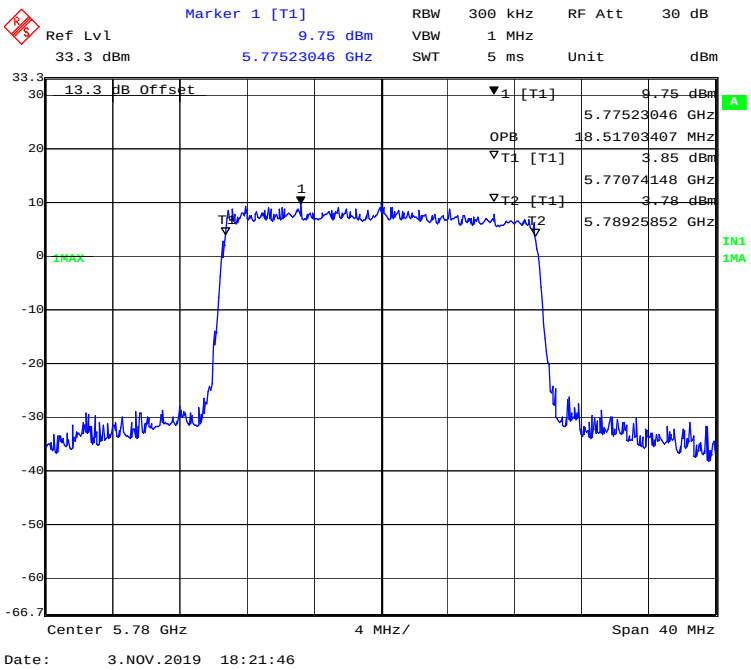


99% Occupied Bandwidth

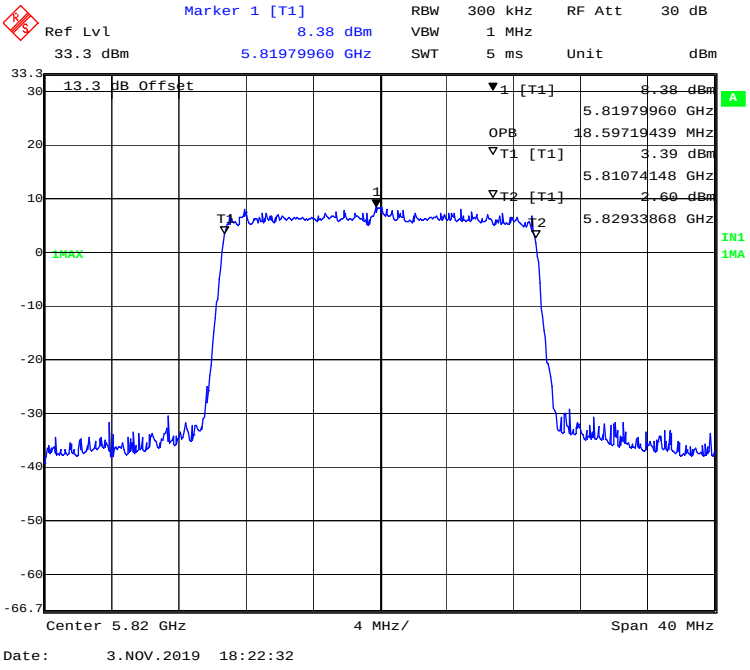
Frequency: 5760MHz



Frequency: 5780MHz



Frequency: 5820MHz



FCC §15.407(a) (1) (3) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

According to §15.407(a)(1)

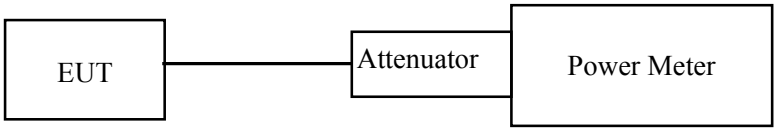
(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to §15.407(a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Sam Ye on 2019-11-03.

Test Mode: Transmitting

Frequency Range(MHz)	Frequency (MHz)	Average Conducted Output Power (dBm)	Limit (dBm)	Result
5180-5220 MHz	5180	16.09	30	PASS
	5200	15.30	30	PASS
	5220	14.87	30	PASS
5760-5820 MHz	5760	19.16	30	PASS
	5780	18.01	30	PASS
	5820	17.54	30	PASS

FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY

Applicable Standard

According to §15.407(a) (1)

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to §15.407(a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedyres New Rules v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F: Maximum power spectral density (PPSD)

Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	50%
ATM Pressure:	101.3 kPa

The testing was performed by Sam Ye on 2019-11-03.

Test Mode: Transmitting

5180MHz-5220MHz:

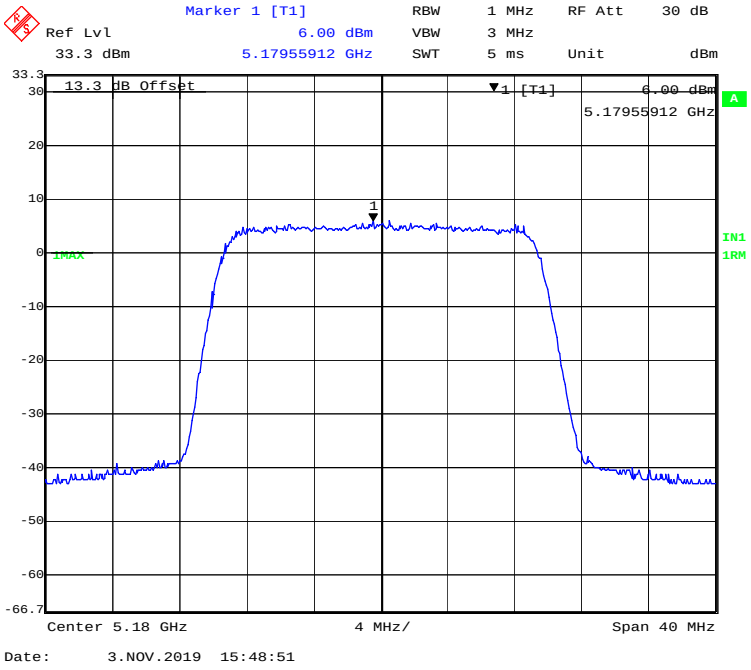
Frequency (MHz)	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
5180	6.00	17	PASS
5200	6.40	17	PASS
5220	5.45	17	PASS

5760MHz-5820MHz:

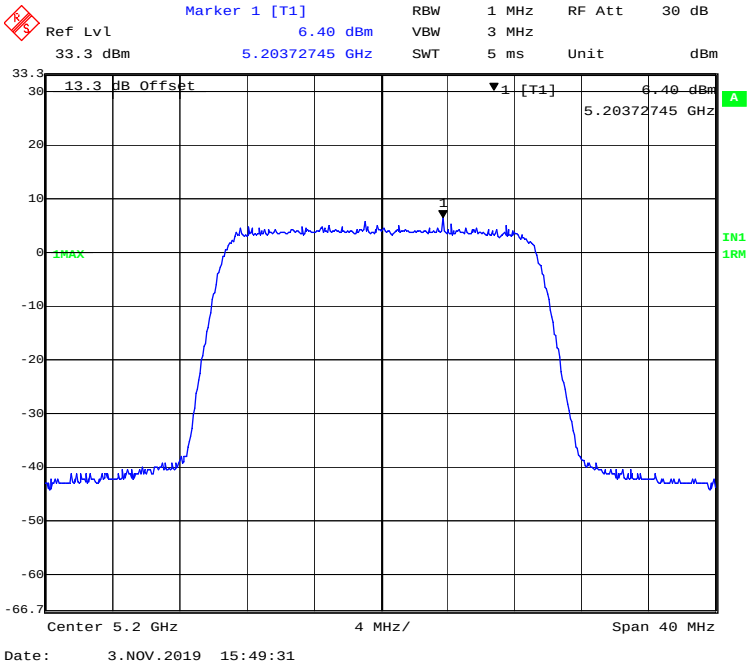
Frequency MHz	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
5760	8.24	30	PASS
5780	7.25	30	PASS
5820	6.17	30	PASS

5180MHz-5220MHz:

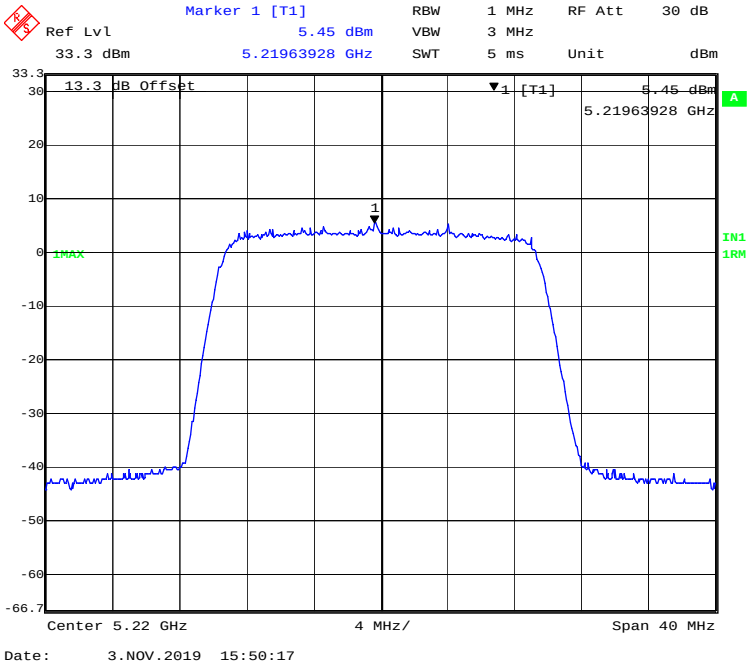
Power spectral density-5180MHz



Power spectral density-5200MHz

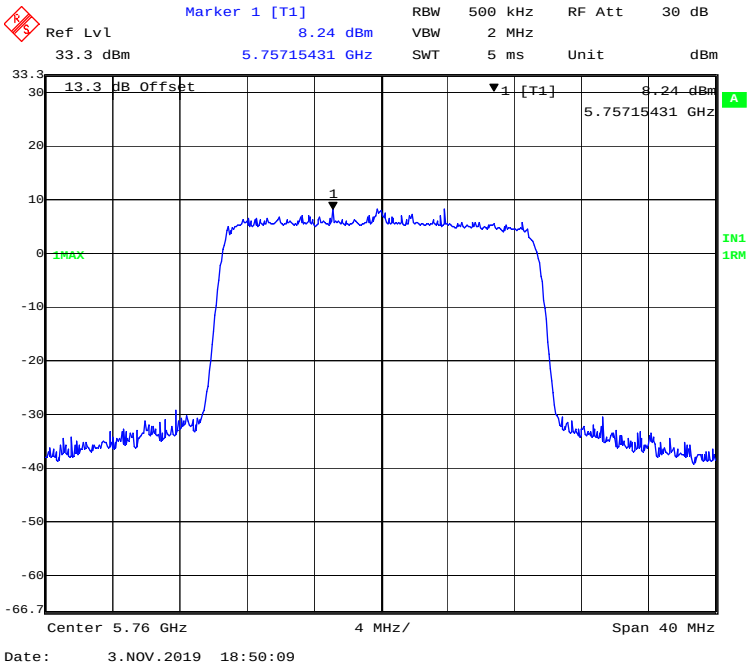


Power spectral density-5220MHz

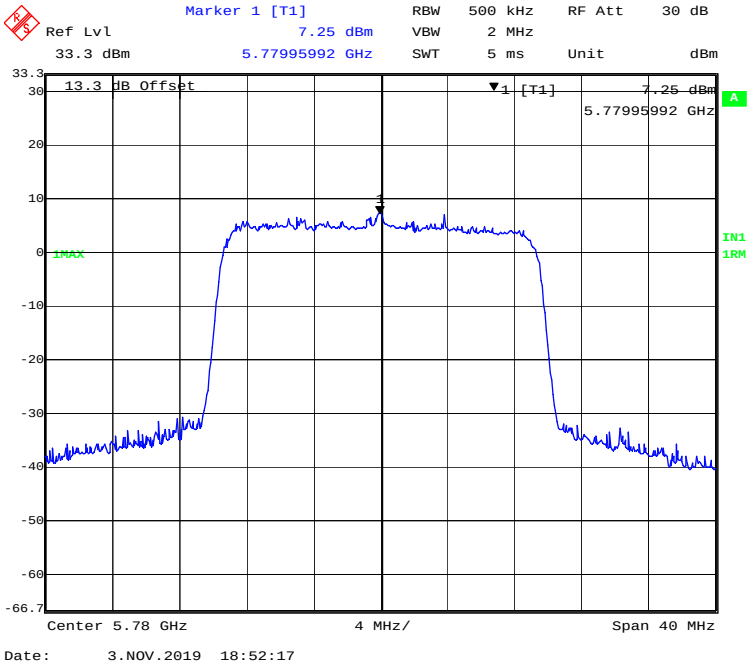


5760MHz-5820 MHz:

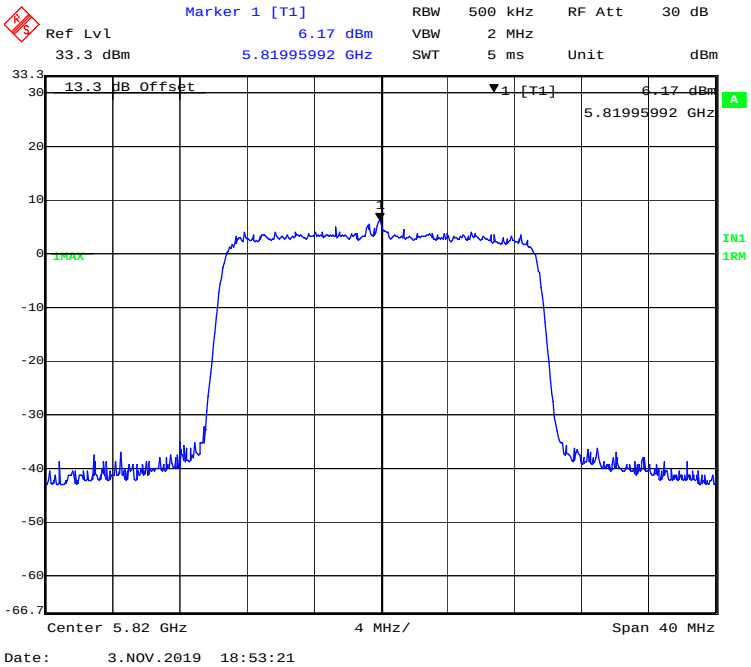
Power spectral density-5760MHz



Power spectral density-5780MHz



Power spectral density-5820MHz



******* END OF REPORT *******