FCC RADIO TEST REPORT
FCC ID: 2AGKB-KD2

Product: Android TV Box

Trade Mark: N/A

Model No.: KD2

Family Model: KD2 PRO,KD2 PLUS,KD3 PRO, KD3 PLUS,KD4,KD5 PRO, KD5 PLUS,HD5,GMMZ-DongleTV1, BTV CAST,BTV CAST13, BTV CAST14,BTV CAST15, BTV CAST16,BC11,BC12,BC13, BC14,BC15,BC16,BC17, BC18, BC19,BC20,XRS4000,XR4000, Unipro3,HD5

Report No.: S22033003004003

Issue Date: 05 May. 2022

Prepared for

Videostrong Technology Co.,Ltd

604, Lushi industrial Building, 28 District, Bao'an District, Shenzhen, China

Prepared by

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Website: http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name	:	Videostrong Technology Co.,Ltd
Address	:	604, Lushi industrial Building, 28 District, Bao'an District, Shenzhen, China
Manufacturer's Name	:	Videostrong Technology Co.,Ltd
Address	:	604, Lushi industrial Building, 28 District, Bao'an District, Shenzhen, China
Product description		
Product name	:	Android TV Box
Model and/or type reference	:	KD2
Family Model	:	KD2 PRO,KD2 PLUS,KD3 PRO,KD3 PLUS,KD4,KD5 PRO, KD5 PLUS,HD5,GMMZ-DongleTV1,BTV CAST,BTV CAST13, BTV CAST14,BTV CAST15,BTV CAST16,BC11,BC12,BC13, BC14,BC15,BC16,BC17, BC18,BC19,BC20,XRS4000, XR4000,Unipro3,HD5
Standards	:	FCC Part15.407
Test procedure		ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v02r01 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 KDB 905462 D03 Client Without DFS New Rules v01r02

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test .....

Date (s) of performance of tests ..... 07 Apr. 2022 ~ 21 Apr. 2022

Date of Issue ..... 05 May. 2022

Test Result ..... **Pass**

Testing Engineer : Susan Li

(Susan Li)

Authorized Signatory : Alex

(Alex Li)

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Revision History

Report No.	Version	Description	Issued Date
S22033003004003	Rev.01	Initial issue of report	05 May. 2022

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407(b)(8)(9)	Spurious Radiated Emissions	PASS	
15.407 (a)	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407 (b)(1) 15.407 (b)(4)	Band Edge	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.407(g)	Frequency Stability Measurement	PASS	
15.407(h)	Dynamic Frequency Selection(DFS)	N/A	
15.203	Antenna Requirement	PASS	
15.407(c)	Automatically discontinue transmission	PASS	(Note 3)

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) This device operates with a duty cycle greater than 99%

(3) The product is a client device, and the data transmission is limited by the AP.
When the information to be sent is missing or the operation fails,
the device will automatically stop sending and directly connect to the AP correctly again.

1.1 FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at
1/F, Building E, Fenda Science Park Sanwei, Xixiang, Bao'an District
Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

CNAS-Lab.	:	The Certificate Registration Number is L5516.
IC-Registration		The Certificate Registration Number is 9270A.
		CAB identifier:CN0074
FCC- Accredited		Test Firm Registration Number: 463705.
		Designation Number: CN1184
A2LA-Lab.		The Certificate Registration Number is 4298.01
Name of Firm	:	Shenzhen NTEK Testing Technology Co., Ltd.
Site Location	:	1/F, Building E, Fenda Science Park Sanwei, Xixiang, Bao'an District Shenzhen, Guangdong, China

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	±2.80dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(9KHz~30MHz)	±6dB
5	All emissions, radiated(30MHz~1GHz)	±2.64dB
6	All emissions, radiated(1GHz~6GHz)	±2.40dB
7	All emissions, radiated(> 6GHz)	±2.52dB
8	Temperature	±0.5°C
9	Humidity	±2%

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	Android TV Box
Trade Mark	N/A
Model Name	KD2
Family Model	KD2 PRO,KD2 PLUS,KD3 PRO,KD3 PLUS,KD4,KD5 PRO,KD5 PLUS, HD5,GMMZ-DongleTV1,BTV CAST,BTV CAST13,BTV CAST14, BTV CAST15,BTV CAST16,BC11,BC12,BC13,BC14,BC15,BC16,BC17, BC18,BC19,BC20,XRS4000,XR4000,Unipro3,HD5
Model Difference	All models are the same circuit and RF module, except the Model names and appearance are different.
FCC ID	2AGKB-KD2
Product Description	See below

Mode Supported	☒802.11a ☒802.11n(HT20) ☒802.11n(HT40) ☒802.11ac(HT20) ☒802.11ac(HT40) ☒802.11ac(HT80)
Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM/ 1024QAM
Operating Frequency Range	☒ U-NII-1: 5150 MHz ~5250MHz ☒ U-NII-3: 5725 MHz ~5850 MHz
Function:	☐Outdoor AP ☐Indoor AP ☐Fixed P2P ☒Client
DFS type:	☐master devices ☐Slave devices with radar detection ☒Slave devices without radar detection
Smart system	☒SISO for 802.11a/n/ac ☒MIMO for 802.11n/ac
Antenna Type	FPC Antenna
Antenna Gain	4dBi
Smart system	☒SISO for 802.11a/n/ac ☒MIMO for 802.11n/ac

Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.

Power supply	DC 5V from USB port
Adapter	N/A
Connecting I/O Port(s)	Please refer to the User's Manual
HW Version	V1.1
SW Version	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Frequency and Channel list:

Band	20MHz		40MHz		80MHz	
	Channel	Frequency	Channel	Frequency	Channel	Frequency
U-NII-1	36	5180 MHz	38	5190 MHz	42	5210 MHz
	40	5200 MHz	46	5230 MHz	-	-
	44	5220 MHz				
	48	5240 MHz				
U-NII-3	149	5745 MHz	151	5755 MHz	155	5775 MHz
	153	5765 MHz	159	5795 MHz		
	157	5785 MHz				
	161	5805 MHz				
	165	5825 MHz				

1.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11a / n 20 /ac 20 CH36/ CH40/ CH 48 802.11a / n 20 / ac 20 CH149/ CH157/ CH 165
Mode 3	802.11n40 / ac40 CH38/ CH 46 802.11n 40 / ac 40 CH 151 / CH 159
Mode 4	802.11ac80 CH 42 802.11ac 80 CH 155

For Radiated Emission	
Final Test Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11a / n 20 /ac 20 CH36/ CH40/ CH 48 802.11a / n 20 / ac 20 CH149/ CH157/ CH 165
Mode 3	802.11n40 / ac40 CH38/ CH 46 802.11n 40 / ac 40 CH 151 / CH 159
Mode 4	802.11ac80 CH 42 802.11ac 80 CH 155

For AC Conducted Emission	
Final Test Mode	Description
Mode 1	Normal Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11a / n 20 /ac 20 CH36/ CH40/ CH 48 802.11a / n 20 / ac 20 CH149/ CH157/ CH 165
Mode 3	802.11n40 / ac40 CH38/ CH 46 802.11n 40 / ac 40 CH 151 / CH 159
Mode 4	802.11ac80 CH 42 802.11ac 80 CH 155

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

This EUT has two antennas, and different modes support different transmit mode what describe as following form:

Mode	Tx / Rx
802.11a / n(20MHz,40MHz) / ac(20MHz,40MHz,80MHz)	1TX, 1RX
802.11n(20MHz,40MHz) / ac(20MHz,40MHz,80MHz)	2TX, 2RX

For 5.2GHz/5.8GHz band, 802.11n(20/40)/ac(20/40/80) has MIMO mode, Antenna 1,2 are simultaneous transmissions, each with the same directional gain.
For power measurements: Directional gain=G_{ANT} + Array Gain=4dBi + 0 = 4dBi
For power spectral density (PSD) measurements: Directional gain=G_{ANT} + Array Gain=4dBi + 3.01 = 7.01dBi

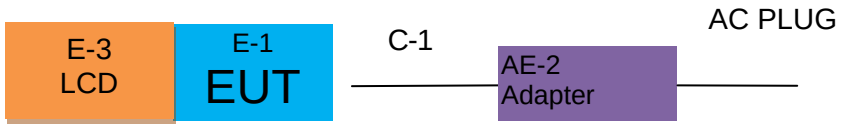
Note: G_{ANT} means antenna gain for the same gain in dBi.
For power spectral density (PSD) measurements: Array Gain = 10log(N_{ANT}/N_{SS})dB.
For power measurements:

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths $\geq$ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

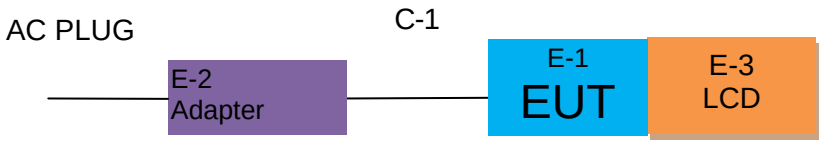
N_{ANT} = number of transmit antennas and
N_{SS} = number of spatial streams. (Assume N_{SS} = *1* unless you have specific information to the contrary.)

1.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

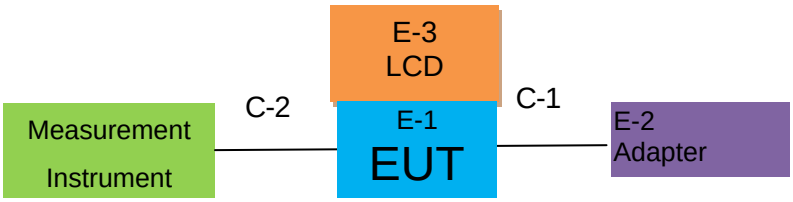
For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases



Note: 1. The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

1.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	Android TV Box	KD2	N/A	EUT
E-2	Adapter	N/A	N/A	Peripherals
E-3	LCD	241P6V	UHBA1724011720C24	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	Power Cable	NO	NO	1.0m
C-2	RF Cable	YES	NO	0.1m

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

(3) During the battery power test, the battery is fully charged.

1.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Aglient	E4407B	MY45108040	2022.04.01	2023.03.31	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2021.07.01	2022.06.30	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2021.07.01	2022.06.30	1 year
4	Test Receiver	R&S	ESPI7	101318	2022.04.06	2023.04.05	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2022.03.30	2023.03.29	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	3 year
7	Horn Antenna	EM	EM-AH-10180	2011071402	2022.03.31	2023.03.30	1 year
8	Amplifier	EMC	EMC051835SE	980246	2021.11. 07	2022.11.06	1 year
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519 B	055	2021.07.01	2022.06.30	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2021.11. 07	2022.11.06	1 year
11	USB RF Power Sensor	DARE	RPR3006W	15I00041SNO84	2021.07.01	2022.06.30	1 year
12	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2019.08.06	2022.08.05	3 year
13	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2019.08.06	2022.08.05	3 year
14	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2019.06.28	2022.06.27	3 year
15	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2019.08.06	2022.08.05	3 year
16	Filter	TRILTHIC	2400MHz	29	2021.07.01	2022.06.30	1 year
17	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A
18	Low Noise Amplifier	B&Z	BZ-P540-550850-452727	16476-11729	2022.03.09	2023.03.08	1 year
19	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2021.11.07	2022.11.06	1 year
20	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2022.03.09	2023.03.08	1 year

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2022.04.06	2023.04.05	1 year
2	LISN	R&S	ENV216	101313	2021.06.22	2022.06.21	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2022.04.06	2023.04.05	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2020.05.11	2023.05.10	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2020.05.11	2023.05.10	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& Aux Equipment which is scheduled for calibration every 3 years.

2. EMC EMISSION TEST

2.1 CONDUCTED EMISSION MEASUREMENT

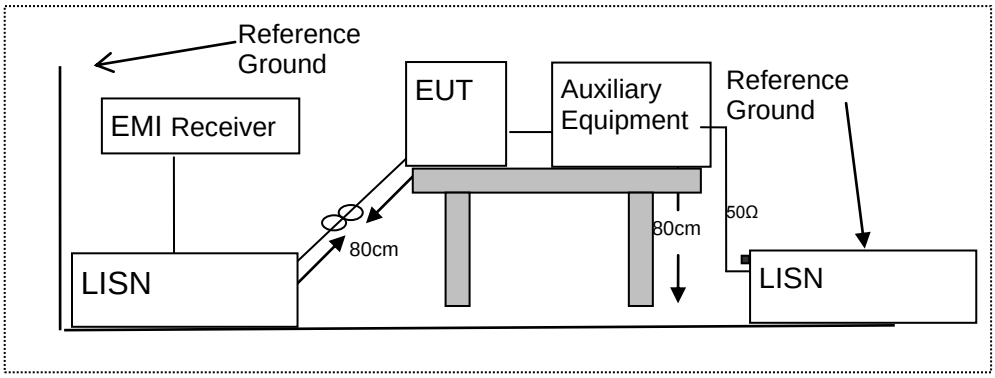
2.1.1 APPLICABLE STANDARD

According to FCC Part 15.207(a)

2.1.2 CONFORMANCE LIMIT

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50
Note: 1. *Decreases with the logarithm of the frequency 2. The lower limit shall apply at the transition frequencies 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

2.1.3 TEST CONFIGURATION



2.1.4 TEST PROCEDURE

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

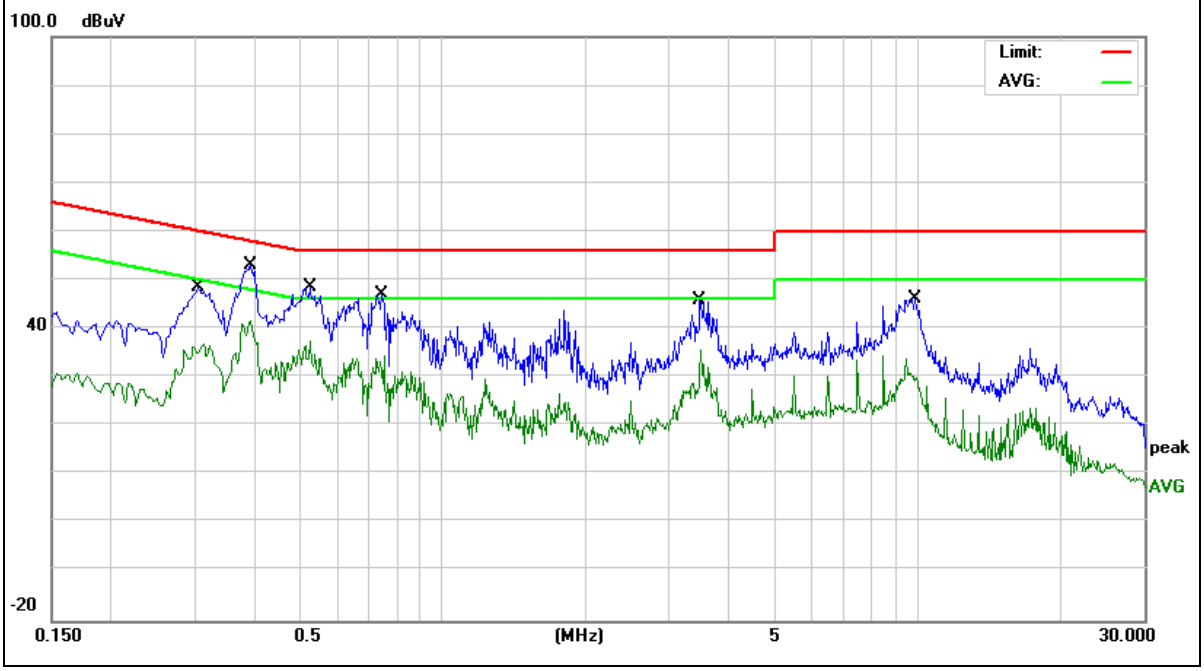
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1(5.2G)

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3060	38.77	9.63	48.40	60.08	-11.68	QP
0.3060	27.27	9.63	36.90	50.08	-13.18	AVG
0.3940	43.43	9.64	53.07	57.98	-4.91	QP
0.3940	32.13	9.64	41.77	47.98	-6.21	AVG
0.5260	38.76	9.65	48.41	56.00	-7.59	QP
0.5260	27.67	9.65	37.32	46.00	-8.68	AVG
0.7460	37.41	9.74	47.15	56.00	-8.85	QP
0.7460	24.79	9.74	34.53	46.00	-11.47	AVG
3.4820	36.12	9.70	45.82	56.00	-10.18	QP
3.4820	25.85	9.70	35.55	46.00	-10.45	AVG
9.8979	36.43	9.71	46.14	60.00	-13.86	QP
9.8979	24.26	9.71	33.97	50.00	-16.03	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

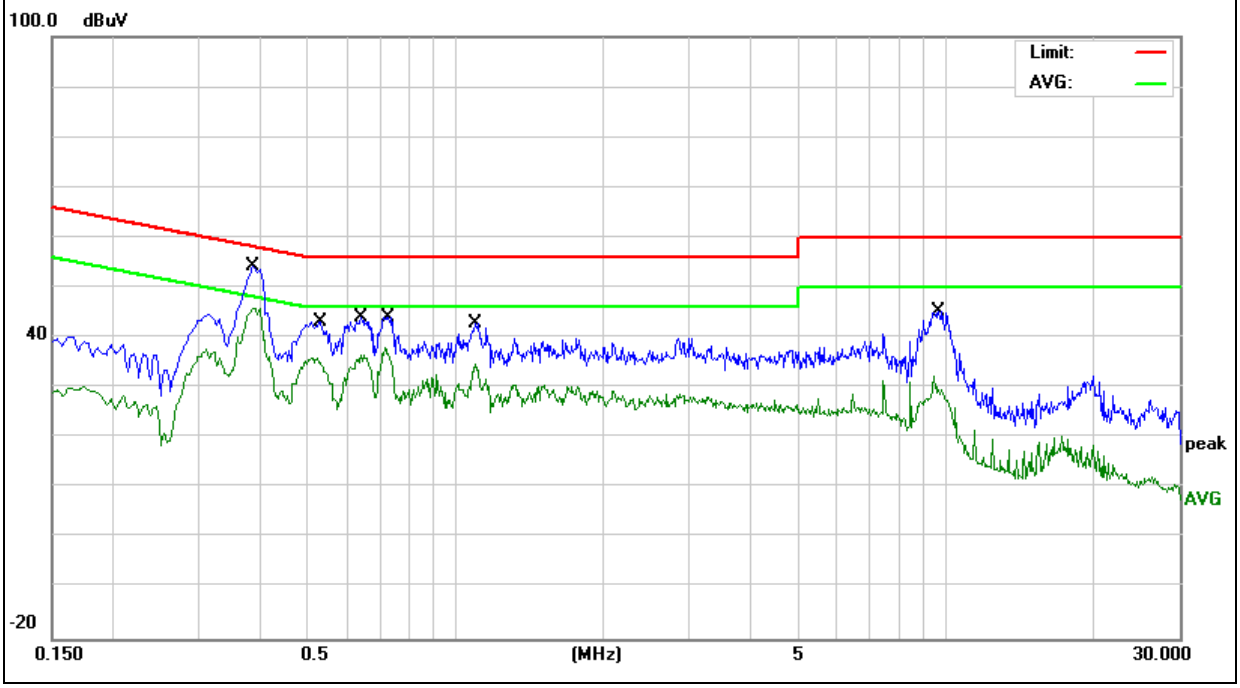


EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1(5.2G)

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3860	44.41	9.70	54.11	58.15	-4.04	QP
0.3860	36.08	9.70	45.78	48.15	-2.37	AVG
0.5299	33.54	9.72	43.26	56.00	-12.74	QP
0.5299	26.29	9.72	36.01	46.00	-9.99	AVG
0.6419	34.34	9.67	44.01	56.00	-11.99	AVG
0.6419	26.78	9.67	36.45	46.00	-9.55	QP
0.7300	34.49	9.65	44.14	56.00	-11.86	AVG
0.7300	28.37	9.65	38.02	46.00	-7.98	QP
1.0940	33.12	9.74	42.86	56.00	-13.14	QP
1.0940	24.95	9.74	34.69	46.00	-11.31	AVG
9.6939	35.56	9.81	45.37	60.00	-14.63	QP
9.6939	22.57	9.81	32.38	50.00	-17.62	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

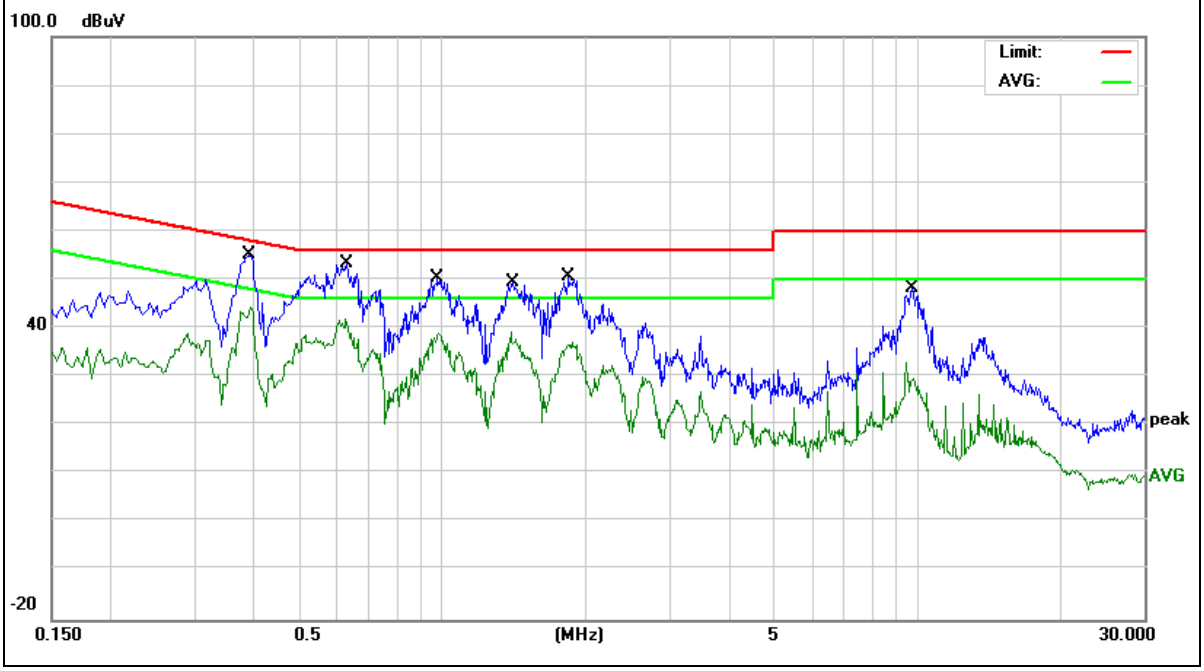


EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1(5.8G)

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3899	45.42	9.64	55.06	58.06	-3.00	QP
0.3899	34.78	9.64	44.42	48.06	-3.64	AVG
0.6300	43.71	9.70	53.41	56.00	-2.59	QP
0.6300	32.29	9.70	41.99	46.00	-4.01	AVG
0.9740	40.52	9.75	50.27	56.00	-5.73	QP
0.9740	29.32	9.75	39.07	46.00	-6.93	AVG
1.4060	39.70	9.75	49.45	56.00	-6.55	QP
1.4060	29.64	9.75	39.39	46.00	-6.61	AVG
1.8420	40.81	9.76	50.57	56.00	-5.43	QP
1.8420	27.43	9.76	37.19	46.00	-8.81	AVG
9.7059	38.40	9.71	48.11	60.00	-11.89	QP
9.7059	23.31	9.71	33.02	50.00	-16.98	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

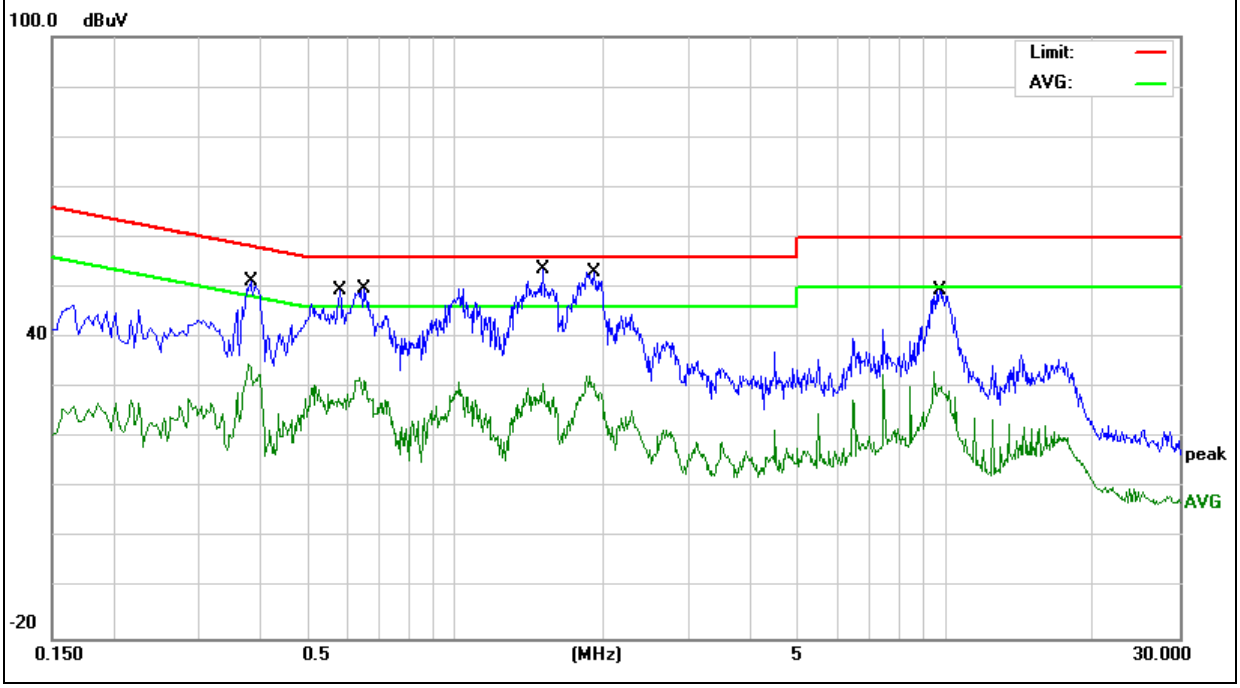


EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from Adapter AC 120V/60Hz	Test Mode：	Mode 1(5.8G)

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3820	41.58	9.70	51.28	58.23	-6.95	QP
0.3820	25.01	9.70	34.71	48.23	-13.52	AVG
0.5820	39.84	9.70	49.54	56.00	-6.46	QP
0.5820	18.98	9.70	28.68	46.00	-17.32	AVG
0.6540	39.99	9.66	49.65	56.00	-6.35	QP
0.6540	22.48	9.66	32.14	46.00	-13.86	AVG
1.5060	43.91	9.71	53.62	56.00	-2.38	QP
1.5060	21.29	9.71	31.00	46.00	-15.00	AVG
1.9180	43.48	9.67	53.15	56.00	-2.85	QP
1.9180	22.56	9.67	32.23	46.00	-13.77	AVG
9.7099	39.51	9.81	49.32	60.00	-10.68	QP
9.7099	23.58	9.81	33.39	50.00	-16.61	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



2.2 RADIATED EMISSION MEASUREMENT

2.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

2.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(10): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed. All other emissions which fall in non-restricted band shall employing the limit refer to part 15.407(b)(1)(2)(3(4)

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

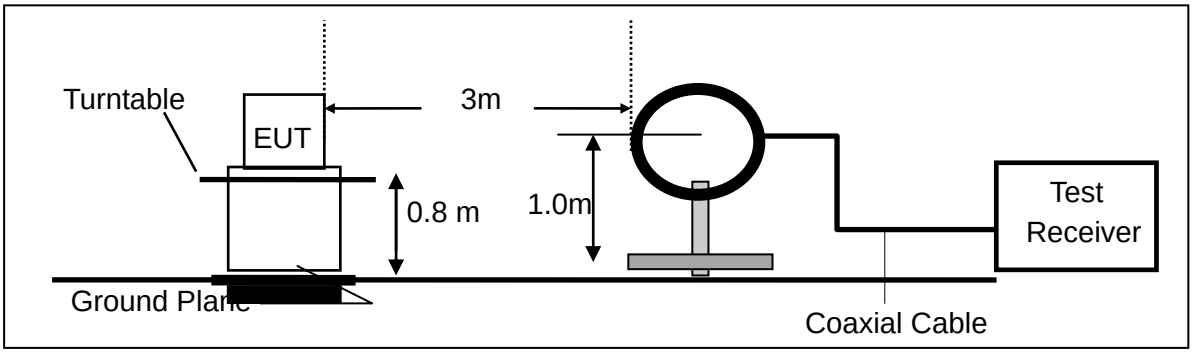
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. For Frequency 9kHz~30MHz:
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.
For Frequency above 30MHz:
Distance extrapolation factor =20log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

2.2.3 MEASURING INSTRUMENTS

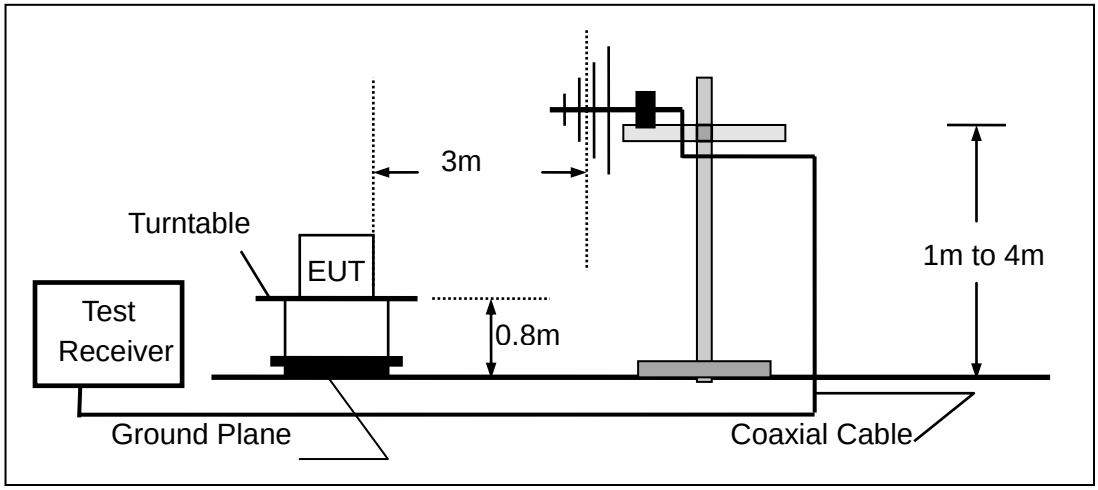
The Measuring equipment is listed in the section 6.3 of this test report.

2.2.4 TEST CONFIGURATION

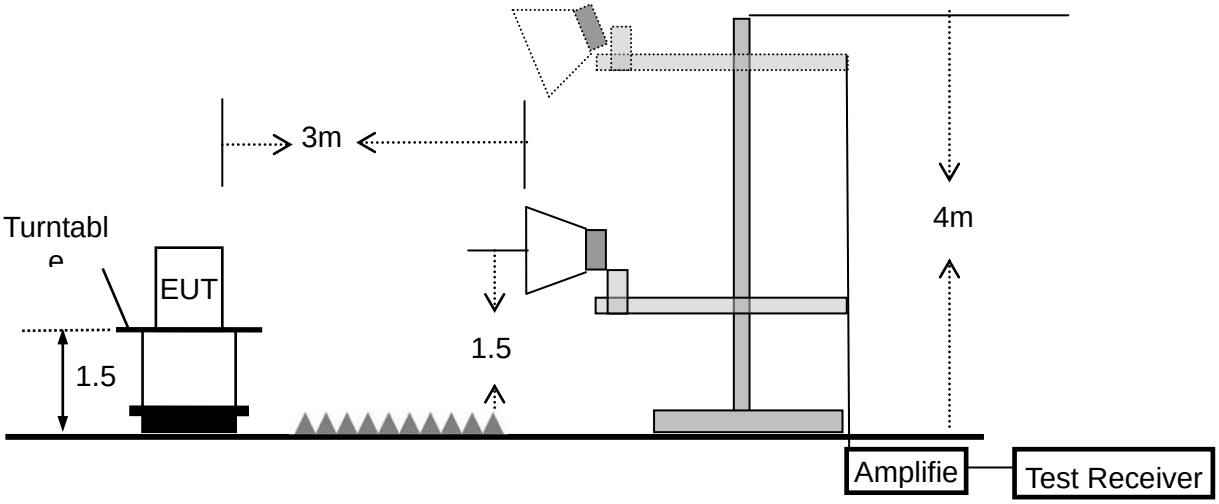
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



2.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

2.2.6 TEST RESULTS (9KHZ – 30 MHZ)

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX	Polarization：	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.2.7 TEST RESULTS (30MHZ – 1GHZ)

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G)- 802.11n40 MIMO Mode(High CH)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	31.1798	11.11	24.02	35.13	40.00	-4.87	QP
V	97.1148	16.37	16.08	32.45	43.50	-11.05	QP
V	185.7880	17.26	15.59	32.85	43.50	-10.65	QP
V	501.1788	12.53	25.29	37.82	46.00	-8.18	QP
V	801.7862	9.31	29.21	38.52	46.00	-7.48	QP
V	929.0081	10.84	30.51	41.35	46.00	-4.65	QP

Remark:

Emission Level= ReadingLevel+ Factor, Margin= Emission Level - Limit

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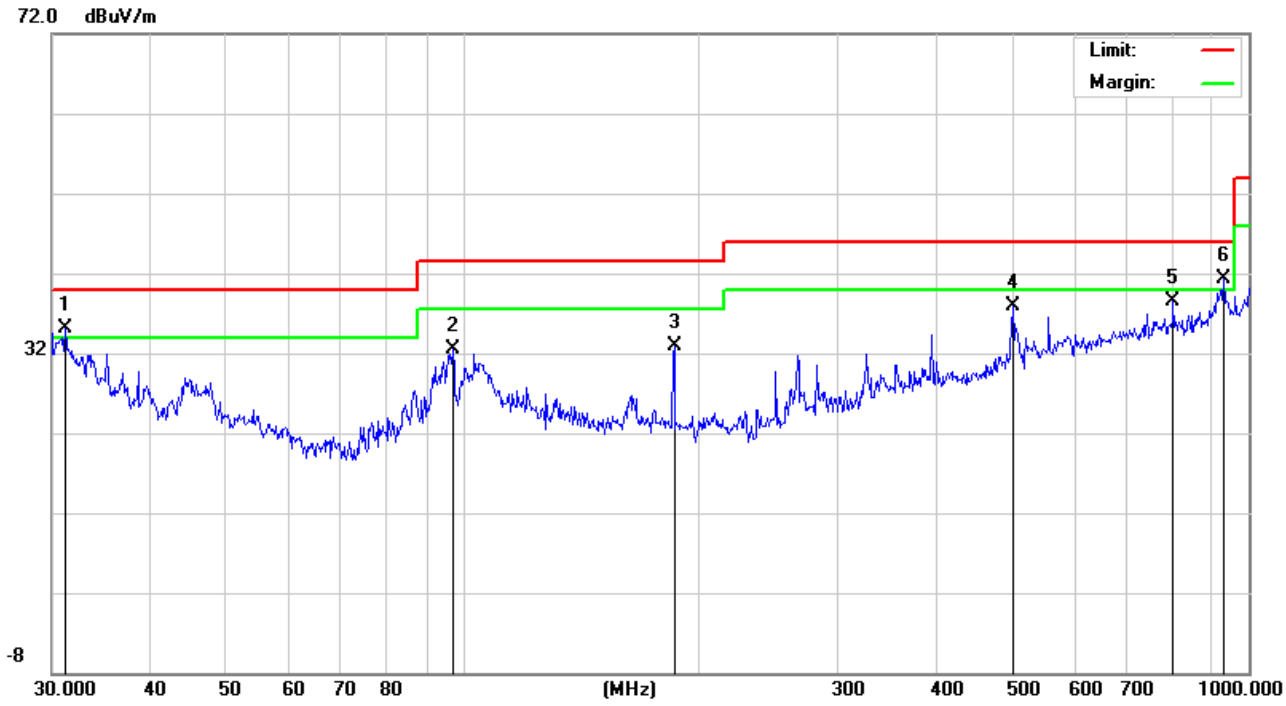
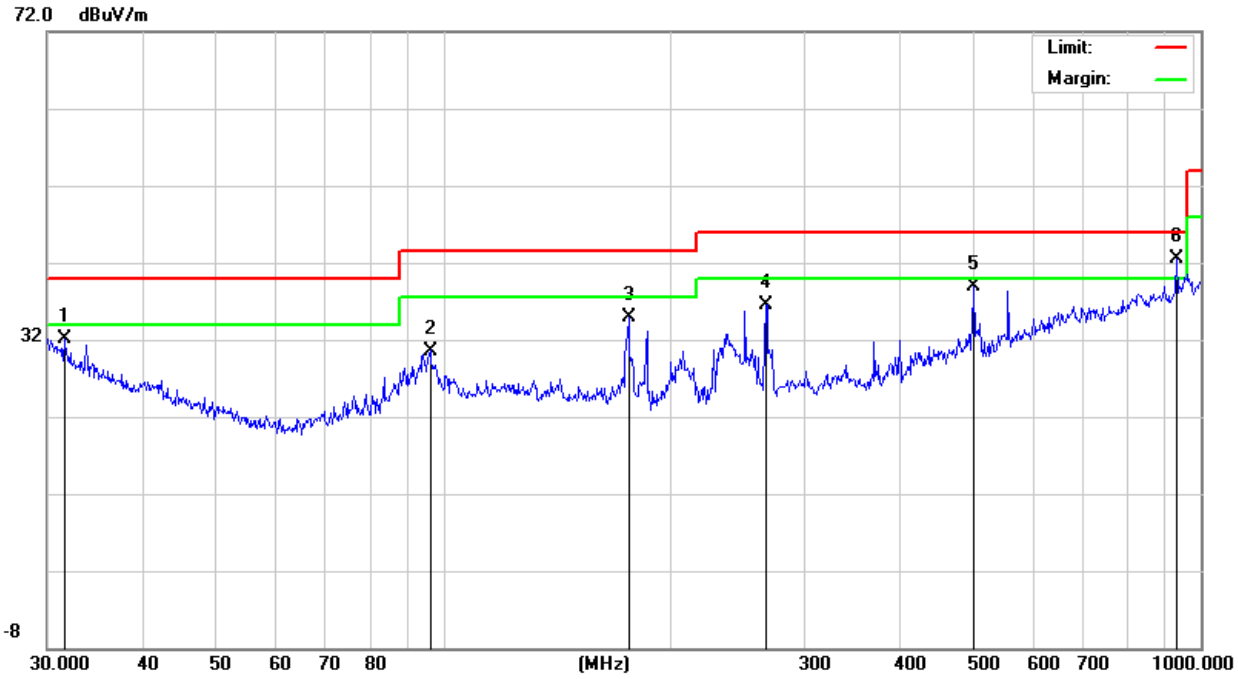


Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	31.6202	8.53	23.54	32.07	40.00	-7.93	QP
H	96.0986	14.54	16.06	30.60	43.50	-12.90	QP
H	175.6516	18.71	16.19	34.90	43.50	-8.6	QP
H	266.6089	16.44	20.11	36.55	46.00	-9.45	QP
H	501.1788	13.61	25.29	38.90	46.00	-7.10	QP
H	929.0081	11.95	30.51	42.46	46.00	-3.54	QP

Remark:

Emission Level= ReadingLevel+ Factor, Margin= Emission Level - Limit

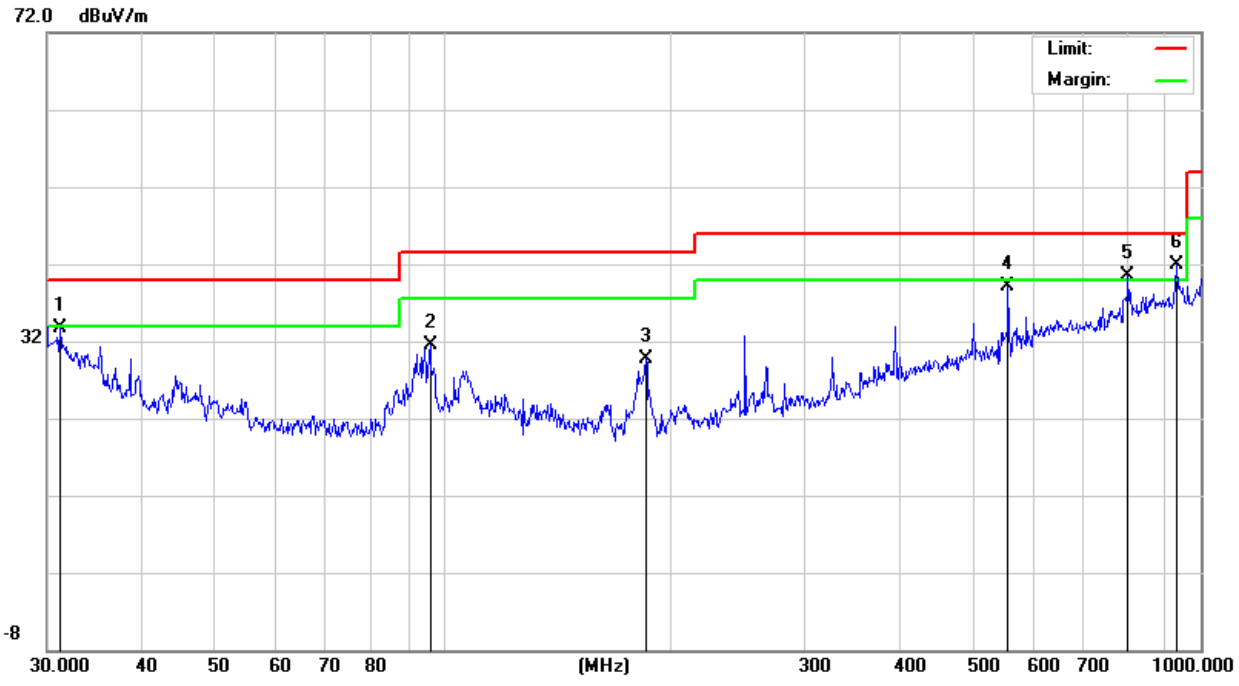


EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.8G)- 802.11ac40 MIMO Mode(Mid CH)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	31.1798	9.61	24.02	33.63	40.00	-6.37	QP
V	96.0986	15.39	16.06	31.45	43.50	-12.05	QP
V	185.1379	14.02	15.63	29.65	43.50	-13.85	QP
V	556.7744	13.10	25.93	39.03	46.00	-6.97	QP
V	801.7862	11.31	29.21	40.52	46.00	-5.48	QP
V	929.0081	11.34	30.51	41.85	46.00	-4.15	QP

Remark:

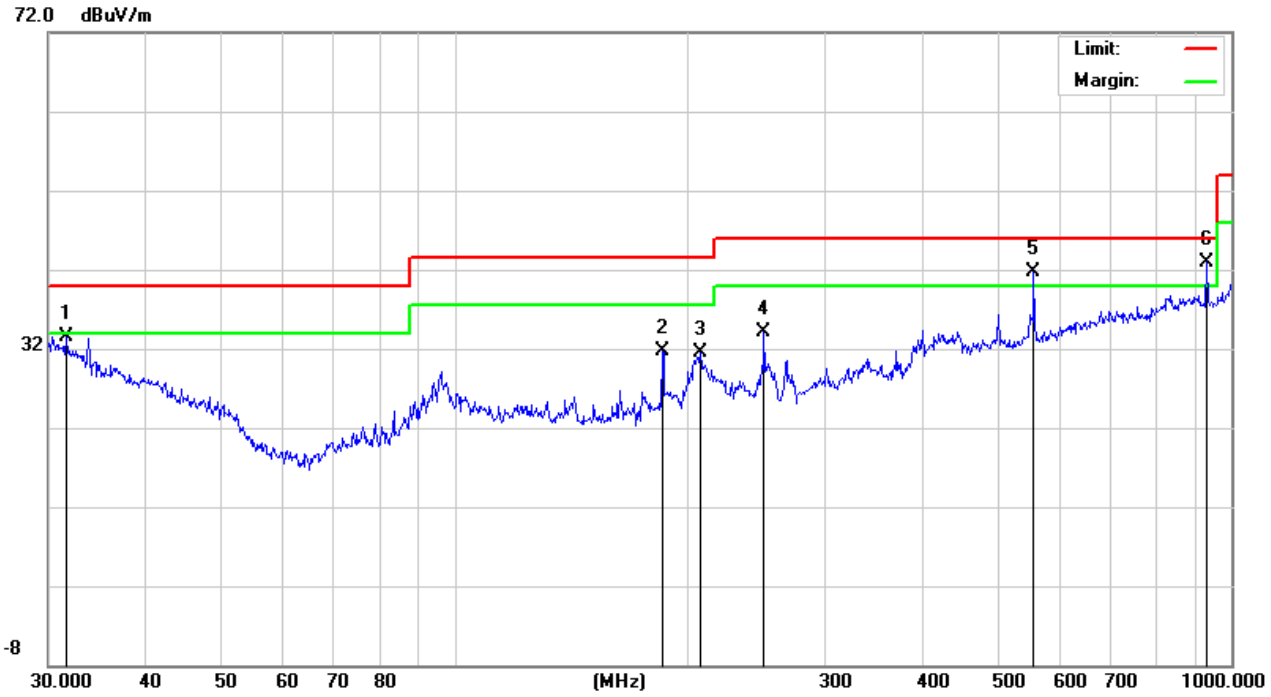
Emission Level= ReadingLevel+ Factor, Margin= Emission Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	31.6202	10.03	23.54	33.57	40.00	-6.43	QP
H	185.1379	16.16	15.63	31.79	43.50	-11.71	QP
H	207.1226	16.29	15.14	31.43	43.50	-12.07	QP
H	250.3009	15.37	18.82	34.19	46.00	-11.81	QP
H	556.7744	15.84	25.93	41.77	46.00	-4.23	QP
H	929.0081	12.45	30.51	42.96	46.00	-3.04	QP

Remark:

Emission Level= ReadingLevel+ Factor, Margin= Emission Level - Limit



Note:All modes have been tested, just the the worst mode has been recorded in the report.

2.2.8 TEST RESULTS (1GHz-18GHz)

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX(5.2G) - 802.11ac40 MIMO Mode		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5190 MHz)-Above 1G									
Vertical	3015	55.21	5.94	35.40	44.00	52.55	68.2	-15.65	Pk
Vertical	3015	59.04	5.94	35.40	44.00	56.38	68.2	-11.82	AV
Vertical	10360	57.26	8.46	39.75	44.50	60.97	68.2	-7.23	Pk
Vertical	10360	59.48	8.46	39.75	44.50	63.19	68.2	-5.01	AV
Vertical	15540	56.73	10.12	38.80	44.10	61.55	74	-12.45	Pk
Vertical	15540	41.68	10.12	38.80	42.70	47.90	54	-6.10	AV
Horizontal	2981	55.16	5.94	35.18	44.00	52.28	68.2	-15.92	Pk
Horizontal	2981	60.66	5.94	35.18	44.00	57.78	68.2	-10.42	AV
Horizontal	10360	60.61	8.46	38.71	44.50	63.28	68.2	-4.92	Pk
Horizontal	10360	59.99	8.46	38.71	44.50	62.66	68.2	-5.54	AV
Horizontal	15540	59.43	10.12	38.38	44.10	63.83	74	-10.17	Pk
Horizontal	15540	43.44	10.12	38.38	44.10	47.84	54	-6.16	AV
High Channel (5230 MHz)-Above 1G									
Vertical	3926	60.06	7.10	37.24	43.50	60.90	74	-13.10	Pk
Vertical	3926	40.73	7.10	37.24	43.50	41.57	54	-12.43	AV
Vertical	10480	58.96	8.46	37.68	44.50	60.60	68.2	-7.60	Pk
Vertical	10480	59.77	8.46	37.68	44.50	61.41	68.2	-6.79	AV
Vertical	15720	56.45	10.12	38.80	44.10	61.27	74	-12.73	Pk
Vertical	15720	45.98	10.12	38.80	42.70	52.20	54	-1.80	AV
Horizontal	3885	59.66	7.10	37.24	43.50	60.50	74	-13.50	Pk
Horizontal	3885	45.98	7.10	37.24	43.50	46.82	54	-7.18	AV
Horizontal	10480	58.52	8.46	38.57	44.50	61.05	68.2	-7.15	Pk
Horizontal	10480	60.82	8.46	38.57	44.50	63.35	68.2	-4.85	AV
Horizontal	15720	60.05	10.12	38.38	44.10	64.45	74	-9.55	Pk
Horizontal	15720	43.75	10.12	38.38	44.10	48.15	54	-5.85	AV

Note:" 802.11ac40 MIMO (5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.8G) -- 802.11n40 MIMO Mode		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5755 MHz)-Above 1G									
Vertical	2806	58.51	5.94	35.40	44.00	55.85	74.00	-18.15	Pk
Vertical	2806	43.81	5.94	35.40	44.00	41.15	54.00	-12.85	AV
Vertical	11490	60.35	8.46	39.75	44.50	64.06	74.00	-9.94	Pk
Vertical	11490	41.13	8.46	39.75	44.50	44.84	54.00	-9.16	AV
Vertical	17235	56.29	10.12	38.80	44.10	61.11	68.20	-7.09	Pk
Vertical	17235	57.15	10.12	38.80	44.10	61.97	68.20	-6.23	AV
Horizontal	2911	55.03	5.94	35.18	44.00	52.15	68.20	-16.05	Pk
Horizontal	2911	55.64	5.94	35.18	44.00	52.76	68.20	-15.44	AV
Horizontal	11490	57.44	8.46	38.71	44.50	60.11	74.00	-13.89	Pk
Horizontal	11490	44.21	8.46	38.71	44.50	46.88	54.00	-7.12	AV
Horizontal	17235	60.4	10.12	38.38	44.10	64.80	68.20	-3.40	Pk
Horizontal	17235	55.69	10.12	38.38	44.10	60.09	68.20	-8.11	AV
High Channel (5795 MHz)-Above 1G									
Vertical	3763	57.08	6.48	36.35	44.05	55.86	74.00	-18.14	Pk
Vertical	3763	44.75	6.48	36.35	44.05	43.53	54.00	-10.47	AV
Vertical	11570	56.15	8.47	37.88	44.51	57.99	74.00	-16.01	Pk
Vertical	11570	43.01	8.47	37.88	44.51	44.85	54.00	-9.15	AV
Vertical	17355	60.37	10.12	38.8	44.10	65.19	68.20	-3.01	Pk
Vertical	17355	60.95	10.12	38.8	44.10	65.77	68.20	-2.43	AV
Horizontal	3561	58.2	6.48	36.37	44.05	57.00	68.20	-11.20	Pk
Horizontal	3561	56.37	6.48	36.37	44.05	55.17	68.20	-13.03	AV
Horizontal	11570	60.83	8.47	38.64	44.50	63.44	74.00	-10.56	Pk
Horizontal	11570	40.07	8.47	38.64	44.50	42.68	54.00	-11.32	AV
Horizontal	17355	56.64	10.12	38.38	44.10	61.04	68.20	-7.16	Pk
Horizontal	17355	59.47	10.12	38.38	44.10	63.87	68.20	-4.33	AV

Note:"802.11n40 MIMO(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

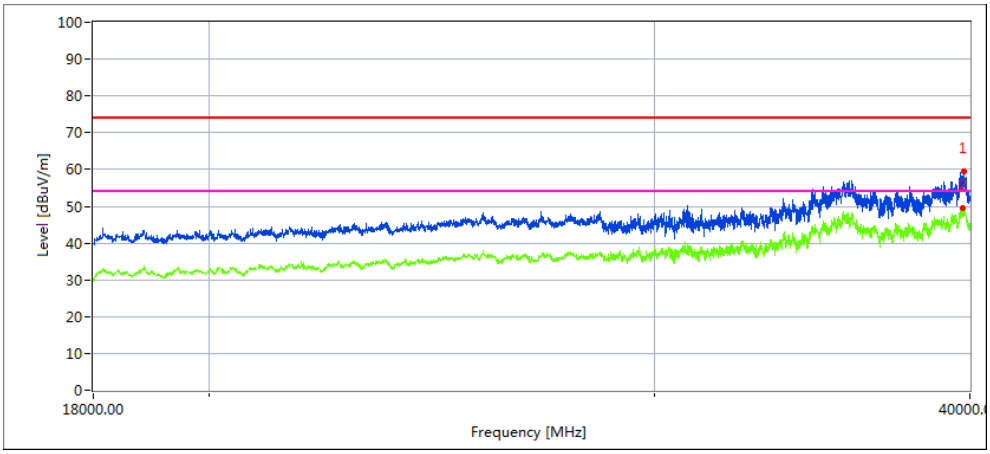
2.2.10 TEST RESULTS (18GHz-40GHz)

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.2G)-802.11ac20 5180MHz~5240MHz; TX (5.8G)-802.11ac20 5745MHz~5825MHz		

All the modulation modes have been tested, and the worst result was report as below:

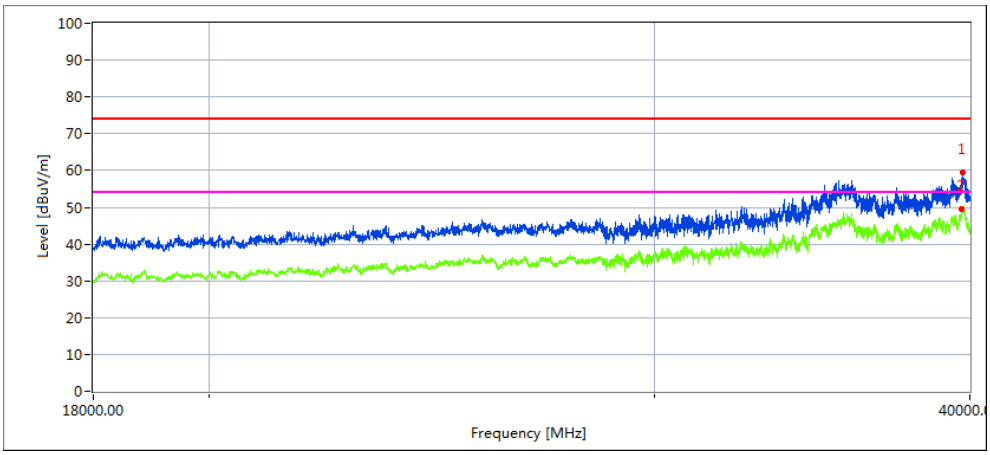
Low Channel (5180 MHz)-Above 1G

Horizontal



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39769.56	39.82	20.09	44.07	43.48	60.5	68.2	7.7	Peak
39767.44	27.67	20.09	44.04	43.48	48.32	54	5.68	AVG

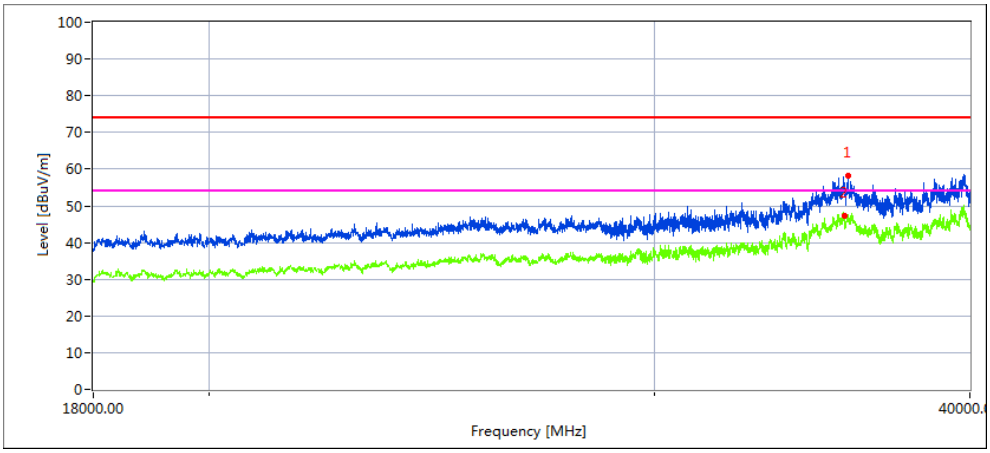
Vertical



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39769.93	32.4	20.09	44.07	43.48	53.08	56.32	3.24	Peak
39769.44	28.05	20.09	44.04	43.48	48.7	54	5.3	AVG

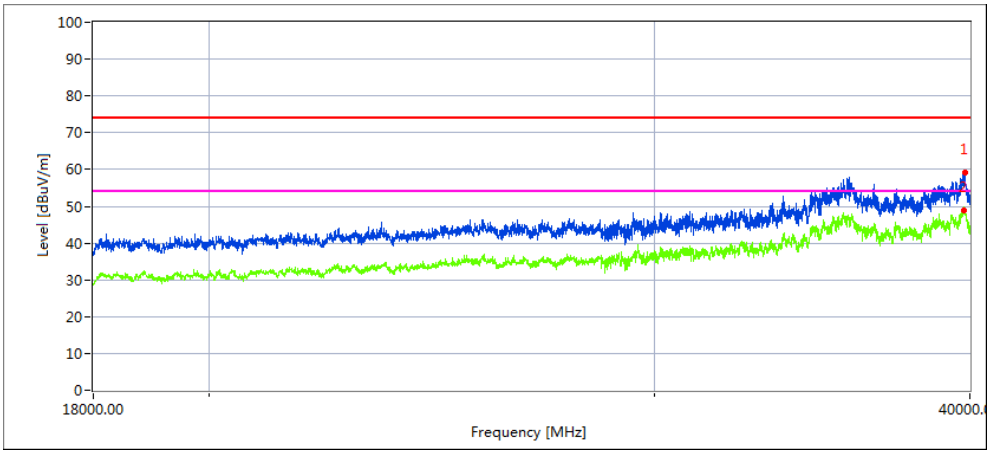
High Channel (5240 MHz)-Above 1G

Horizontal



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
35628.56	41.09	19.11	42.73	44.61	58.32	68.2	9.88	Peak
35596.95	31.82	19.11	42.73	44.61	49.05	54	4.95	AVG

Vertical

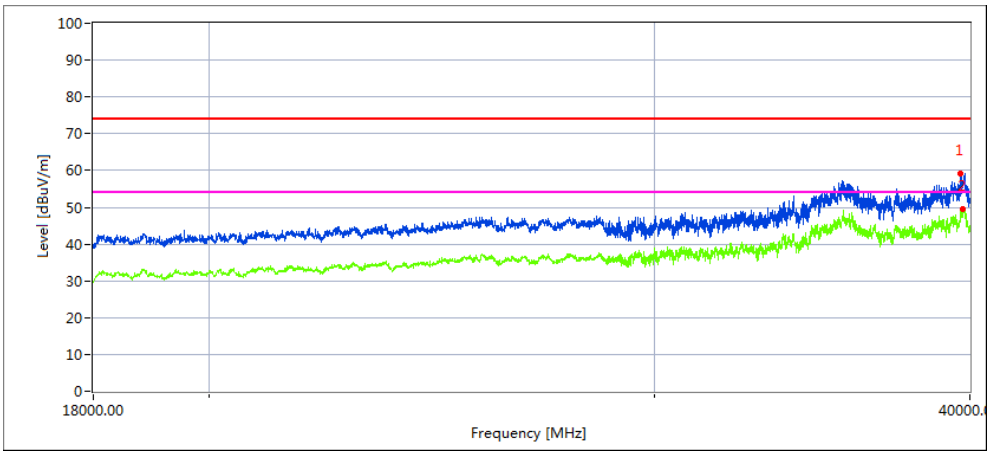


Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39769.85	37.52	20.09	44.07	43.48	58.2	68.2	10	Peak
39769.62	25.87	20.09	44.04	43.48	46.52	54	7.48	AVG

Note:802.11ac20 MIMO mode is the worst mode.

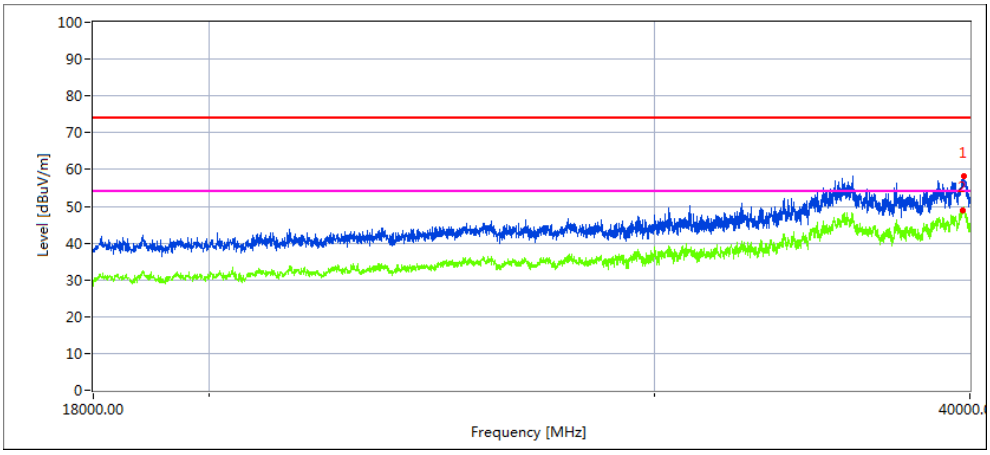
Low Channel (5745 MHz)-Above 1G

Horizontal



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39670.38	39	20.09	44.16	43.48	59.77	68.2	8.43	Peak
39670.19	29.93	20.09	44.16	43.48	50.7	54	3.3	AVG

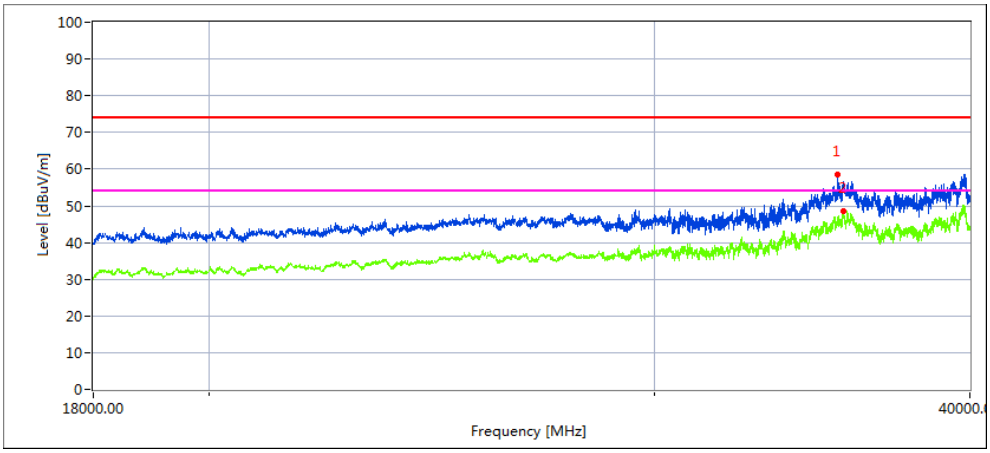
Vertical



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39731.45	38.19	20.06	44.07	43.21	59.11	68.2	9.09	Peak
39731.57	29.14	20.06	44.07	43.21	50.06	54	3.94	AVG

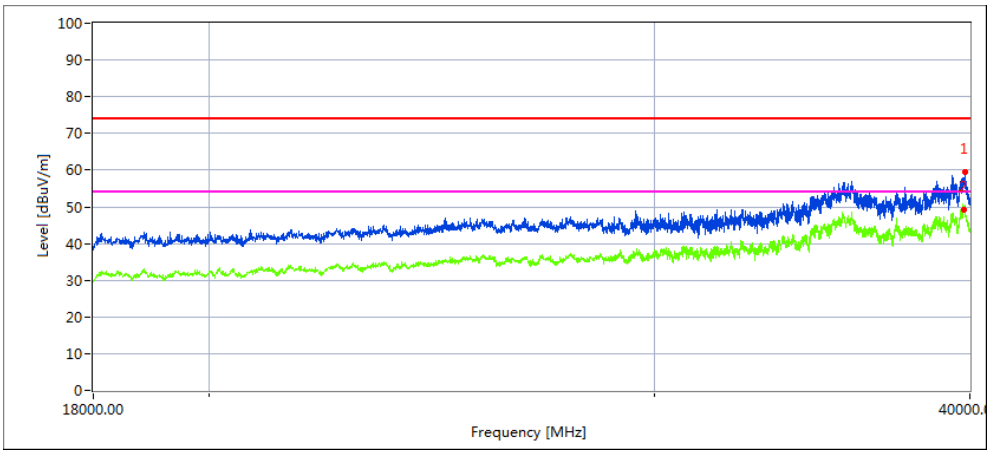
High Channel (5825 MHz)-Above 1G

Horizontal



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
35628.73	40.17	19.11	42.63	43.48	58.43	68.2	9.77	Peak
35635.98	30.56	19.12	42.63	43.48	48.83	54	5.17	AVG

Vertical



Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark
39822.12	38.69	20.1	44.1	43.22	59.67	68.2	8.94	Peak
39821.93	29.84	20.1	44.1	43.22	50.82	54	3.82	AVG

Note:802.11ac20 MIMO mode is the worst mode.

2.2.10 Spurious Emission in Restricted Band 4.5GHz~5.150 GHz& 5.350GHz~5460GHz

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5.2G)-802.11ac20 MIMO Mode 5180MHz~5240MHz,		

All the modulation modes have been tested, The report just record the worst data mode.

Frequency	Meter Reading	Cable Loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
5.2G WIFI-802.11ac20MIMO Mode									
4500	56.58	5.2	35.6	44.2	53.18	74	-20.82	Pk	Horizontal
4500	48.01	5.2	35.6	44.2	44.61	54	-9.39	AV	Horizontal
4500	59.60	5.2	35.6	44.2	56.2	74	-17.8	Pk	Vertical
4500	46.58	5.2	35.6	44.2	43.18	54	-10.82	AV	Vertical
5150	70.56	5.36	35.66	44.22	67.36	74	-6.64	Pk	Horizontal
5150	80.55	5.36	35.66	44.22	77.35	54	23.35	AV	Horizontal
5150	57.52	5.36	35.66	44.22	54.32	74	-19.68	Pk	Vertical
5150	80.24	5.36	35.66	44.22	77.04	54	23.04	AV	Vertical
5350	66.05	5.68	35.68	44.22	63.19	74	-10.81	Pk	Vertical
5350	47.85	5.68	35.68	44.22	44.99	54	-9.01	AV	Vertical
5350	61.61	5.68	35.68	44.22	58.75	74	-15.25	Pk	Horizontal
5350	45.94	5.68	35.68	44.22	43.08	54	-10.92	AV	Horizontal

Note: (1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor

(2) “802.11ac20 MIMO ” mode is the worst mode. When PK value is lower than the Average value limit, average don't record.

3. POWER SPECTRAL DENSITY TEST

3.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, 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.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz 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.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz 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.

For the band 5.725-5.85 GHz

(3)For the band 5.725-5.85 GHz, 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.

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3.2 TEST PROCEDURE

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

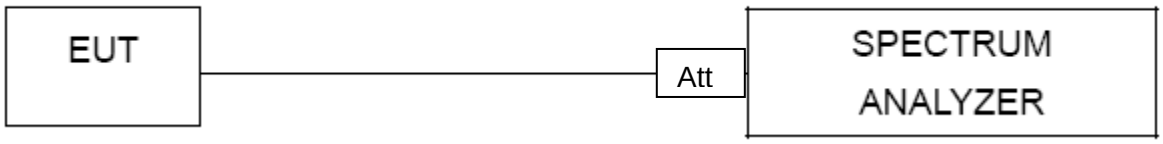
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

3.3 DEVIATION FROM STANDARD

No deviation.

3.4 TEST SETUP



3.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

3.6 TEST RESULTS

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1015 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band 1 (5180-5240MHz), Band 3 (5745-5825MHz)		

Note: For 802.11n/ac has MIMO mode. Directional gain= Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi = 4+10*log(2)=7.01dBi

Band1 For 802.11n/ac 5GHz has MIMO mode.
7.01dbi>6.0dbi so power spectral density limit = 9.99dBm
Band 3 For 802.11n 5GHz has MIMO mode.
7.01dbi>6.0dbi so power spectral density limit = 28.99dBm

Test data reference attachment.

4. 26DB & 99% EMISSION BANDWIDTH

4.1 APPLIED PROCEDURES / LIMIT

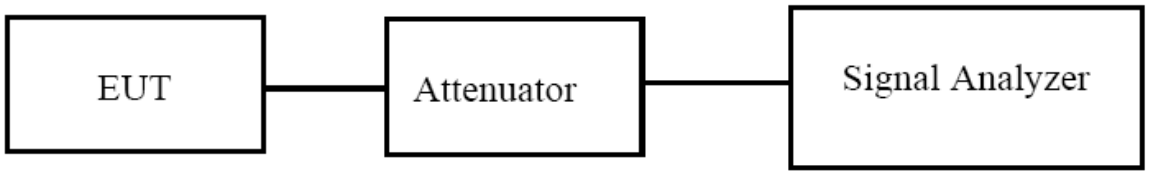
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band 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, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are 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.

4.2 TEST PROCEDURE

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%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



4.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.4 TEST RESULTS

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band 1 (5180-5240MHz), Band 3 (5745-5825MHz)		

Test data reference attachment.

5. MINIMUM 6 DB BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(e)
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.2 TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 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.

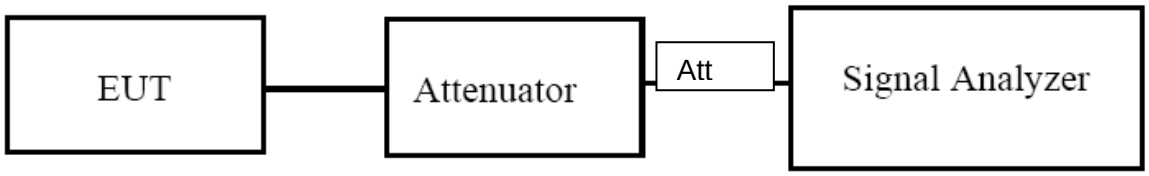
f) Allow the trace to stabilize.

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.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band 3 (5745-5825MHz)		

Test data reference attachment.

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5250~5350	250 mW or 11 dBm + 10 log B Note: The limit is the smaller of the two, "B" represents -26dB bandwidth.
5470~5725	250 mW or 11 dBm + 10 log B Note: The limit is the smaller of the two, "B" represents -26dB bandwidth.
5725~5850	1W

6.2 TEST PROCEDURE

· Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

a) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:

1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.

2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle D of the transmitter output signal as described in 12.2.

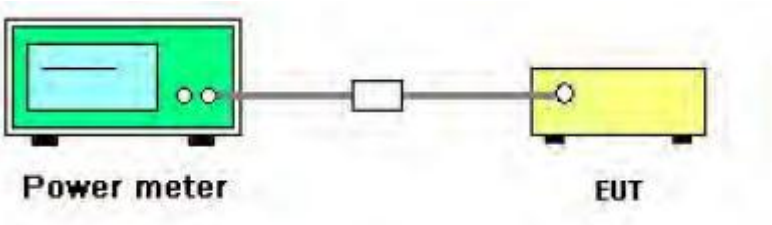
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.

d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.2 TEST RESULTS

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band 1 (5180-5240MHz), Band 3 (5745-5825MHz)		

Note: For 802.11n/ac has MIMO mode. Directional gain=4dBi

Band1 For 802.11n/ac 5GHz has MIMO mode.
4dbi<6.0dbi, so conducted power limit= 24dBm
Band 3 For 802.11n/ac 5GHz has MIMO mode.
4dbi<6.0dbi, so conducted power limit= 30dBm

Test data reference attachment.

7. OUT OF BAND EMISSIONS

7.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) 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.

(2) For transmitters operating in the 5.25-5.35 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.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:
(i) 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.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

7.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.

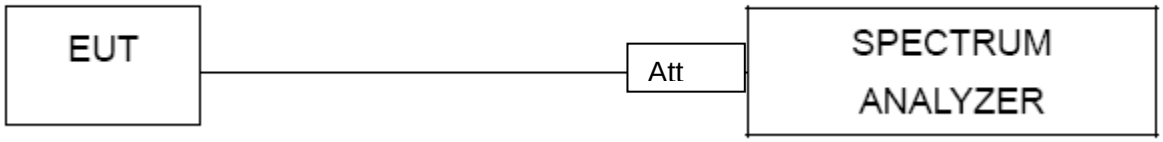
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

5. Repeat above procedures until all measured frequencies were complete.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

EUT：	Android TV Box	Model Name ：	KD2
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	DC 5V

Test data reference attachment.

NOTE: The 27GHz-40GHz amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

8. Frequency Stability Measurement

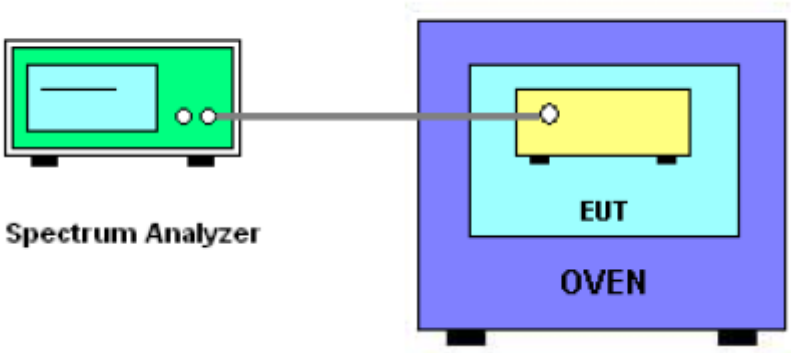
8.1 LIMIT

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

8.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10_6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

8.3 TEST SETUP LAYOUT



8.4 EUT OPERATION DURING TEST

1. The EUT was programmed to be in continuously un-modulation transmitting mode.
2. The module has two antennas, and the worst data is Antenna 1, only shown Antenna 1 Plot.

8.5 TEST RESULTS

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency Band I (5180-5240MHz) -5.2G		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5180.0038	5180	0.0038	-0.7336
		V max (V)	5.75	5180.0219	5180	0.0219	-4.2278
		V min (V)	4.75	5179.9914	5180	-0.0086	1.6602
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5180.0049	5180	0.0049	-0.9459
		T (°C)	-10	5180.0144	5180	0.0144	-2.7799
		T (°C)	0	5180.0146	5180	0.0146	-2.8185
		T (°C)	10	5180.0223	5180	0.0223	-4.3050
		T (°C)	20	5180.0268	5180	0.0268	-5.1737
		T (°C)	30	5180.0101	5180	0.0101	-1.9498
		T (°C)	40	5179.9949	5180	-0.0051	0.9846
		T (°C)	50	5180.0087	5180	0.0087	-1.6795
		T (°C)	60	5180.0003	5180	0.0003	-0.0579
		T (°C)	70	5180.0245	5180	0.0245	-4.7297
Limits				Within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5199.9926	5200	-0.0074	1.4231
		V max (V)	5.75	5200.0120	5200	0.0120	-2.3077
		V min (V)	4.75	5200.0114	5200	0.0114	-2.1923
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5200.0131	5200	0.0131	-2.5192
		T (°C)	-10	5200.0253	5200	0.0253	-4.8654
		T (°C)	0	5200.0146	5200	0.0146	-2.8077
		T (°C)	10	5200.0080	5200	0.0080	-1.5385
		T (°C)	20	5199.9987	5200	-0.0013	0.2500
		T (°C)	30	5200.0051	5200	0.0051	-0.9808
		T (°C)	40	5199.9858	5200	-0.0142	2.7308
		T (°C)	50	5200.0037	5200	0.0037	-0.7115
		T (°C)	60	5199.9976	5200	-0.0024	0.4615
		T (°C)	70	5200.0030	5200	0.0030	-0.5769
Limits				Within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5240.0064	5240	0.0064	-1.2214
		V max (V)	5.75	5240.0023	5240	0.0023	-0.4389
		V min (V)	4.75	5239.9992	5240	-0.0008	0.1527
Limits				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5239.9968	5240	-0.0032	0.6107
		T (°C)	-10	5240.0020	5240	0.0020	-0.3817
		T (°C)	0	5239.9895	5240	-0.0105	2.0038
		T (°C)	10	5240.0046	5240	0.0046	-0.8779
		T (°C)	20	5240.0162	5240	0.0162	-3.0916
		T (°C)	30	5240.0198	5240	0.0198	-3.7786
		T (°C)	40	5240.0016	5240	0.0016	-0.3053
		T (°C)	50	5240.0136	5240	0.0136	-2.5954
		T (°C)	60	5240.0155	5240	0.0155	-2.9580
		T (°C)	70	5240.0187	5240	0.0187	-3.5687
Limits				Within 5150-5250MHz			
Result				Complies			

EUT：	Android TV Box	Model Name. ：	KD2
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX Frequency(5745-5825MHz) -5.8G		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5745.0175	5745	0.0175	-3.0461
		V max (V)	5.75	5745.0109	5745	0.0109	-1.8973
		V min (V)	4.75	5745.0185	5745	0.0185	-3.2202
Limits				Within 5745-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5745.0095	5745	0.0095	-1.6536
		T (°C)	-10	5744.9937	5745	-0.0063	1.0966
		T (°C)	0	5745.0196	5745	0.0196	-3.4117
		T (°C)	10	5744.9994	5745	-0.0006	0.1044
		T (°C)	20	5745.0194	5745	0.0194	-3.3768
		T (°C)	30	5745.0267	5745	0.0267	-4.6475
		T (°C)	40	5744.9985	5745	-0.0015	0.2611
		T (°C)	50	5745.0195	5745	0.0195	-3.3943
		T (°C)	60	5745.0052	5745	0.0052	-0.9051
		T (°C)	70	5745.0242	5745	0.0242	-4.2124
Limits				Within 5745-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5784.9994	5785	-0.0006	0.1037
		V max (V)	5.75	5784.9932	5785	-0.0068	1.1755
		V min (V)	4.75	5784.9888	5785	-0.0112	1.9360
Limits				Within 5745-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5784.9895	5785	-0.0105	1.8150
		T (°C)	-10	5785.0074	5785	0.0074	-1.2792
		T (°C)	0	5785.0063	5785	0.0063	-1.0890
		T (°C)	10	5784.9992	5785	-0.0008	0.1383
		T (°C)	20	5785.0136	5785	0.0136	-2.3509
		T (°C)	30	5785.0133	5785	0.0133	-2.2990
		T (°C)	40	5784.9996	5785	-0.0004	0.0691
		T (°C)	50	5785.0277	5785	0.0277	-4.7882
		T (°C)	60	5785.0023	5785	0.0023	-0.3976
		T (°C)	70	5784.9955	5785	-0.0045	0.7779
Limits				Within 5745-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5	5824.9843	5825	-0.0157	2.6953
		V max (V)	5.75	5825.0113	5825	0.0113	-1.9399
		V min (V)	4.75	5825.0013	5825	0.0013	-0.2232
Limits				Within 5745-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5825.0287	5825	0.0287	-4.9270
		T (°C)	-10	5825.0255	5825	0.0255	-4.3777
		T (°C)	0	5824.9895	5825	-0.0105	1.8026
		T (°C)	10	5825.0216	5825	0.0216	-3.7082
		T (°C)	20	5824.9999	5825	-0.0001	0.0172
		T (°C)	30	5824.9878	5825	-0.0122	2.0944
		T (°C)	40	5825.0023	5825	0.0023	-0.3948
		T (°C)	50	5824.9953	5825	-0.0047	0.8069
		T (°C)	60	5825.0082	5825	0.0082	-1.4077
		T (°C)	70	5824.9881	5825	-0.0119	2.0429
Limits				Within 5745-5850MHz			
Result				Complies			

Note: antenna 1 is the worst case.

9. DYNAMIC FREQUENCY SELECTION(DFS)

9.1 APPLICABILITY OF DFS REQUIREMENTS

EUT is client and operates as client without radar detection function.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes
Client Beacon Test	N/A	Yes	Yes

Additional requirements for devices with multiple bandwidth modes	Operational Mode	
	Master or Client With Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note
Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

9.2 INTERFERENCE THRESHOLD VALUES, MASTER OR CLIENT INCORPORATING IN-SERVICE MONITORING

Maximum Transmit Power	Value (see notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note 3: EIRP is based on the highest antenna gain.

9.3 DFS RESPONSE REQUIREMENT VALUES

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the 99% power bandwidth See Note 3.

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:
• For the Short pulse radar Test Signals this instant is the end of the Burst.
• For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
• For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate Channel changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

9.4 SHORT PULSE RADAR TEST WAVEFORMS

As the EUT is a Client Device with no Radar Detection, only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time.

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	60%	30
1	1	Test A Test B	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a
Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms.
If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

9.5 CALIBRATION SETUP AND DFS TEST RESULTS

Radar Waveform Calibration Procedure

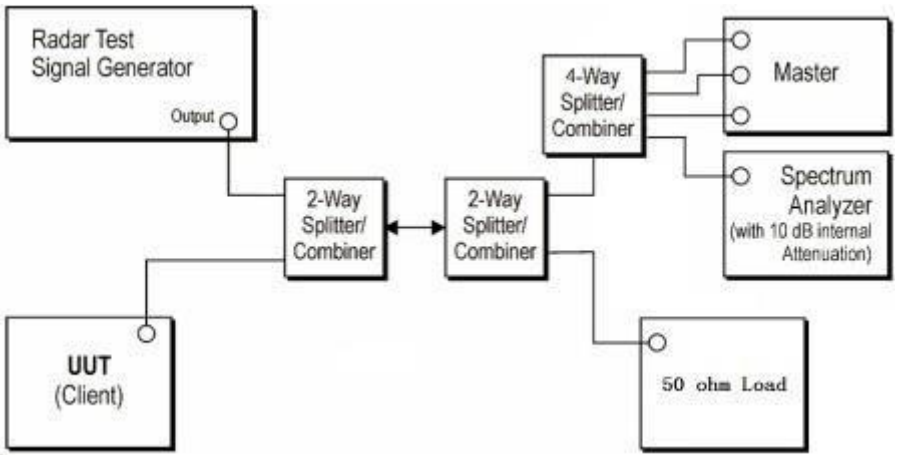
1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master

2) The interference Radar Detection Threshold Level is -62dBm - 2dBi +1dB = -63dBm that had been taken into account the output power range and antenna gain.

3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.

4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was -62dBm - 2dBi +1dB = -63dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

9.6 CONDUCTED CALIBRATION SETUP



Wireless AP	Manufacturer	LINKSYS LLC
	Model NO.	WRT32X
	FCC ID	Q87-WRT3200ACM

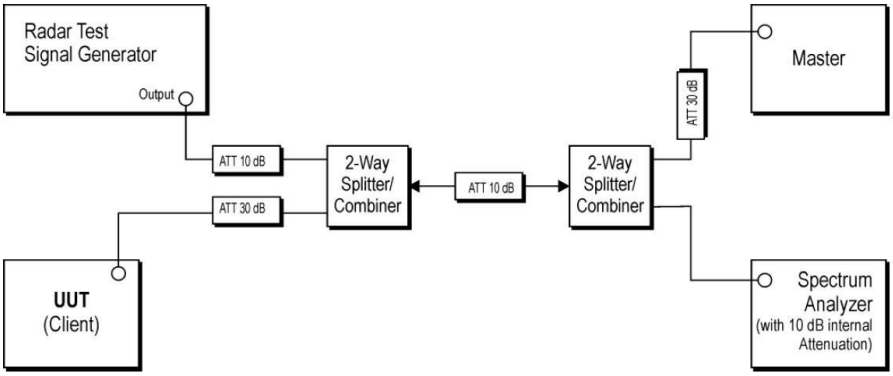
9.7 RADAR WAVEFORM CALIBRATION RESULT

Not Applicable

9.8 IN-SERVICE MONITORING: CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD

TEST CONFIGURATION:

Setup for Client with injection at the Master



TEST PROCEDURE:

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is Streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom In 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) =S (12000ms) / B (4000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: C (ms)= N X Dwell (0.3ms); where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.
8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

TEST MODE: N/A

9.9 RESULT OF CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD FOR CLIENT BEACON TEST

Not Applicable

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, 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.

10.2 EUT ANTENNA

The EUT antenna 1 and antenna 2 are permanent attached Internal FPC Antenna: 4dBi, It comply with thestandard requirement.

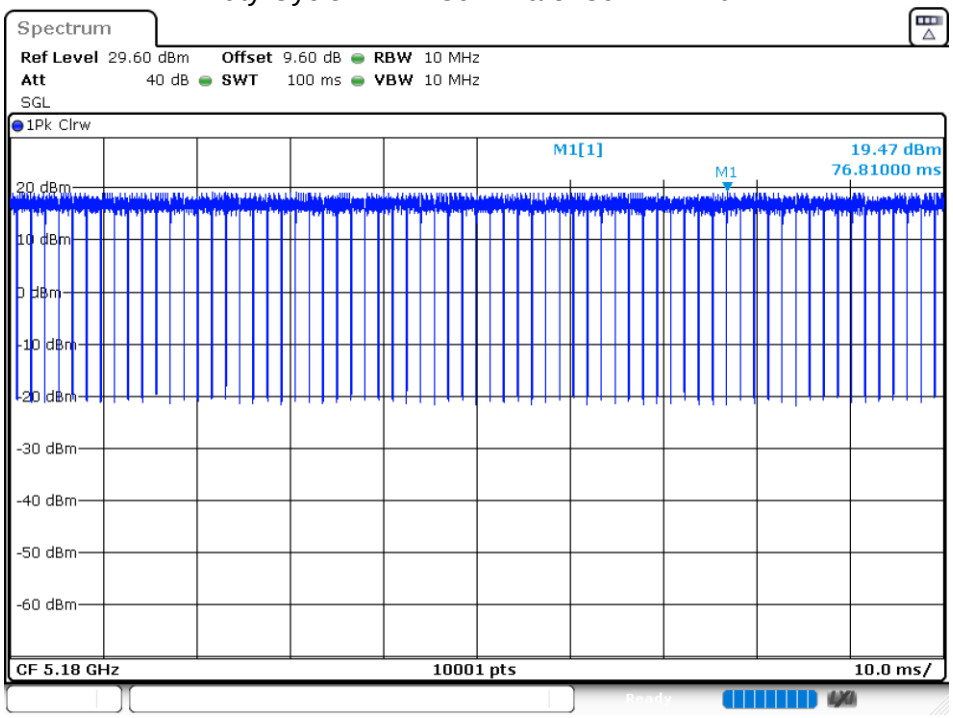
11. TEST RESULT

5.2G WIFI

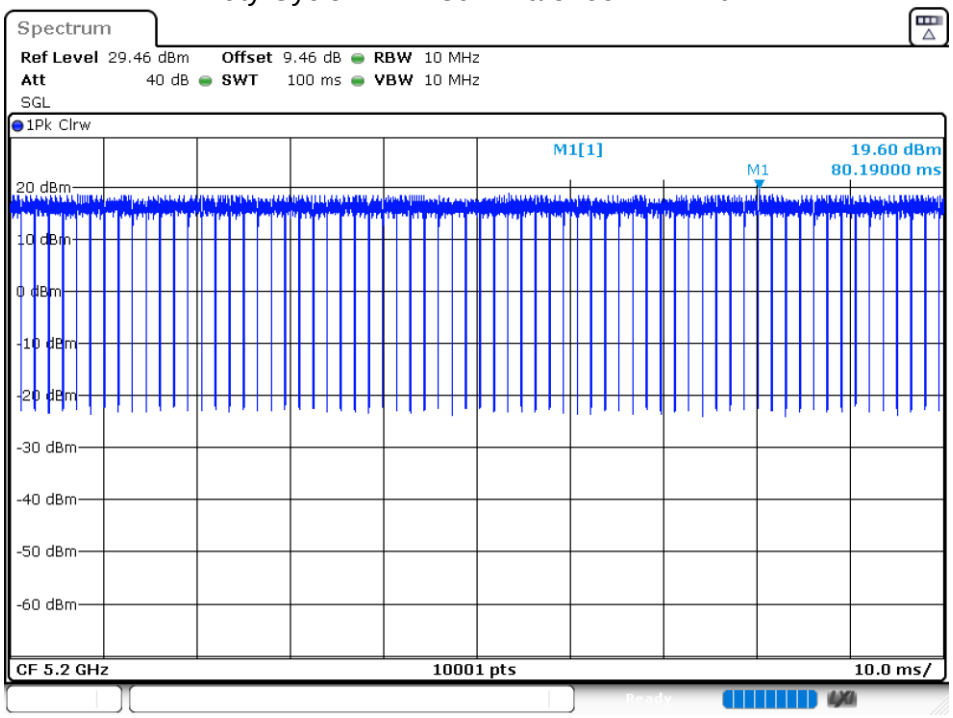
11.1.1 DUTY CYCLE

Antenna	Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
Ant 1	NVNT	802.11a	5180	94.06	0.27
Ant 1	NVNT	802.11a	5200	94.07	0.27
Ant 1	NVNT	802.11a	5240	94.08	0.26
Ant 2	NVNT	802.11a	5180	94.11	0.26
Ant 2	NVNT	802.11a	5200	93.99	0.27
Ant 2	NVNT	802.11a	5240	94.06	0.27
Ant 1	NVNT	802.11ac20	5180	93.71	0.28
Ant 1	NVNT	802.11ac20	5200	93.73	0.28
Ant 1	NVNT	802.11ac20	5240	93.73	0.28
Ant 2	NVNT	802.11ac20	5180	93.75	0.28
Ant 2	NVNT	802.11ac20	5200	93.69	0.28
Ant 2	NVNT	802.11ac20	5240	93.74	0.28
Ant 1	NVNT	802.11ac40	5190	89.32	0.49
Ant 1	NVNT	802.11ac40	5230	88.03	0.55
Ant 2	NVNT	802.11ac40	5190	89.36	0.49
Ant 2	NVNT	802.11ac40	5230	88.87	0.51
Ant 1	NVNT	802.11ac80	5210	79.05	1.02
Ant 2	NVNT	802.11ac80	5210	77.75	1.09
Ant 1	NVNT	802.11n(HT20)	5180	93.64	0.29
Ant 1	NVNT	802.11n(HT20)	5200	93.69	0.28
Ant 1	NVNT	802.11n(HT20)	5240	93.73	0.28
Ant 2	NVNT	802.11n(HT20)	5180	93.64	0.29
Ant 2	NVNT	802.11n(HT20)	5200	93.64	0.29
Ant 2	NVNT	802.11n(HT20)	5240	93.64	0.29
Ant 1	NVNT	802.11n(HT40)	5190	88.19	0.55
Ant 1	NVNT	802.11n(HT40)	5230	88.19	0.55
Ant 2	NVNT	802.11n(HT40)	5190	88.2	0.55
Ant 2	NVNT	802.11n(HT40)	5230	88.19	0.55

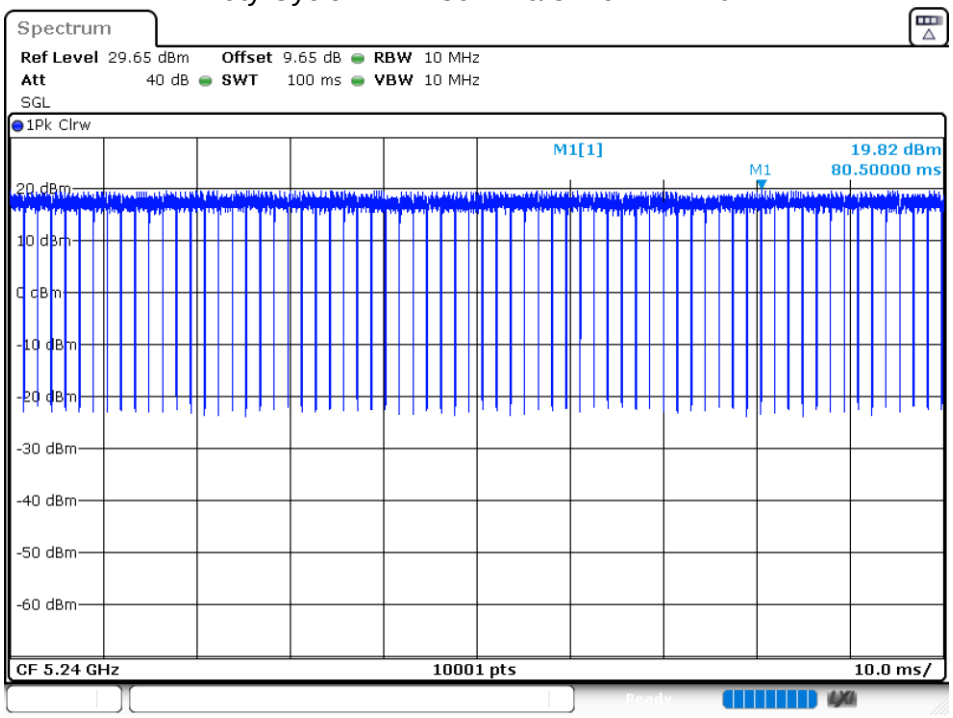
Duty Cycle NVNT 802.11a 5180MHz Ant 1



Duty Cycle NVNT 802.11a 5200MHz Ant 1



Duty Cycle NVNT 802.11a 5240MHz Ant 1



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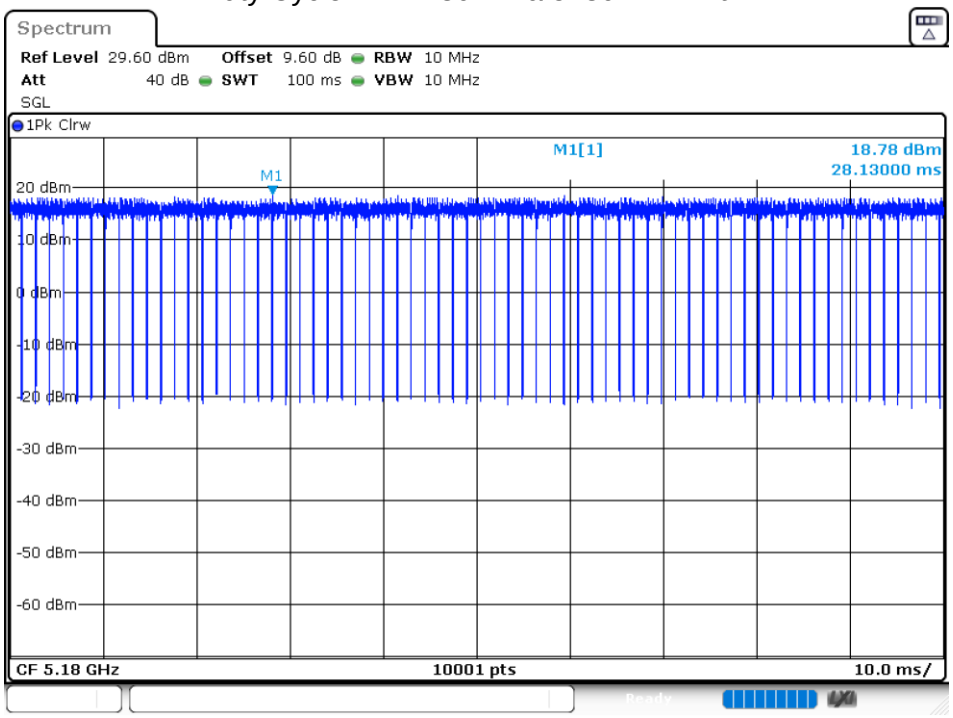

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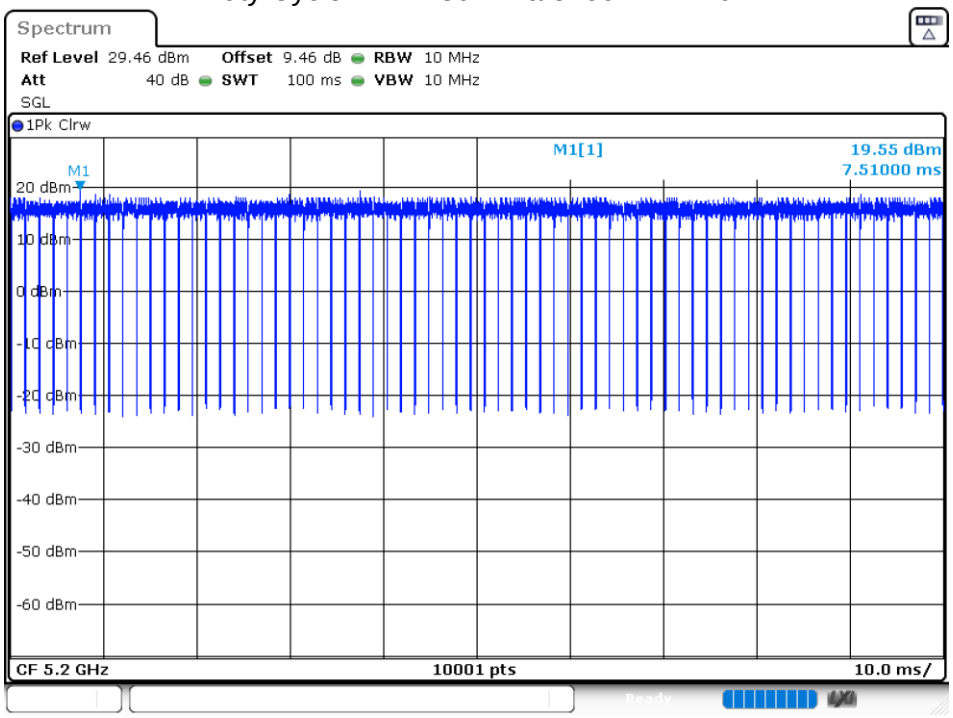
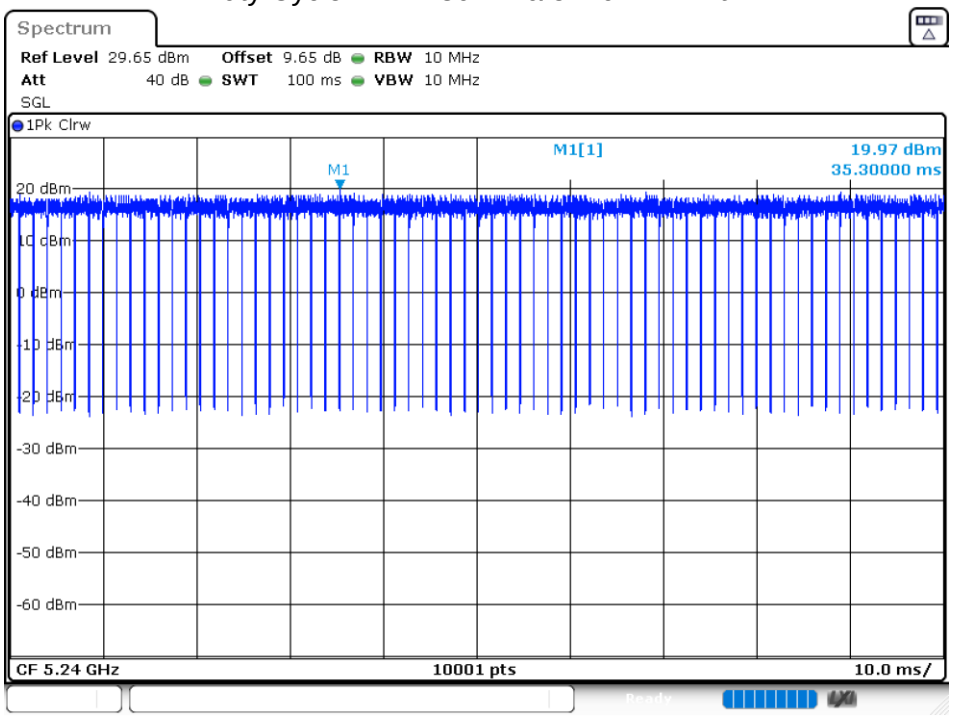
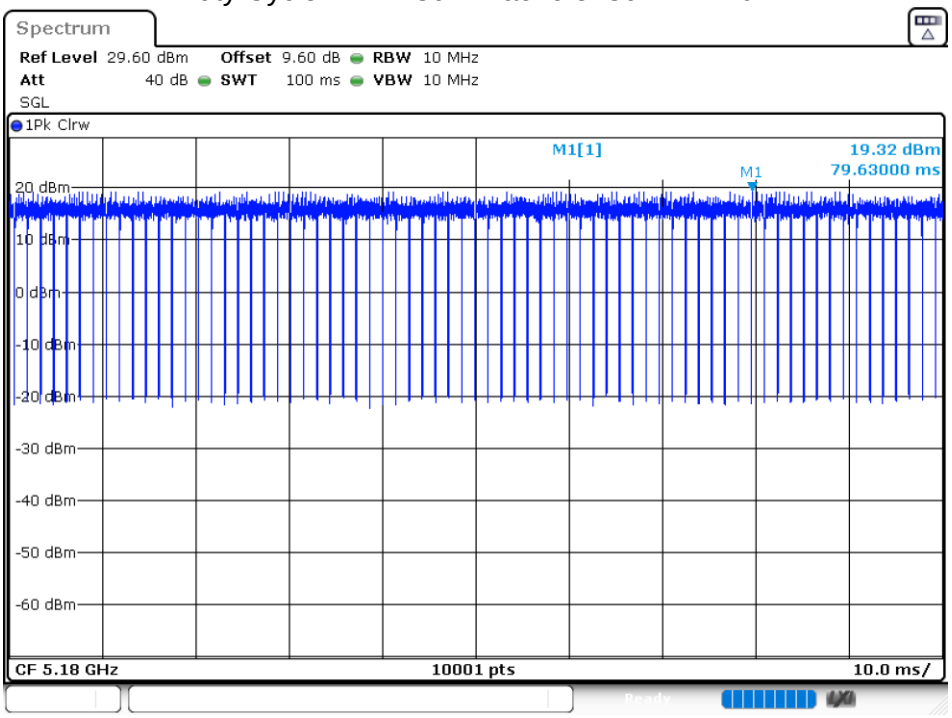


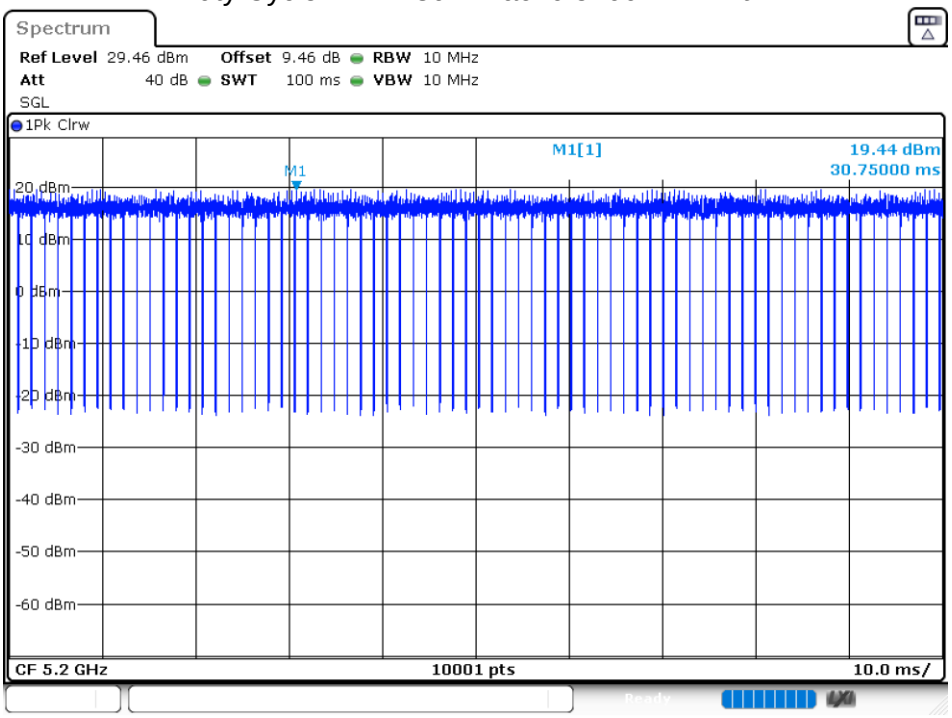
Duty Cycle NVNT 802.11a 5240MHz Ant 2



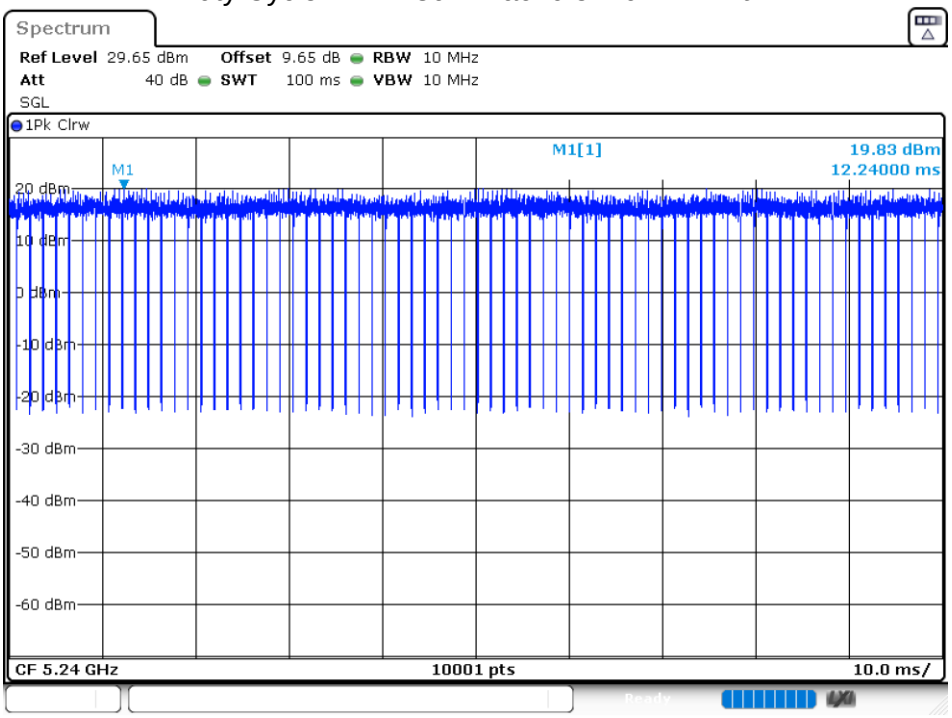
Duty Cycle NVNT 802.11ac20 5180MHz Ant 1



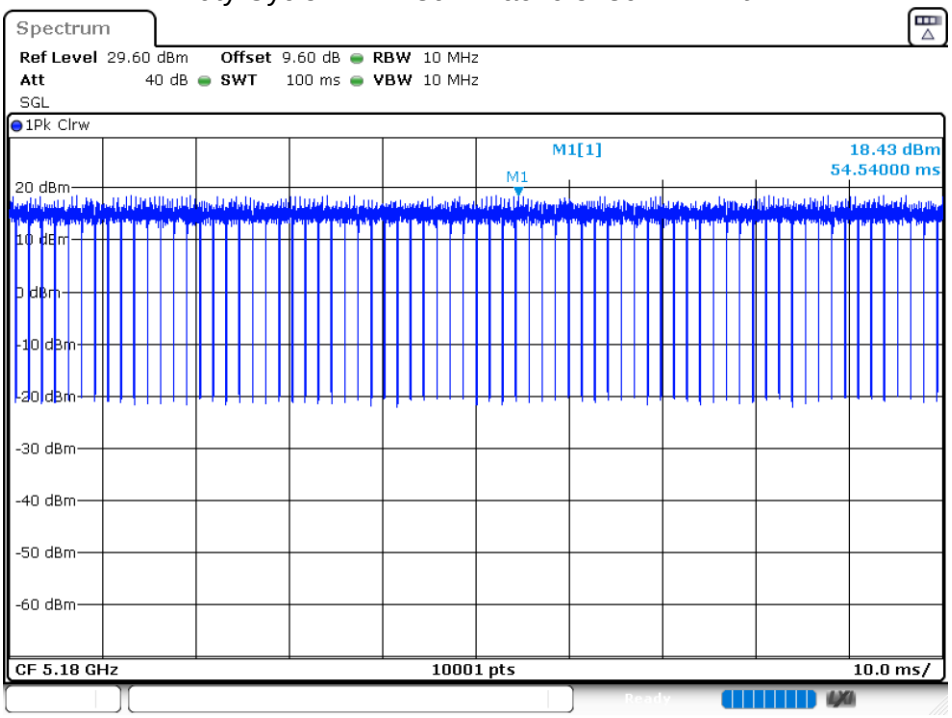
Duty Cycle NVNT 802.11ac20 5200MHz Ant 1



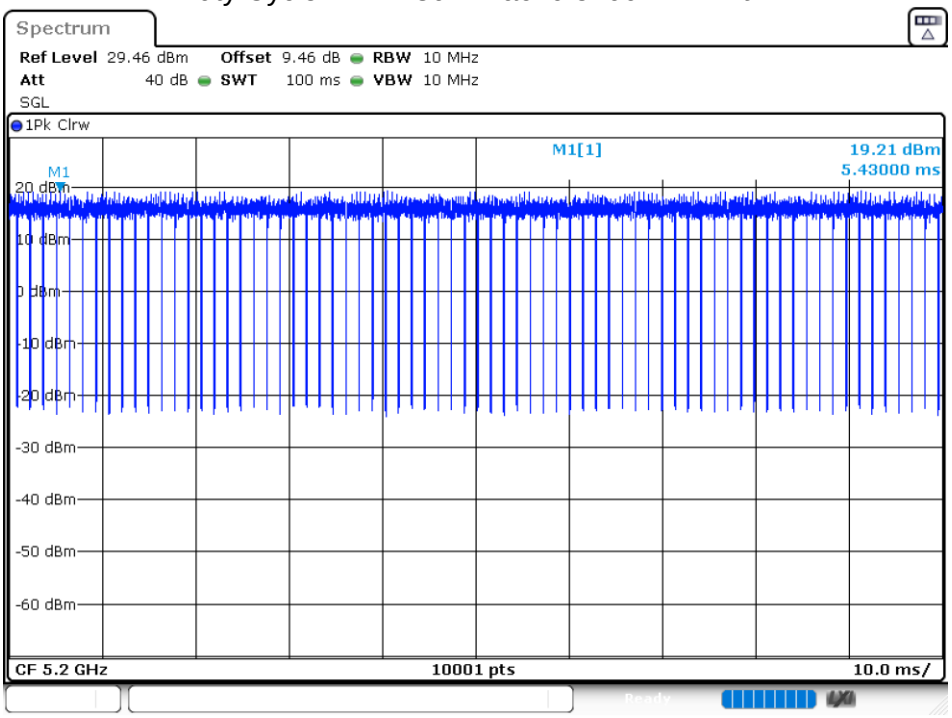
Duty Cycle NVNT 802.11ac20 5240MHz Ant 1



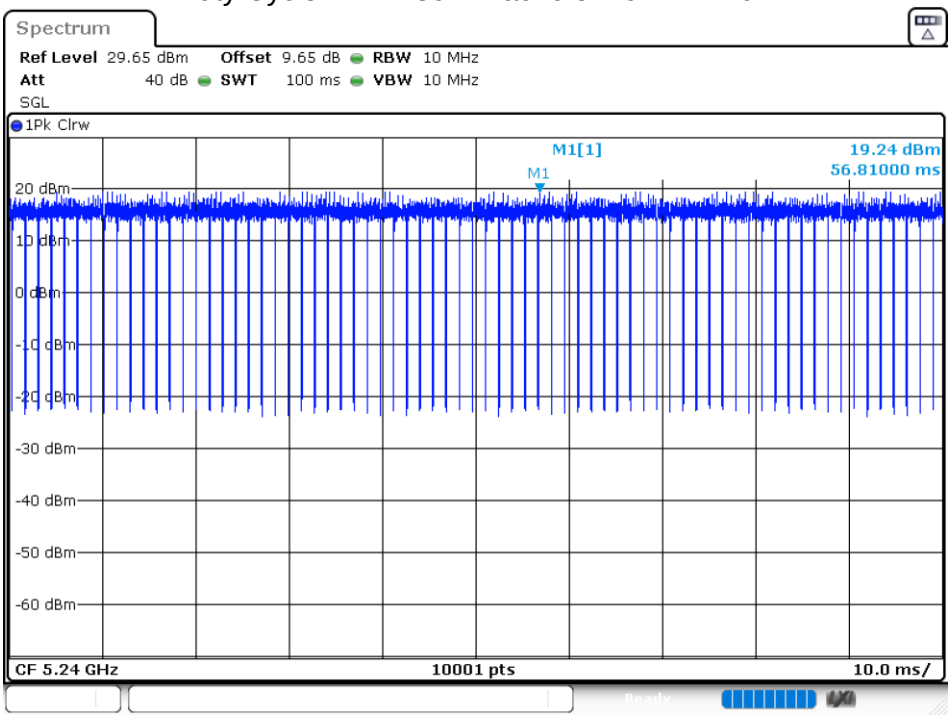
Duty Cycle NVNT 802.11ac20 5180MHz Ant 2



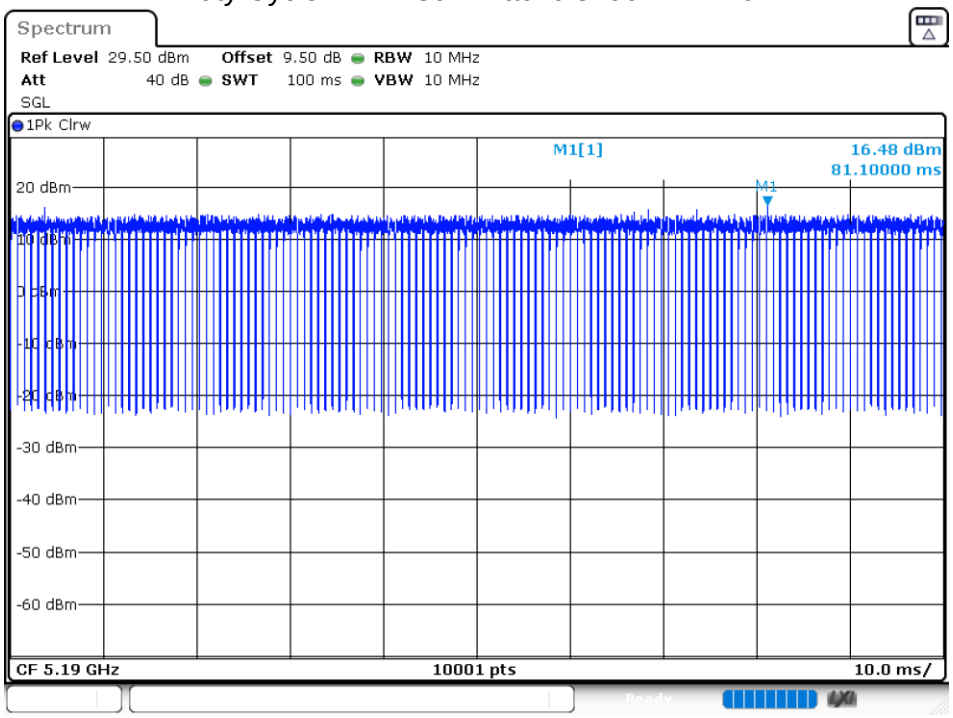
Duty Cycle NVNT 802.11ac20 5200MHz Ant 2



Duty Cycle NVNT 802.11ac20 5240MHz Ant 2



Duty Cycle NVNT 802.11ac40 5190MHz Ant 1



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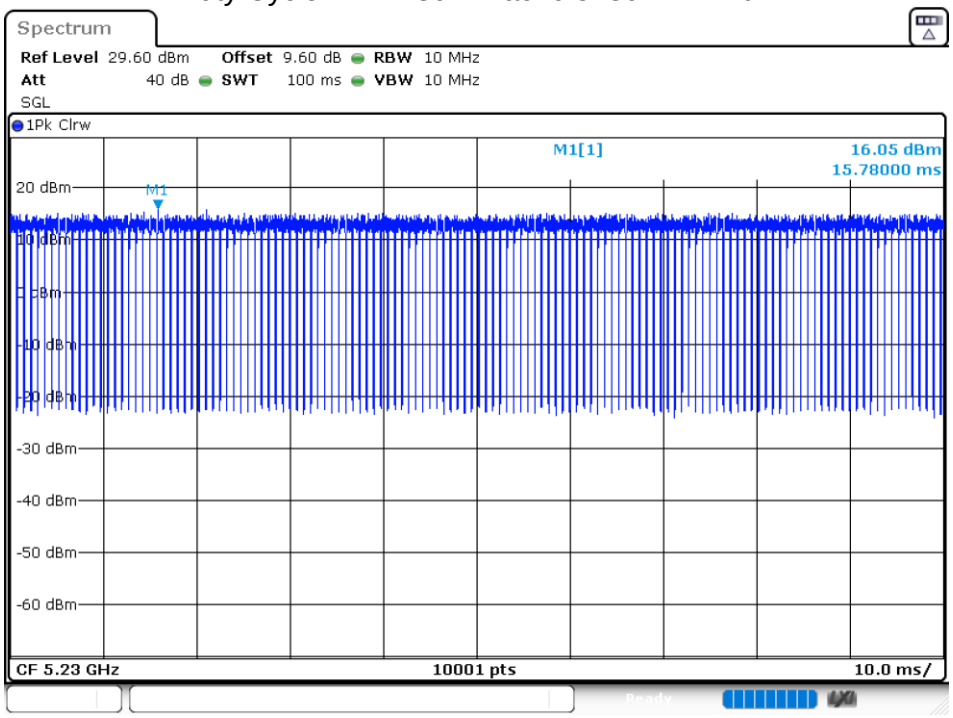
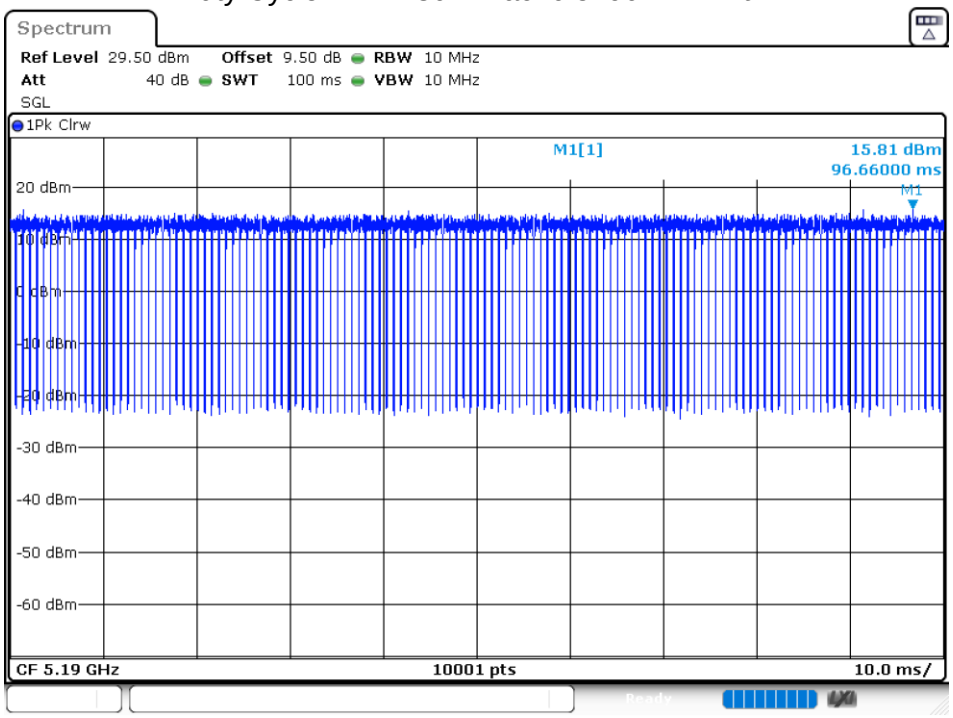
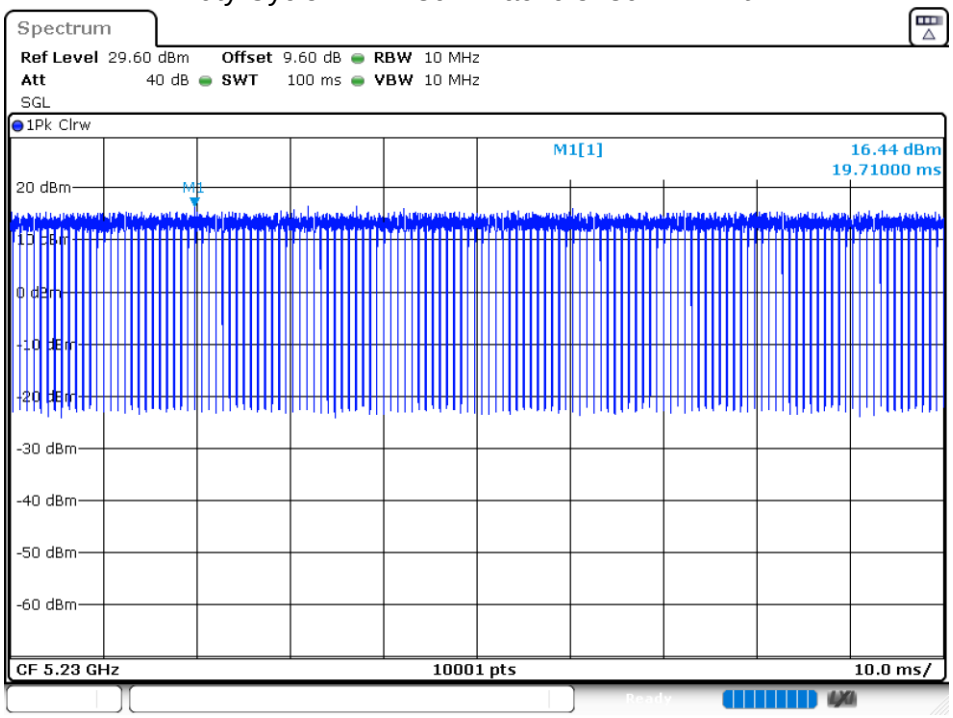


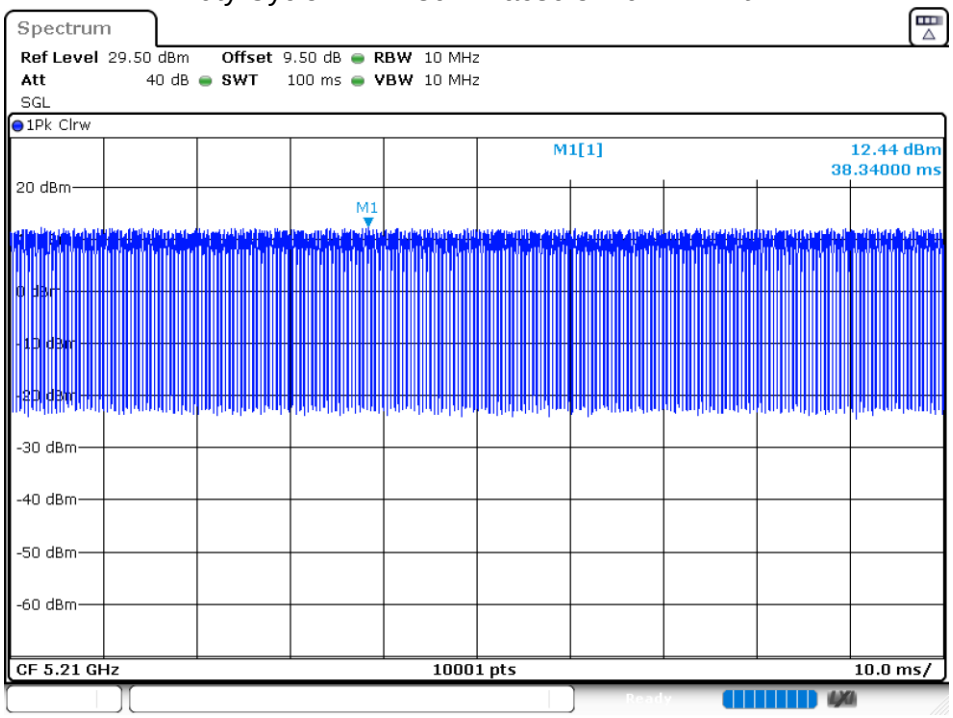
Duty Cycle NVNT 802.11ac40 5190MHz Ant 2



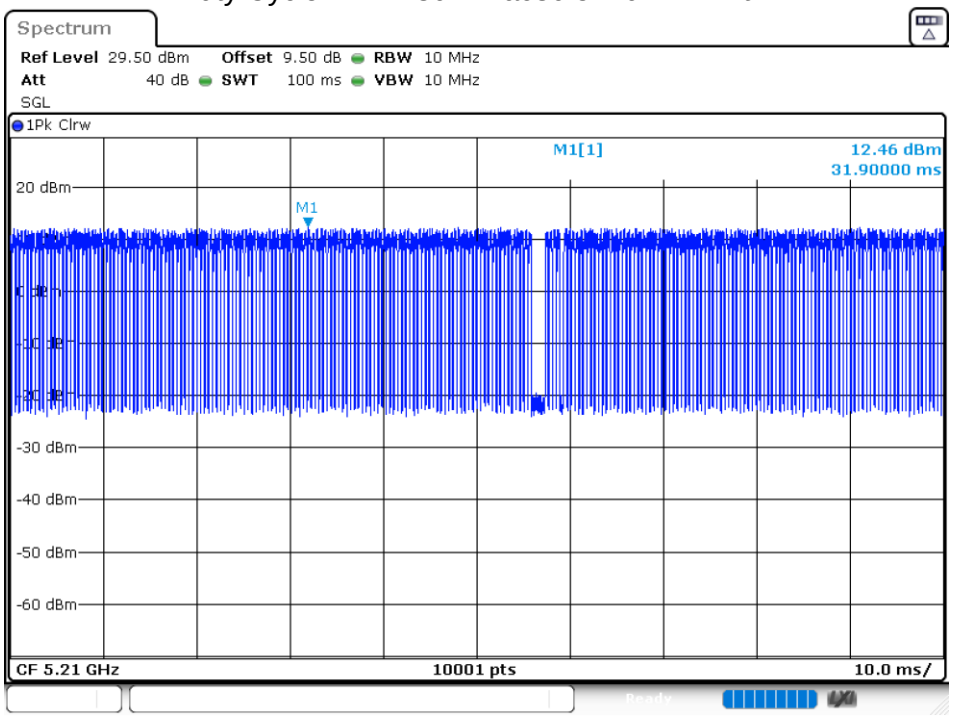
Duty Cycle NVNT 802.11ac40 5230MHz Ant 2



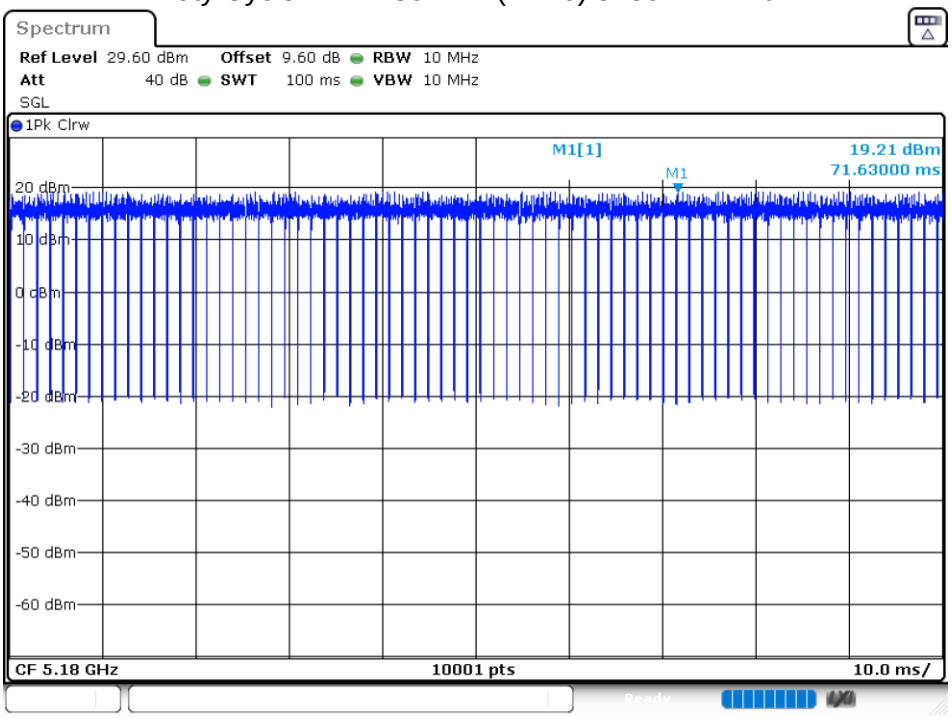
Duty Cycle NVNT 802.11ac80 5210MHz Ant 1



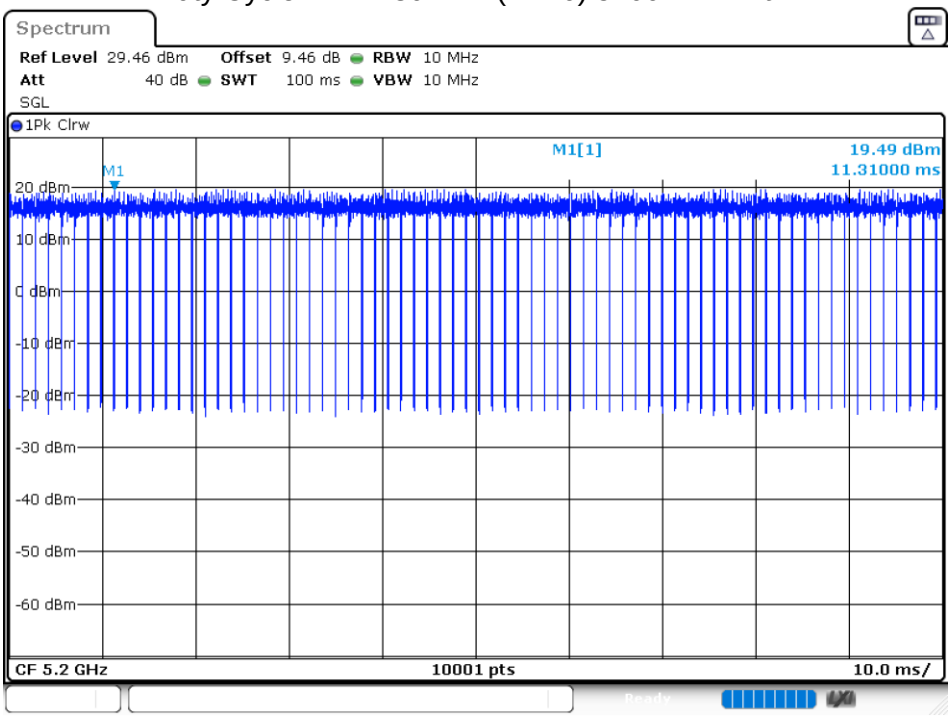
Duty Cycle NVNT 802.11ac80 5210MHz Ant 2



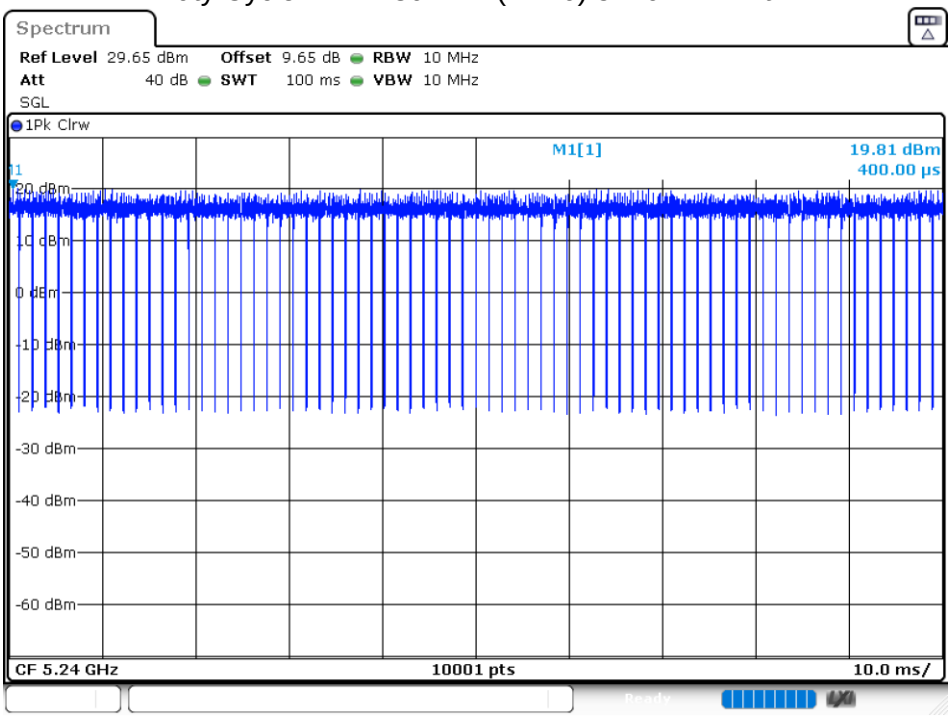
Duty Cycle NVNT 802.11n(HT20) 5180MHz Ant 1



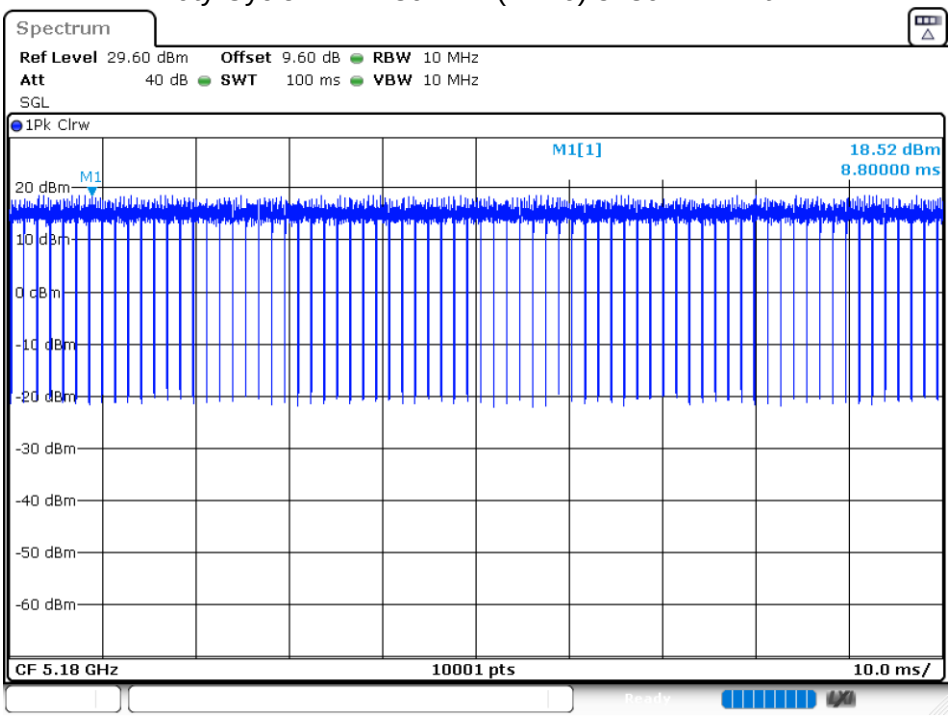
Duty Cycle NVNT 802.11n(HT20) 5200MHz Ant 1



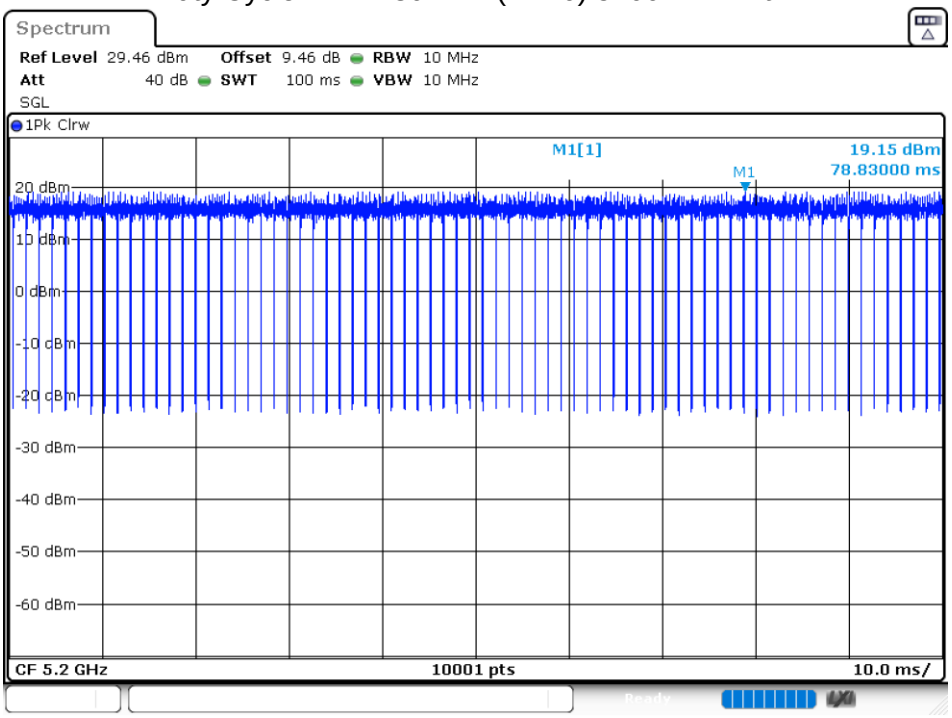
Duty Cycle NVNT 802.11n(HT20) 5240MHz Ant 1



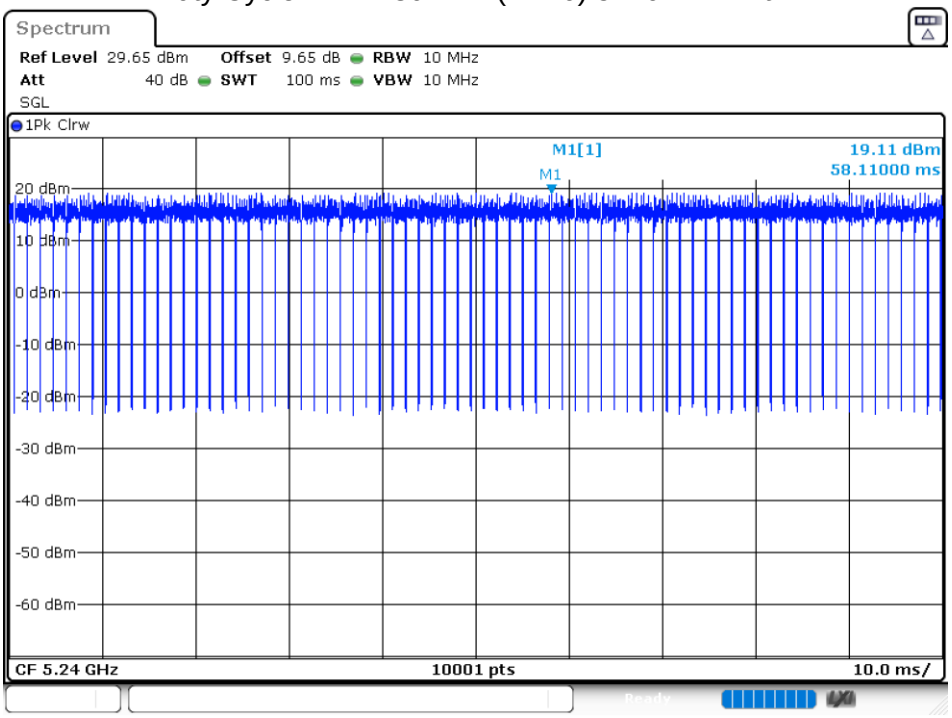
Duty Cycle NVNT 802.11n(HT20) 5180MHz Ant 2



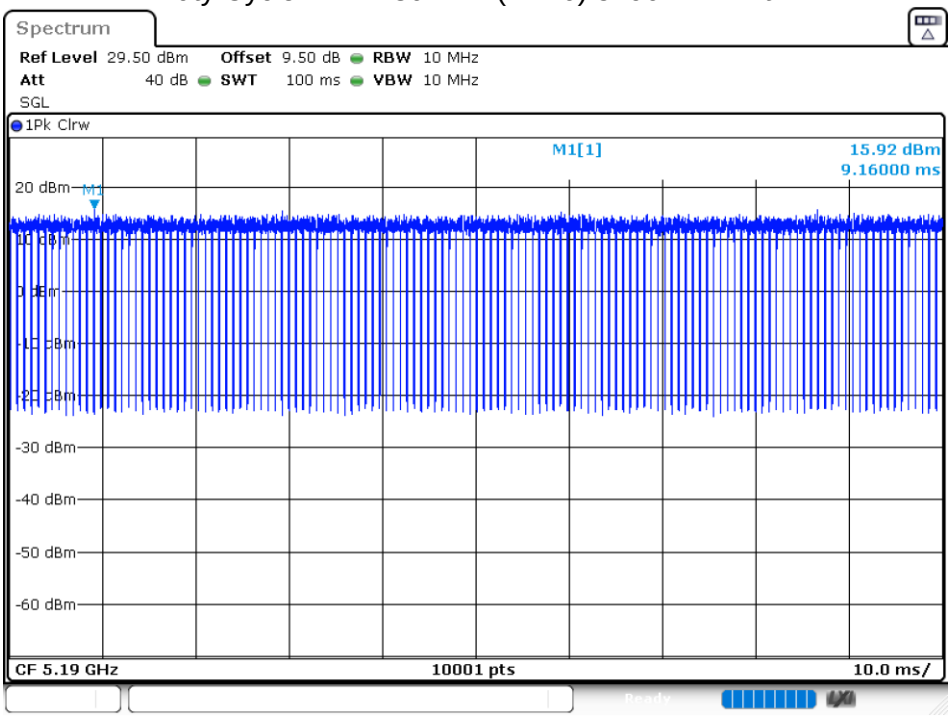
Duty Cycle NVNT 802.11n(HT20) 5200MHz Ant 2



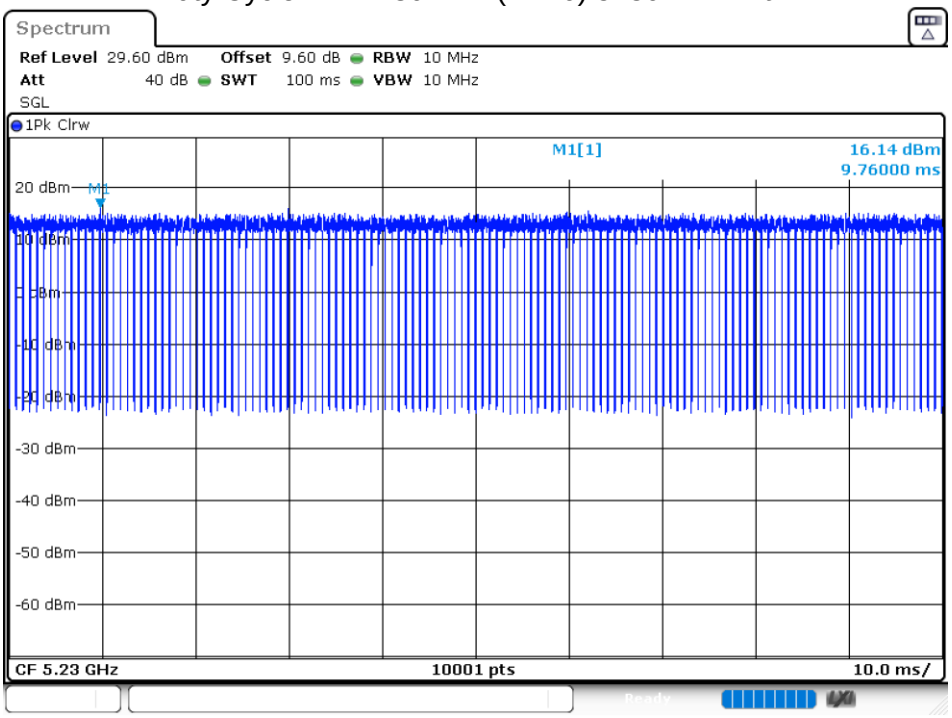
Duty Cycle NVNT 802.11n(HT20) 5240MHz Ant 2



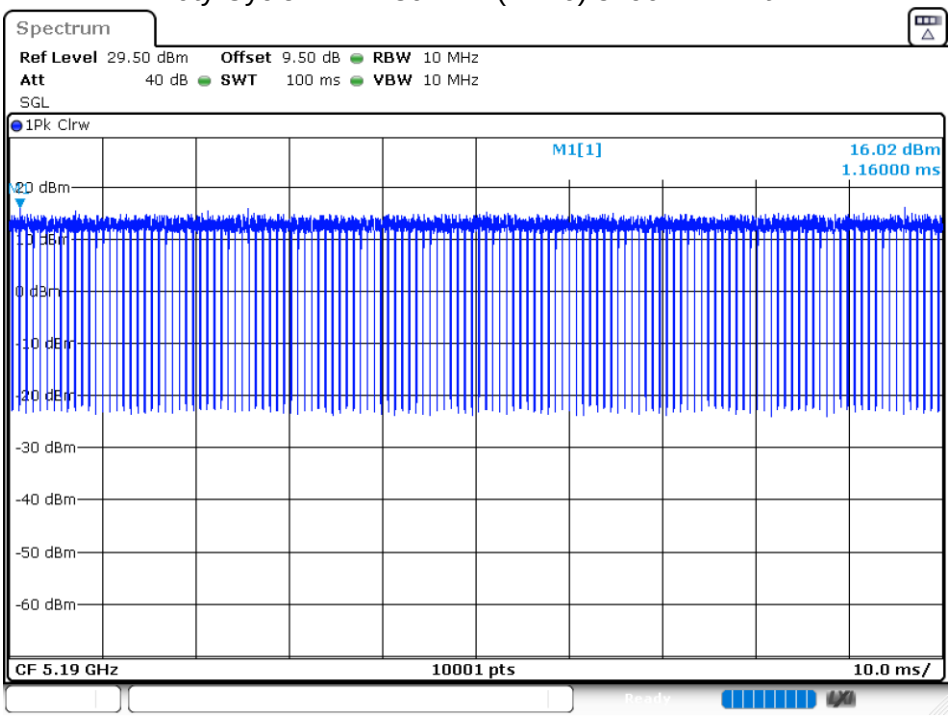
Duty Cycle NVNT 802.11n(HT40) 5190MHz Ant 1



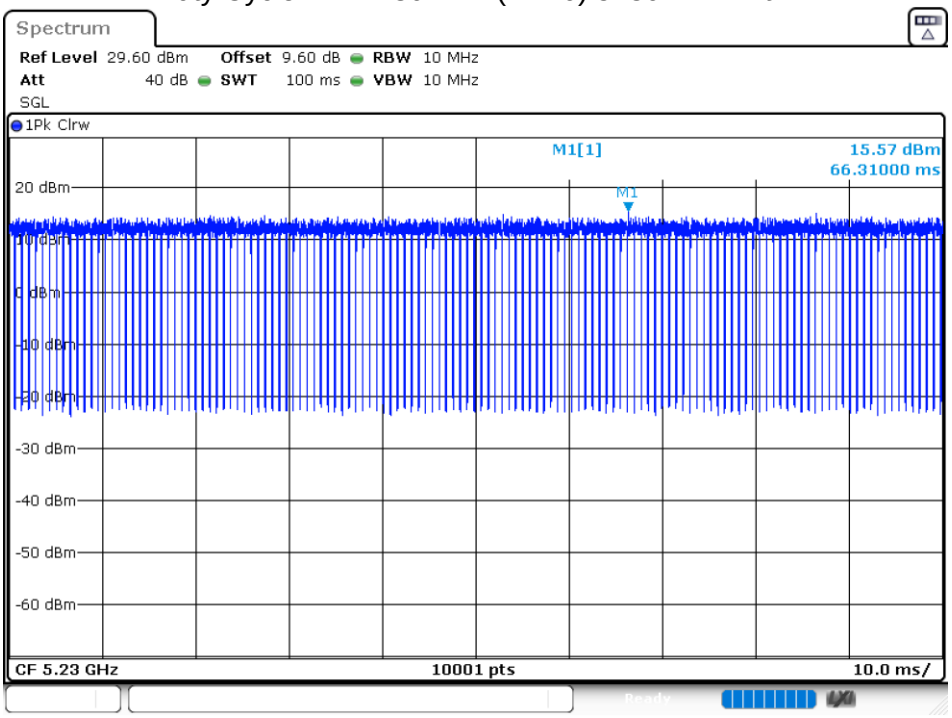
Duty Cycle NVNT 802.11n(HT40) 5230MHz Ant 1



Duty Cycle NVNT 802.11n(HT40) 5190MHz Ant 2



Duty Cycle NVNT 802.11n(HT40) 5230MHz Ant 2



11.1.2 MAXIMUM CONDUCTED OUTPUT POWER

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	802.11a	5180	Ant 1	10.42	0.27	10.69	24	Pass
NVNT	802.11a	5200	Ant 1	9.4	0.27	9.67	24	Pass
NVNT	802.11a	5240	Ant 1	10.43	0.26	10.69	24	Pass
NVNT	802.11a	5180	Ant 2	9.55	0.26	9.81	24	Pass
NVNT	802.11a	5200	Ant 2	9.09	0.27	9.36	24	Pass
NVNT	802.11a	5240	Ant 2	9.8	0.27	10.07	24	Pass
NVNT	802.11ac20	5180	Ant 1	9.49	0.28	9.77	24	Pass
NVNT	802.11ac20	5200	Ant 1	9.5	0.28	9.78	24	Pass
NVNT	802.11ac20	5240	Ant 1	9.59	0.28	9.87	24	Pass
NVNT	802.11ac20	5180	Ant 2	8.92	0.28	9.2	24	Pass
NVNT	802.11ac20	5200	Ant 2	9.32	0.28	9.6	24	Pass
NVNT	802.11ac20	5240	Ant 2	8.87	0.28	9.15	24	Pass
NVNT	802.11ac40	5190	Ant 1	8.87	0.49	9.36	24	Pass
NVNT	802.11ac40	5230	Ant 1	9.12	0.55	9.67	24	Pass
NVNT	802.11ac40	5190	Ant 2	9.25	0.49	9.74	24	Pass
NVNT	802.11ac40	5230	Ant 2	9.48	0.51	9.99	24	Pass
NVNT	802.11ac80	5210	Ant 1	8.87	1.02	9.89	24	Pass
NVNT	802.11ac80	5210	Ant 2	8.69	1.09	9.78	24	Pass
NVNT	802.11n(HT20)	5180	Ant 1	9.54	0.29	9.83	24	Pass
NVNT	802.11n(HT20)	5200	Ant 1	9.55	0.28	9.83	24	Pass
NVNT	802.11n(HT20)	5240	Ant 1	9.63	0.28	9.91	24	Pass
NVNT	802.11n(HT20)	5180	Ant 2	8.84	0.29	9.13	24	Pass
NVNT	802.11n(HT20)	5200	Ant 2	9.26	0.29	9.55	24	Pass
NVNT	802.11n(HT20)	5240	Ant 2	8.79	0.29	9.08	24	Pass
NVNT	802.11n(HT40)	5190	Ant 1	8.9	0.55	9.45	24	Pass
NVNT	802.11n(HT40)	5230	Ant 1	9.33	0.55	9.88	24	Pass
NVNT	802.11n(HT40)	5190	Ant 2	9.41	0.55	9.96	24	Pass
NVNT	802.11n(HT40)	5230	Ant 2	8.64	0.55	9.19	24	Pass

11.1.3 OCCUPIED CHANNEL BANDWIDTH

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Verdict
NVNT	802.11a	5180	Ant 1	16.9583	19.232	Pass
NVNT	802.11a	5200	Ant 1	16.9823	19.604	Pass
NVNT	802.11a	5240	Ant 1	16.9983	20.04	Pass
NVNT	802.11a	5180	Ant 2	16.9623	19.188	Pass
NVNT	802.11a	5200	Ant 2	16.9623	19.8	Pass
NVNT	802.11a	5240	Ant 2	16.9343	19.684	Pass
NVNT	802.11ac20	5180	Ant 1	17.9662	20.34	Pass
NVNT	802.11ac20	5200	Ant 1	17.9342	20.412	Pass
NVNT	802.11ac20	5240	Ant 1	17.9382	20.136	Pass
NVNT	802.11ac20	5180	Ant 2	17.9742	20.276	Pass
NVNT	802.11ac20	5200	Ant 2	17.9422	20.42	Pass
NVNT	802.11ac20	5240	Ant 2	17.9182	20.144	Pass
NVNT	802.11ac40	5190	Ant 1	36.2924	40.752	Pass
NVNT	802.11ac40	5230	Ant 1	36.3004	40.752	Pass
NVNT	802.11ac40	5190	Ant 2	36.2924	40.656	Pass
NVNT	802.11ac40	5230	Ant 2	36.2204	40.416	Pass
NVNT	802.11ac80	5210	Ant 1	76.0884	82.56	Pass
NVNT	802.11ac80	5210	Ant 2	75.8484	82.24	Pass
NVNT	802.11n(HT20)	5180	Ant 1	17.8902	20.148	Pass
NVNT	802.11n(HT20)	5200	Ant 1	17.8982	20.312	Pass
NVNT	802.11n(HT20)	5240	Ant 1	18.0382	20.24	Pass
NVNT	802.11n(HT20)	5180	Ant 2	17.9942	20.428	Pass
NVNT	802.11n(HT20)	5200	Ant 2	17.9902	20.372	Pass
NVNT	802.11n(HT20)	5240	Ant 2	17.9742	20.38	Pass
NVNT	802.11n(HT40)	5190	Ant 1	36.3644	40.984	Pass
NVNT	802.11n(HT40)	5230	Ant 1	36.4524	40.944	Pass
NVNT	802.11n(HT40)	5190	Ant 2	36.4124	40.992	Pass
NVNT	802.11n(HT40)	5230	Ant 2	36.2684	41.144	Pass

OBW NVNT 802.11a 5180MHz Ant 1