RADIO TEST REPORT

Report No:STS1812139W06

Issued for

Audiocodes Ltd.

1 Hayarden St. Airport City Lod 70151, Israel

Product Name:	IP PHONE
Brand Name:	AudioCodes
Model Name:	445HD
Series Model:	N/A
FCC ID:	XAK445HD
IC ID:	3808A-445HD
Test Standard:	FCC Part 15.247
	RSS-247 Issue 2, February 2017

Shenzhen STS Test Services Co., Ltd.
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TEST RESULT CERTIFICATION

Applicant's name ..... :	Audiocodes Ltd.
Address ..... :	1 Hayarden St. Airport City Lod 70151, Israel
Manufacture's Name ..... :	Audiocodes Ltd.
Address ..... :	1 Hayarden St. Airport City Lod 70151, Israel

Product description

Product Name ..... :	IP PHONE
Brand Name ..... :	AudioCodes
Model Name ..... :	445HD
Series Model ..... :	N/A
Test Standards ..... :	FCC Part15.247
	RSS-247 Issue 2, February 2017
Test procedure ..... :	ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC/IC 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 ..... :	05 Dec. 2018 ~12 Dec. 2018
Date of Issue ..... :	17 Dec. 2017
Test Result ..... :	**Pass**

Testing Engineer : Chris chen
(Chris chen)

Technical Manager : Sunday Hu
(Sunday Hu)

Authorized Signatory : Vita Li
(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	17 Dec. 2018	STS1812139W06	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

KDB 558074 D01 DTS Meas Guidance v05 and KDB 558074 D01 DTS Meas Guidance v03r05

FCC Part 15.247,Subpart C RSS-247 Issue 2			
Standard Section	Test Item	Judgment	Remark
15.207 RSS-Gen Issue 5 April 2018	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
RSS-GEN clause 6.7	99% Bandwidth	PASS	
15.247 (b)(3) RSS-247 Issue 2, February 2017 (5.4)	Output Power	PASS	
15.247 (c) RSS-247 Issue 2, February 2017 (5.5)	Radiated Spurious Emission	PASS	
15.247 (d) RSS-247 Issue 2, February 2017 (5.5)	Conducted Spurious & Band Edge Emission	PASS	
15.247 (e) RSS-247 Issue 2, February 2017	Power Spectral Density	PASS	
15.205	Restricted Band Edge Emission	PASS	
Part 15.247(d)/part 15.209(a) RSS-247 Issue 2, February 2017	Band Edge Emission	PASS	
15.203 RSS-Gen Issue 5 April 2018	Antenna Requirement	PASS	
RSS-Gen Issue 5 April 2018	Frequency Stability	PASS	

NOTE:

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

(2) all tests are according to ANSI C63.10-2013 .

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

FCC Registration No.: 625569

IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

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	RF output power,conducted	±0.71dB
2	Unwanted Emissions,conducted	±0.63dB
3	All emissions,radiated 30-200MHz	±3.43dB
4	All emissions,radiated 200MHz-1GHz	±3.57dB
5	All emissions,radiated>1G	±4.13dB
6	Conducted Emission(9KHz-150KHz)	±3.18dB
7	Conducted Emission(150KHz-30MHz)	±2.70dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	IP PHONE	
Trade Name	AudioCodes	
Model Name	445HD	
Series Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a IP PHONE	
	Operation Frequency:	802.11b/g/n20: 2412~2462 MHz 802.11n(40MHz):2422~2452MHz
	Modulation Type:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6 Mbps 802.11n(20MHz): 65/58.5/52/39/26/19.5/13/6.5 Mbps 802.11n(40MHz): 135/121.5/108/81/54/40.5/37/13.5 Mbps
	Number Of Channel:	802.11b/g/n20:11CH 802.11n 40: 7CH
	Antenna Designation:	Please see Note 3
	Antenna Gain (dBi):	ANT A: 3.15dBi. ANT B: 3.15dBi. Directional gain =6.16dBi
	Duty Cycle:	>98%
Channel List	Please refer to the Note 2.	
Adapter	Power supply and ADP(rating): Input: AC100-240V, 0.6A, 50/60Hz Output: DC 12V, 2.0A	
Hardware version	Version 3.1.2	
Software version	RL-UM02WBS-8723DU-V1.0	
Radio Hardware version	MPLY.LR9.W1444,MD.LWTG.MP.V79.P4	
Radio Software version	SC6531_W13.04.05_Release	
Test Software	3.18.19	
RF Power Setting TEST Software (power class)	2.4 GHz:802.11 b/g/n 20:12/10/9 2.4 GHz:802.11 n 40:9	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1 For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2

Operation Frequency of channel			
802.11b/g/n(20MHz)		Channel List for 802.11n(40MHz)	
Channel	Frequency	Channel	Frequency
01	2412	03	2422
02	2417	04	2427
03	2422	05	2432
04	2427	06	2437
05	2432	07	2442
06	2437	08	2447
07	2442	09	2452
08	2447		
09	2452		
10	2457		
11	2462		

3 Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:
Carrier Frequency Channel

2.4GHz Test Frequency:

For 802.11b/g/n (HT20)		For 802.11n (HT40)	
Channel	Freq.(MHz)	Channel	Freq.(MHz)
01	2412	03	2422
06	2437	06	2437
11	2462	09	2452

4 KDB 662911 D01 Multiple Transmitter Output v02r01
2) Directional Gain Calculations for In-Band Measurements
a) Basic methodology with NANT transmit antennas, each with the same directional gain GAN T dBi, being driven by NANT transmitter outputs of equal power. Directional gain is to be com puted as follows:
(i) If any transmit signals are correlated with each other,
Directional gain = GANT + 10 log(NANT) dBi
(ii) If all transmit signals are completely uncorrelated with each other,
Directional gain = GANT
ANT A=3.15 dBi
ANT B=3.15 dB

GANT + 10 log(NANT) dBi
Directional gain= 3.15+10log2=6.16dBi

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Directional gain (dBi)
WLAN	AudioCodes	445HD	PIFA Antenna	N/A	ANT A: 3.15dBi ANT B: 3.15dBi	6.16

2.2 DESCRIPTION OF THE TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11b CH1	1 Mbps
Mode 2	TX IEEE 802.11b CH6	1 Mbps
Mode 3	TX IEEE 802.11 b CH11	1 Mbps
Mode 4	TX IEEE 802.11g CH1	6 Mbps
Mode 5	TX IEEE 802.11g CH6	6 Mbps
Mode 6	TX IEEE 802.11g CH11	6 Mbps
Mode 7	TX IEEE 802.11n HT20 CH1	MCS 0
Mode 8	TX IEEE 802.11n HT20 CH6	MCS 0
Mode 9	TX IEEE 802.11n HT20 CH11	MCS 0
Mode 10	TX IEEE 802.11n HT40 CH3	MCS 0
Mode 11	TX IEEE 802.11n HT40 CH6	MCS 0
Mode 12	TX IEEE 802.11n HT40 CH9	MCS 0

Note:

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

(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report

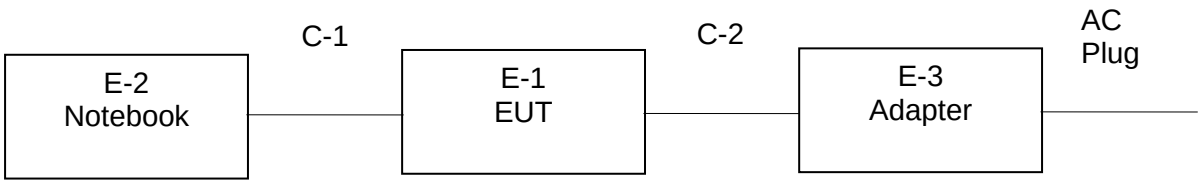
(3) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

AC Conducted Emission

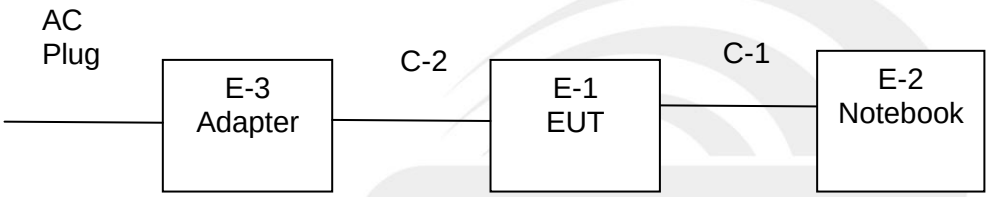
Test Case	
AC Conducted Emission	Mode13: Keeping WIFI TX

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set



Conducted Emission Test



2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-3	Adapter	N/A	RD1202000-C55-29MG	N/A	N/A
C-2	DC Cable	N/A	110cm	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	DELL	VOSTRO.3800	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

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) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12
Signal Analyzer	Agilent	N9020A	MY51110105	2018.03.08	2019.03.07
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
SHF-EHF Horn Antenna (15G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2019.03.10
Pre-mplifier(0.1M-3GHz)	EM	EM330	060665	2018.10.13	2019.10.12
PreAmplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2018.10.13	2019.10.12
Temperature & Humitidy	HH660	Mieo	N/A	2018.10.11	2019.10.10
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12
LISN	R&S	ENV216	101242	2018.10.11	2019.10.10
LISN	EMCO	3810/2NM	23625	2018.10.11	2019.10.10
Temperature & Humitidy	HH660	Mieo	N/A	2018.10.11	2019.10.10

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2018.10.13	2019.10.12
Signal Analyzer	Agilent	N9020A	MY49100060	2018.10.13	2019.10.12
Temperature & Humitidy	HH660	Mieo	N/A	2018.10.11	2019.10.10

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

operating frequency band. In case the emission fall within the restricted band specified on Part 15. 207(a) and RSS-Gen Issue 5 limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

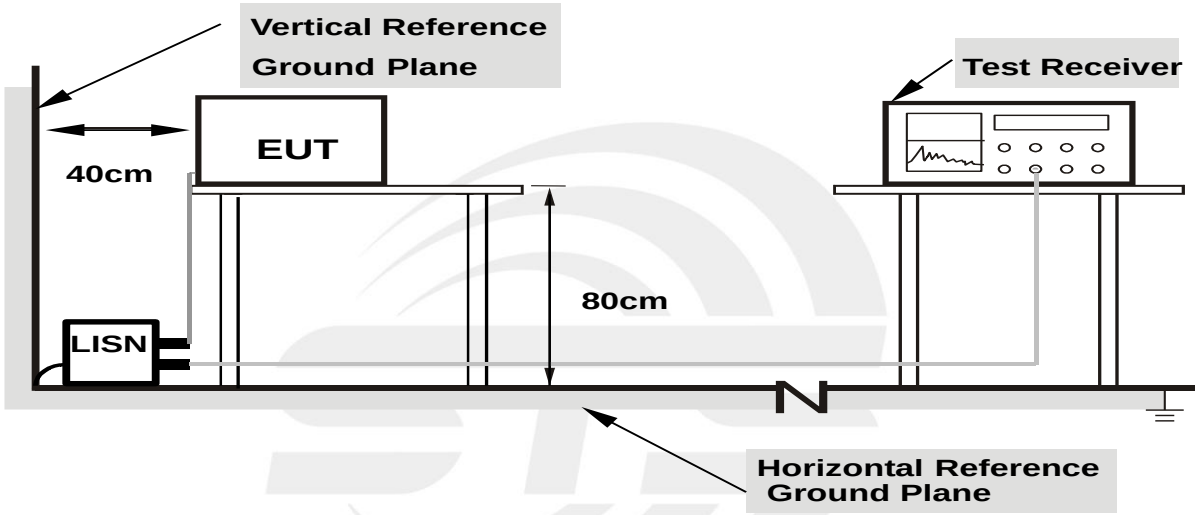
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected 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.
b. 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 40 cm long.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



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

3.1.4 EUT OPERATING CONDITIONS

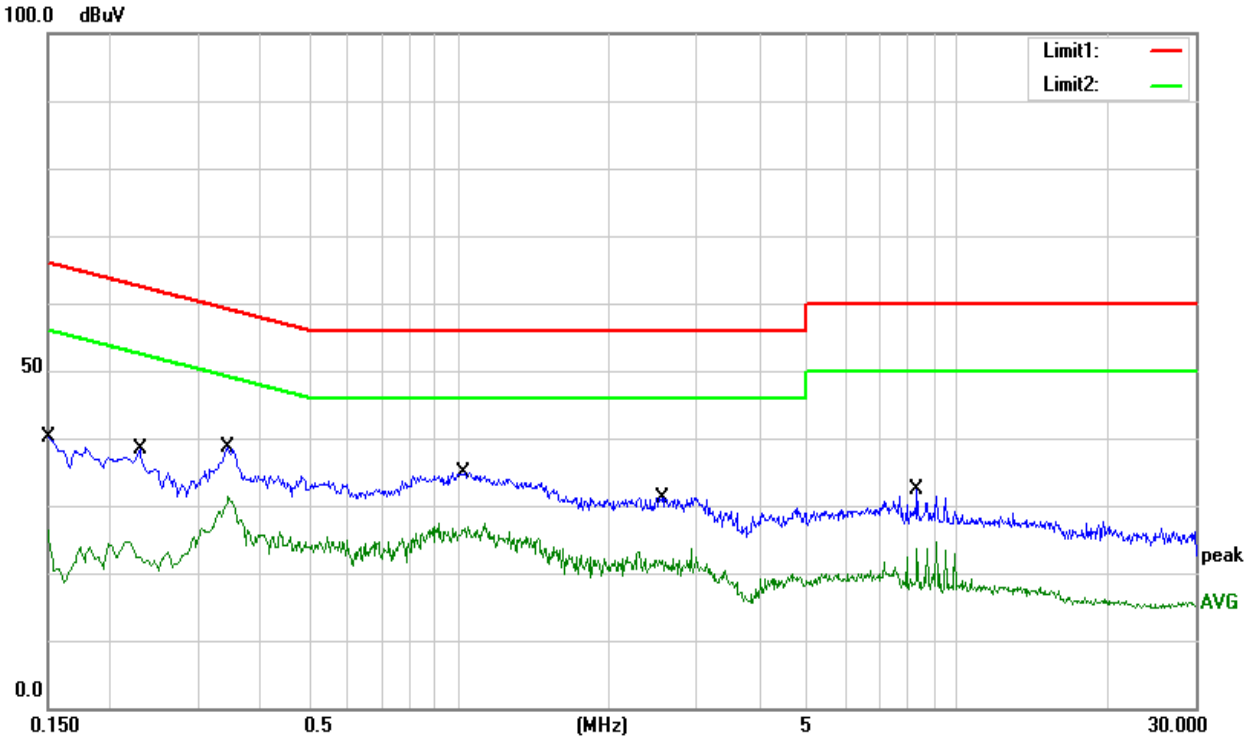
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

Temperature:	24.2 ℃	Relative Humidity:	56%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 13		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1500	20.01	20.23	40.24	66.00	-25.76	QP
0.1500	6.09	20.23	26.32	56.00	-29.68	AVG
0.2300	17.98	20.38	38.36	62.45	-24.09	QP
0.2300	4.24	20.38	24.62	52.45	-27.83	AVG
0.3427	18.04	20.62	38.66	59.14	-20.48	QP
0.3427	10.67	20.62	31.29	49.14	-17.85	AVG
1.0300	14.73	20.16	34.89	56.00	-21.11	QP
1.0300	7.23	20.16	27.39	46.00	-18.61	AVG
2.5540	11.24	20.01	31.25	56.00	-24.75	QP
2.5540	3.55	20.01	23.56	46.00	-22.44	AVG
8.3020	12.39	20.00	32.39	60.00	-27.61	QP
8.3020	4.64	20.00	24.64	50.00	-25.36	AVG

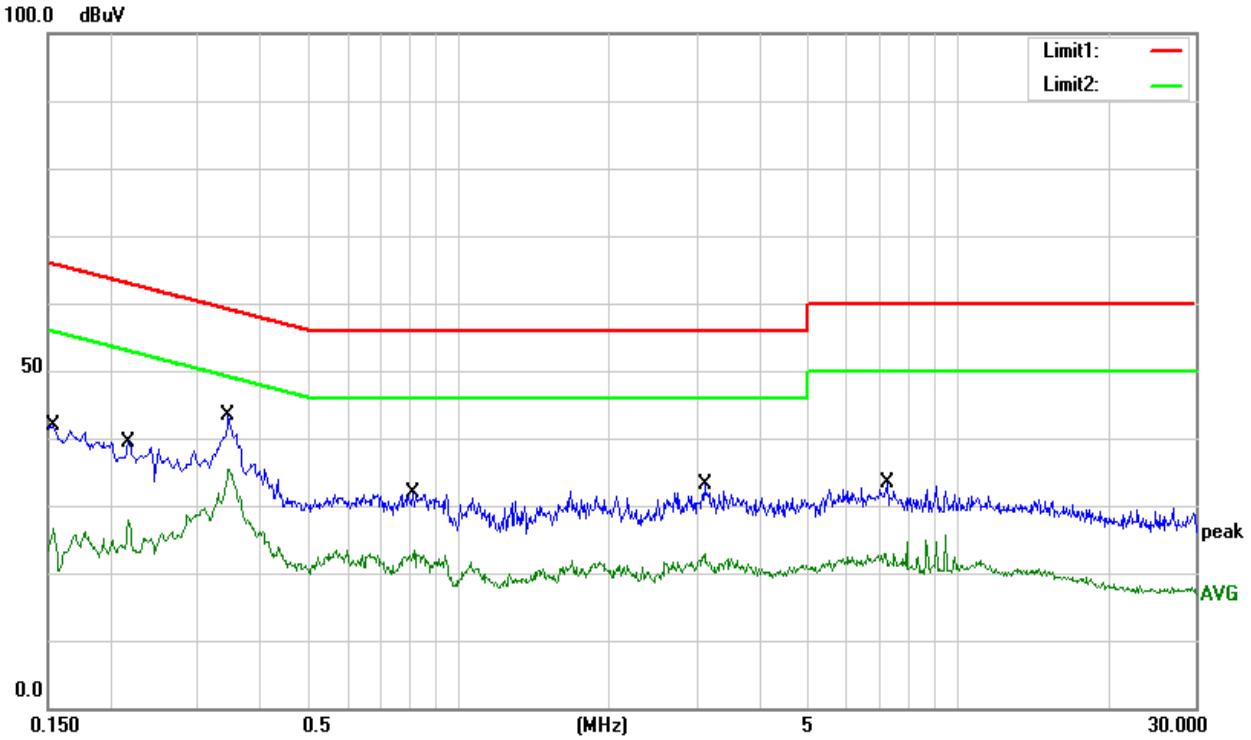
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	24.2 ℃	Relative Humidity:	56%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 13		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1540	21.53	20.23	41.76	65.78	-24.02	QP
0.1540	6.45	20.23	26.68	55.78	-29.10	AVG
0.2180	19.04	20.32	39.36	62.89	-23.53	QP
0.2180	7.48	20.32	27.80	52.89	-25.09	AVG
0.3460	22.80	20.61	43.41	59.06	-15.65	QP
0.3460	14.82	20.61	35.43	49.06	-13.63	AVG
0.8100	11.62	20.22	31.84	56.00	-24.16	QP
0.8100	3.17	20.22	23.39	46.00	-22.61	AVG
3.1180	13.28	19.97	33.25	56.00	-22.75	QP
3.1180	2.94	19.97	22.91	46.00	-23.09	AVG
7.2180	13.44	19.92	33.36	60.00	-26.64	QP
7.2180	5.64	19.92	25.56	50.00	-24.44	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) and RSS-247 Issue 2 limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1000MHz-25GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz /3MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2422 MHz Upper Band Edge: 2452 to 2500 MHz
RB / VB (emission in restricted band)	1 MHz /3MHz

Receiver Parameter	Setting
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

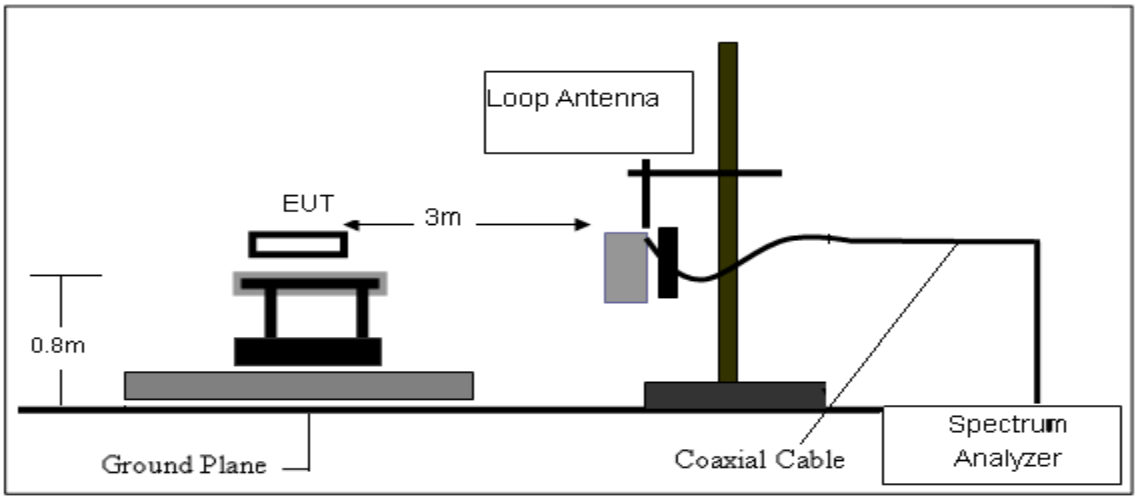
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. 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:

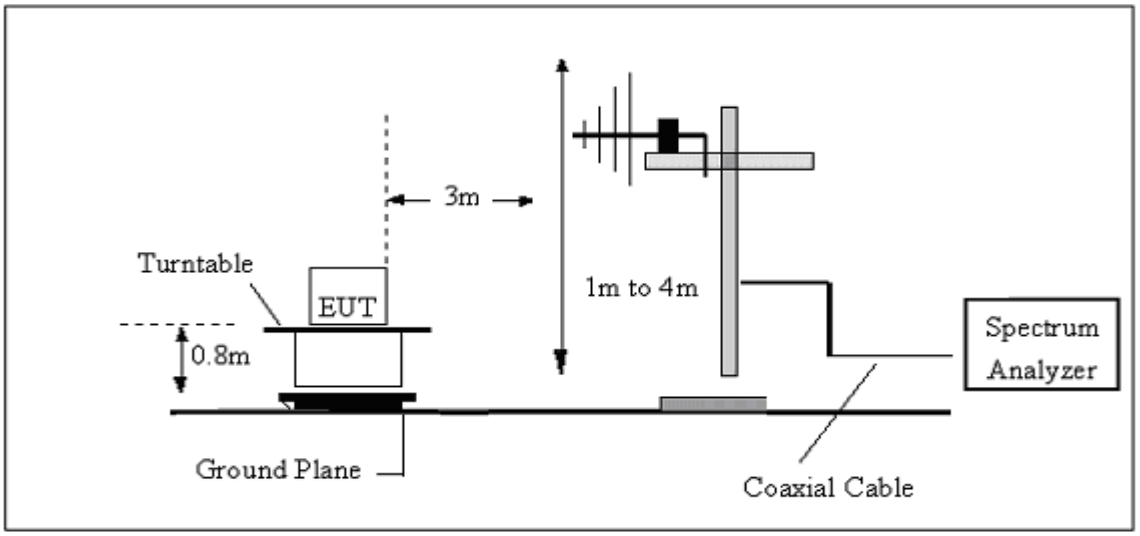
Both horizontal and vertical antenna polarities were tested and performed test to three orthogonal axis. The worst case emissions were reported

3.2.3 TEST SETUP

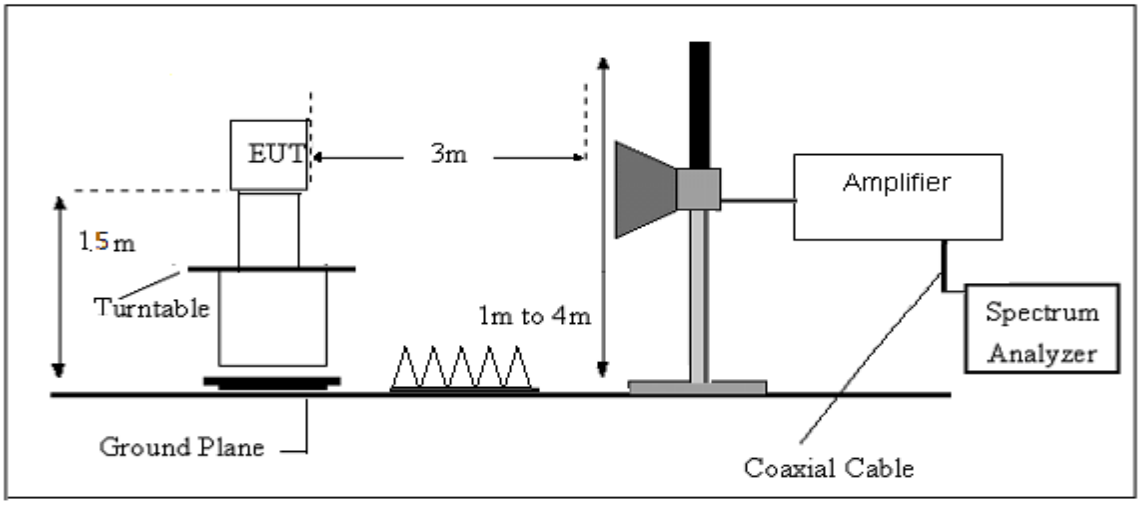
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

3.2.6 TEST RESULT

9KHz-30MHz

Temperature：	24.3℃	Relative Humidtity：	47%
Test Voltage ：	AC 120V/60Hz	Polarization ：	--
Test Mode ：	TX Mode		

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
--	--	--	--	--	PASS
--	--	--	--	--	PASS

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

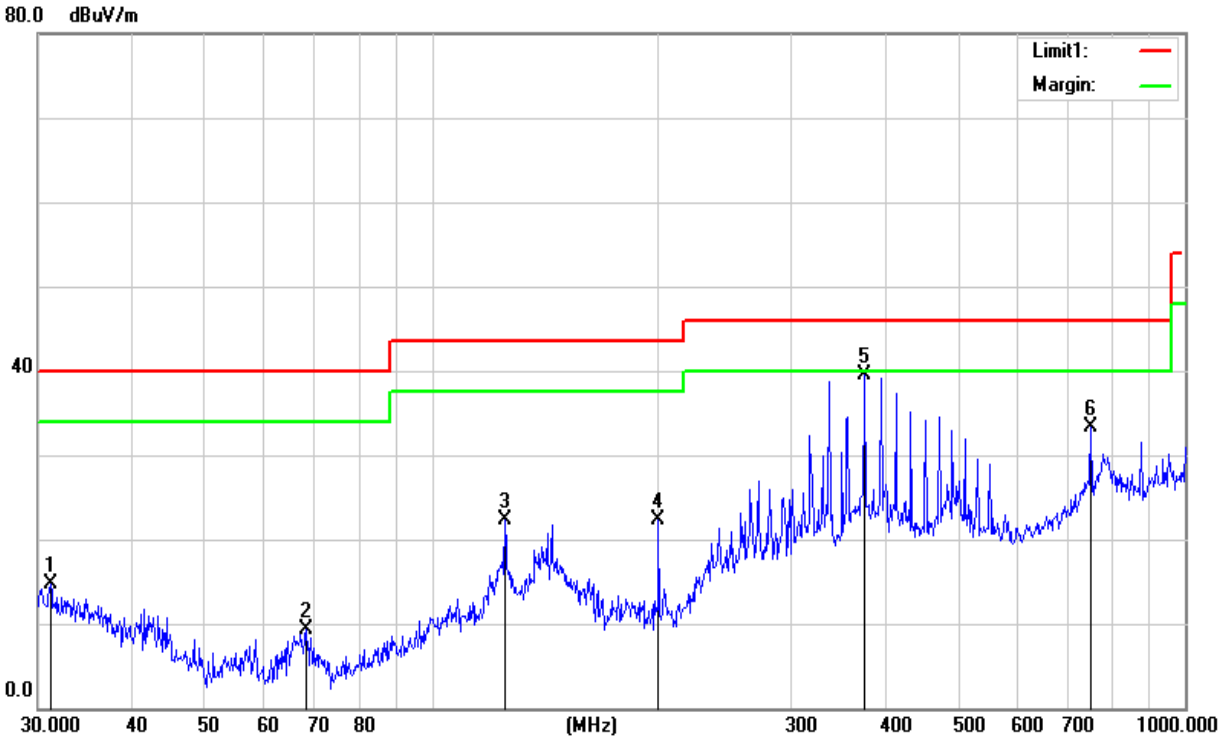
(30MHz - 1000MHz)

Temperature：	24.3℃	Relative Humidtity：	47%
Test Voltage ：	AC 120V/60Hz	Polarization ：	Horizontal
Test Mode ：	Mode 1/2/3/4/5/6/7/8/9/10/11/12(Mode 9 worst mode)		

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
31.1798	26.47	-11.79	14.68	40.00	-25.32	QP
68.1514	33.37	-24.15	9.22	40.00	-30.78	QP
125.0066	39.88	-17.61	22.27	43.50	-21.23	QP
199.9856	42.48	-20.17	22.31	43.50	-21.19	QP
375.9385	52.33	-12.73	39.60	46.00	-6.40	QP
750.1083	36.93	-3.56	33.37	46.00	-12.63	QP

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit

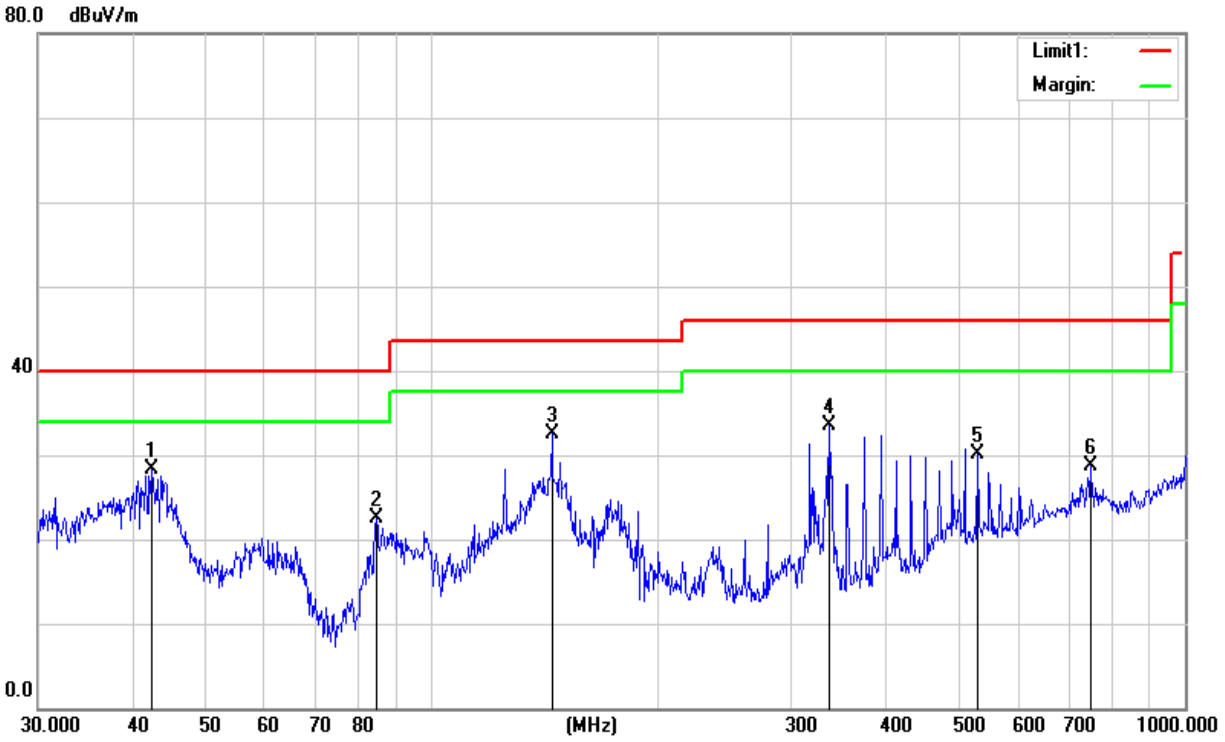


Temperature：	24.3℃	Relative Humidtity：	47%
Test Voltage ：	AC 120V/60Hz	Polarization ：	Vertical
Test Mode ：	Mode 1/2/3/4/5/6/7/8/9/10/11/12(Mode 9 worst mode)		

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
42.4508	45.83	-17.59	28.24	40.00	-11.76	QP
84.4054	44.16	-21.59	22.57	40.00	-17.43	QP
144.3348	50.26	-17.72	32.54	43.50	-10.96	QP
337.2155	47.47	-14.04	33.43	46.00	-12.57	QP
530.1014	38.08	-7.92	30.16	46.00	-15.84	QP
750.1082	32.22	-3.56	28.66	46.00	-17.34	QP

Remark:.

1. Margin = Result (Result =Reading + Factor)–Limit



(1000MHz-25GHz) Restricted band and Spurious emission Requirements

802.11n(HT20) Low Channel (Antenna A+B)

Frequency (MHz)	Meter Reading (dBμV)	Amplifier （dB）	Loss （dB）	Antenna Factor （dB/m）	Orrected Factor （dB）	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2412 MHz)										
3264.61	61.65	44.70	6.70	28.20	-9.80	51.85	74.00	-22.15	PK	Vertical
3264.61	50.81	44.70	6.70	28.20	-9.80	41.01	54.00	-12.99	AV	Vertical
3264.72	61.32	44.70	6.70	28.20	-9.80	51.52	74.00	-22.48	PK	Horizontal
3264.72	50.59	44.70	6.70	28.20	-9.80	40.79	54.00	-13.21	AV	Horizontal
4824.52	59.31	44.20	9.04	31.60	-3.56	55.75	74.00	-18.25	PK	Vertical
4824.52	50.16	44.20	9.04	31.60	-3.56	46.60	54.00	-7.40	AV	Vertical
4824.59	59.37	44.20	9.04	31.60	-3.56	55.81	74.00	-18.19	PK	Horizontal
4824.59	49.87	44.20	9.04	31.60	-3.56	46.31	54.00	-7.69	AV	Horizontal
5359.81	48.85	44.20	9.86	32.00	-2.34	46.51	74.00	-27.49	PK	Vertical
5359.81	39.26	44.20	9.86	32.00	-2.34	36.92	54.00	-17.08	AV	Vertical
5359.67	47.76	44.20	9.86	32.00	-2.34	45.42	74.00	-28.58	PK	Horizontal
5359.67	39.46	44.20	9.86	32.00	-2.34	37.12	54.00	-16.88	AV	Horizontal
7235.92	54.36	43.50	11.40	35.50	3.40	57.76	74.00	-16.24	PK	Vertical
7235.92	44.96	43.50	11.40	35.50	3.40	48.36	54.00	-5.64	AV	Vertical
7235.75	53.57	43.50	11.40	35.50	3.40	56.97	74.00	-17.03	PK	Horizontal
7235.75	43.78	43.50	11.40	35.50	3.40	47.18	54.00	-6.82	AV	Horizontal

802.11n(HT20) Mid Channel (Antenna A+B)

Frequency (MHz)	Meter Reading (dBμV)	Amplifier （dB）	Loss （dB）	Antenna Factor （dB/m）	Orrected Factor （dB）	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Mid Channel (2437 MHz)										
3264.71	61.23	44.70	6.70	28.20	-9.80	51.43	74.00	-22.57	PK	Vertical
3264.71	50.80	44.70	6.70	28.20	-9.80	41.00	54.00	-13.00	AV	Vertical
3264.66	62.15	44.70	6.70	28.20	-9.80	52.35	74.00	-21.65	PK	Horizontal
3264.66	50.26	44.70	6.70	28.20	-9.80	40.46	54.00	-13.54	AV	Horizontal
4874.42	59.58	44.20	9.04	31.60	-3.56	56.02	74.00	-17.98	PK	Vertical
4874.42	49.23	44.20	9.04	31.60	-3.56	45.67	54.00	-8.33	AV	Vertical
4874.41	58.72	44.20	9.04	31.60	-3.56	55.16	74.00	-18.84	PK	Horizontal
4874.41	49.35	44.20	9.04	31.60	-3.56	45.79	54.00	-8.21	AV	Horizontal
5359.63	49.23	44.20	9.86	32.00	-2.34	46.89	74.00	-27.11	PK	Vertical
5359.63	39.50	44.20	9.86	32.00	-2.34	37.16	54.00	-16.84	AV	Vertical
5359.60	47.71	44.20	9.86	32.00	-2.34	45.37	74.00	-28.63	PK	Horizontal
5359.60	38.76	44.20	9.86	32.00	-2.34	36.42	54.00	-17.58	AV	Horizontal
7310.97	54.91	43.50	11.40	35.50	3.40	58.31	74.00	-15.69	PK	Vertical
7310.97	43.52	43.50	11.40	35.50	3.40	46.92	54.00	-7.08	AV	Vertical
7310.87	53.56	43.50	11.40	35.50	3.40	56.96	74.00	-17.04	PK	Horizontal
7310.87	44.78	43.50	11.40	35.50	3.40	48.18	54.00	-5.82	AV	Horizontal

802.11n(HT20) High Channel (Antenna A+B)

Frequency (MHz)	Meter Reading (dBμV)	Amplifier （dB）	Loss （dB）	Antenna Factor （dB/m）	Orrected Factor （dB）	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
High Channel (2462 MHz)										
3264.84	62.21	44.70	6.70	28.20	-9.80	52.41	74.00	-21.59	PK	Vertical
3264.84	51.15	44.70	6.70	28.20	-9.80	41.35	54.00	-12.65	AV	Vertical
3264.81	61.00	44.70	6.70	28.20	-9.80	51.20	74.00	-22.80	PK	Horizontal
3264.81	50.09	44.70	6.70	28.20	-9.80	40.29	54.00	-13.71	AV	Horizontal
4924.46	59.48	44.20	9.04	31.60	-3.56	55.92	74.00	-18.08	PK	Vertical
4924.46	49.18	44.20	9.04	31.60	-3.56	45.62	54.00	-8.38	AV	Vertical
4924.56	58.61	44.20	9.04	31.60	-3.56	55.05	74.00	-18.95	PK	Horizontal
4924.56	49.40	44.20	9.04	31.60	-3.56	45.84	54.00	-8.16	AV	Horizontal
5359.72	48.77	44.20	9.86	32.00	-2.34	46.43	74.00	-27.57	PK	Vertical
5359.72	39.43	44.20	9.86	32.00	-2.34	37.09	54.00	-16.91	AV	Vertical
5359.85	48.26	44.20	9.86	32.00	-2.34	45.92	74.00	-28.08	PK	Horizontal
5359.85	38.55	44.20	9.86	32.00	-2.34	36.21	54.00	-17.79	AV	Horizontal
7385.94	53.56	43.50	11.40	35.50	3.40	56.96	74.00	-17.04	PK	Vertical
7385.94	44.67	43.50	11.40	35.50	3.40	48.07	54.00	-5.93	AV	Vertical
7385.89	54.23	43.50	11.40	35.50	3.40	57.63	74.00	-16.37	PK	Horizontal
7385.89	43.79	43.50	11.40	35.50	3.40	47.19	54.00	-6.81	AV	Horizontal

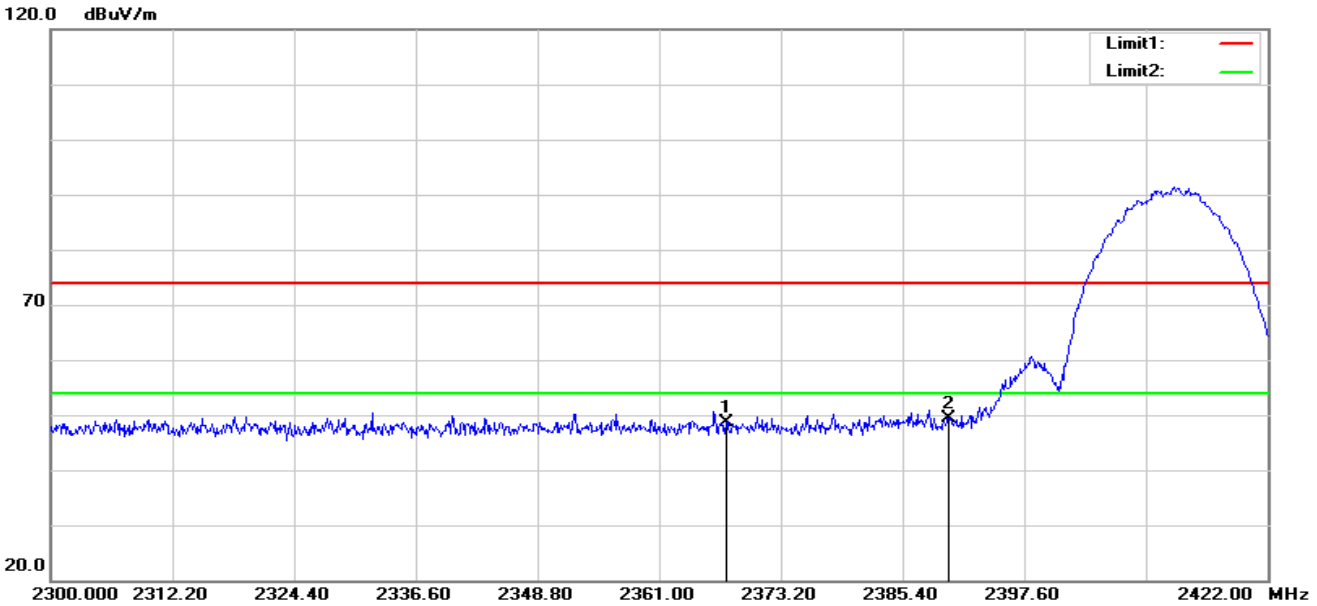
Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Scan with 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40),all have been tested the antenna A, antenna B and antenna A+B, the worst case is 802.11n (HT-20) of the antenna A+B.
   Emission Level = Meter Reading + Factor
   Margin = Limit - Emission Leve
3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

3.2.6 TEST RESULTS (Band edge Requirements)

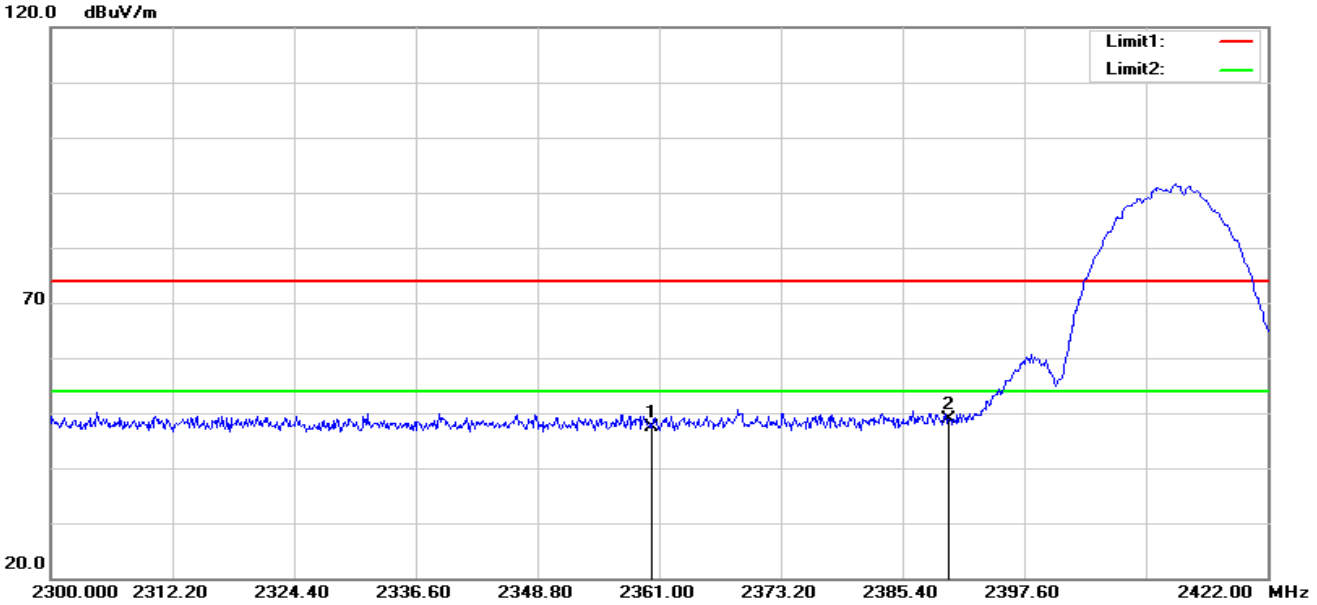
802.11b-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2367.710	59.36	-10.63	48.73	74.00	-25.27	peak
2	2390.000	59.82	-10.48	49.34	74.00	-24.66	peak

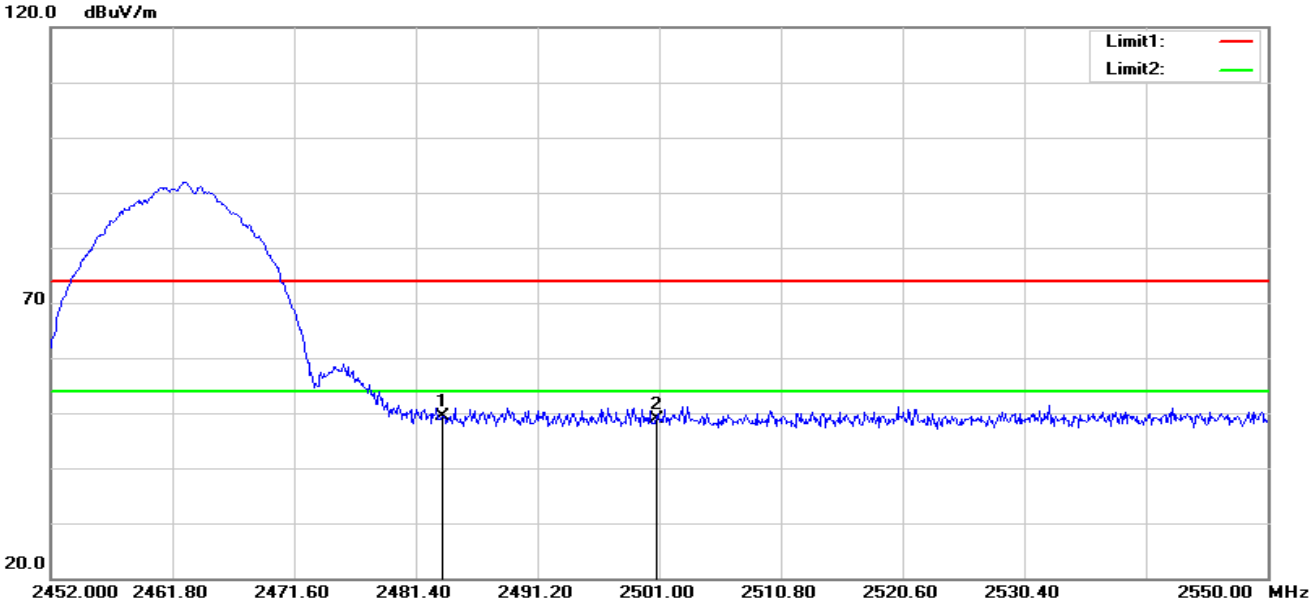
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2360.268	58.10	-10.67	47.43	74.00	-26.57	peak
2	2390.000	59.35	-10.48	48.87	74.00	-25.13	peak

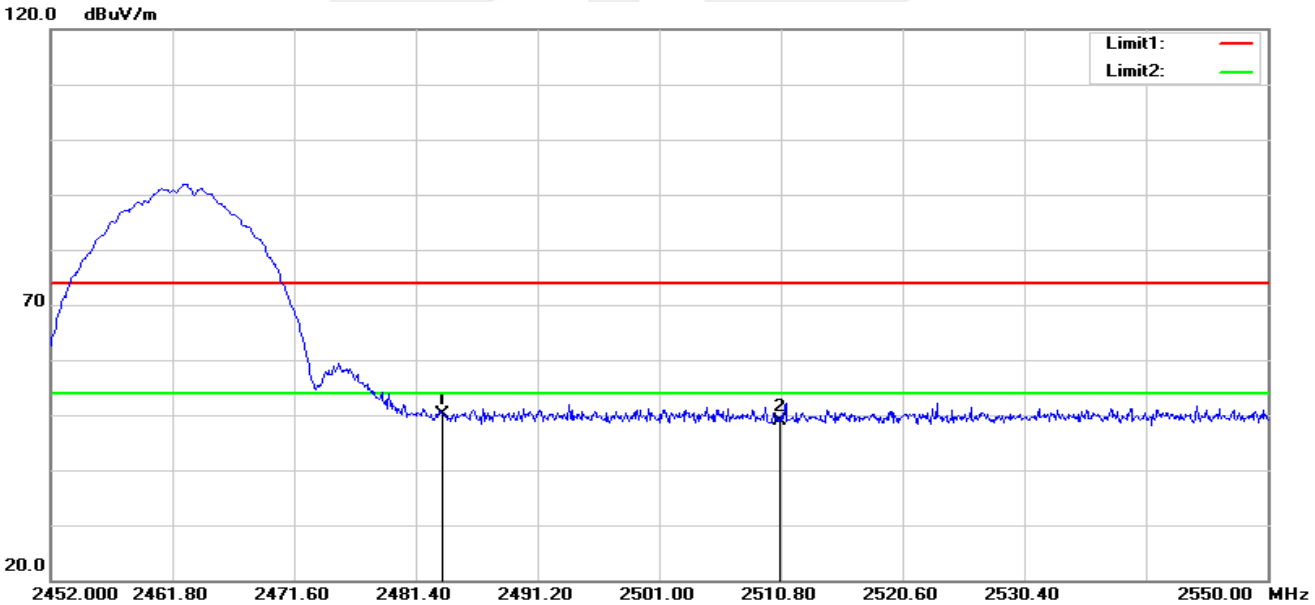
802.11b-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	59.37	-9.99	49.38	74.00	-24.62	peak
2	2500.804	58.84	-9.91	48.93	74.00	-25.07	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	60.17	-9.99	50.18	74.00	-23.82	peak
2	2510.702	58.86	-9.88	48.98	74.00	-25.02	peak

Note: 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40),all have been tested the antenna A,antenna B and antenna A+B, the worst case is 802.11b of the antenna B.

4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d) and RSS-247 Issue 2, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 to 2422 MHz Upper Band Edge: 2452 to 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP

The EUT which is powered by the Adapter, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

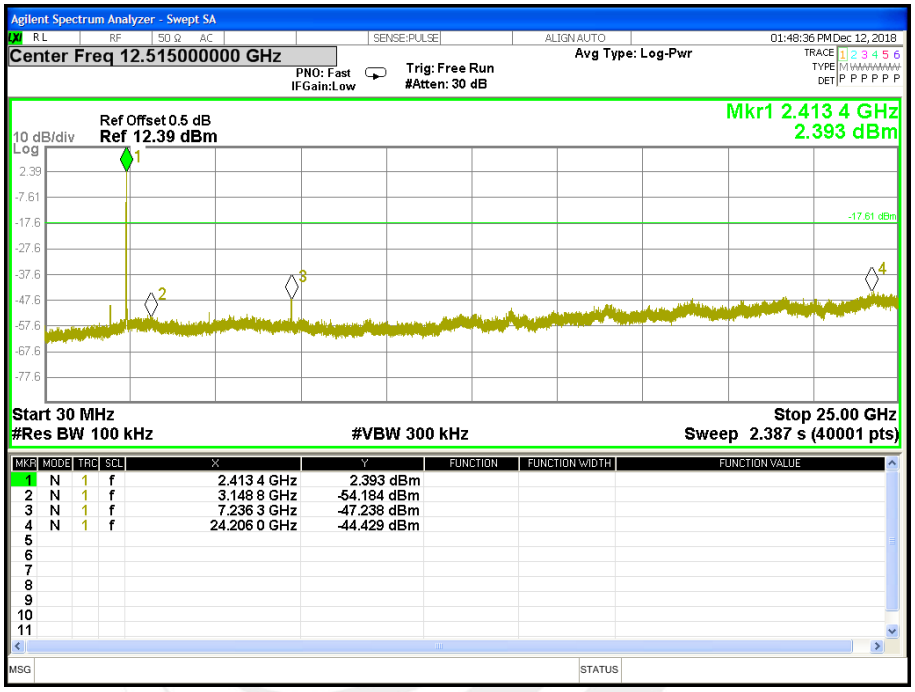
4.6 TEST RESULTS

NOTE: Antenna B Power> Antenna A Power, Both antenna A and B have been test,Only show the worst data of Antenna B

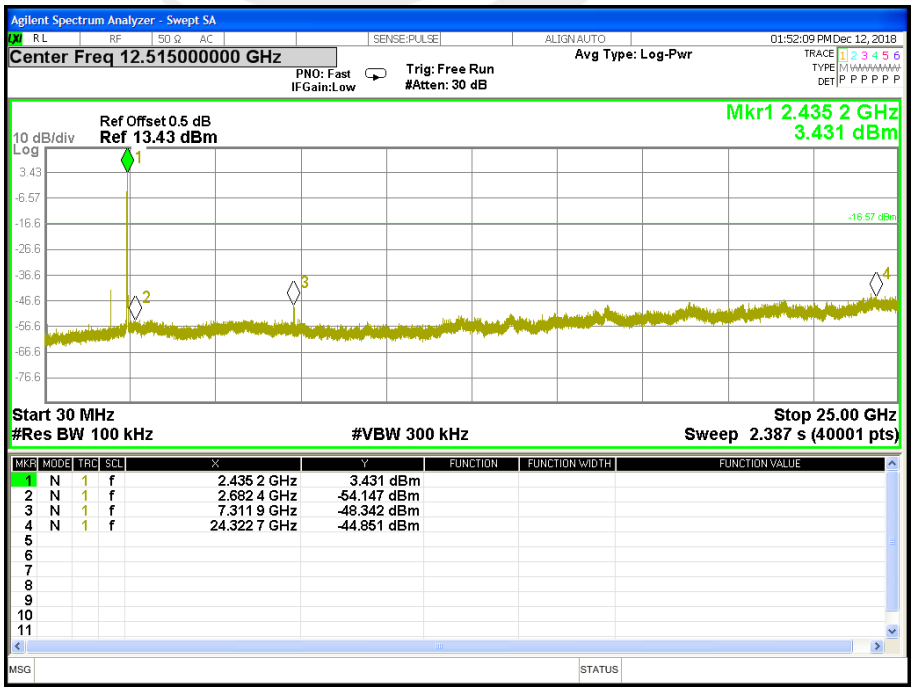
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	TX b Mode /CH01, CH06, CH11

Antenna B

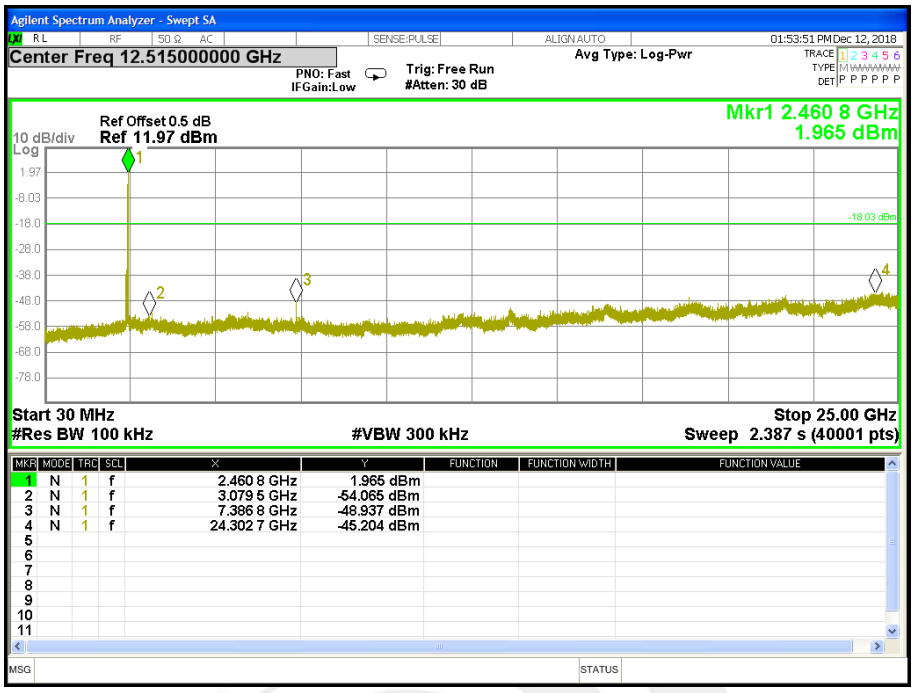
CH 01



CH 06

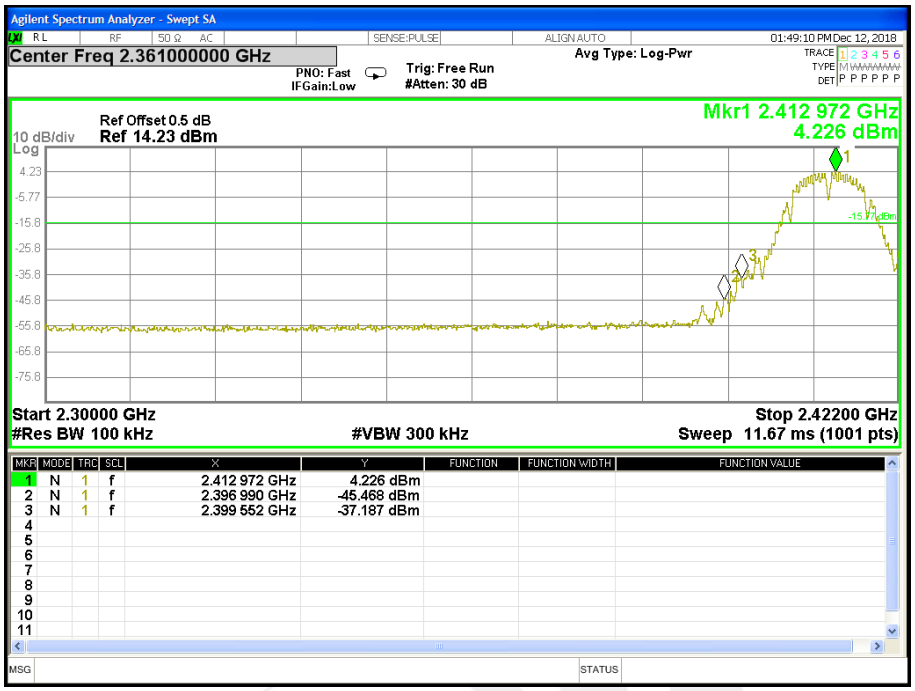


CH 11

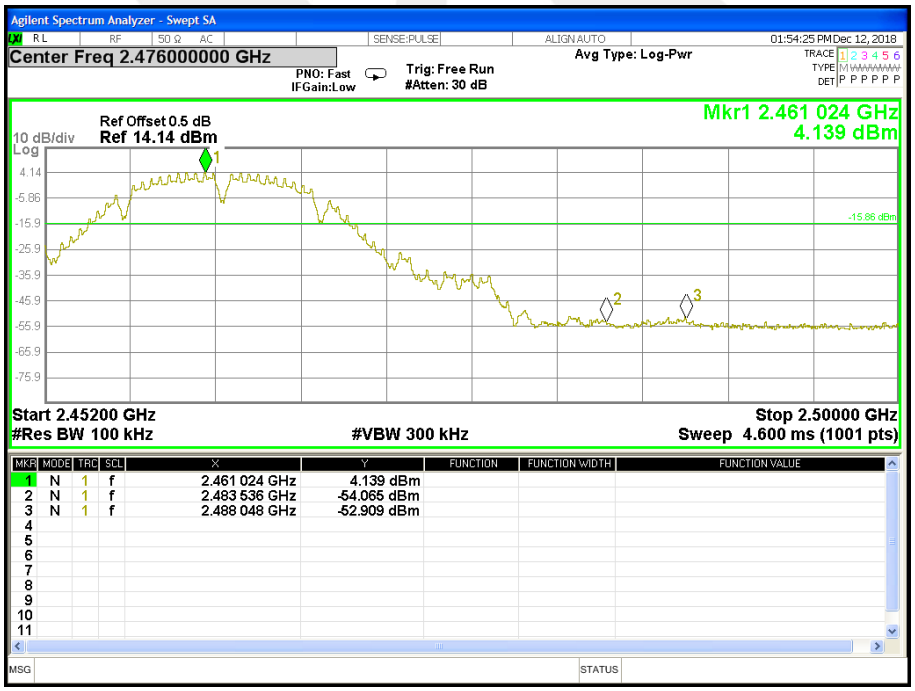

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
01:53:51 PM Dec 12, 2018
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P
Mkr1 2.460 8 GHz
1.965 dBm
Ref Offset 0.5 dB
10 dB/div
Log
Ref 11.97 dBm
1.97
-8.03
-18.0
-28.0
-38.0
-48.0
-58.0
-68.0
-78.0
-18.03 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.460 8 GHz 1.965 dBm
2 N 1 f 3.079 5 GHz -54.065 dBm
3 N 1 f 7.386 8 GHz -48.937 dBm
4 N 1 f 24.302 7 GHz -45.204 dBm
5
6
7
8
9
10
11
MSG
STATUS

Band edge

CH 01



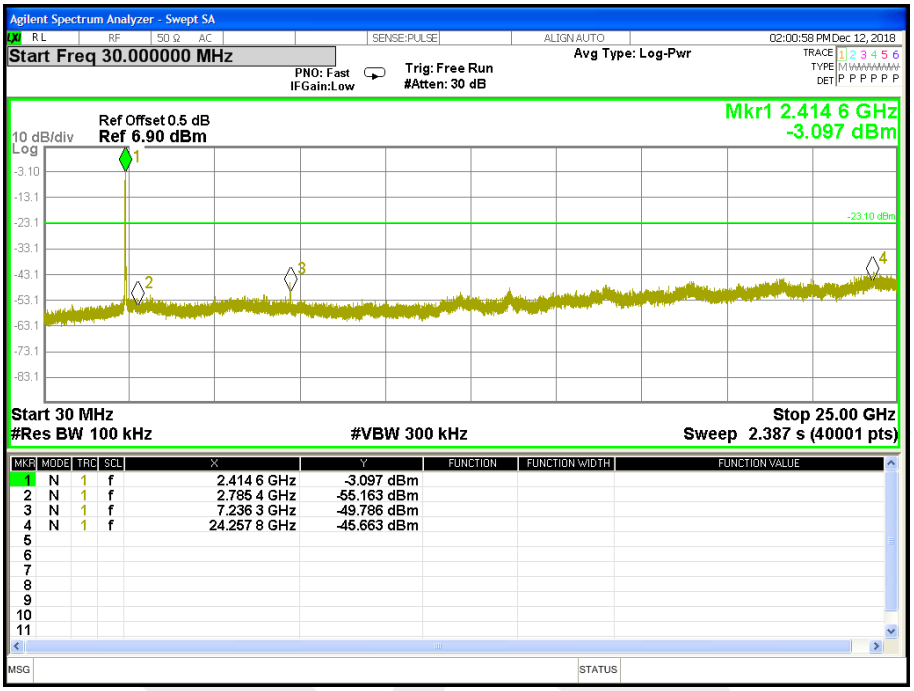
CH 11



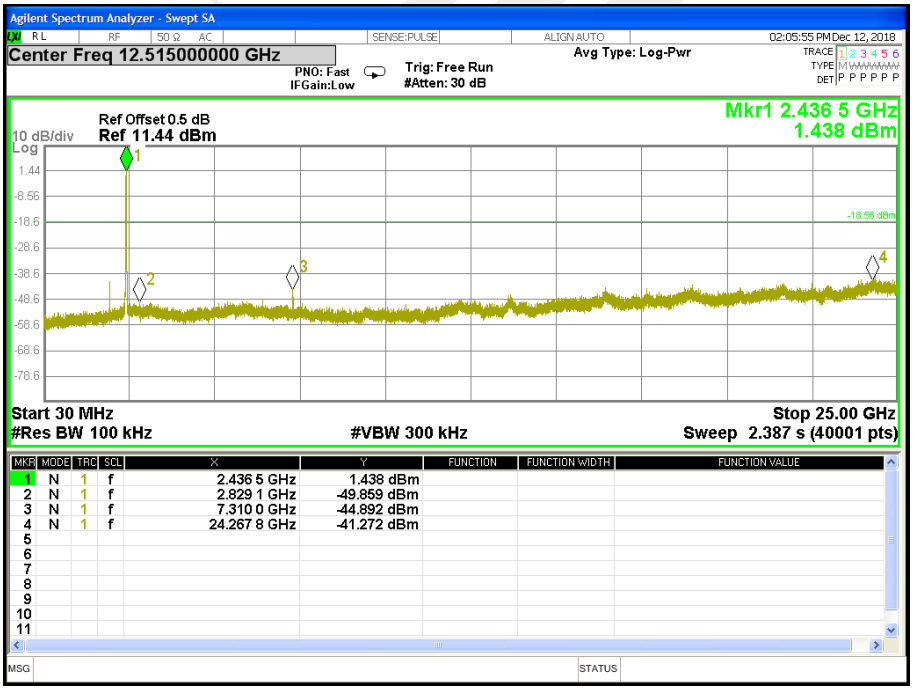
Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX g Mode /CH01, CH06, CH11

Antenna B

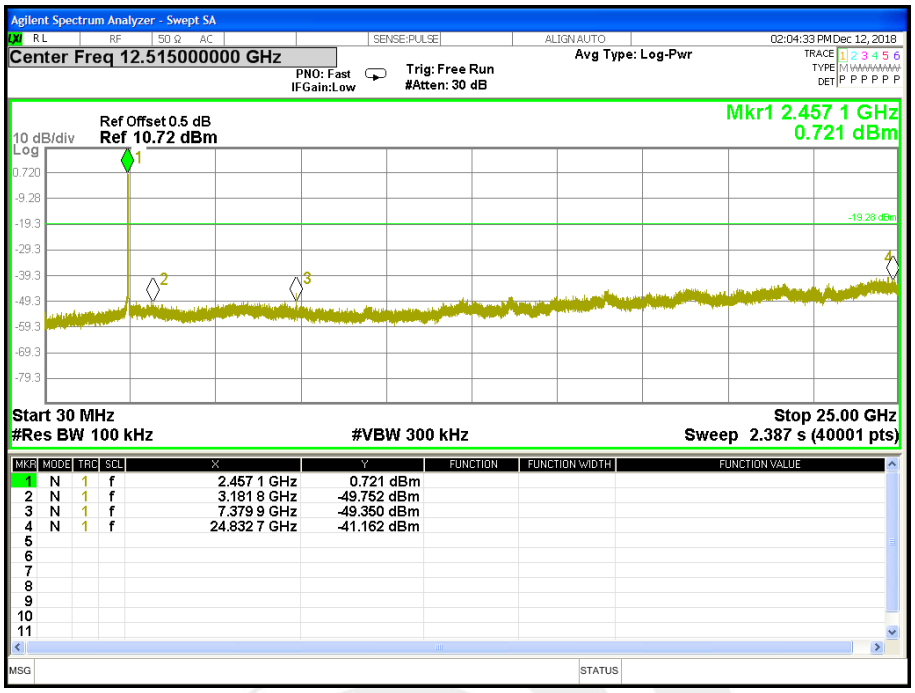
CH 01



CH06

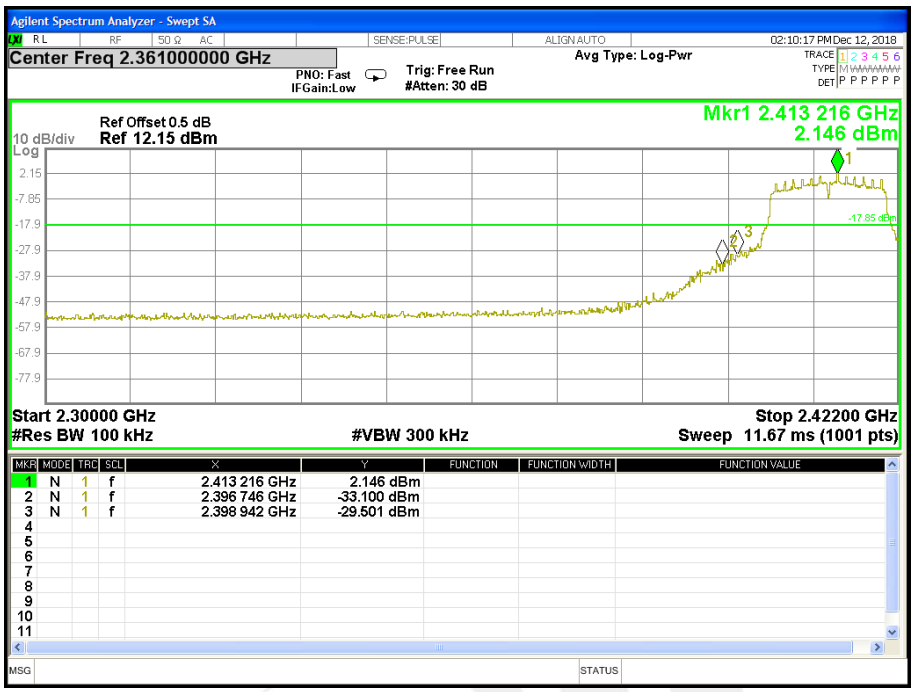


CH 11

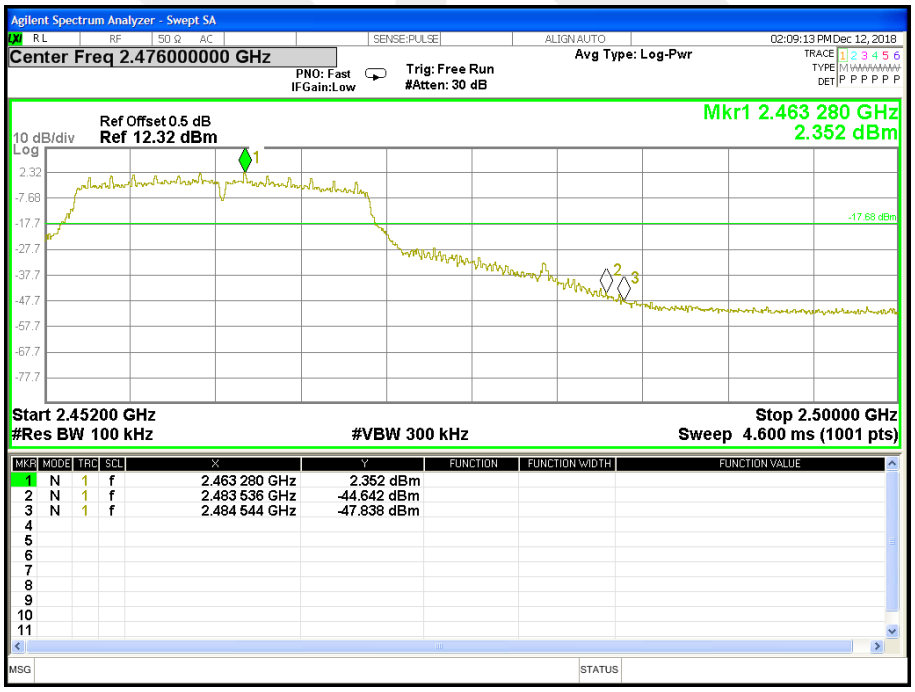

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
02:04:33 PM Dec 12, 2018
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P P
Ref Offset 0.5 dB
10 dB/div
Log
Ref 10.72 dBm
Mkr1 2.457 1 GHz
0.721 dBm
0.720
-9.28
-19.3
-29.3
-39.3
-49.3
-59.3
-69.3
-79.3
-19.28 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.457 1 GHz 0.721 dBm
2 N 1 f 3.181 8 GHz -49.752 dBm
3 N 1 f 7.379 9 GHz -49.350 dBm
4 N 1 f 24.832 7 GHz -41.162 dBm
5
6
7
8
9
10
11
MSG
STATUS

Band edge

CH 01



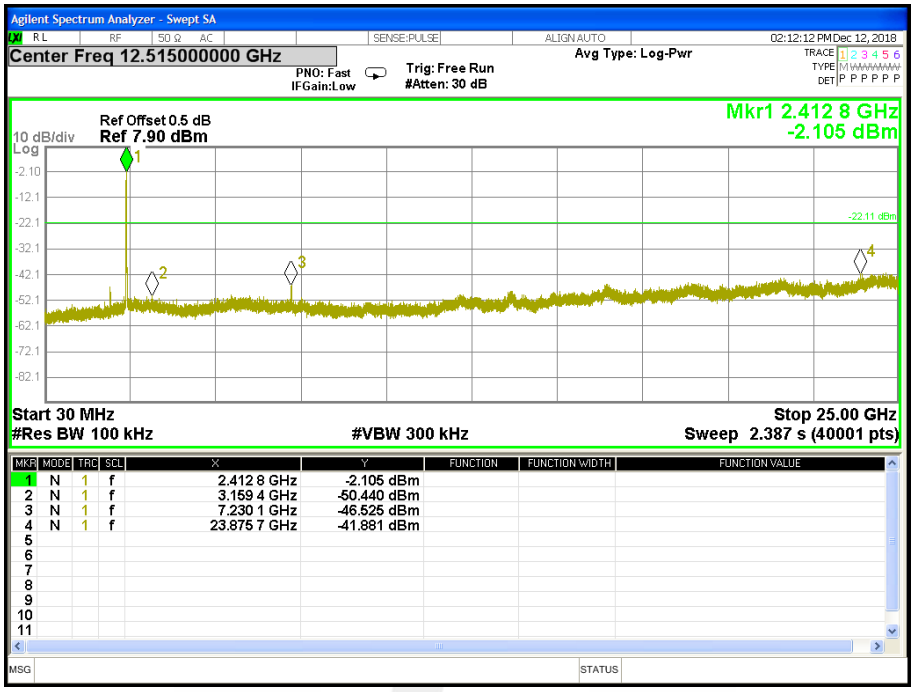
CH11



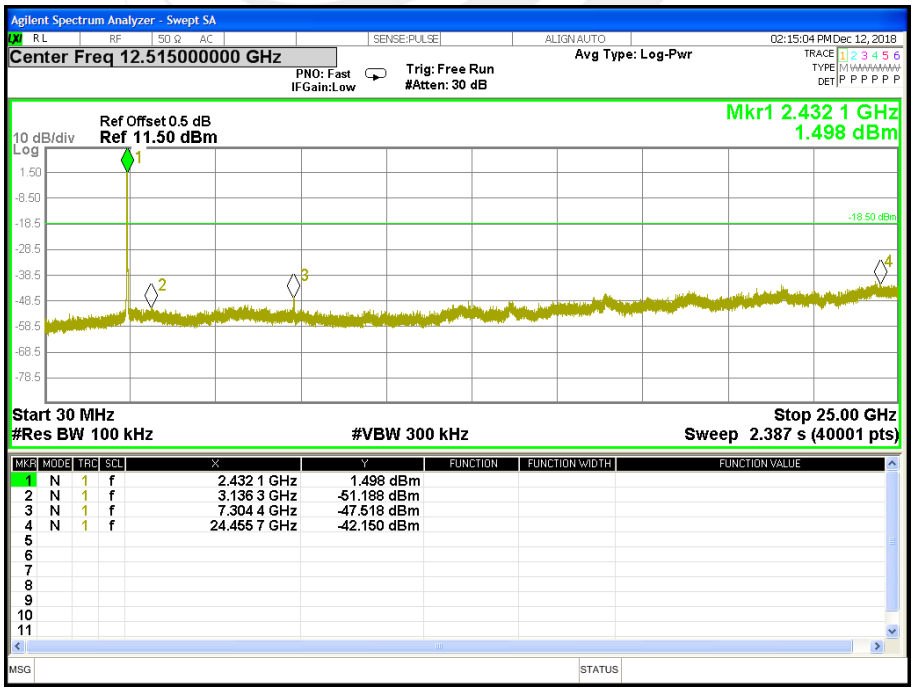
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	TX n Mode(20M) /CH01, CH06, CH11

Antenna B

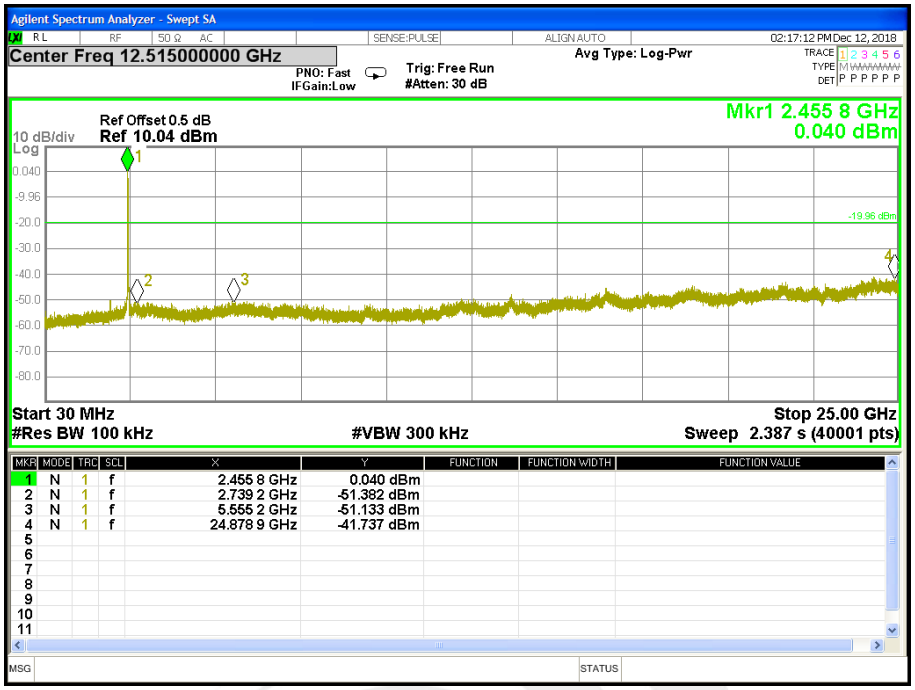
CH 01



CH 06

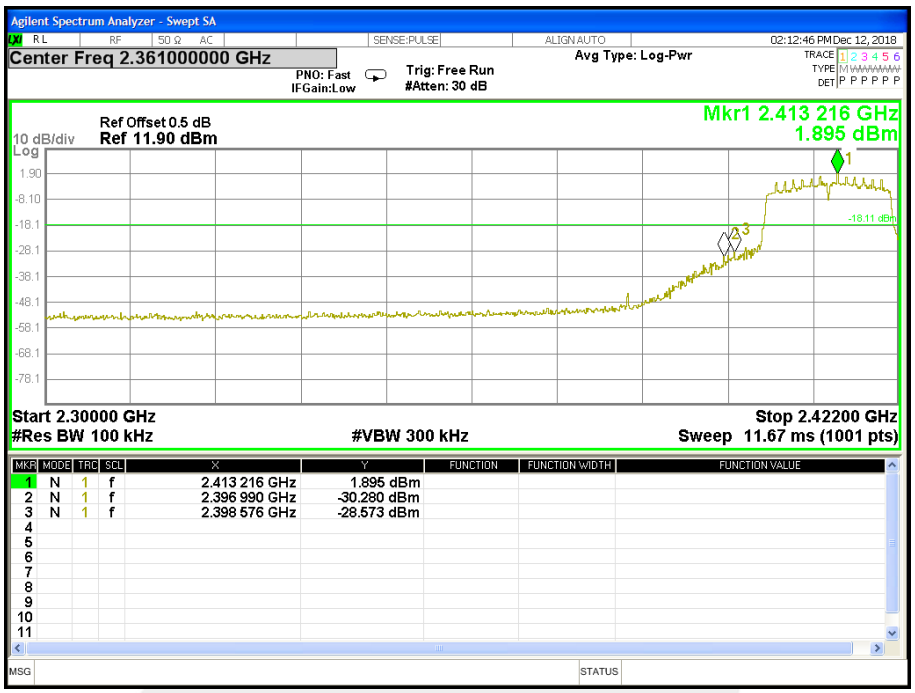


CH 11

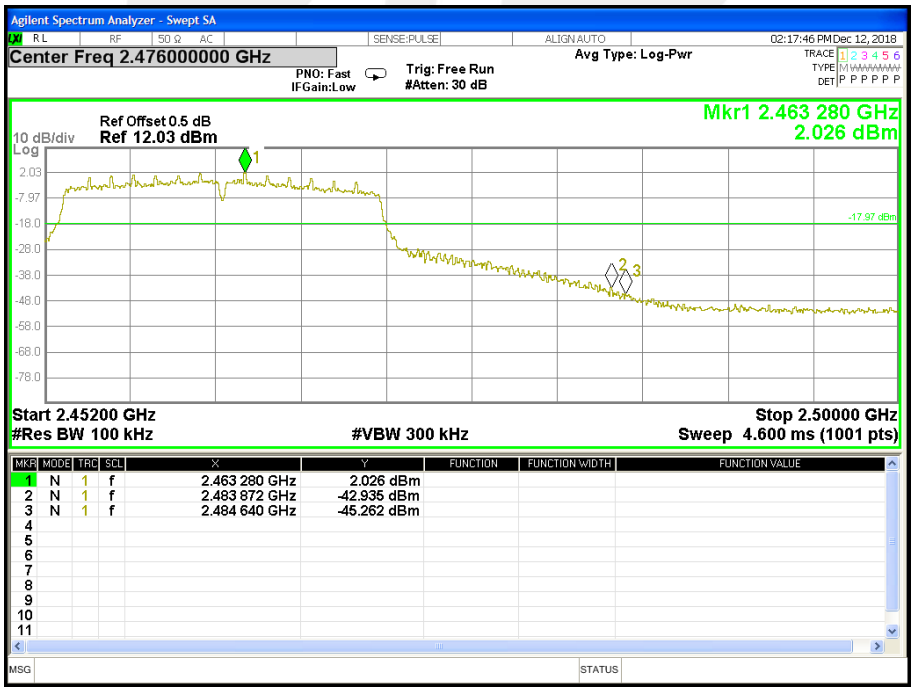

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
02:17:12 PM Dec 12, 2018
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 0.5 dB
10 dB/div
Log
Ref 10.04 dBm
Mkr1 2.455 8 GHz
0.040 dBm
0.040
-9.96
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-19.96 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.455 8 GHz 0.040 dBm
2 N 1 f 2.739 2 GHz -51.382 dBm
3 N 1 f 5.555 2 GHz -51.133 dBm
4 N 1 f 24.878 9 GHz -41.737 dBm
MSG
STATUS

Band edge

CH 01



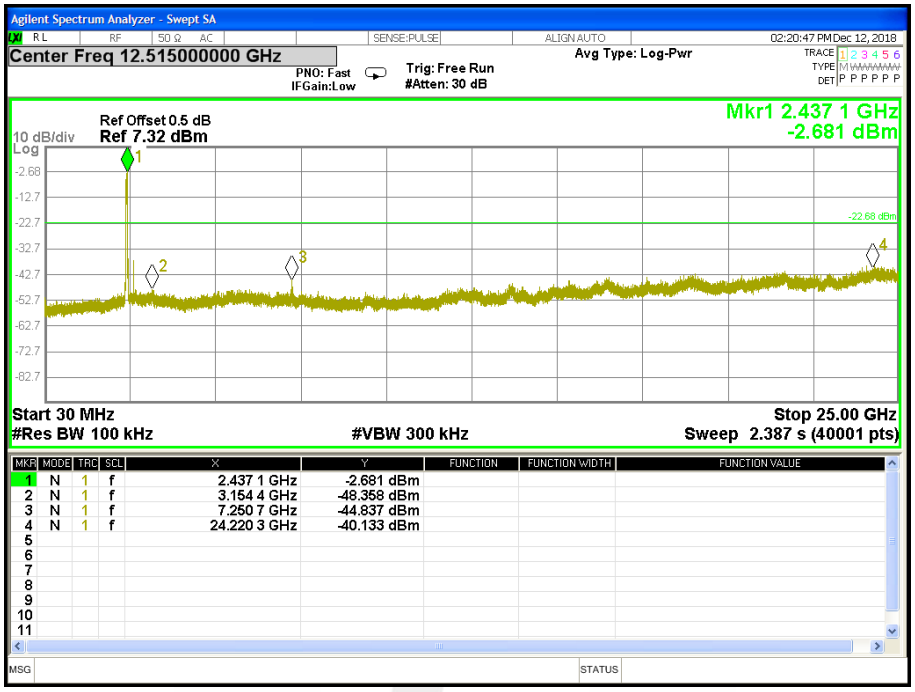
CH 11



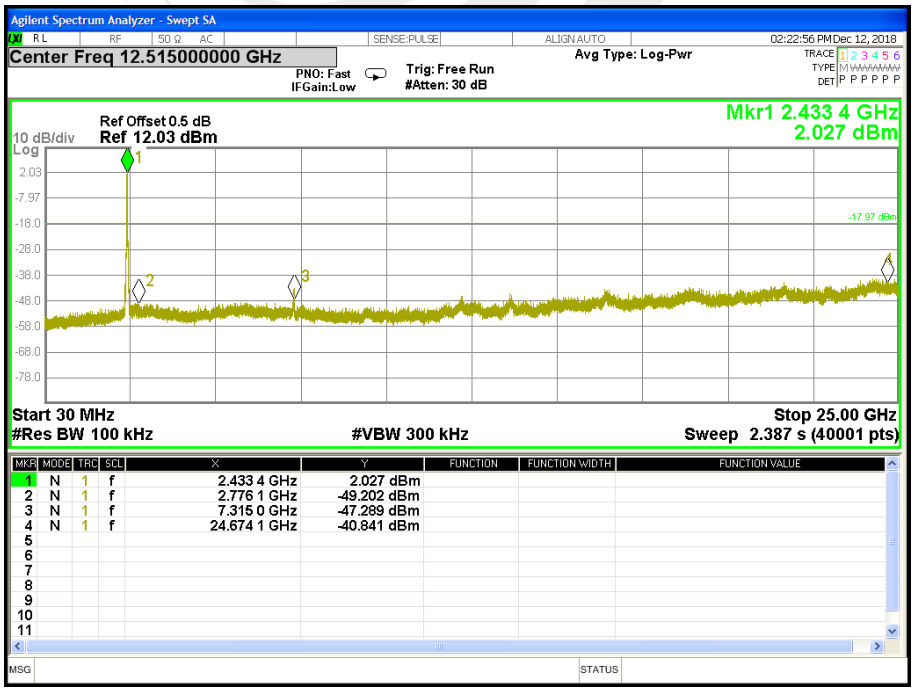
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	TX n Mode(40M) /CH03, CH06, CH09

Antenna B

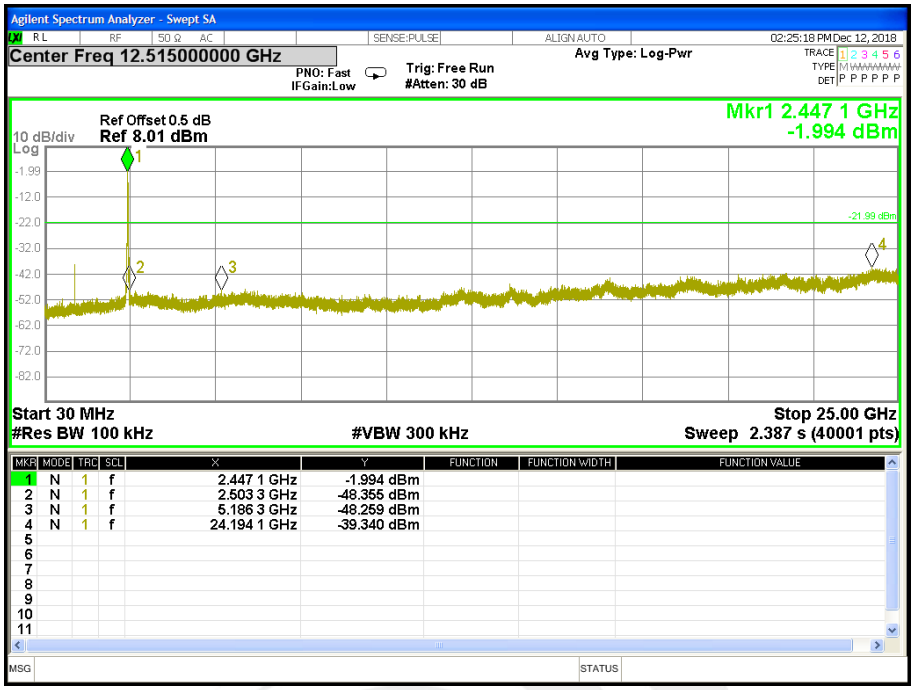
CH 03



CH 06

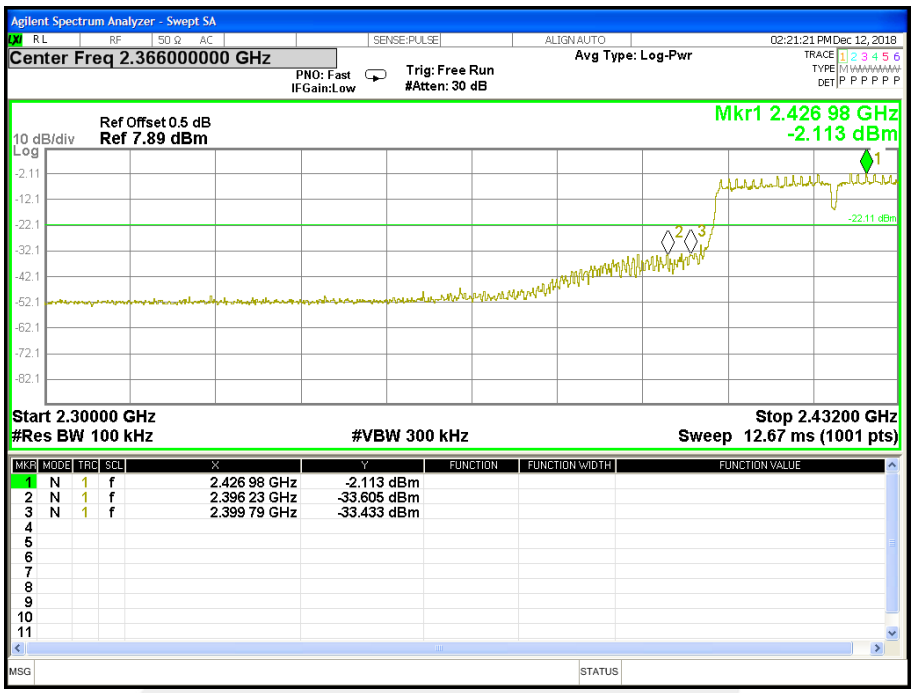


CH 09

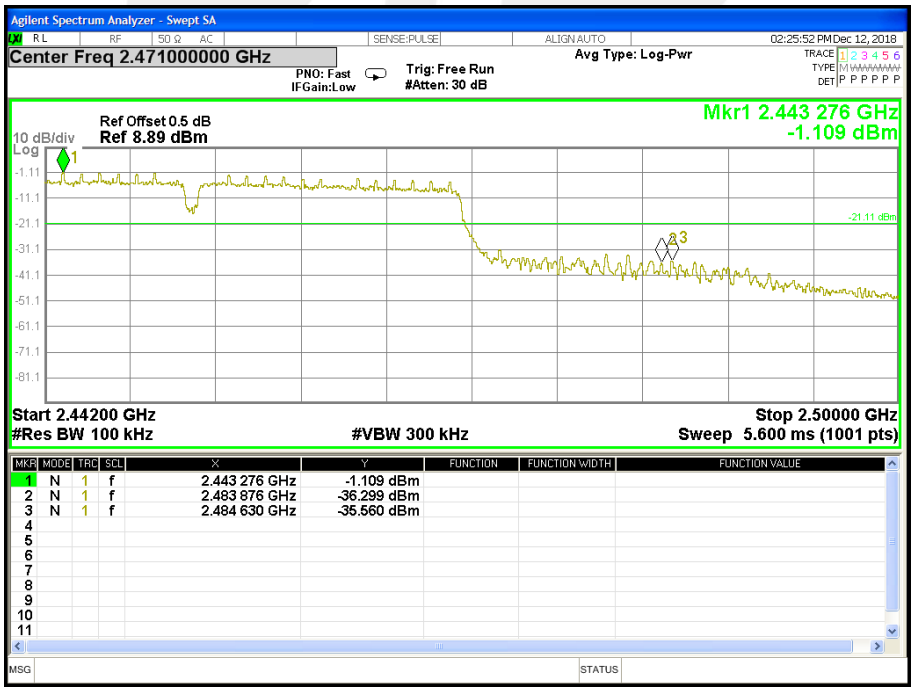

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
02:25:18 PM Dec 12, 2018
Ref Offset 0.5 dB
10 dB/div
Ref 8.01 dBm
Log
Mkr1 2.447 1 GHz
-1.994 dBm
-21.99 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.447 1 GHz -1.994 dBm
2 N 1 f 2.503 3 GHz -48.355 dBm
3 N 1 f 5.186 3 GHz -48.259 dBm
4 N 1 f 24.194 1 GHz -39.340 dBm

Band edge

CH 03



CH 09



5. POWER SPECTRAL DENSITY TEST

5.1 LIMIT

FCC Part 15.247,Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e) RSS-247 Issue 2	Power Spectral Density	≤8 dBm (RBW ≥ 3KHz)	2400-2483.5	PASS

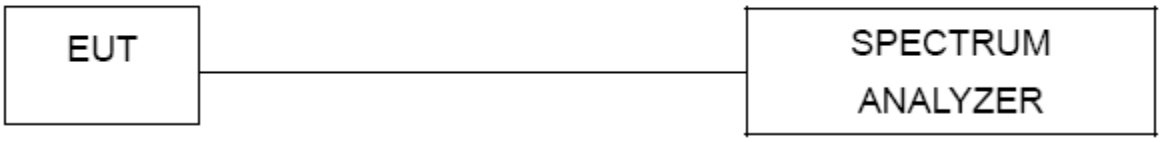
5.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

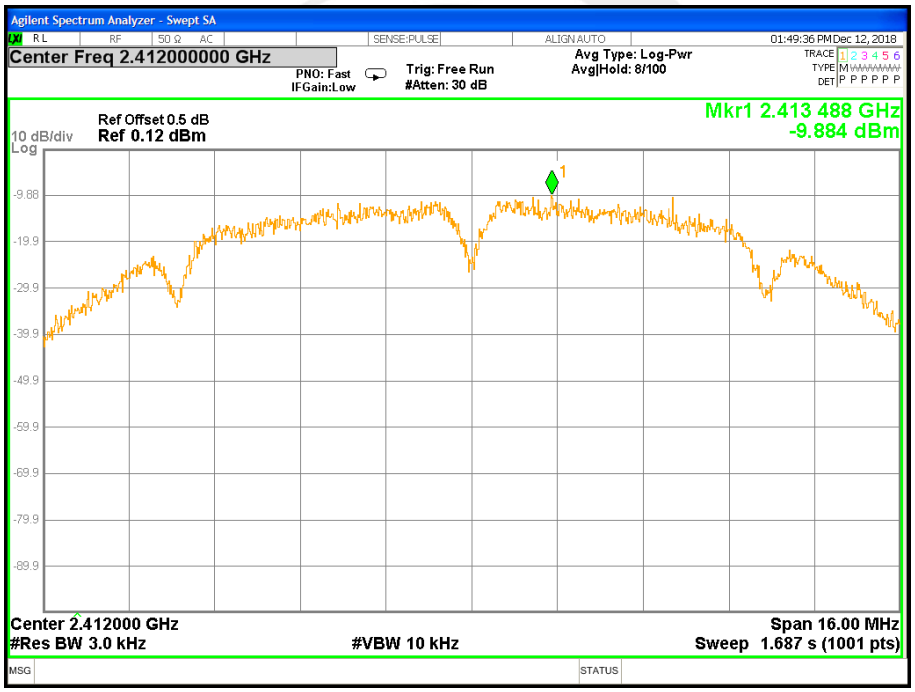
Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX b Mode /CH01, CH06, CH11

NOTE: Antenna B Power> Antenna A Power, Both antenna A and B have been test,Only show the worst data of Antenna B, 802.11b/g model can't transmit at the same time.

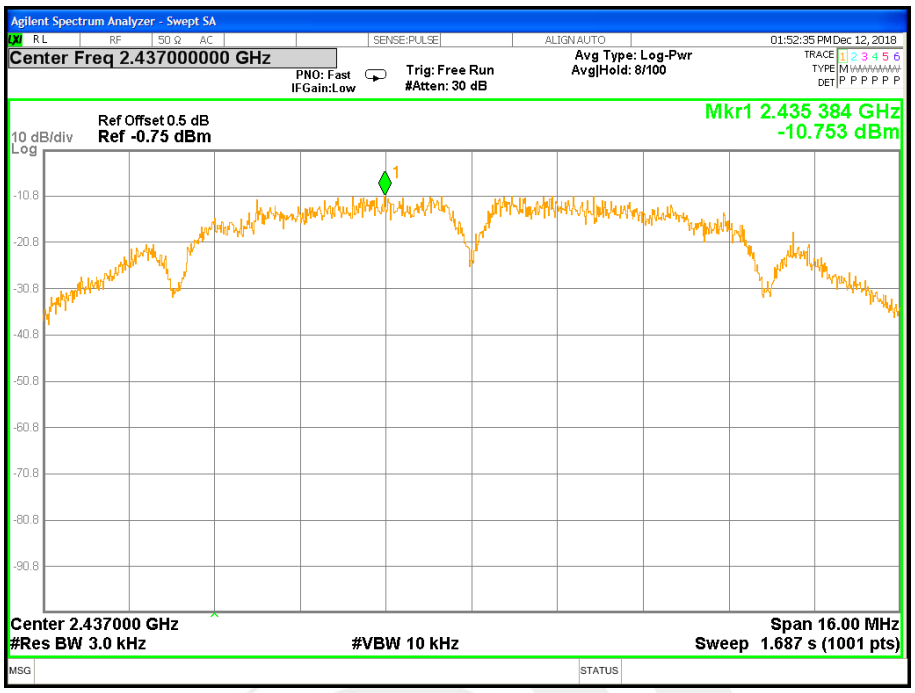
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-10.258	-9.884	--	≤8	PASS
2437	-11.105	-10.753	--	≤8	PASS
2462	-10.066	-9.336	--	≤8	PASS

Antenna B

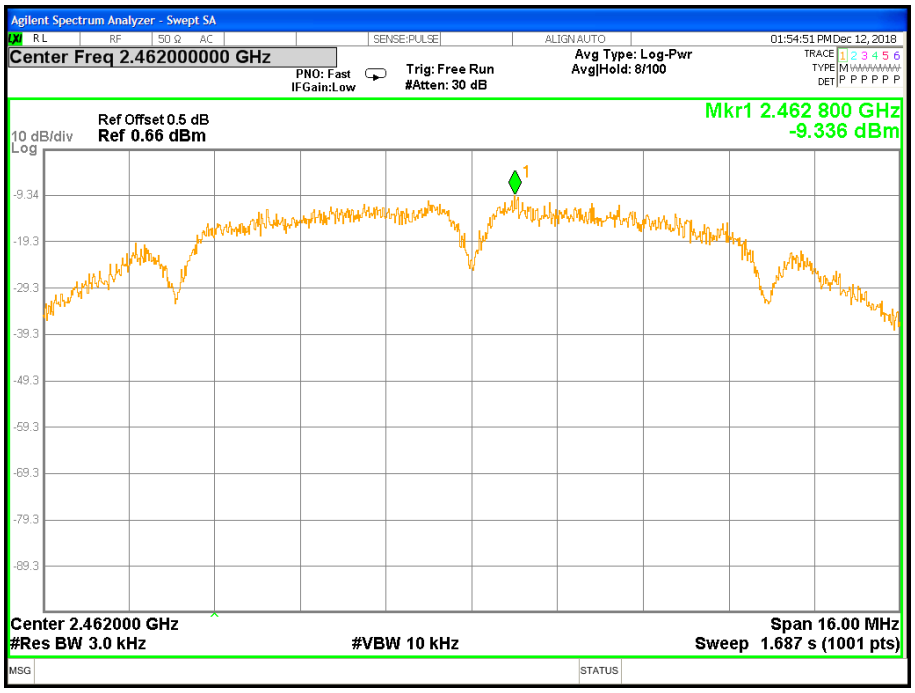
TX CH01



TX CH06



TX CH11

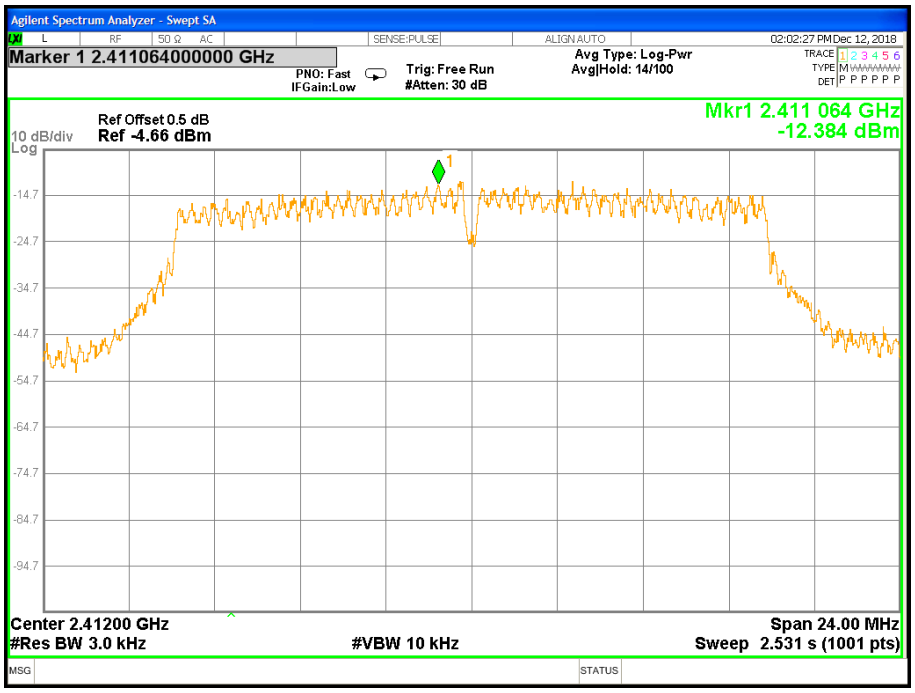


Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX g Mode /CH01, CH06, CH11

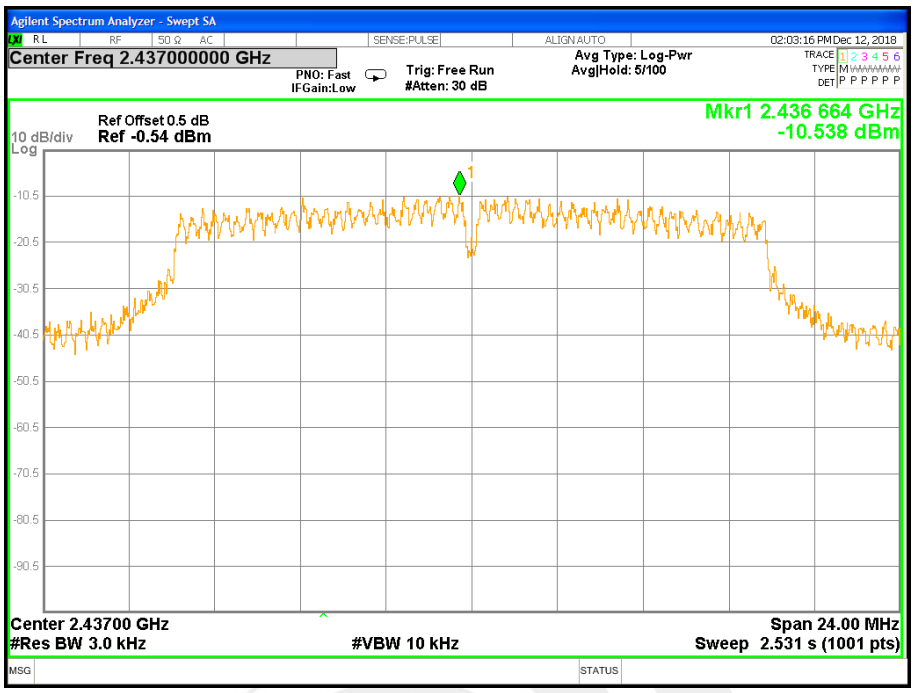
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-12.618	-12.384	--	≤8	PASS
2437	-11.051	10.538	--	≤8	PASS
2462	-11.241	-10.831	--	≤8	PASS

Antenna B

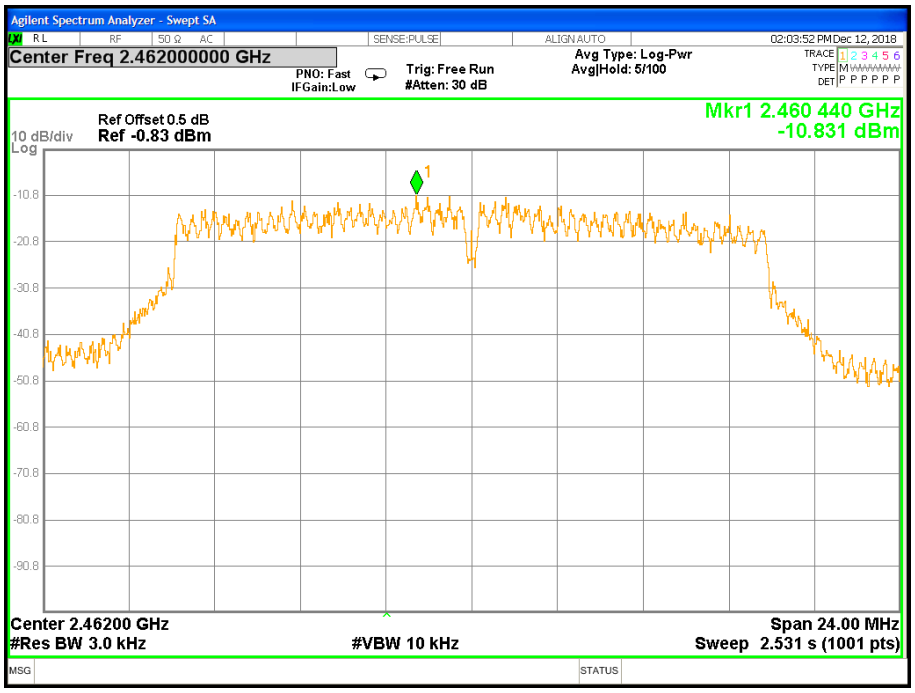
TX CH01



TX CH06



TX CH11

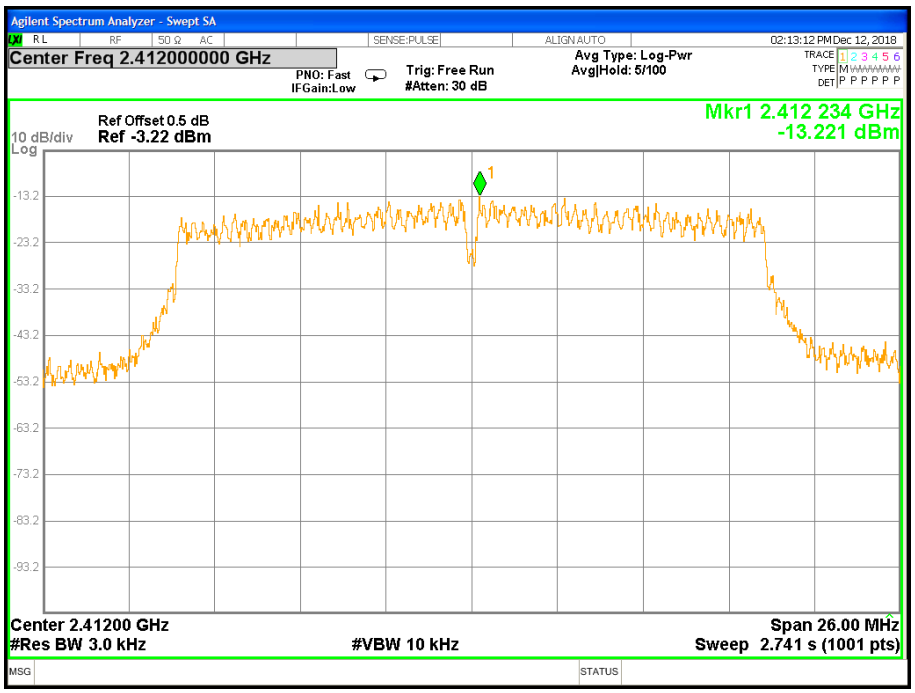


Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX n Mode(20M) /CH01, CH06, CH11

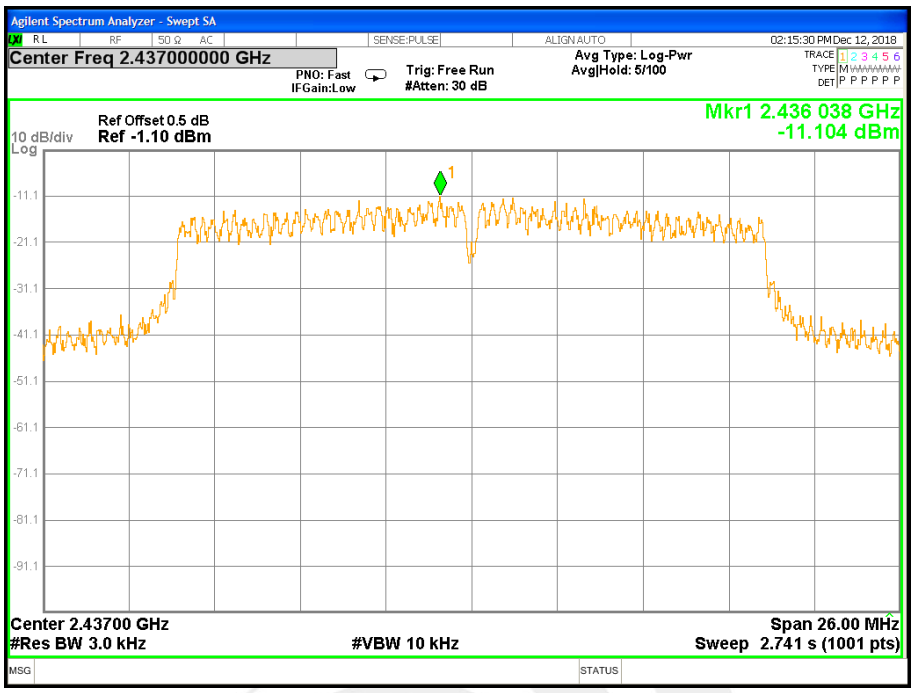
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-13.648	-13.221	-10.42	≤8	PASS
2437	-11.748	-11.104	-8.40	≤8	PASS
2462	-12.945	-12.606	-9.76	≤8	PASS

Antenna B

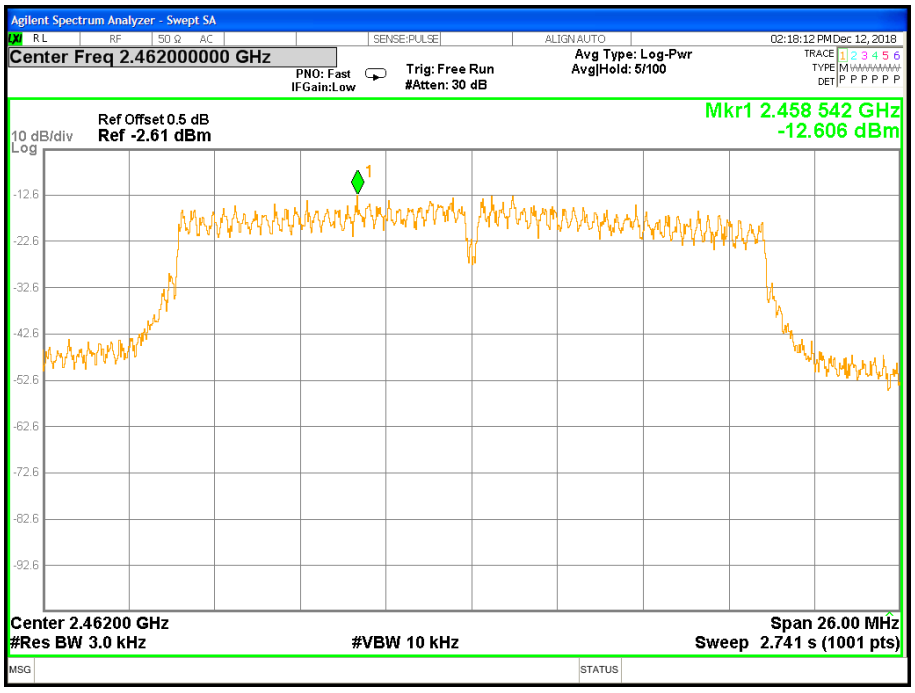
TX CH01



TX CH06



TX CH11

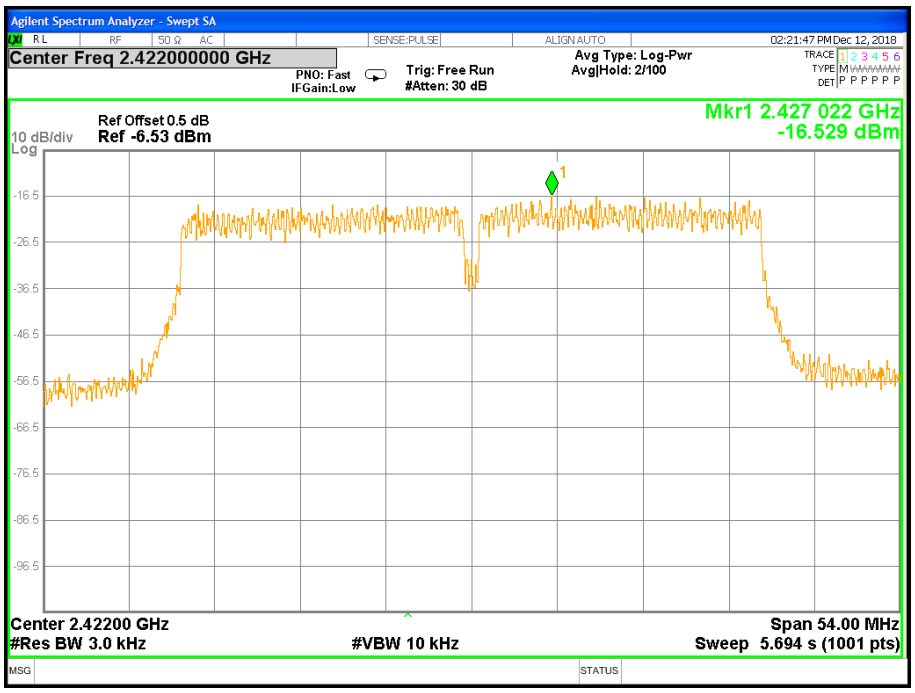


Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX n Mode(40M) /CH03, CH06, CH09

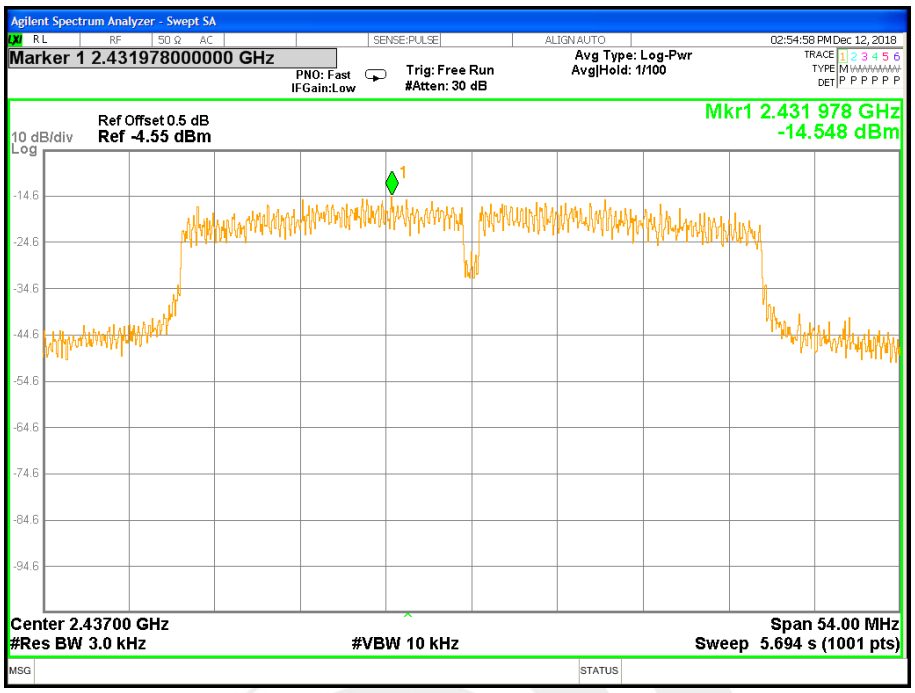
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2422	-16.958	-16.529	-13.73	≤8	PASS
2437	-15.161	-14.548	-11.83	≤8	PASS
2452	-15.645	-14.962	-12.28	≤8	PASS

Antenna B

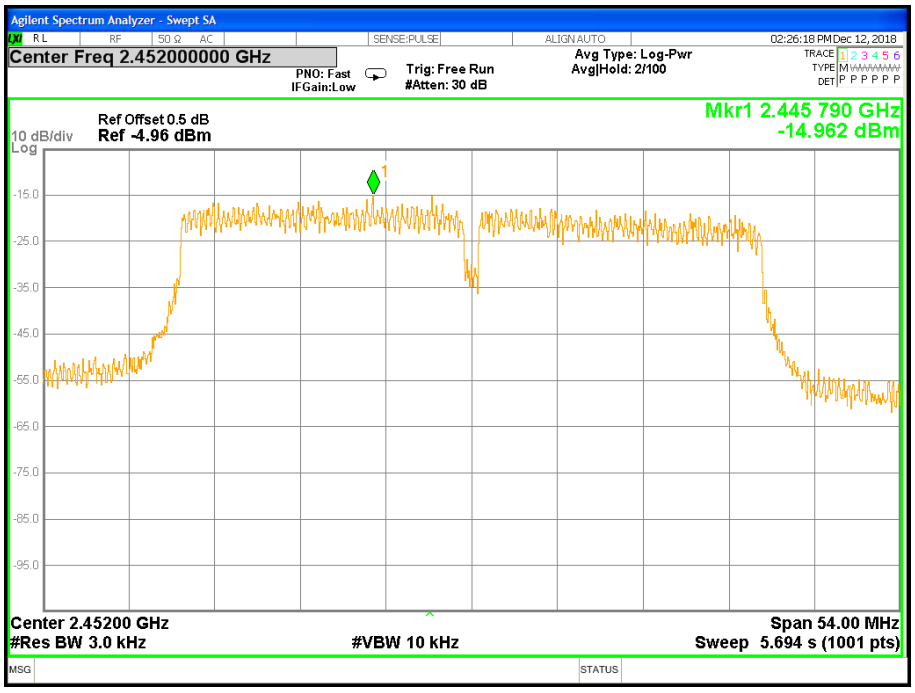
TX CH03



TX CH06



TX CH09



6. BANDWIDTH TEST

6.1 LIMIT

FCC Part 15.247,Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	6dB Bandwidth	>= 500KHz	2400-2483.5	PASS
RSS-Gen Clause 6.7	99% Bandwidth	For reporting purposes only.	2400-2483.5	PASS

6.2 TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

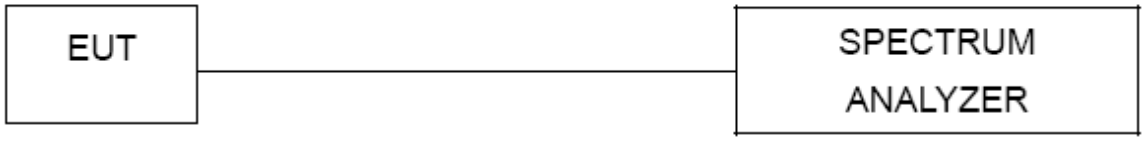
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100KHz For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : ≥3 × RBW For 99% Bandwidth : approximately 3×RBW
Trace	Max hold
Sweep	Auto

Allow the trace to stabilize and 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 and 99% relative to the maximum level measured in the fundamental emission.

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 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX b Mode /CH01, CH06, CH11

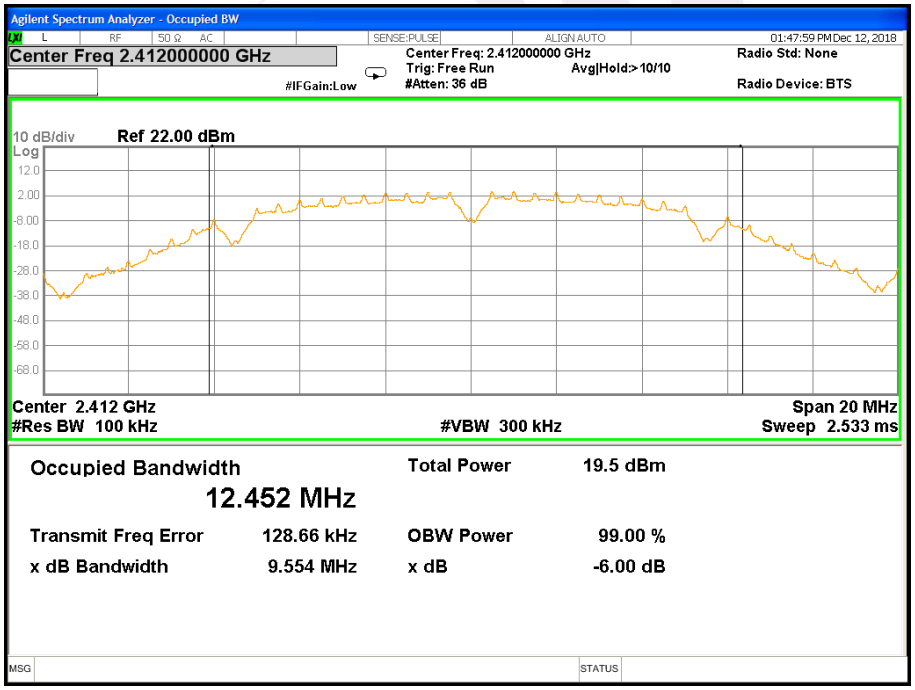
Remark: PEAK DETECTOR IS USED

NOTE: Antenna B Power> Antenna A Power, Both antenna A and B have been test,Only show the worst data of Antenna B

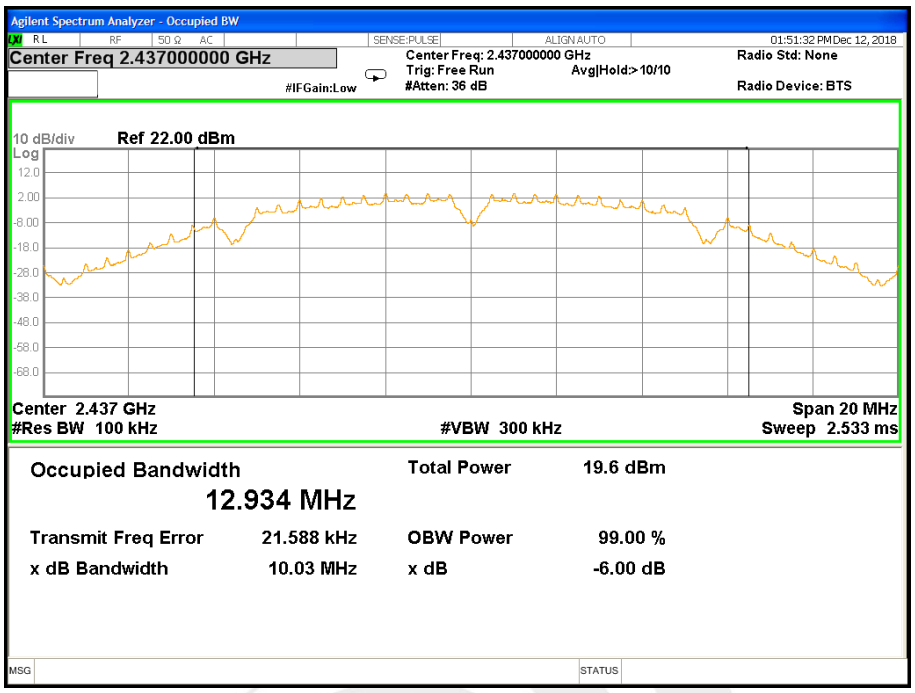
Frequency	6dB Bandwidth (MHz)		99% Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B	ANTENNA -A	ANTENNA -B		
2412 MHz	9.521	9.554	12.406	12.431	≥500KHz	PASS
2437 MHz	10.00	10.03	12.811	12.838	≥500KHz	PASS
2462 MHz	9.562	9.567	12.982	12.992	≥500KHz	PASS

Antenna B(6dB Bandwidth)

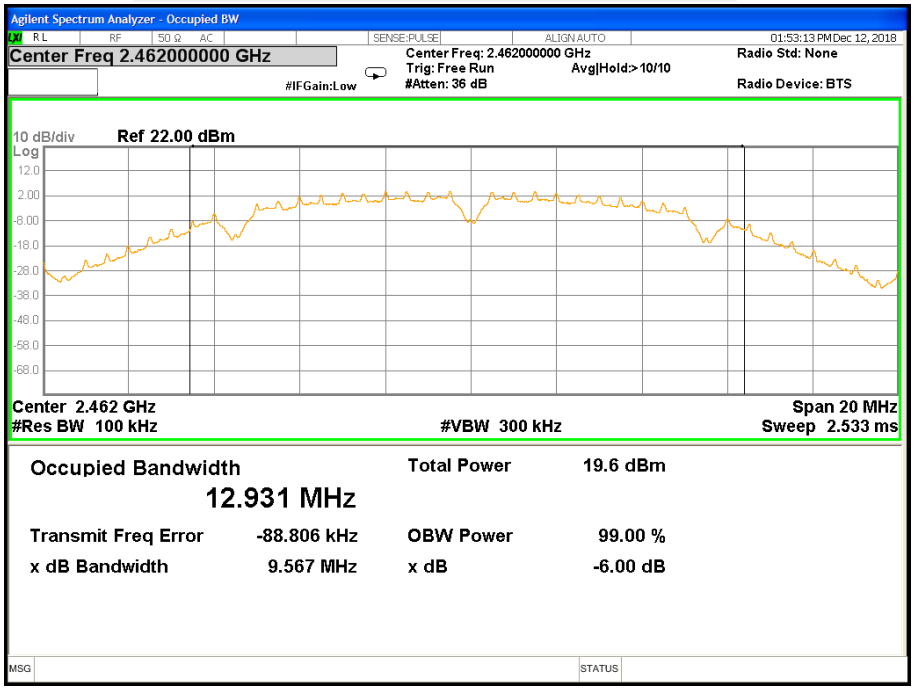
TX CH 01



TX CH 06

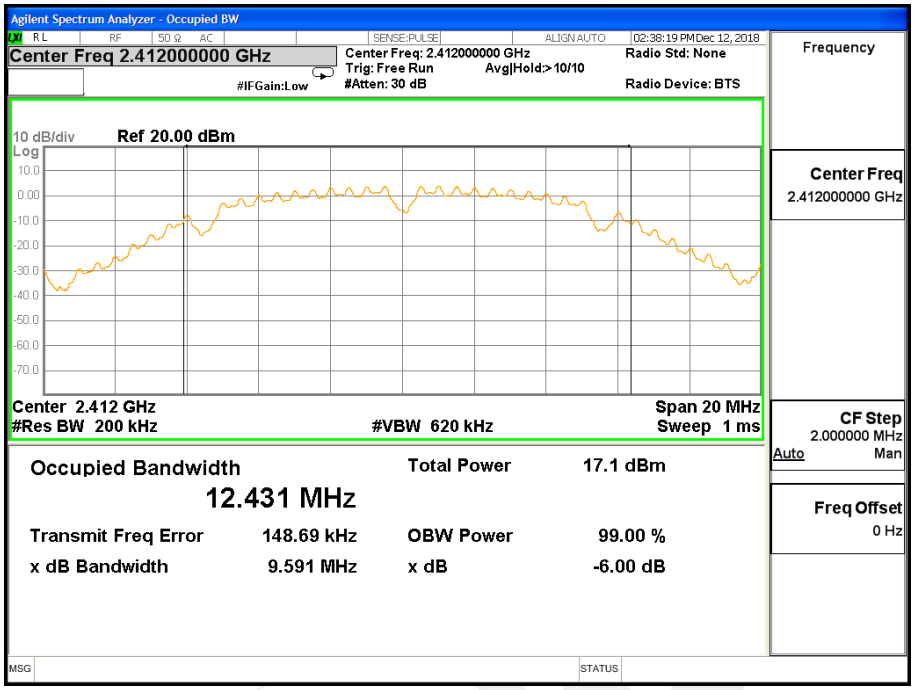


TX CH 11

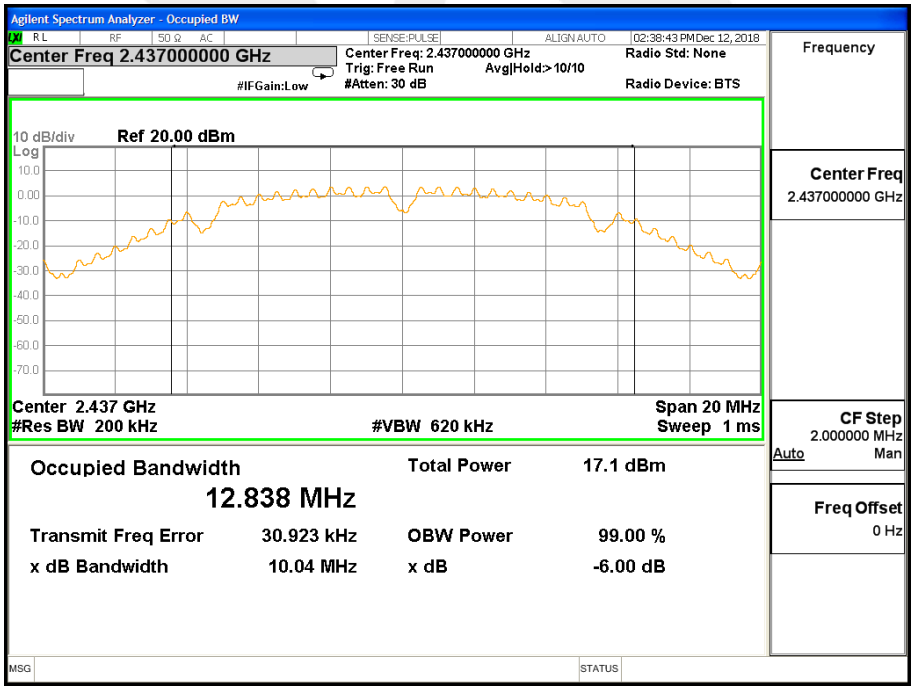


Antenna B(99% Bandwidth)

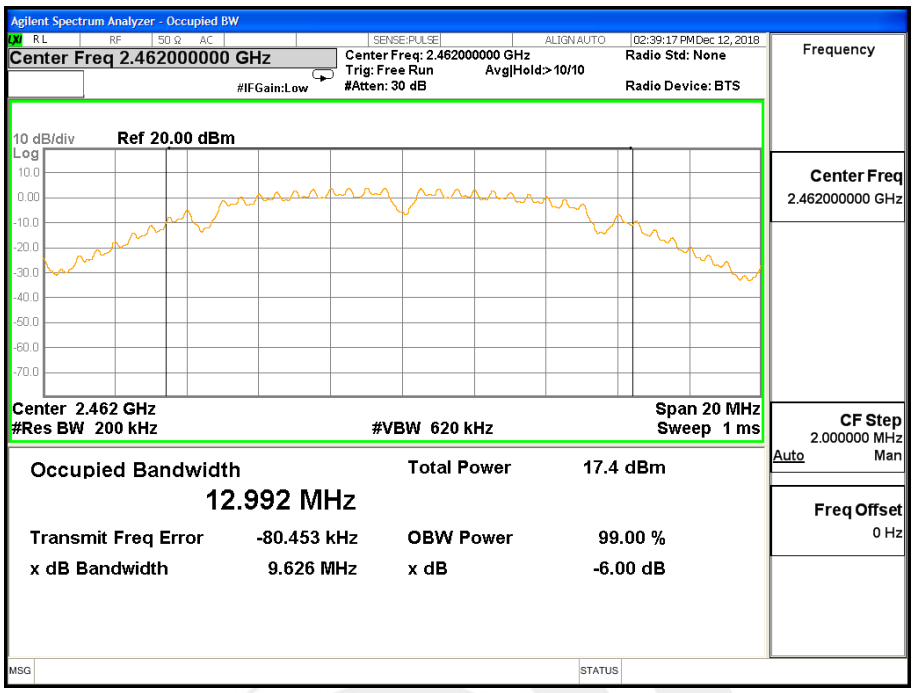
TX CH 01



TX CH 06



TX CH 11

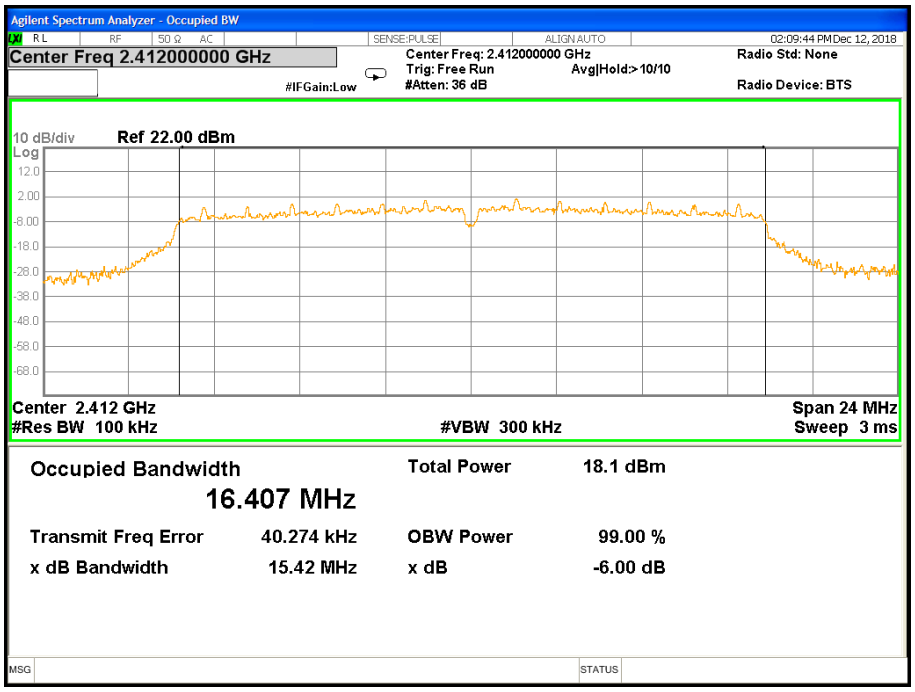

Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
02:39:17 PM Dec 12, 2018
Center Freq 2.462000000 GHz
Center Freq: 2.462000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.462000000 GHz
Center 2.462 GHz
#Res BW 200 kHz
#VBW 620 kHz
Span 20 MHz
Sweep 1 ms
CF Step
2.000000 MHz
Auto
Man
Occupied Bandwidth
12.992 MHz
Total Power 17.4 dBm
Freq Offset
0 Hz
Transmit Freq Error -80.453 kHz
OBW Power 99.00 %
x dB Bandwidth 9.626 MHz
x dB -6.00 dB
MSG
STATUS

Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX g Mode /CH01, CH06, CH11

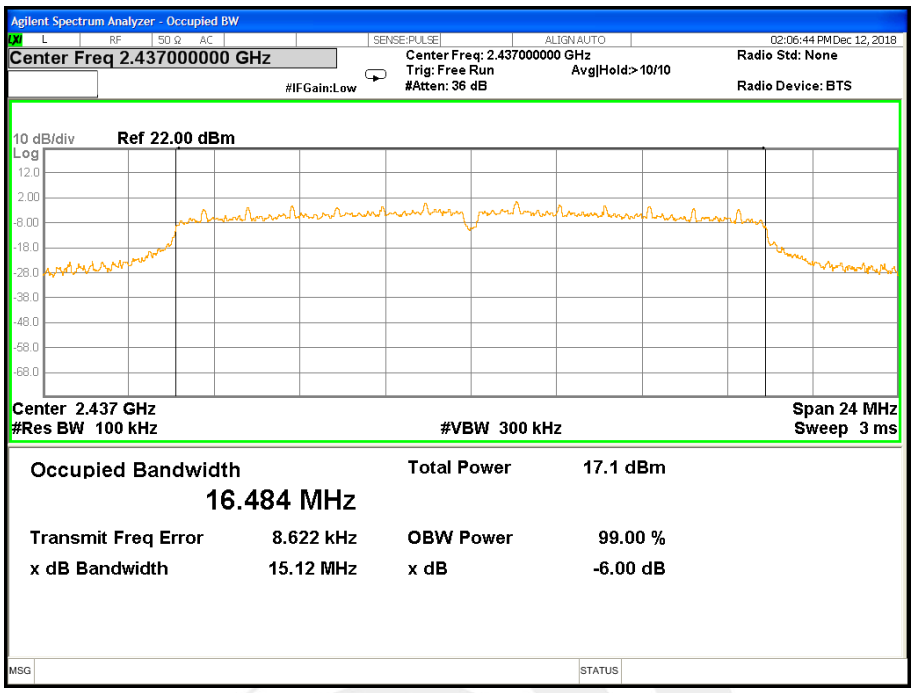
Frequency	6dB Bandwidth (MHz)		99% Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B	ANTENNA -A	ANTENNA -B		
2412 MHz	15.01	15.42	16.602	16.618	≥500KHz	PASS
2437 MHz	15.11	15.12	16.611	16.614	≥500KHz	PASS
2462 MHz	15.56	15.70	16.503	16.506	≥500KHz	PASS

Antenna B(6dB Bandwidth)

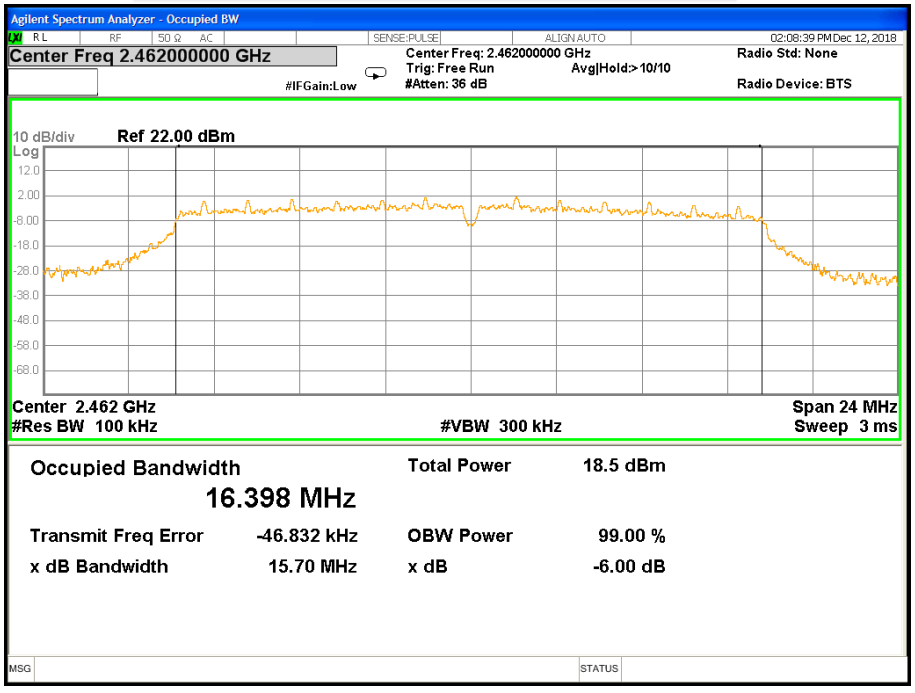
TX CH 01



TX CH 06

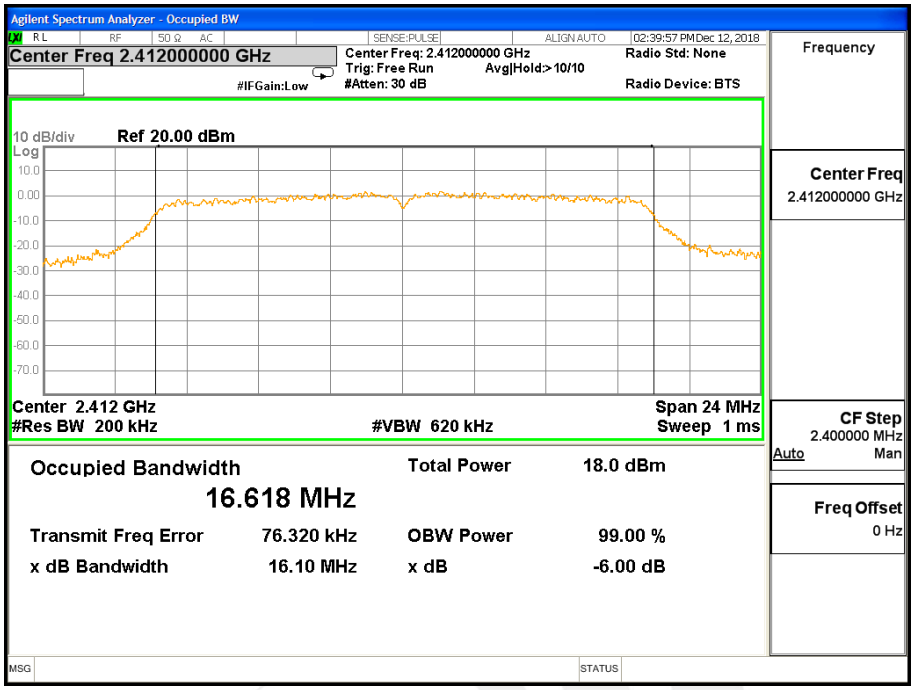


TX CH 11

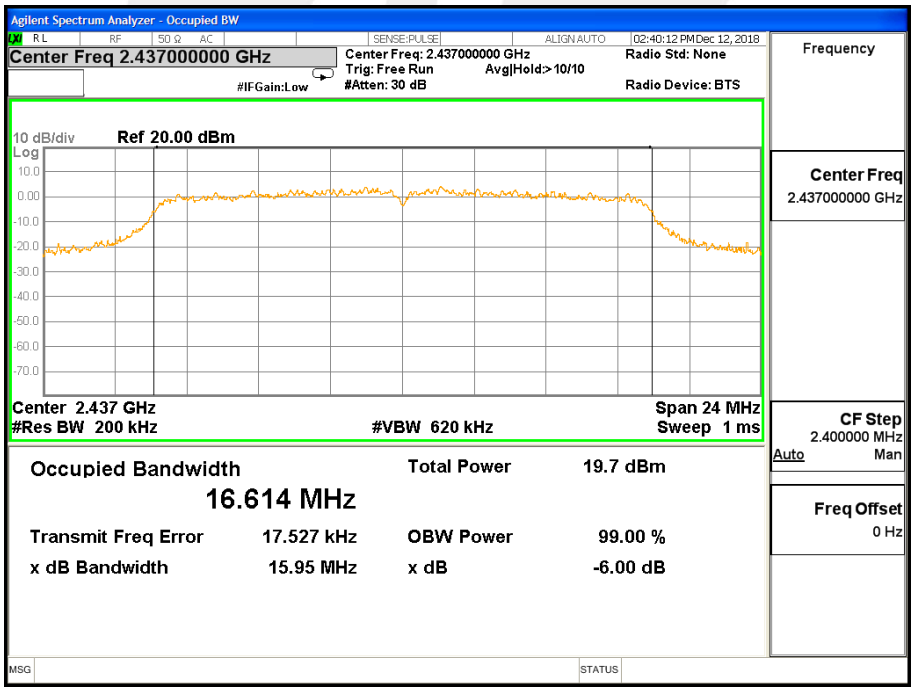


Antenna B(99% Bandwidth)

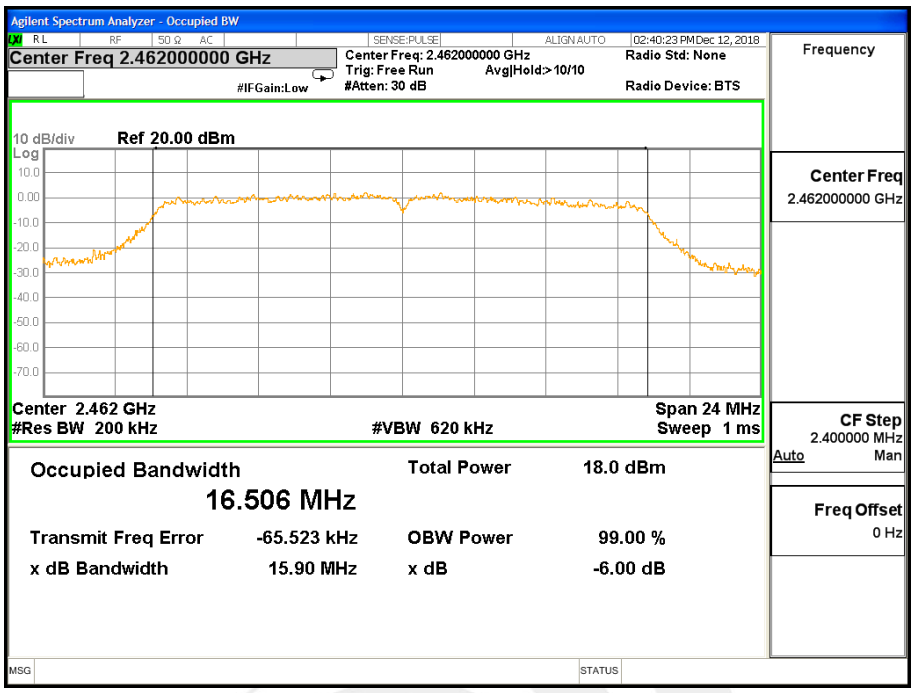
TX CH 01



TX CH 06



TX CH 11

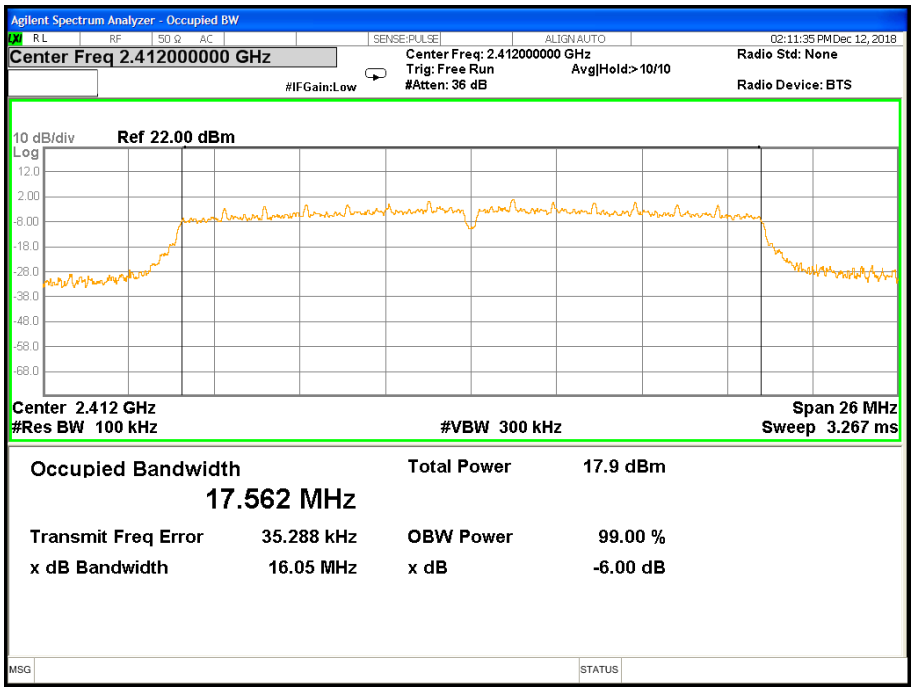

Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω
AC
SENSE:PULSE
ALIGN AUTO
02:40:23 PM Dec 12, 2018
Center Freq 2.462000000 GHz
Center Freq: 2.462000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.462000000 GHz
Center 2.462 GHz
#Res BW 200 kHz
#VBW 620 kHz
Span 24 MHz
Sweep 1 ms
CF Step
2.400000 MHz
Auto
Man
Occupied Bandwidth
16.506 MHz
Total Power
18.0 dBm
Freq Offset
0 Hz
Transmit Freq Error
-65.523 kHz
OBW Power
99.00 %
x dB Bandwidth
15.90 MHz
x dB
-6.00 dB
MSG
STATUS

Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX n Mode(20M) /CH01, CH06, CH11

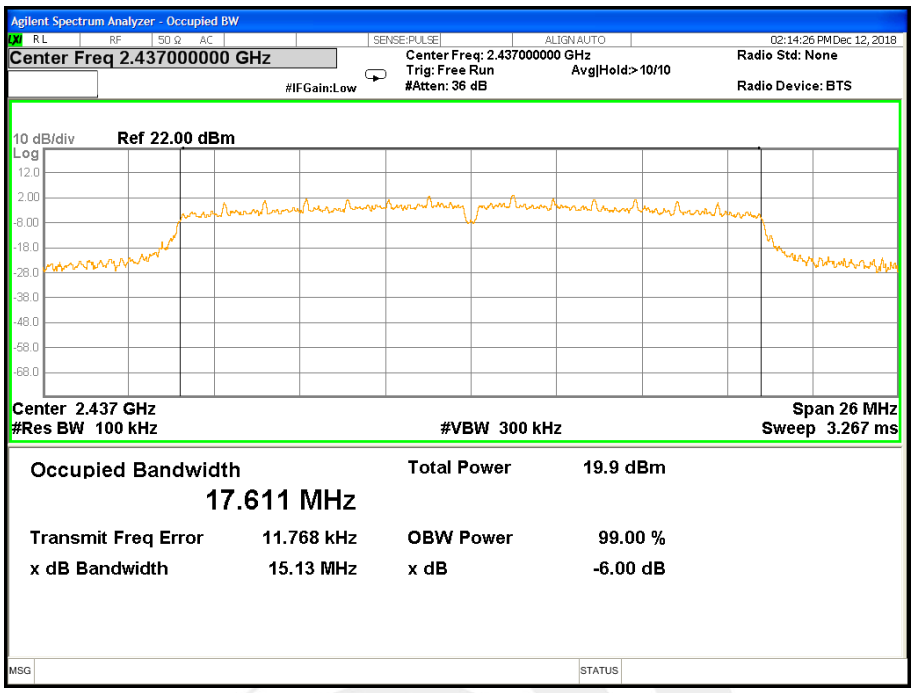
Frequency	6dB Bandwidth (MHz)		99% Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B	ANTENNA -A	ANTENNA -B		
2412 MHz	16.01	16.05	17.592	17.600	≥500KHz	PASS
2437 MHz	15.05	15.13	17.615	17.632	≥500KHz	PASS
2462 MHz	16.31	16.32	17.548	17.568	≥500KHz	PASS

Antenna B(6dB Bandwidth)

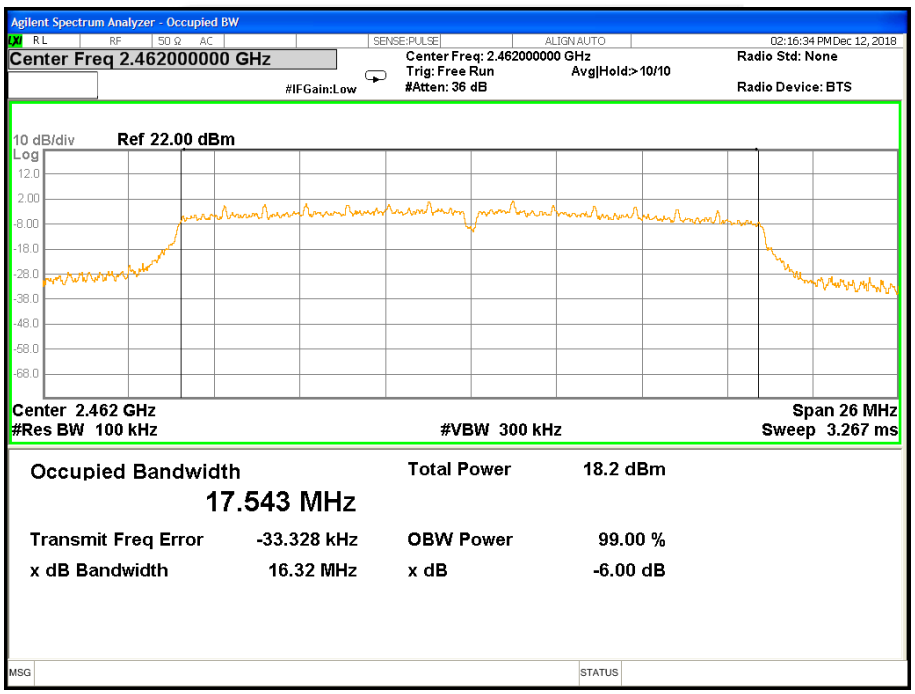
TX CH 01



TX CH 06

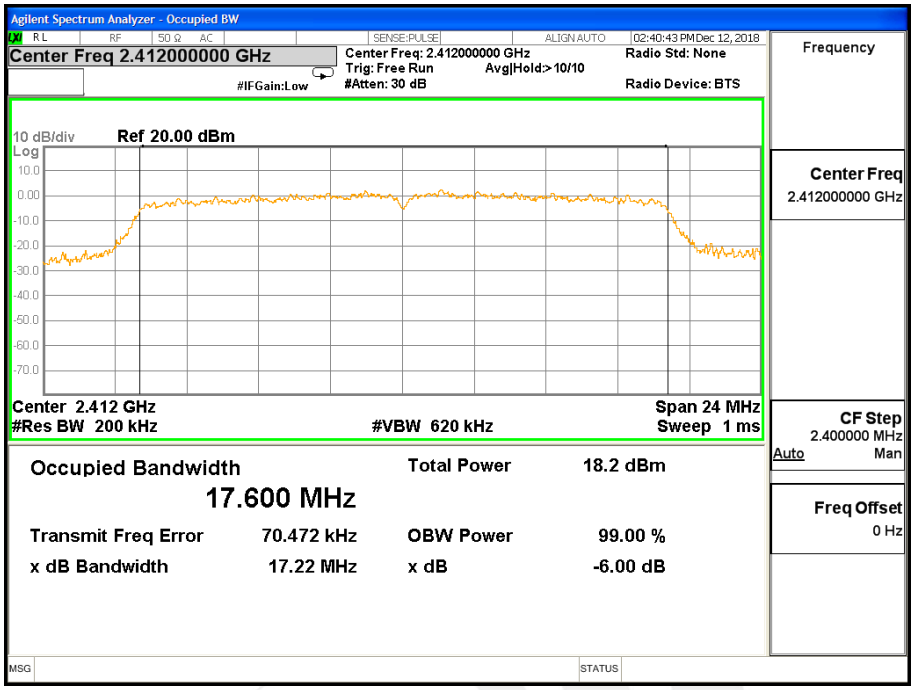


TX CH 11

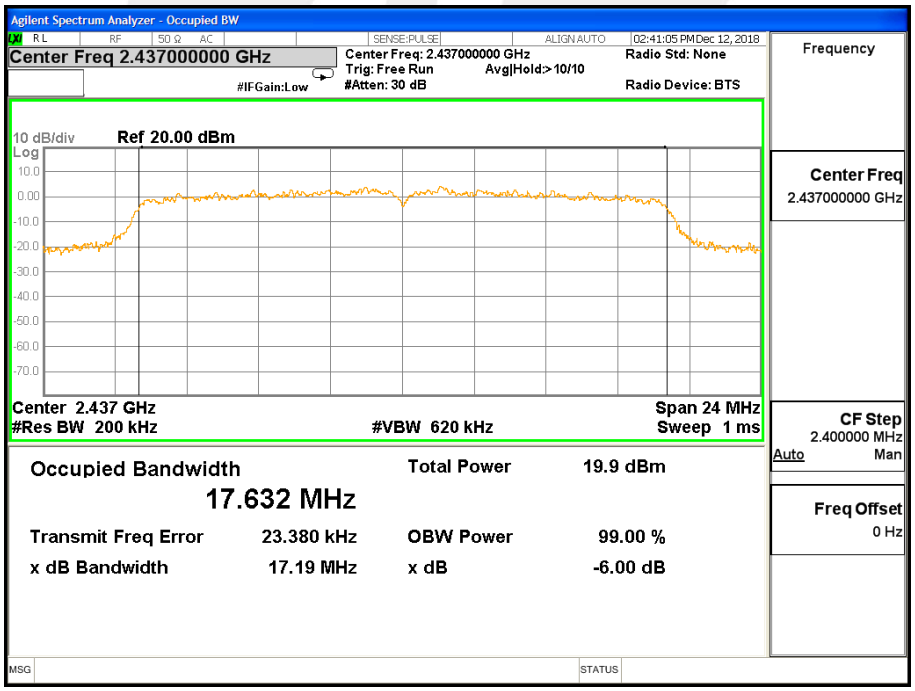


Antenna B(99% Bandwidth)

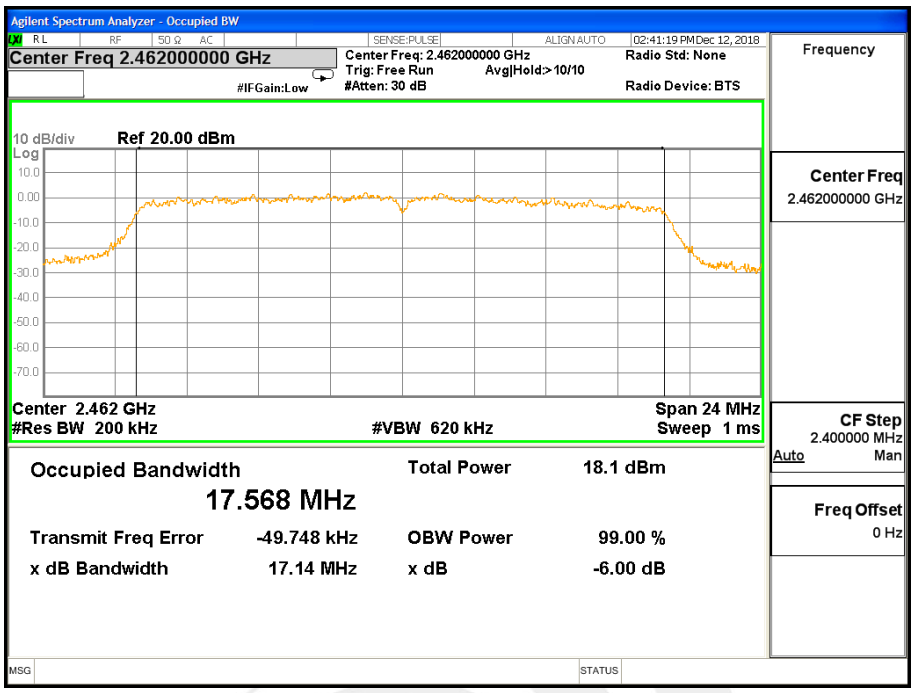
TX CH 01



TX CH 06



TX CH 11

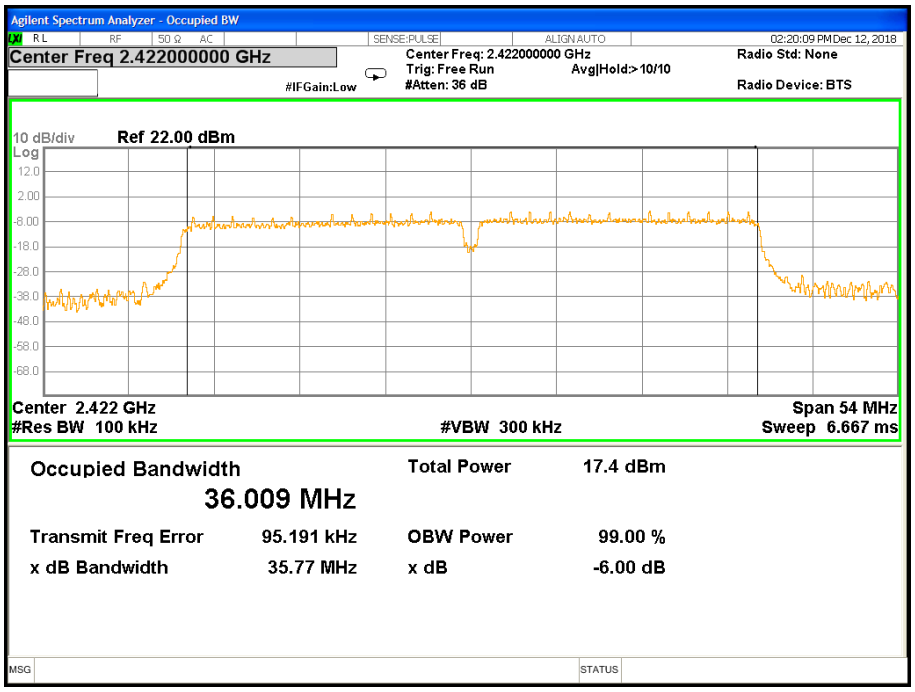

Agilent Spectrum Analyzer - Occupied BW
RL RF 50 Ω AC SENSE:PULSE ALIGN AUTO 02:41:19 PM Dec 12, 2018
Center Freq 2.462000000 GHz
Center Freq: 2.462000000 GHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low #Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.462000000 GHz
Center 2.462 GHz
#Res BW 200 kHz
#VBW 620 kHz
Span 24 MHz
Sweep 1 ms
CF Step
2.400000 MHz
Auto Man
Occupied Bandwidth
17.568 MHz
Total Power 18.1 dBm
Transmit Freq Error -49.748 kHz
OBW Power 99.00 %
x dB Bandwidth 17.14 MHz
x dB -6.00 dB
Freq Offset
0 Hz
MSG
STATUS

Temperature：	25 ℃	Relative Humidity：	60%
Test Voltage ：	AC 120V/60Hz	Test Mode ：	TX n Mode(40M) /CH03, CH06, CH09

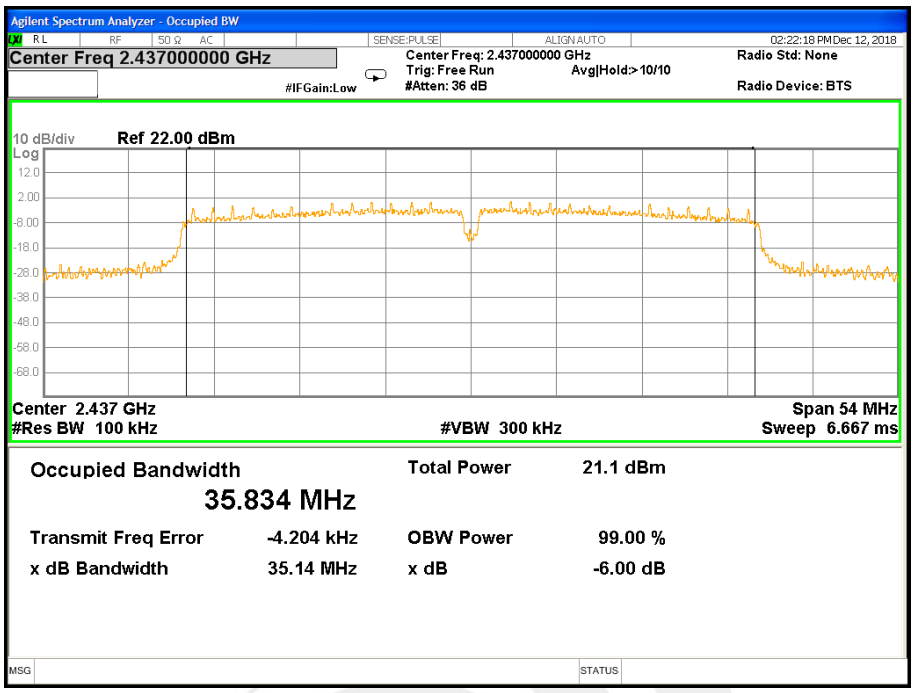
Frequency	6dB Bandwidth (MHz)		99% Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B	ANTENNA -A	ANTENNA -B		
2412 MHz	35.12	35.77	36.115	36.125	≥500KHz	PASS
2437 MHz	35.03	35.14	35.952	35.994	≥500KHz	PASS
2462 MHz	35.47	35.74	36.061	36.093	≥500KHz	PASS

Antenna B(6dB Bandwidth)

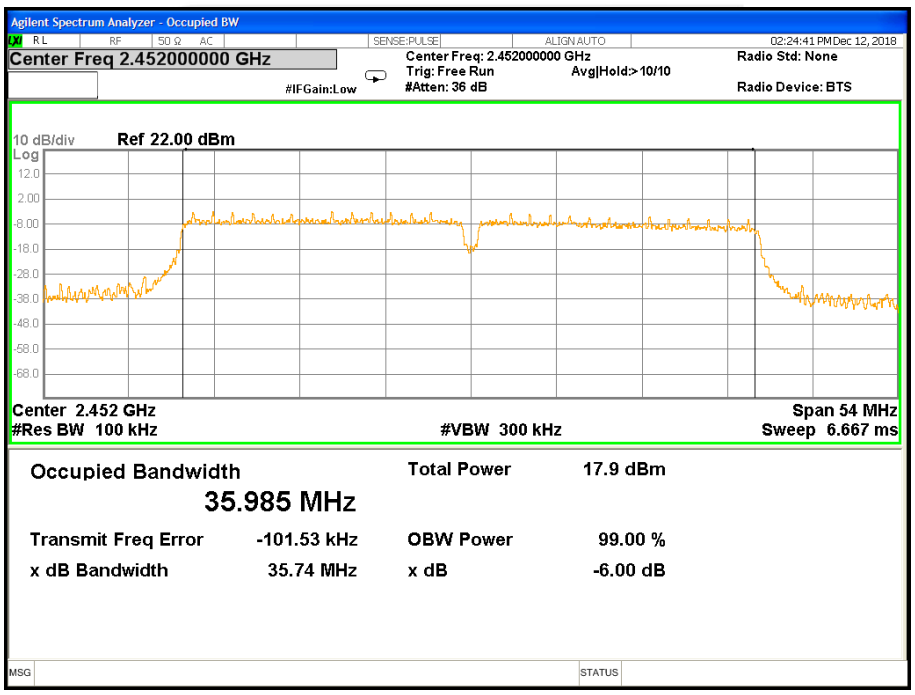
TX CH 03



TX CH 06

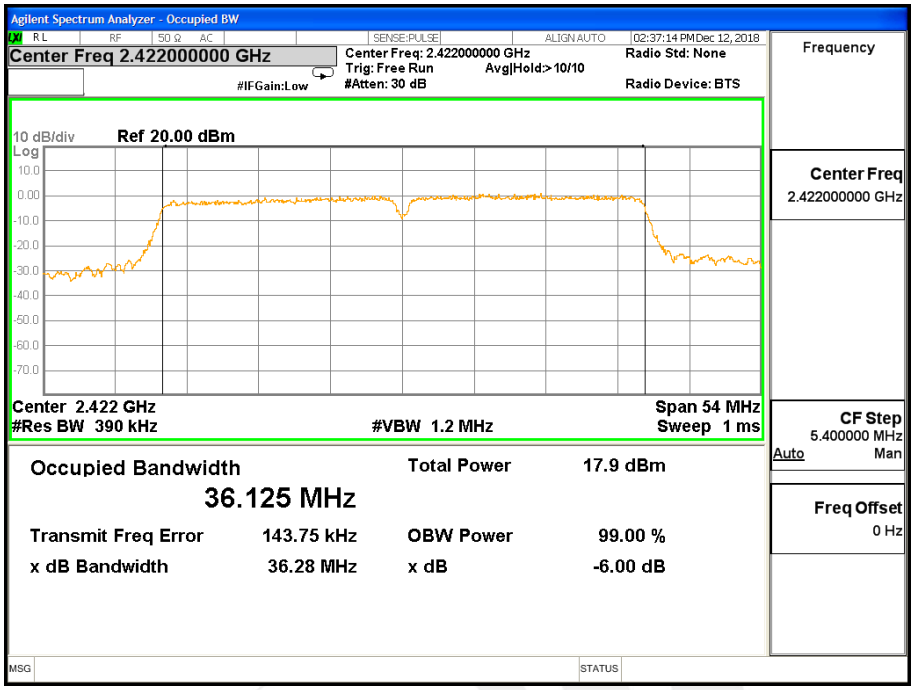


TX CH 09

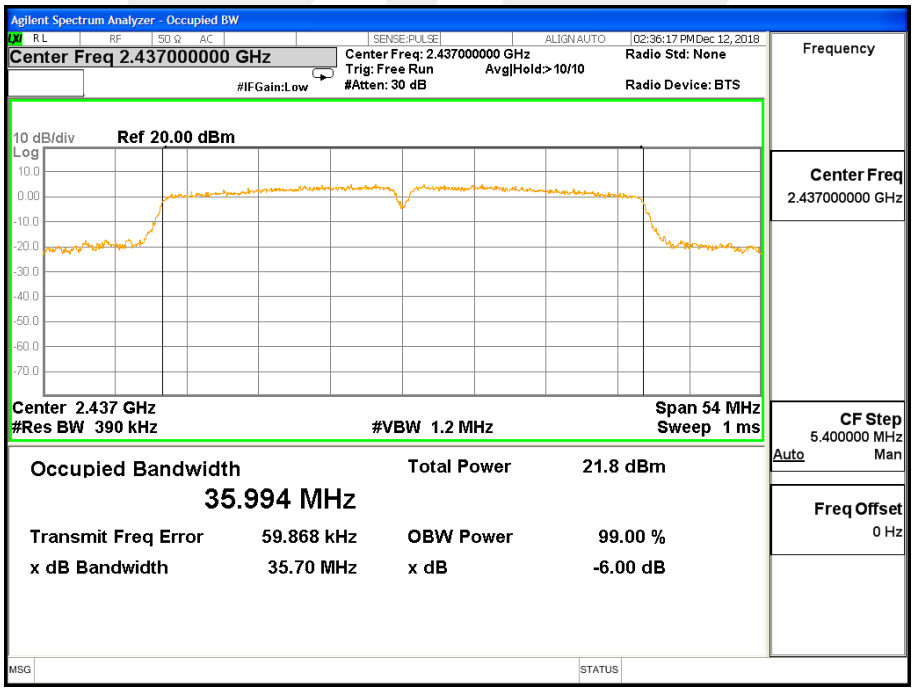


Antenna B(99% Bandwidth)

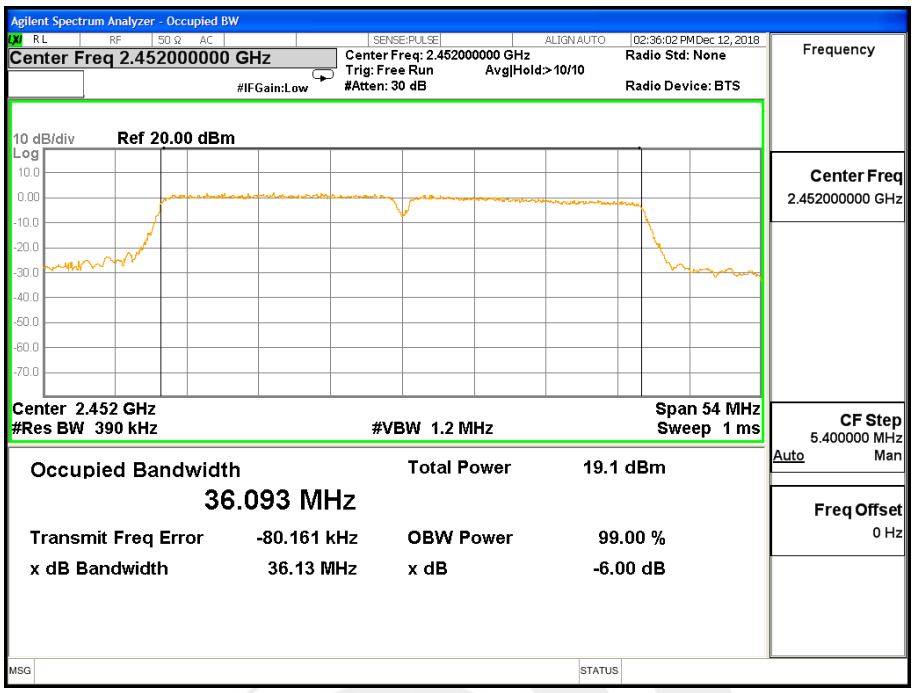
TX CH 03



TX CH 06



TX CH 09


Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω
AC
SENSE:PULSE
ALIGN AUTO
02:36:02 PM Dec 12, 2018
Center Freq 2.452000000 GHz
Center Freq: 2.452000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.452000000 GHz
Center 2.452 GHz
#Res BW 390 kHz
#VBW 1.2 MHz
Span 54 MHz
Sweep 1 ms
CF Step
5.400000 MHz
Auto
Man
Occupied Bandwidth
36.093 MHz
Total Power
19.1 dBm
Freq Offset
0 Hz
Transmit Freq Error
-80.161 kHz
OBW Power
99.00 %
x dB Bandwidth
36.13 MHz
x dB
-6.00 dB
MSG
STATUS

7. PEAK OUTPUT POWER TEST

7.1 LIMIT

FCC Part 15.247,Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) RSS-247 Issue 2	Output Power	1 watt or 30dBm	2400-2483.5	PASS

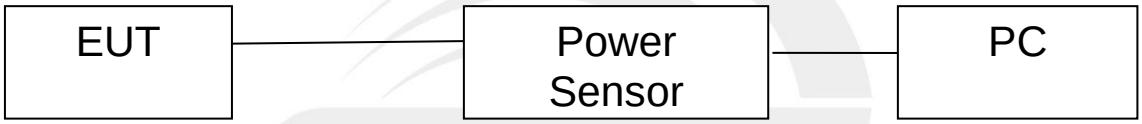
7.2 TEST PROCEDURE

a. The EUT was directly connected to the Power Sensor&PC

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 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz		

Note:

1.Antenna B Power> Antenna A Power, Both antenna A and B have been test, 802.11b/g model can't transmit at the same time,802.11n(HT20), 802.11n(HT40) can transmit at the same time.

2.The Directional gain= 3.15+10log2=6.16dBi, the antenna gain is greater than 6dBi, the 802.11n(HT20),802.11n(HT40) limit will reduced 0.16dBi, the limit is 29.84dBm.

TX 802.11b Mode

Test Channe	Frequency	PK Power ANT A	PK Power ANT B	PK Power ANT A+ANT B	AV Power ANT A	AV Power ANT B	AV Power ANT A+ANT B	LIMIT
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm
CH01	2412	13.25	13.38	--	12.05	12.21	--	30
CH06	2437	13.33	13.41	--	12.14	12.36	--	30
CH11	2462	13.94	14.25	--	12.44	12.58	--	30

TX 802.11g Mode

Test Channe	Frequency	PK Power ANT A	PK Power ANT B	PK Power ANT A+ANT B	AV Power ANT A	AV Power ANT B	AV Power ANT A+ANT B	LIMIT
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm
CH01	2412	13.02	13.11	--	11.89	12.05	--	30
CH06	2437	13.24	13.58	--	11.98	12.28	--	30
CH11	2462	13.37	13.74	--	12.25	12.49	--	30

TX 802.11n(HT20) Mode

Test Channe	Frequency	PK Power ANT A	PK Power ANT B	PK Power ANT A+ANT B	AV Power ANT A	AV Power ANT B	AV Power ANT A+ANT B	LIMIT
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm
CH01	2412	12.89	13.16	16.04	10.58	10.69	13.65	29.84
CH06	2437	13.18	13.52	16.36	10.74	10.88	13.82	29.84
CH11	2462	13.22	13.60	16.42	10.82	10.93	13.89	29.84

TX 802.11n(HT40) Mode								
Test Channe	Frequency	PK Power ANT A	PK Power ANT B	PK Power ANT A+ANT B	AV Power ANT A	AV Power ANT B	AV Power ANT A+ANT B	LIMIT
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm
CH03	2422	12.78	13.25	16.03	10.25	10.54	13.41	29.84
CH06	2437	13.12	13.49	16.32	10.31	10.66	13.50	29.84
CH09	2452	13.20	13.66	16.45	10.74	11.24	14.01	29.84

8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 and RSS-Gen Issue 5 requirement: For intentional device, according to 15.203 and RSS-Gen Issue 5: 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.

8.2 EUT ANTENNA

The EUT antenna is PIFA Antenna. It comply with the standard requirement.

9.FREQUENCY STABILITY

9.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/-0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage,and for a variation in primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees.

9.2 TEST PROCEDURE

1.The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2.Turn the EUT on and couple its output to spectrum analyzer.
3.Turn the EUT off and set the chamber to the highest temperature specified.
4.Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize,turn the EUT on and measure the operating frequency after 2,5,and 10 minutes.
5.Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6.The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes.The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

9.3 TEST RESULT

Channel 06 (2437MHz)

Voltage vs. Frequency Stability

Voltage vs. Frequency Stability Voltage(V)	Measurement Frequency(MHz)
AC 115V/50Hz	2437.0017
AC 100V/50Hz	2437.0017
AC 93.5V/50Hz	2437.0009
Max.Deviation(MHz)	0.0017
Max.Deviation(ppm)	0.70

Rated working voltage:AC 100V/50Hz

Temperature vs. Frequency Stability

Temperature(℃)	Measurement Frequency(MHz)
-30	2437.0031
-20	2437.0027
-10	2437.0025
0	2437.0029
10	2437.0023
20	2437.0026
30	2437.0024
40	2437.0023
50	2437.0025
Max.Deviation(MHz)	0.0031
Max.Deviation(ppm)	1.27

APPENDIX - PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※