S T S L A B

RADIO TEST REPORT

Report No:STS1904086W01

Issued for

Rosewill Inc.

17708 Rowland Street, City of Industry, CA 91748, United States

Product Name:	USB WiFi Adapter
Brand Name:	Rosewill
Model Name:	RNX-N300UBv2
Series Model:	RNX-N300UB
FCC ID:	W6R-RNXN300UB
Test Standard:	FCC Part 15.247

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TEST RESULT CERTIFICATION

Applicant's Name .....: Rosewill Inc.

Address .....: 17708 Rowland Street, City of Industry, CA 91748, United States

Manufacture's Name .....: Rosewill Inc.

Address .....: 17708 Rowland Street, City of Industry, CA 91748, United States

Product Description

Product Name.....: USB WiFi Adapter

Brand Name .....: Rosewill

Model Name .....: RNX-N300UBv2

Series Model.....: RNX-N300UB

Test Standards .....: FCC Part15.247

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 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 .....: 19 Apr. 2019 ~ 15 May 2019

Date of Issue .....: 16 May 2019

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	16 May 2019	STS1904086W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)(3)	Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	
15.247 (e)	Power Spectral Density	PASS	
15.205	Restricted Band Edge Emission	PASS	
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	
15.203	Antenna Requirement	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 test Firm Registration Number: 625569

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

<table>
<tr><td>Product Name</td><td>USB WiFi Adapter</td></tr>
<tr><td>Trade Name</td><td>Rosewill</td></tr>
<tr><td>Model Name</td><td>RNX-N300UBv2</td></tr>
<tr><td>Series Model</td><td>RNX-N300UB</td></tr>
<tr><td>Model Difference</td><td>Just only different in model name</td></tr>
<tr><td>Product Description</td><td>The EUT is a USB WiFi Adapter
<table>
<tr><td>Operation Frequency:</td><td>802.11b/g/n 20: 2412~2462 MHz
802.11n(40MHz):2422~2452MHz</td></tr>
<tr><td>Modulation Type:</td><td>802.11b(DSSS):CCK,DQPSK,DBPSK
802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM
802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM</td></tr>
<tr><td>Number Of Channel:</td><td>802.11b/g/n20: 11CH
802.11n 40: 7CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
<tr><td>Antenna Gain (dBi):</td><td>Antenna number: 2
Antenna A gain : 3dBi
Antenna B gain : 3dBi
MIMO technology Directional gain= 6.01dBi</td></tr>
<tr><td>Duty Cycle:</td><td>>98%</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Power Rating</td><td>Input: DC 5V</td></tr>
<tr><td>Hardware version number</td><td>V4.1</td></tr>
<tr><td>Software version number</td><td>1026.5.118.2013</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

NOTE: 802.11b/g : SISO mode only : 802.11n H20 /H40: MIMO mode only

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)		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 GANT dBi, being driven by NANT transmitter outputs of equal power. Directional gain is to be computed 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 dBi

ANT B=3 dBi

GANT + 10 log(NANT) dBi

Directional gain= 3+10log2=6.01dBi

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	SISO mode	1 Mbps
Mode 5	TX IEEE 802.11g CH1	6 Mbps
Mode 6	TX IEEE 802.11g CH6	6 Mbps
Mode 7	TX IEEE 802.11g CH11	6 Mbps
Mode 8	SISO mode	6 Mbps
Mode 9	TX IEEE 802.11n HT20 CH1	MCS 0
Mode 10	TX IEEE 802.11n HT20 CH6	MCS 0
Mode 11	TX IEEE 802.11n HT20 CH11	MCS 0
Mode 12	keeping MIMO TX mode	MCS 0
Mode 13	TX IEEE 802.11n HT40 CH3	MCS 0
Mode 14	TX IEEE 802.11n HT40 CH6	MCS 0
Mode 15	TX IEEE 802.11n HT40 CH9	MCS 0
Mode 16	keeping MIMO TX mode	MCS 0

Note:

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

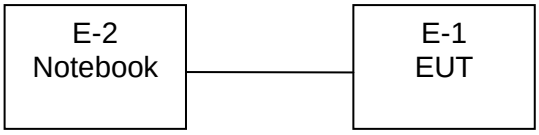
(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report

AC Conducted Emission

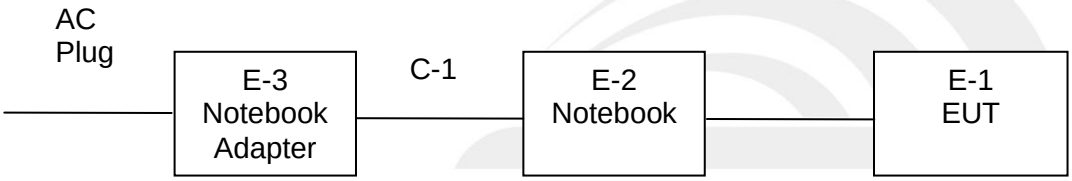
Test Case	
AC Conducted Emission	Mode17: Keeping TX + WLAN Link

2.3 BLOCK DIGRAM SHOADSL MODENG THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious EmissionTest



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
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	HP	500-320cx	N/A	N/A
E-3	Notebook Adapter	HP	HSTNN-CA15	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	2019.03.02	2020.03.01
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 (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10
Pre-Amplifier(0.1M-3G Hz)	EM	EM330	060665	2018.10.13	2019.10.12
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2018.10.13	2019.10.12
Temperature & Humidity	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 & Humidity	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 & Humidity	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) 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.

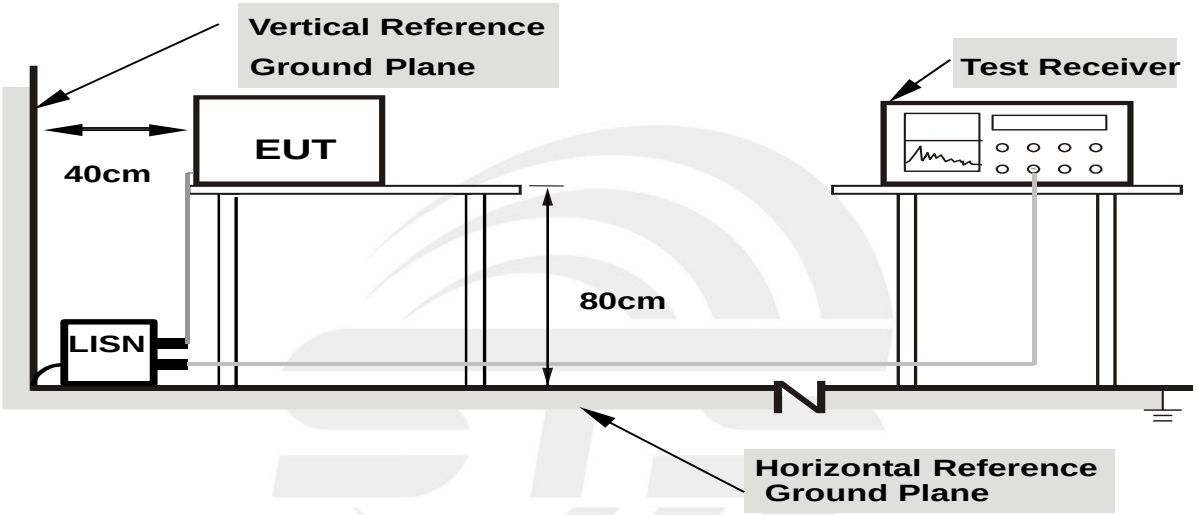
The following table is the setting of the receiver

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

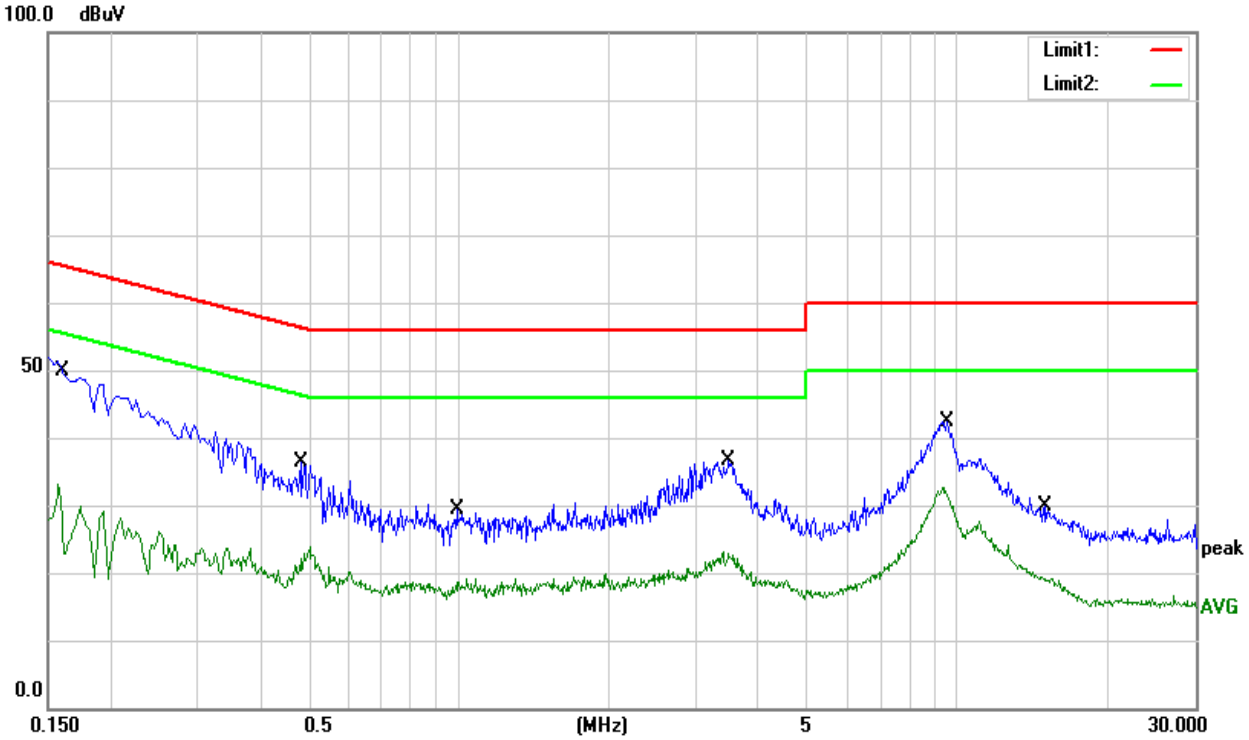
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

Temperature:	25.5℃	Relative Humidity:	63%
Test Voltage :	AC 120V/60Hz	Phase:	L
Test Mode :	Mode 17		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1623	28.99	20.22	49.21	65.35	-16.14	QP
0.1623	6.29	20.22	26.51	55.35	-28.84	AVG
0.4820	15.82	20.44	36.26	56.30	-20.04	QP
0.4820	0.40	20.44	20.84	46.30	-25.46	AVG
0.9900	9.14	20.16	29.30	56.00	-26.70	QP
0.9900	-0.32	20.16	19.84	46.00	-26.16	AVG
3.4740	16.57	20.07	36.64	56.00	-19.36	QP
3.4740	-1.26	20.07	18.81	46.00	-27.19	AVG
9.5300	22.63	19.87	42.50	60.00	-17.50	QP
9.5300	6.11	19.87	25.98	50.00	-24.02	AVG
14.9940	10.11	19.81	29.92	60.00	-30.08	QP
14.9940	-4.03	19.81	15.78	50.00	-34.22	AVG

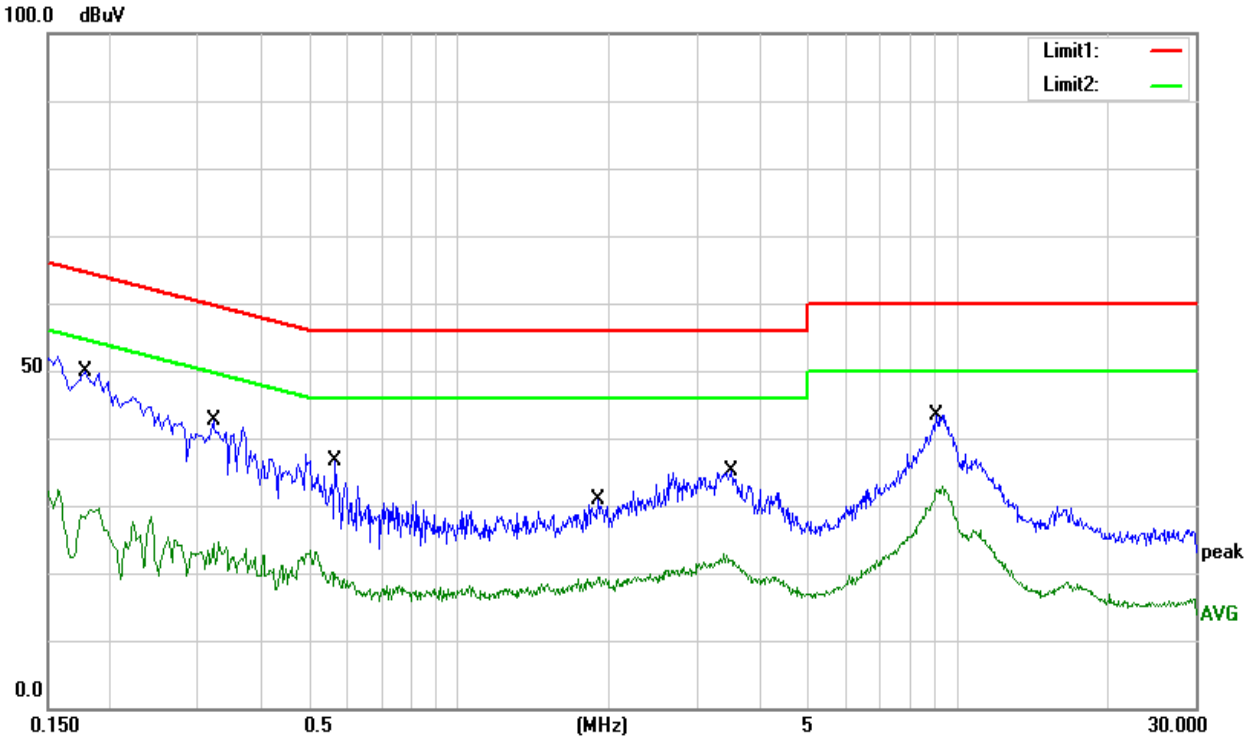
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	25.5℃	Relative Humidity:	63%
Test Voltage :	AC 120V/60Hz	Phase:	N
Test Mode :	Mode 17		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
0.1780	29.69	20.27	49.96	64.58	-14.62	QP
0.1780	7.30	20.27	27.57	54.58	-27.01	AVG
0.3220	21.96	20.71	42.67	59.66	-16.99	QP
0.3220	1.89	20.71	22.60	49.66	-27.06	AVG
0.5660	16.14	20.38	36.52	56.00	-19.48	QP
0.5660	-2.63	20.38	17.75	46.00	-28.25	AVG
1.9060	10.65	20.15	30.80	56.00	-25.20	QP
1.9060	-0.32	20.15	19.83	46.00	-26.17	AVG
3.5140	15.14	20.07	35.21	56.00	-20.79	QP
3.5140	-0.54	20.07	19.53	46.00	-26.47	AVG
9.0860	23.49	19.88	43.37	60.00	-16.63	QP
9.0860	6.49	19.88	26.37	50.00	-23.63	AVG

Remark:
1. 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) 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

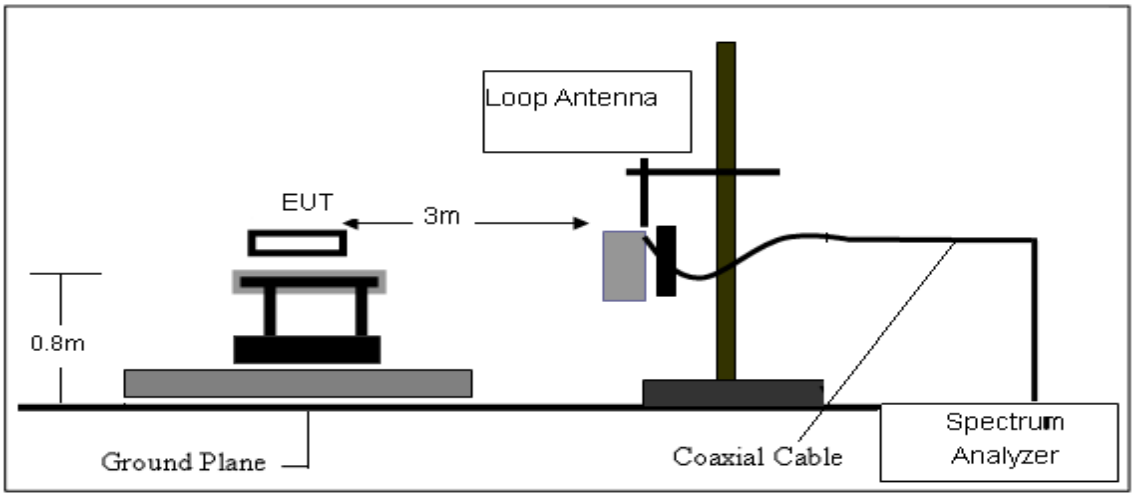
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. 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:

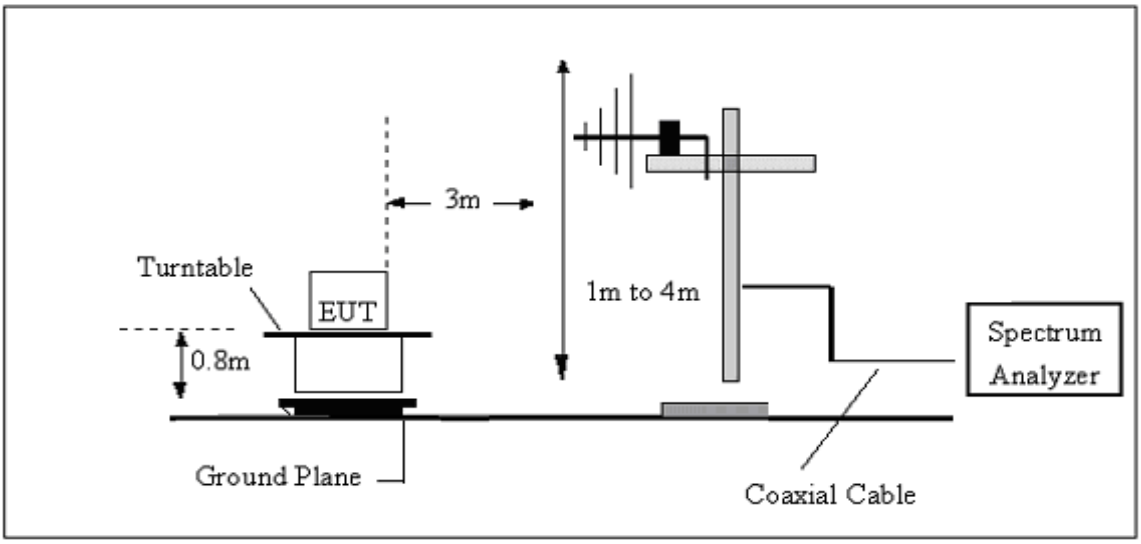
Both horizontal and vertical antenna polarities were tested and performed test to three orthogonal axis. The worst case emissions were reported

3.2.3 TEST SETUP

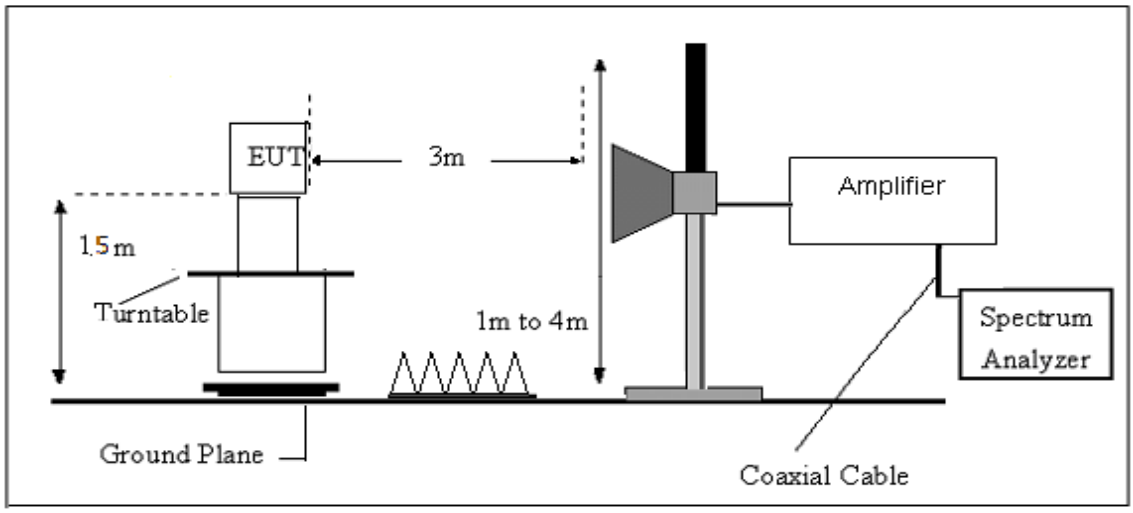
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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:	61%
Test Voltage :	DC 5V	Polarization :	--
Test Mode :	TX Mode		

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

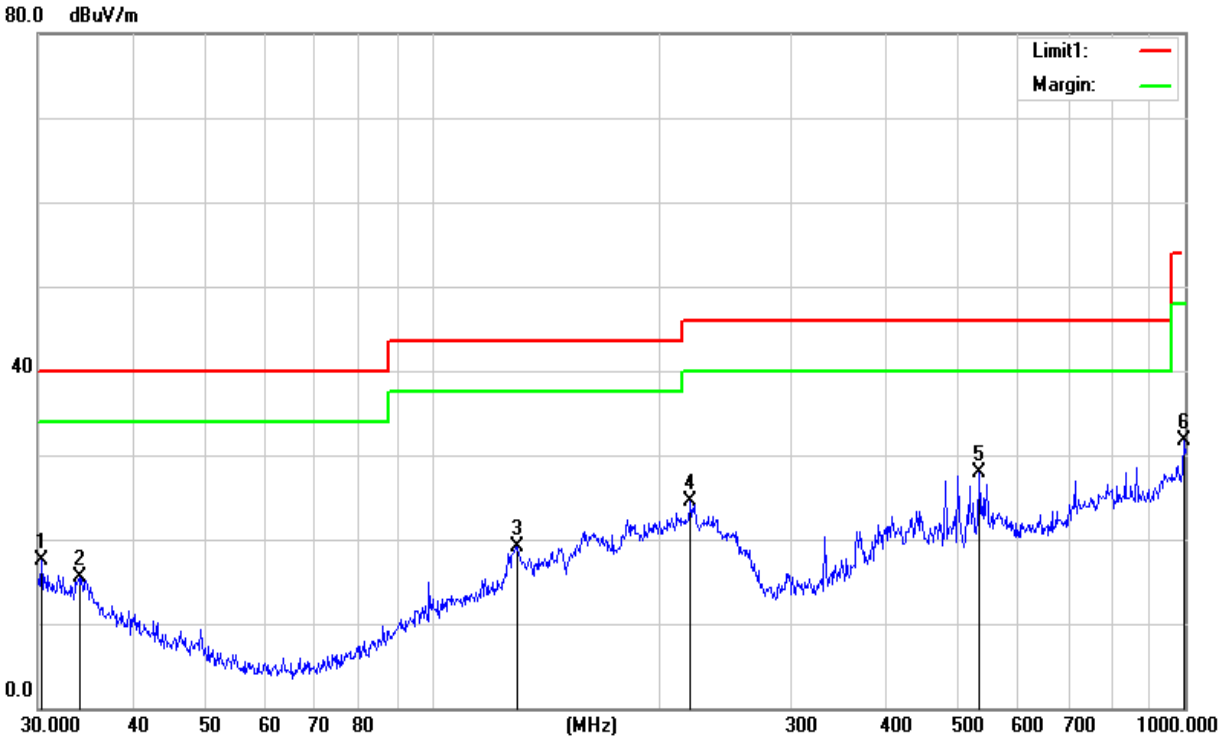
(30MHz - 1000MHz)

Temperature:	24.3 ℃	Relative Humidtity:	61%
Test Voltage :	DC 5V	Polarization :	Horizontal
Test Mode :	Mode 1~16(Mode 12 worst mode)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.3172	28.78	-11.35	17.43	40.00	-22.57	QP
34.0363	28.75	-13.26	15.49	40.00	-24.51	QP
129.9225	36.67	-17.55	19.12	43.50	-24.38	QP
220.6170	43.59	-19.08	24.51	46.00	-21.49	QP
533.8320	35.56	-7.58	27.98	46.00	-18.02	QP
996.4995	31.79	-0.09	31.70	54.00	-22.30	QP

Remark:

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

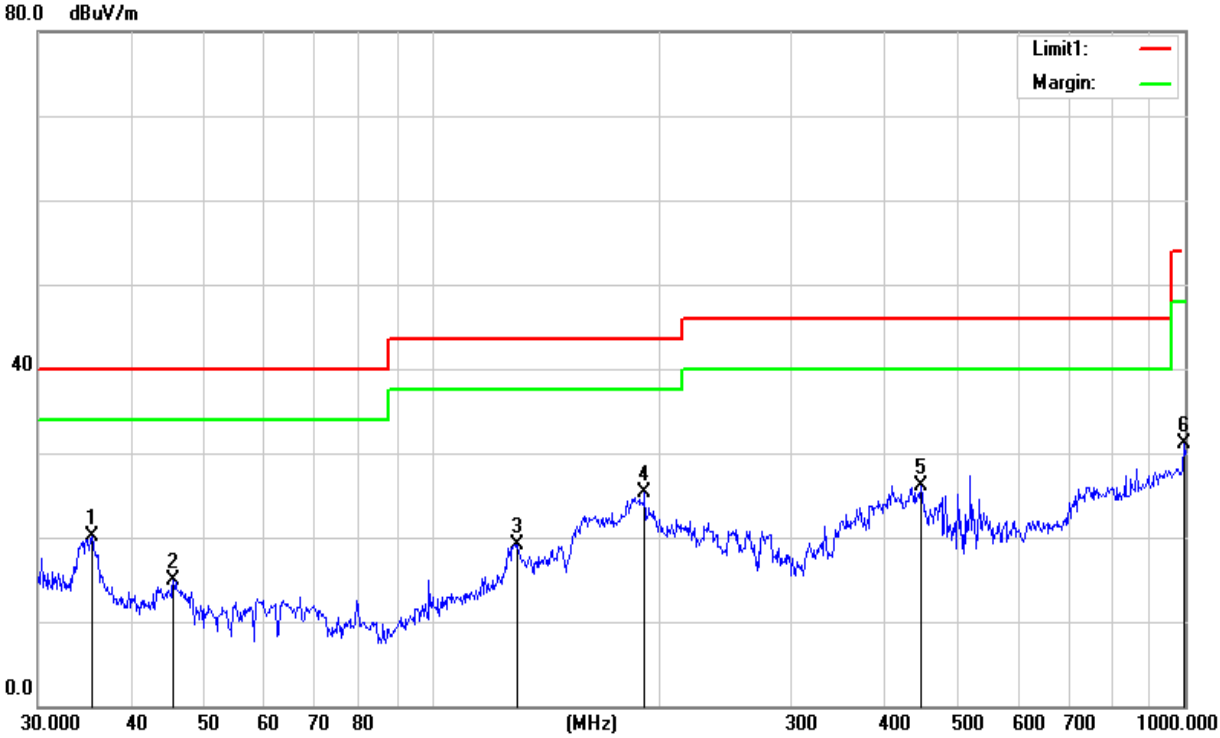


Temperature:	24.3 ℃	Relative Humidtity:	61%
Test Voltage :	DC 5V	Polarization :	Vertical
Test Mode :	Mode 1~16(Mode 12 worst mode)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
35.3750	33.95	-13.94	20.01	40.00	-19.99	QP
45.3755	34.05	-19.10	14.95	40.00	-25.05	QP
129.9225	36.67	-17.55	19.12	43.50	-24.38	QP
191.7450	45.51	-20.24	25.27	43.50	-18.23	QP
446.4141	36.80	-10.64	26.16	46.00	-19.84	QP
996.4995	31.29	-0.09	31.20	54.00	-22.80	QP

Remark:.

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



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

802.11n20 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)										
3264.73	61.19	44.70	6.70	28.20	-9.80	51.39	74.00	-22.61	PK	Vertical
3264.73	50.48	44.70	6.70	28.20	-9.80	40.68	54.00	-13.32	AV	Vertical
3264.85	62.15	44.70	6.70	28.20	-9.80	52.35	74.00	-21.65	PK	Horizontal
3264.85	51.12	44.70	6.70	28.20	-9.80	41.32	54.00	-12.68	AV	Horizontal
4824.35	58.58	44.20	9.04	31.60	-3.56	55.02	74.00	-18.98	PK	Vertical
4824.35	49.57	44.20	9.04	31.60	-3.56	46.01	54.00	-7.99	AV	Vertical
4824.33	58.48	44.20	9.04	31.60	-3.56	54.92	74.00	-19.08	PK	Horizontal
4824.33	50.46	44.20	9.04	31.60	-3.56	46.90	54.00	-7.10	AV	Horizontal
5359.78	49.00	44.20	9.86	32.00	-2.34	46.66	74.00	-27.34	PK	Vertical
5359.78	39.75	44.20	9.86	32.00	-2.34	37.41	54.00	-16.59	AV	Vertical
5359.84	48.00	44.20	9.86	32.00	-2.34	45.66	74.00	-28.34	PK	Horizontal
5359.84	39.00	44.20	9.86	32.00	-2.34	36.66	54.00	-17.34	AV	Horizontal
7235.91	53.86	43.50	11.40	35.50	3.40	57.26	74.00	-16.74	PK	Vertical
7235.91	44.09	43.50	11.40	35.50	3.40	47.49	54.00	-6.51	AV	Vertical
7235.81	53.95	43.50	11.40	35.50	3.40	57.35	74.00	-16.65	PK	Horizontal
7235.81	44.45	43.50	11.40	35.50	3.40	47.85	54.00	-6.15	AV	Horizontal

802.11n20 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)										
3264.79	61.09	44.70	6.70	28.20	-9.80	51.29	74.00	-22.71	PK	Vertical
3264.79	49.99	44.70	6.70	28.20	-9.80	40.19	54.00	-13.81	AV	Vertical
3264.80	61.58	44.70	6.70	28.20	-9.80	51.78	74.00	-22.22	PK	Horizontal
3264.80	50.49	44.70	6.70	28.20	-9.80	40.69	54.00	-13.31	AV	Horizontal
4874.56	58.73	44.20	9.04	31.60	-3.56	55.17	74.00	-18.83	PK	Vertical
4874.56	49.21	44.20	9.04	31.60	-3.56	45.65	54.00	-8.35	AV	Vertical
4874.53	59.08	44.20	9.04	31.60	-3.56	55.52	74.00	-18.48	PK	Horizontal
4874.53	50.13	44.20	9.04	31.60	-3.56	46.57	54.00	-7.43	AV	Horizontal
5359.78	49.13	44.20	9.86	32.00	-2.34	46.79	74.00	-27.21	PK	Vertical
5359.78	39.94	44.20	9.86	32.00	-2.34	37.60	54.00	-16.40	AV	Vertical
5359.85	48.51	44.20	9.86	32.00	-2.34	46.17	74.00	-27.83	PK	Horizontal
5359.85	38.61	44.20	9.86	32.00	-2.34	36.27	54.00	-17.73	AV	Horizontal
7310.80	53.91	43.50	11.40	35.50	3.40	57.31	74.00	-16.69	PK	Vertical
7310.80	43.91	43.50	11.40	35.50	3.40	47.31	54.00	-6.69	AV	Vertical
7310.75	54.95	43.50	11.40	35.50	3.40	58.35	74.00	-15.65	PK	Horizontal
7310.75	44.61	43.50	11.40	35.50	3.40	48.01	54.00	-5.99	AV	Horizontal

802.1120 High Channel(Antenna A+B)

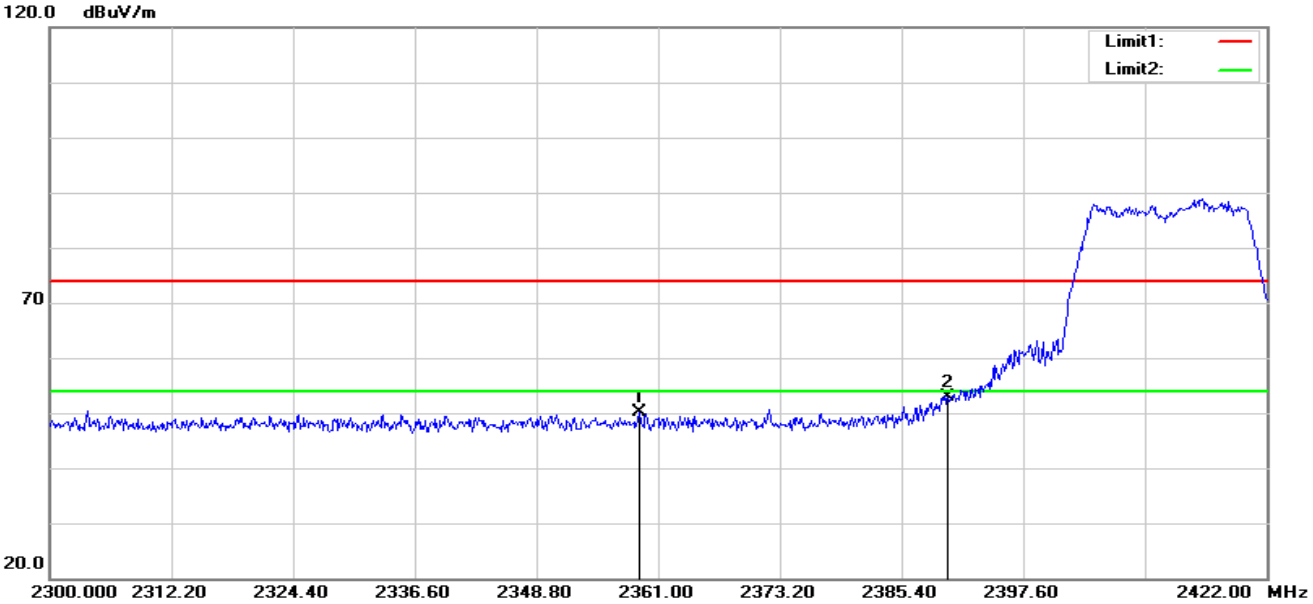
Frequency (MHz)	Meter Reading (dBμV)	Amplifier （dB）	Loss （dB）	Antenna Factor （dB/m）	Orrected Factor （dB）	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
High Channel (2462 MHz)										
3264.76	61.98	44.70	6.70	28.20	-9.80	52.18	74.00	-21.82	PK	Vertical
3264.76	50.23	44.70	6.70	28.20	-9.80	40.43	54.00	-13.57	AV	Vertical
3264.85	61.95	44.70	6.70	28.20	-9.80	52.15	74.00	-21.85	PK	Horizontal
3264.85	50.39	44.70	6.70	28.20	-9.80	40.59	54.00	-13.41	AV	Horizontal
4924.41	58.71	44.20	9.04	31.60	-3.56	55.15	74.00	-18.85	PK	Vertical
4924.41	49.20	44.20	9.04	31.60	-3.56	45.64	54.00	-8.36	AV	Vertical
4924.48	58.84	44.20	9.04	31.60	-3.56	55.28	74.00	-18.72	PK	Horizontal
4924.48	49.43	44.20	9.04	31.60	-3.56	45.87	54.00	-8.13	AV	Horizontal
5359.84	48.05	44.20	9.86	32.00	-2.34	45.71	74.00	-28.29	PK	Vertical
5359.84	39.23	44.20	9.86	32.00	-2.34	36.89	54.00	-17.11	AV	Vertical
5359.75	47.82	44.20	9.86	32.00	-2.34	45.48	74.00	-28.52	PK	Horizontal
5359.75	39.06	44.20	9.86	32.00	-2.34	36.72	54.00	-17.28	AV	Horizontal
7385.83	54.97	43.50	11.40	35.50	3.40	58.37	74.00	-15.63	PK	Vertical
7385.83	44.83	43.50	11.40	35.50	3.40	48.23	54.00	-5.77	AV	Vertical
7385.91	54.87	43.50	11.40	35.50	3.40	58.27	74.00	-15.73	PK	Horizontal
7385.91	44.80	43.50	11.40	35.50	3.40	48.20	54.00	-5.80	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 antennaA+B, the worst case is 802.11n(HT20) of the antenna A+B.
3. Emission Level = Meter Reading + Factor; Margin = Limit - Emission Leve
4.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 (Restricted band Requirements)

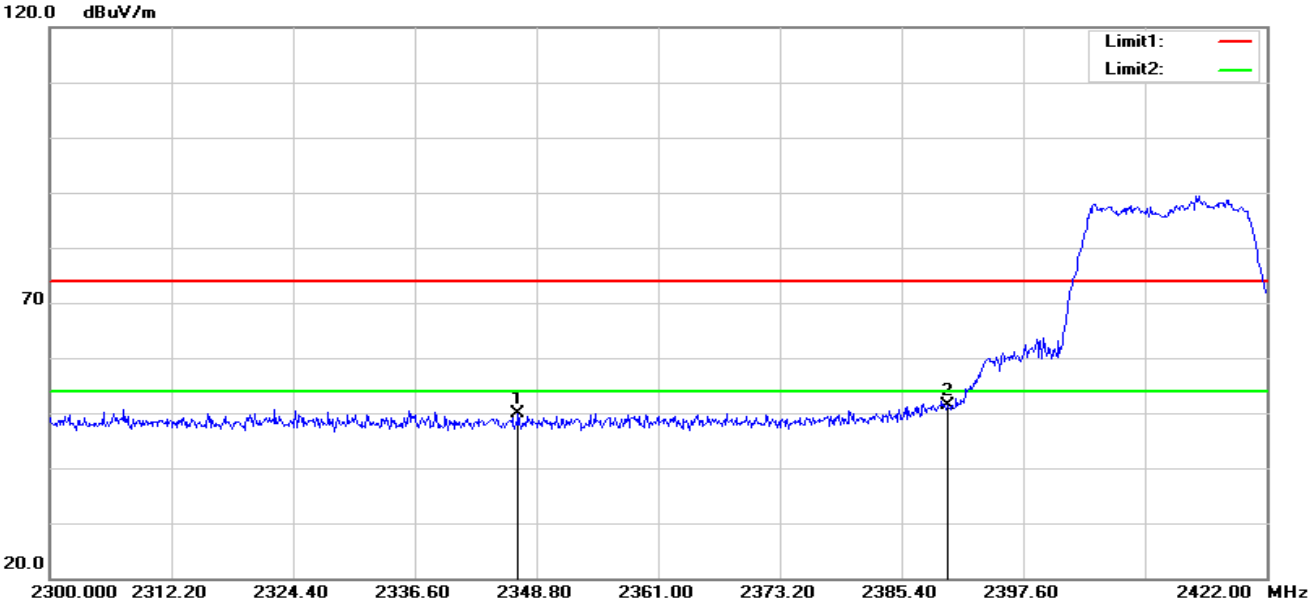
802.11g-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2359.170	60.82	-10.69	50.13	74.00	-23.87	peak
2	2390.000	63.42	-10.48	52.94	74.00	-21.06	peak

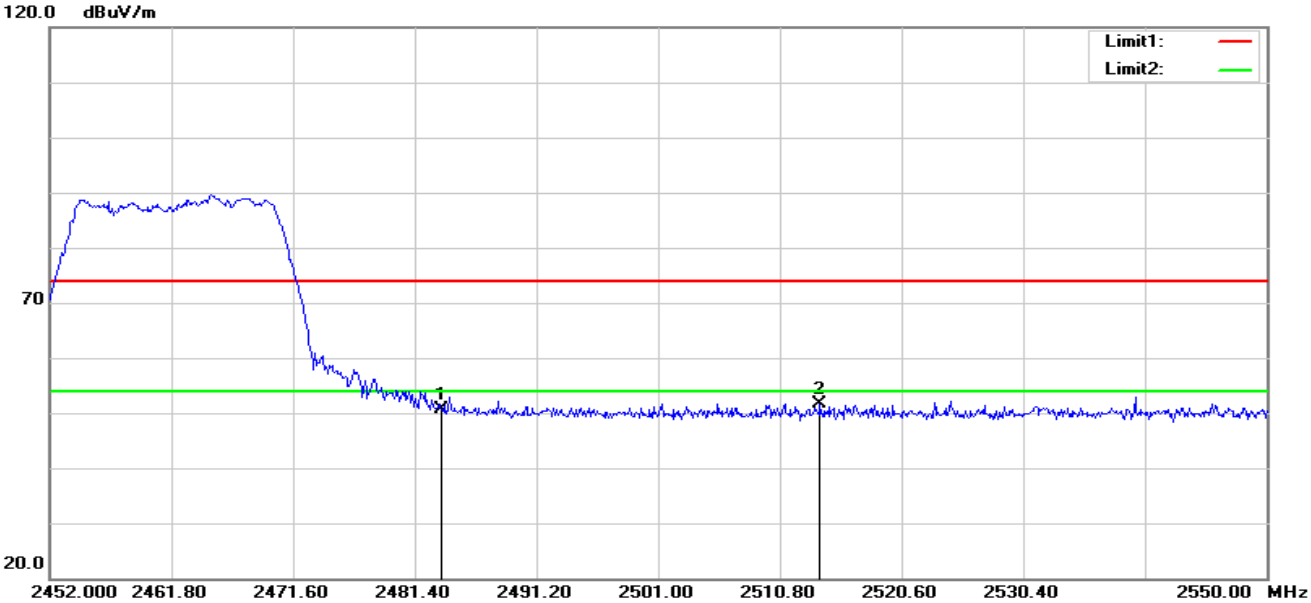
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2346.970	60.71	-10.76	49.95	74.00	-24.05	peak
2	2390.000	61.77	-10.48	51.29	74.00	-22.71	peak

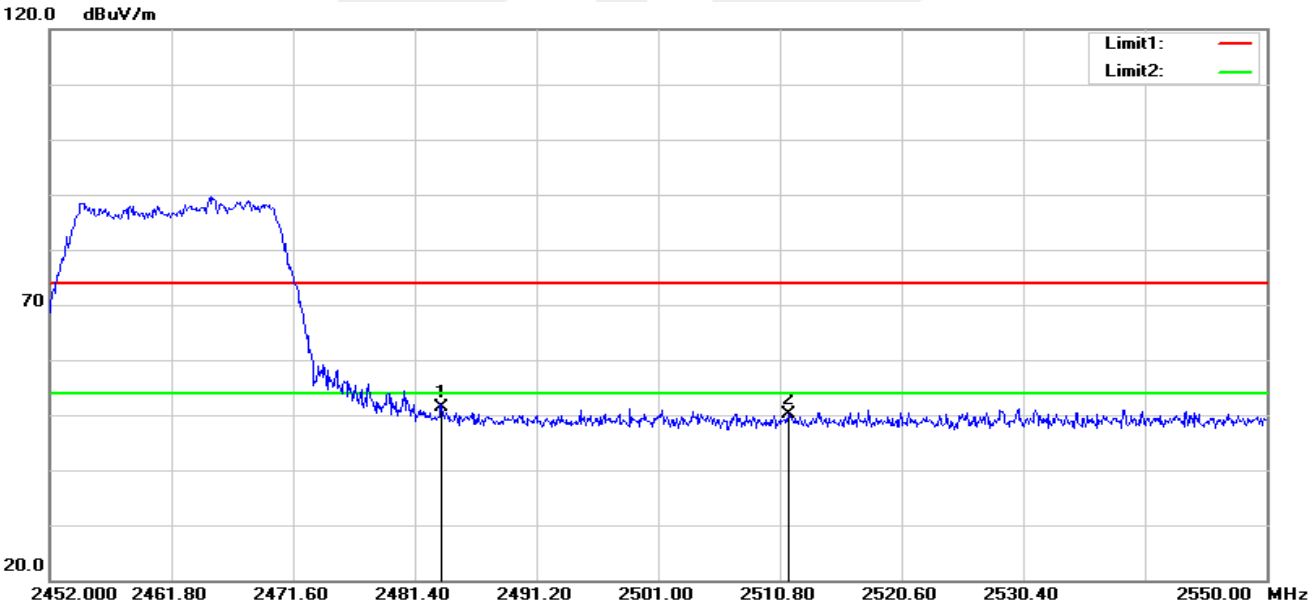
802.11g-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	60.55	-9.99	50.56	74.00	-23.44	peak
2	2514.034	61.40	-9.87	51.53	74.00	-22.47	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	61.37	-9.99	51.38	74.00	-22.62	peak
2	2511.486	60.08	-9.87	50.21	74.00	-23.79	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 802.11g of the antenna A.

4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d), 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 PC, is connected 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.

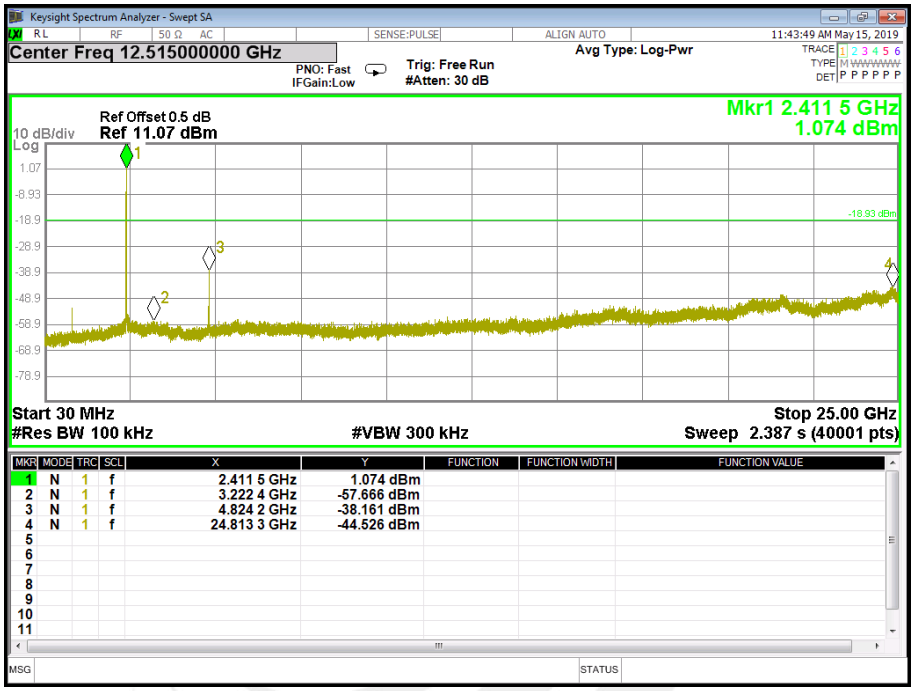
4.6 TEST RESULTS

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

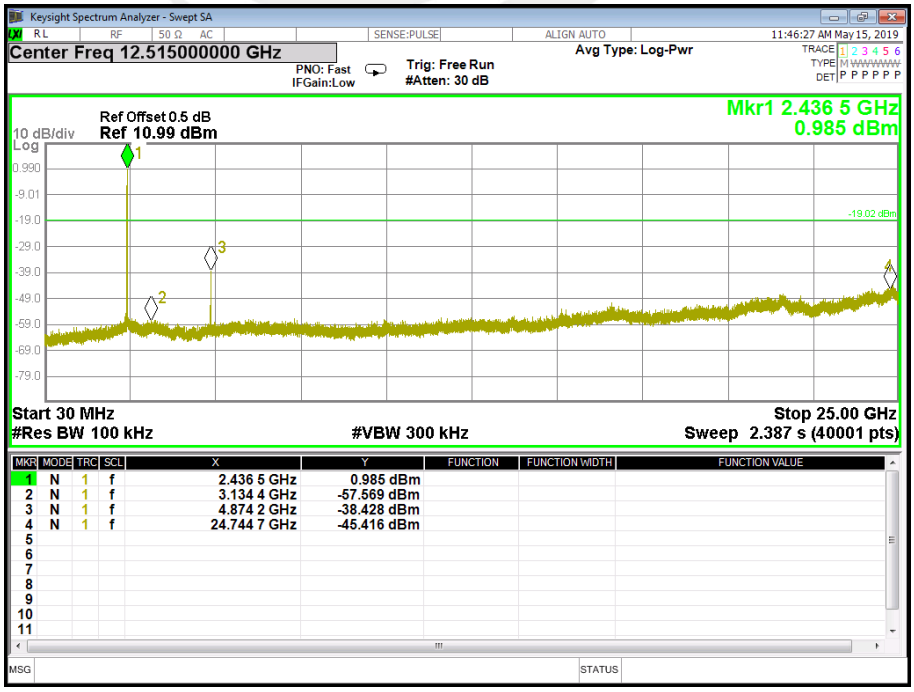
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX b Mode /CH01, CH06, CH11

Antenna A

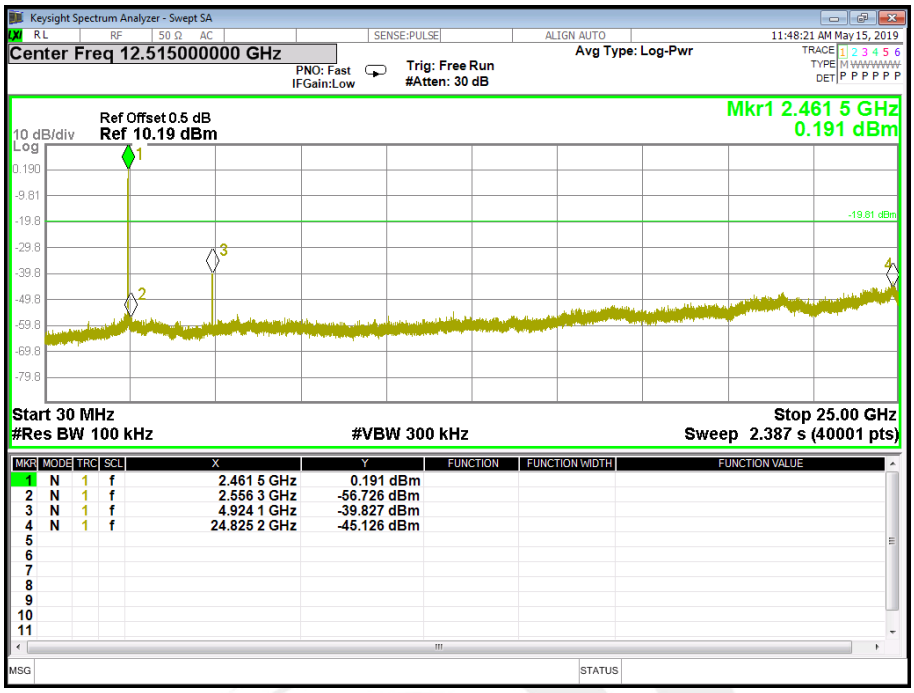
CH 01



CH 06

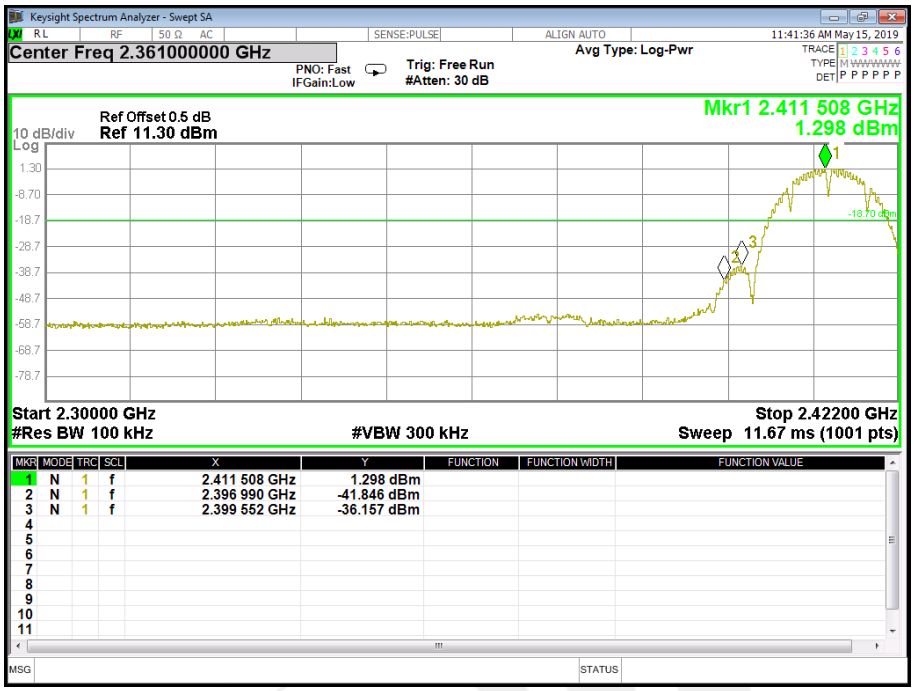


CH 11

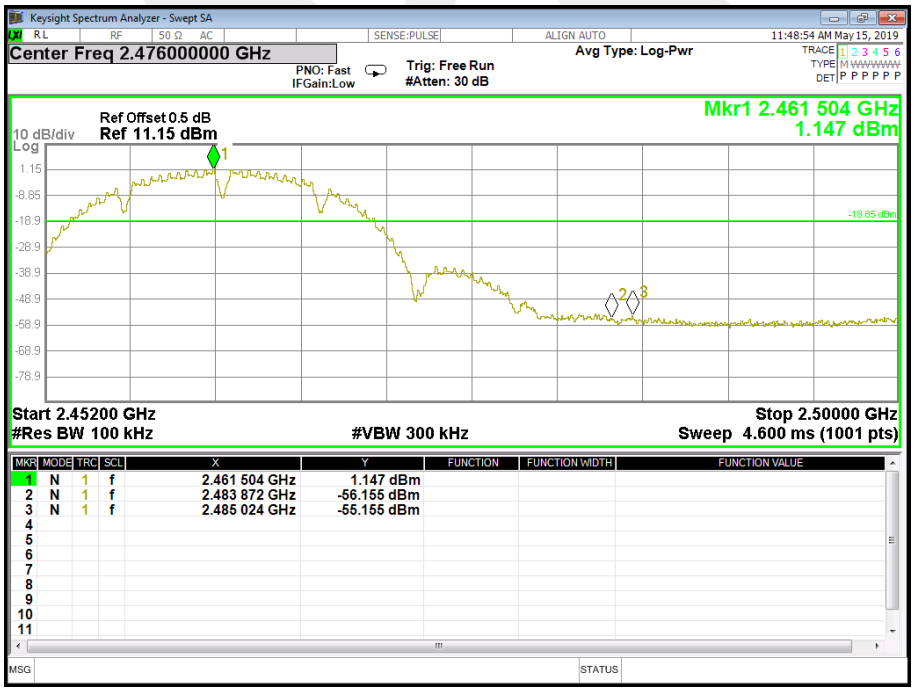

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Avg Type: Log-Pwr
Trig: Free Run
#Atten: 30 dB
PNO: Fast
IFGain:Low
11:48:21 AM May 15, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 10.19 dBm
Mkr1 2.461 5 GHz
0.191 dBm
-19.81 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.461 5 GHz 0.191 dBm
2 N 1 f 2.556 3 GHz -56.726 dBm
3 N 1 f 4.924 1 GHz -39.827 dBm
4 N 1 f 24.825 2 GHz -45.126 dBm

Band edge

CH 01



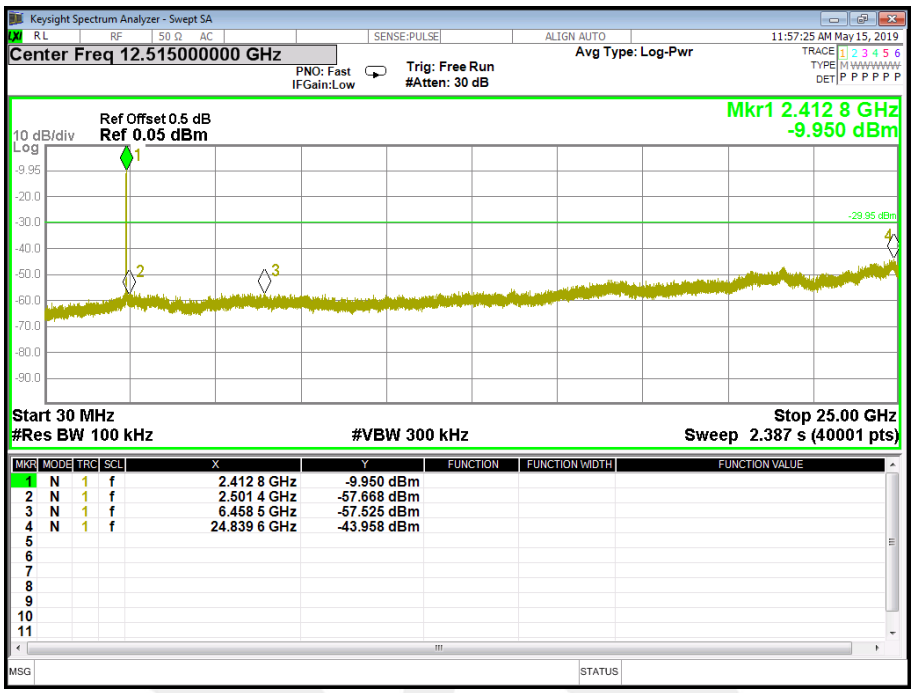
CH 11



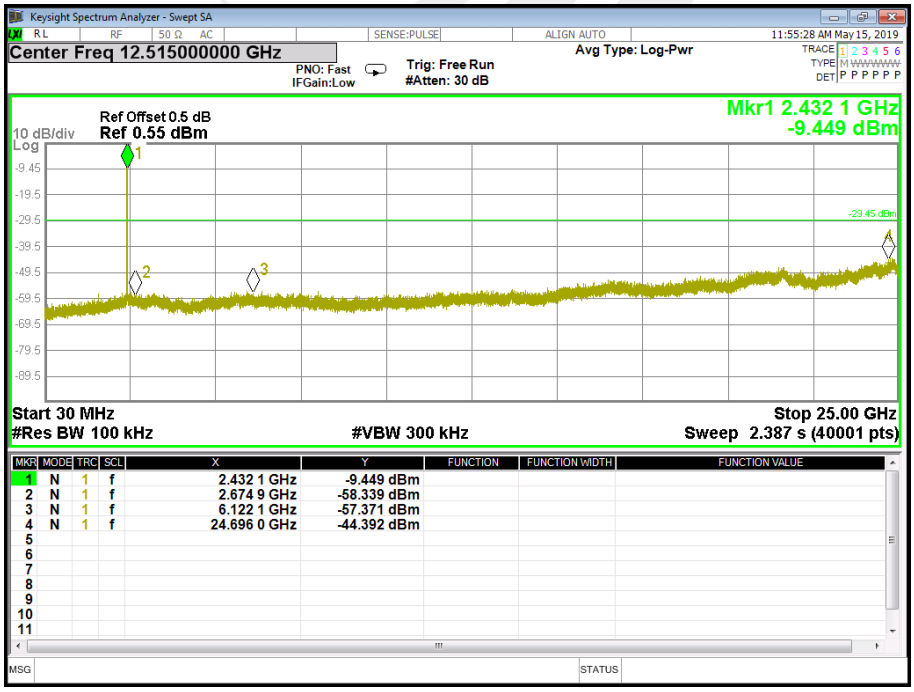
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX g Mode /CH01, CH06, CH11

Antenna A

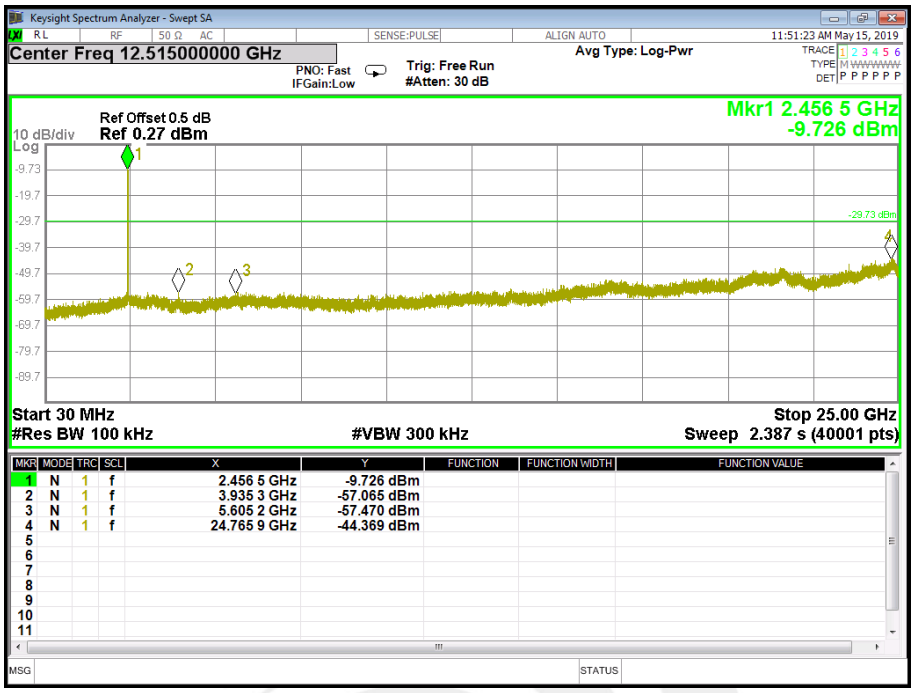
CH 01



CH06

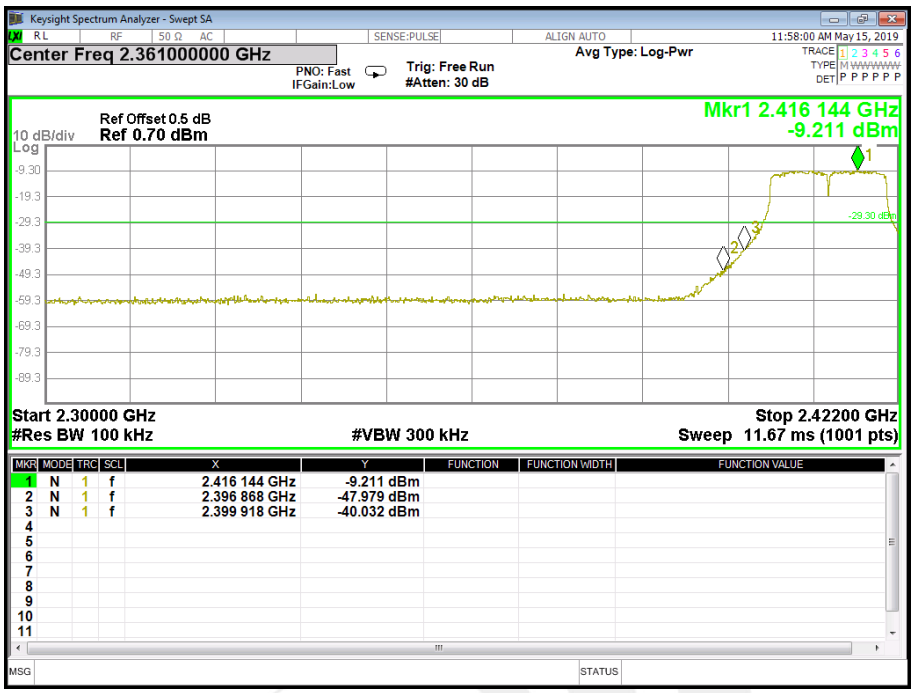


CH 11

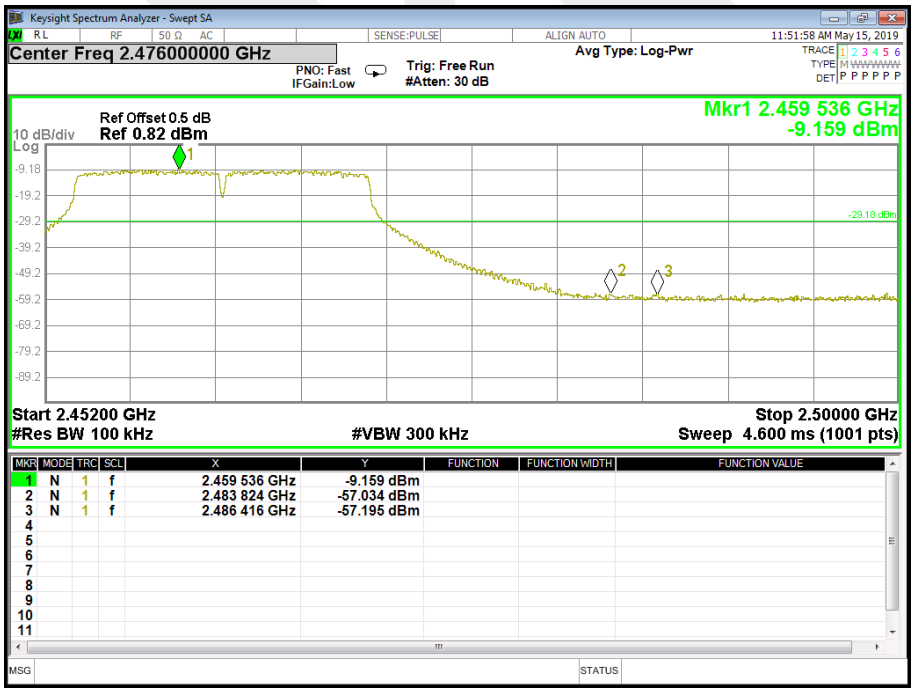

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:51:23 AM May 15, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 0.27 dBm
Mkr1 2.456 5 GHz
-9.726 dBm
-29.73 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.456 5 GHz -9.726 dBm
2 N 1 f 3.935 3 GHz -57.065 dBm
3 N 1 f 5.605 2 GHz -57.470 dBm
4 N 1 f 24.765 9 GHz -44.369 dBm

Band edge

CH 01



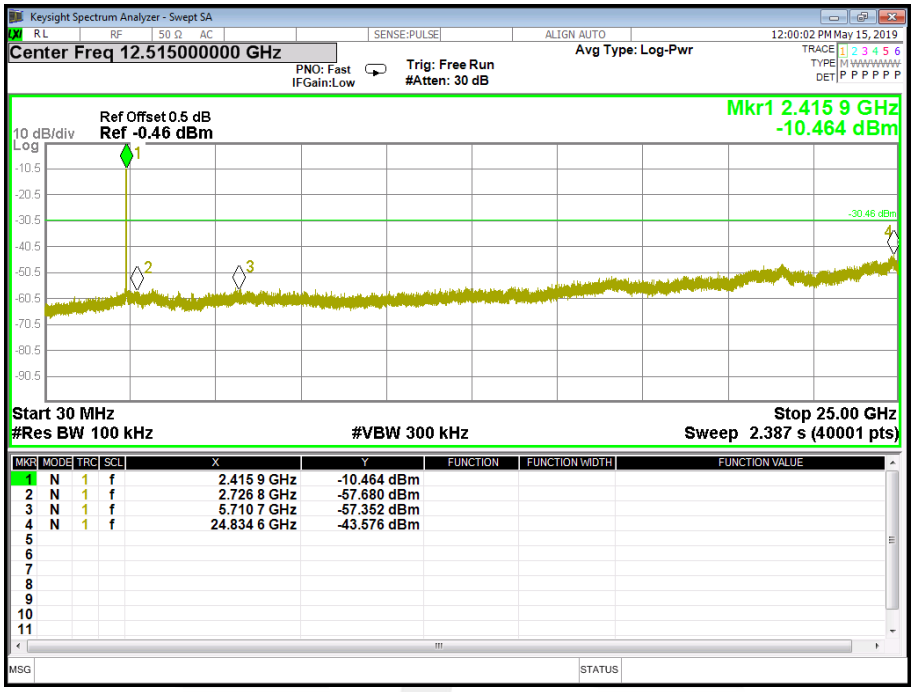
CH11



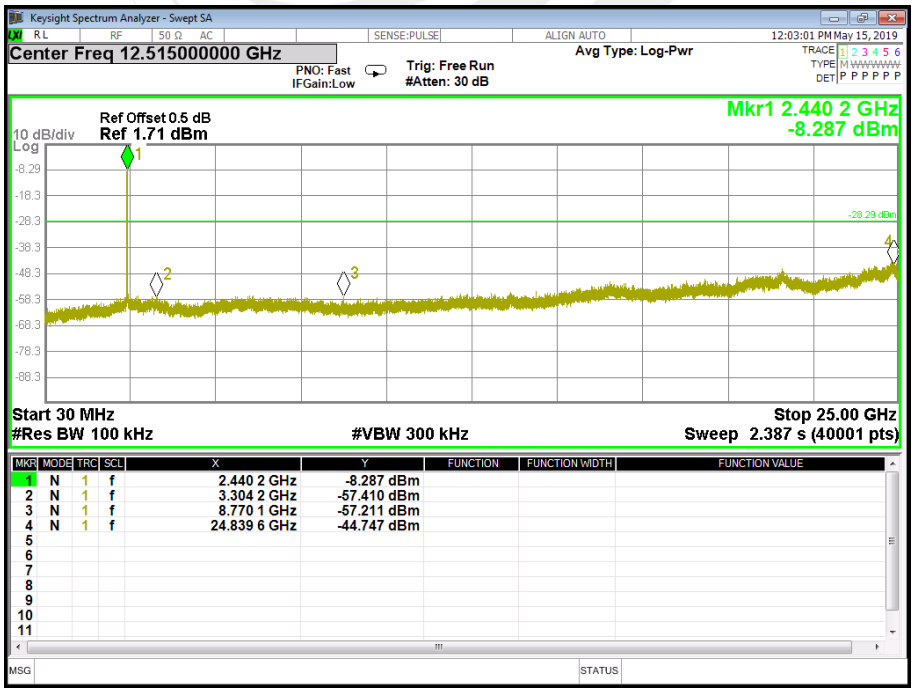
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(20M) /CH01, CH06, CH11

Antenna A

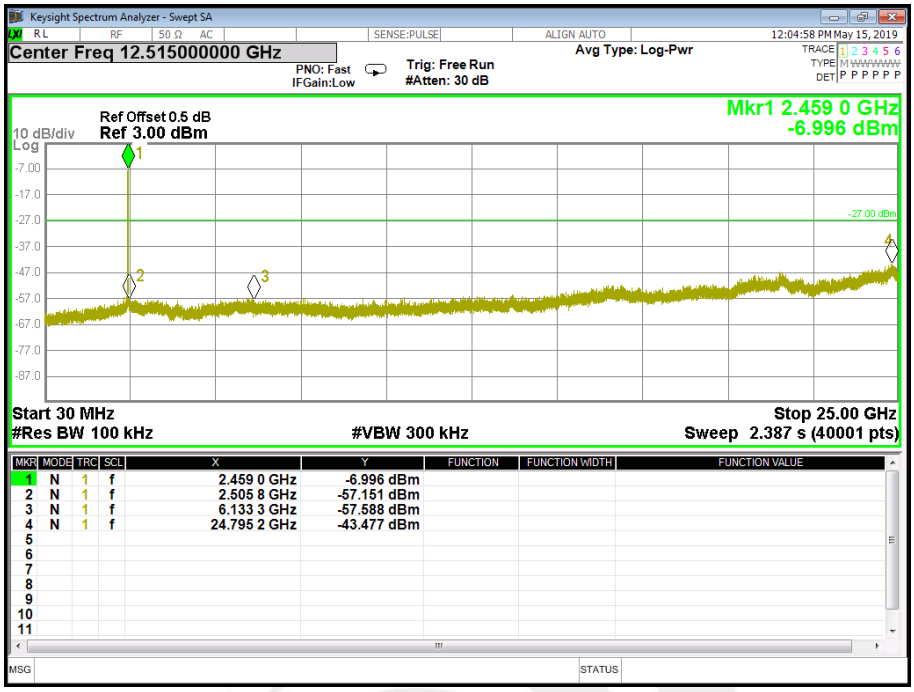
CH 01



CH 06

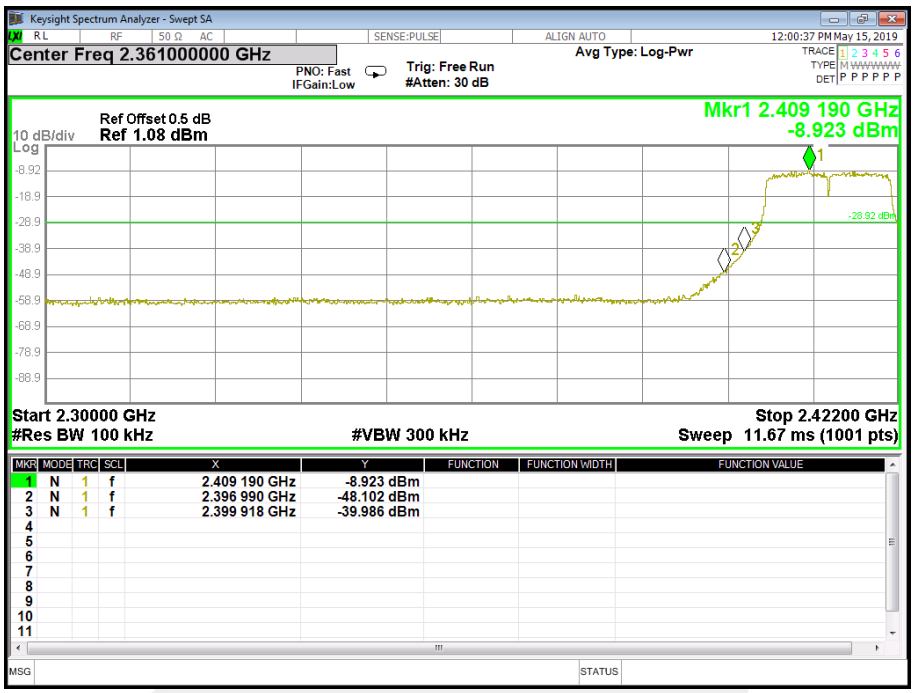


CH 11

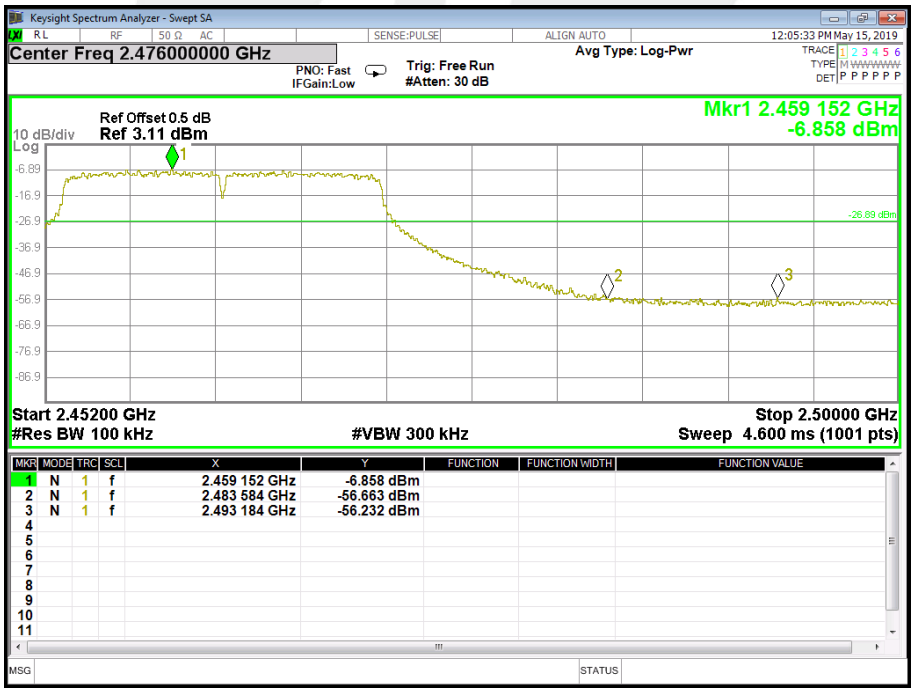

Keysight Spectrum Analyzer - Swept SA
RL RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
12:04:58 PM May 15, 2019
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P P P P P P
Ref Offset 0.5 dB
10 dB/div Ref 3.00 dBm
Log
Mkr1 2.459 0 GHz
-6.996 dBm
-7.00
-17.0
-27.0
-37.0
-47.0
-57.0
-67.0
-77.0
-87.0
-27.00 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 2.459 0 GHz -6.996 dBm
2 N 1 f 2.505 8 GHz -57.151 dBm
3 N 1 f 6.133 3 GHz -57.588 dBm
4 N 1 f 24.795 2 GHz -43.477 dBm
5
6
7
8
9
10
11
MSG
STATUS

Band edge

CH 01



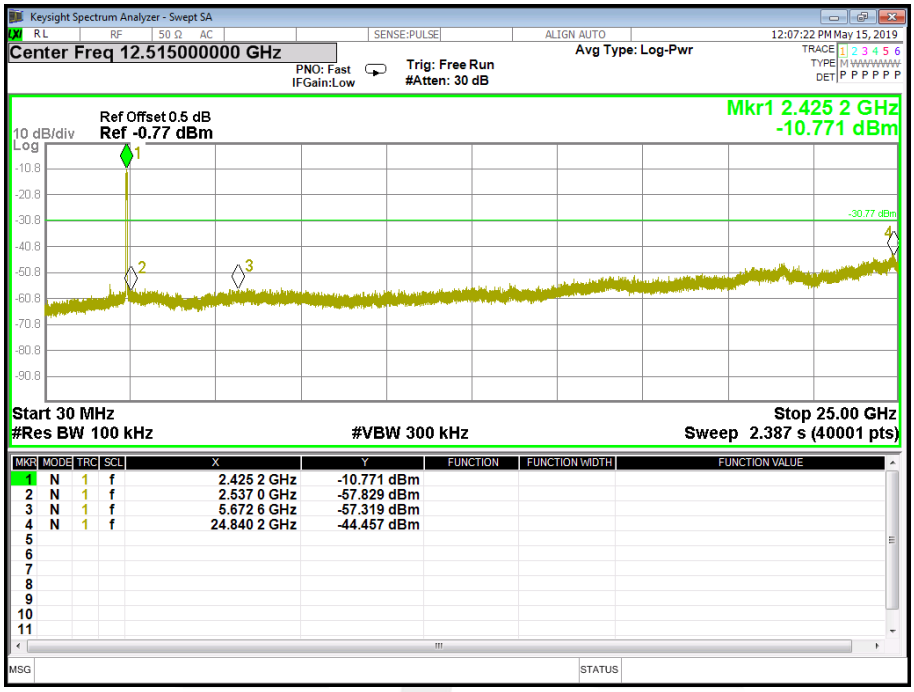
CH 11



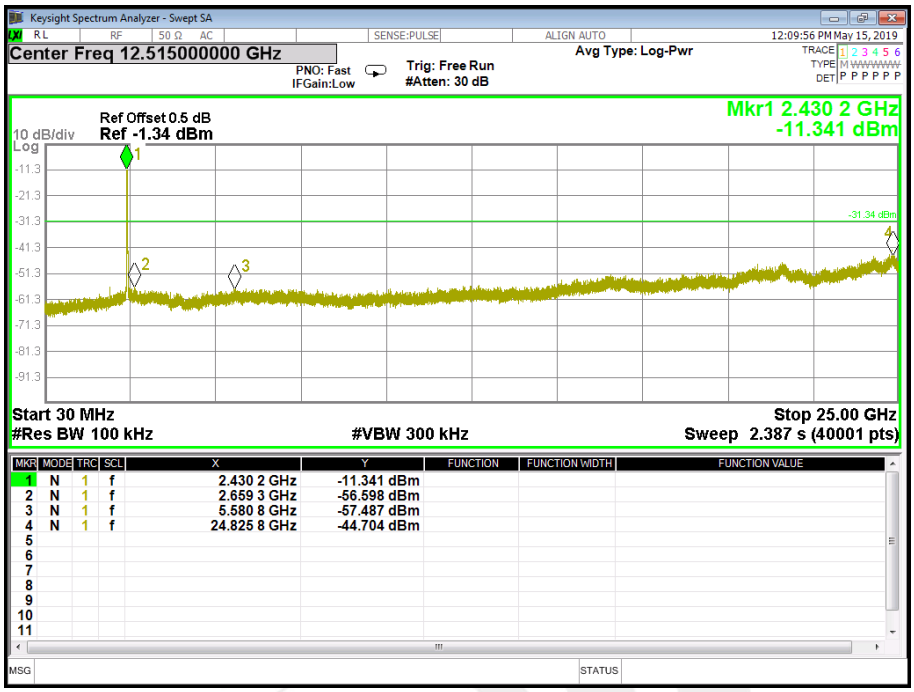
Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(40M) /CH03, CH06, CH09

Antenna A

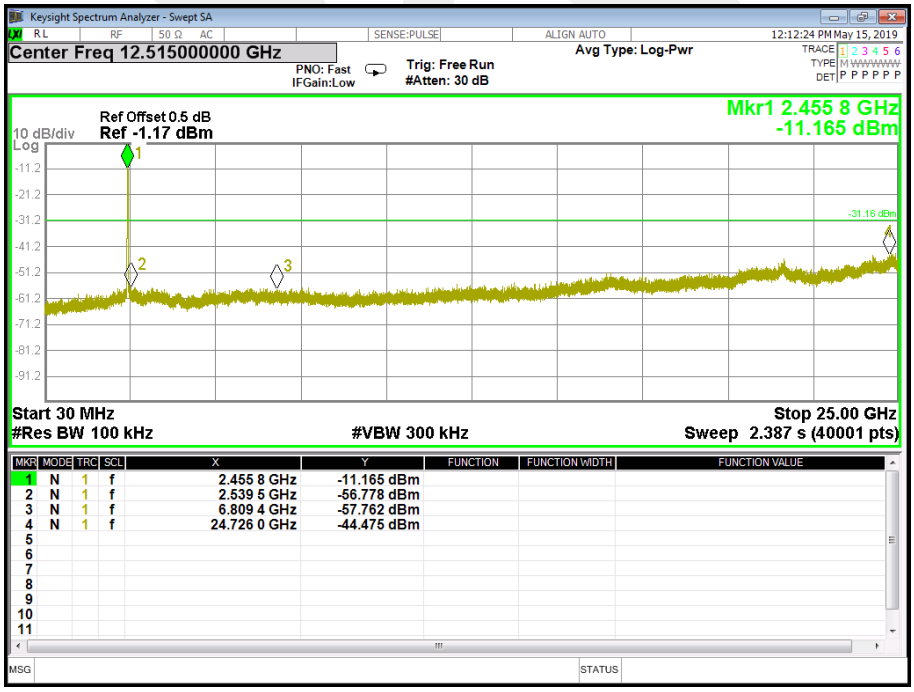
CH 03



CH06

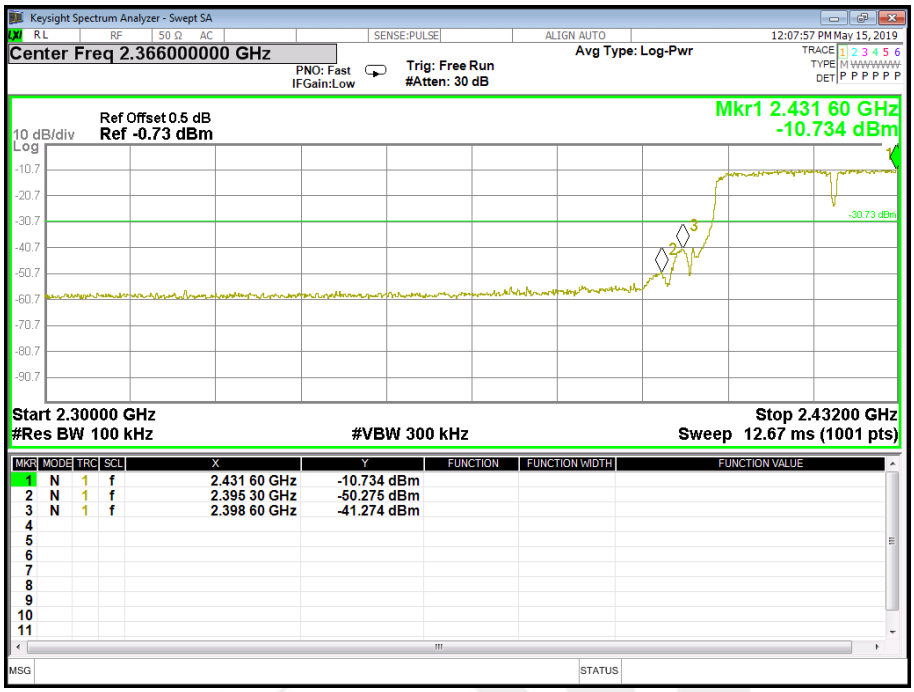

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
12:09:56 PM May 15, 2019
Ref Offset 0.5 dB
10 dB/div
Ref -1.34 dBm
Mkr1 2.430 2 GHz
-11.341 dBm
-31.34 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.430 2 GHz -11.341 dBm
2 N 1 f 2.659 3 GHz -56.598 dBm
3 N 1 f 5.580 8 GHz -57.487 dBm
4 N 1 f 24.825 8 GHz -44.704 dBm

CH09

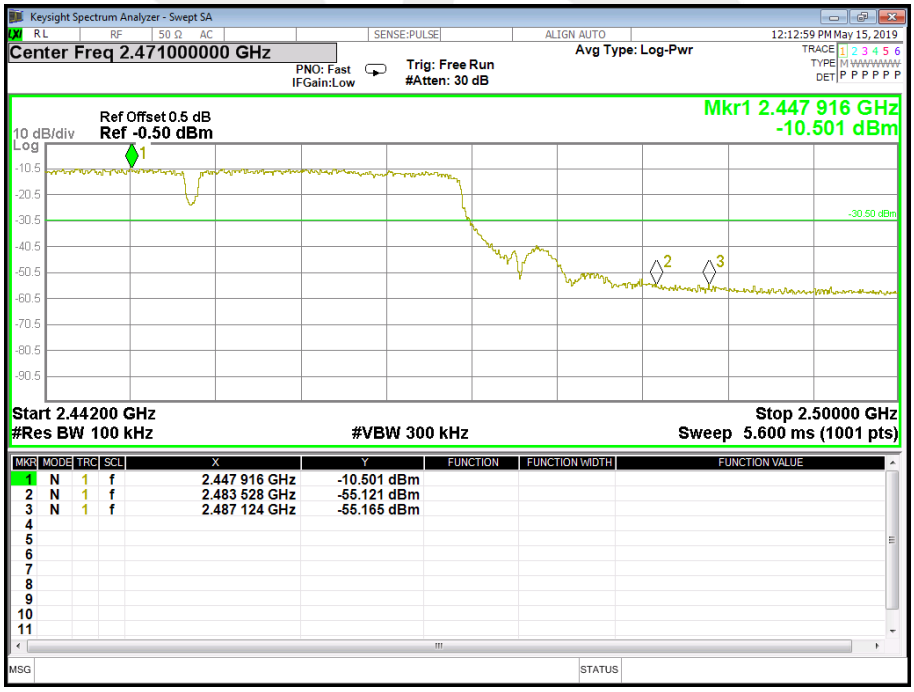

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
12:12:24 PM May 15, 2019
Ref Offset 0.5 dB
10 dB/div
Ref -1.17 dBm
Mkr1 2.455 8 GHz
-11.165 dBm
-31.16 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.455 8 GHz -11.165 dBm
2 N 1 f 2.539 5 GHz -56.778 dBm
3 N 1 f 6.809 4 GHz -57.762 dBm
4 N 1 f 24.726 0 GHz -44.475 dBm

Band edge

CH03



CH 09



5. POWER SPECTRAL DENSITY TEST

5.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	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

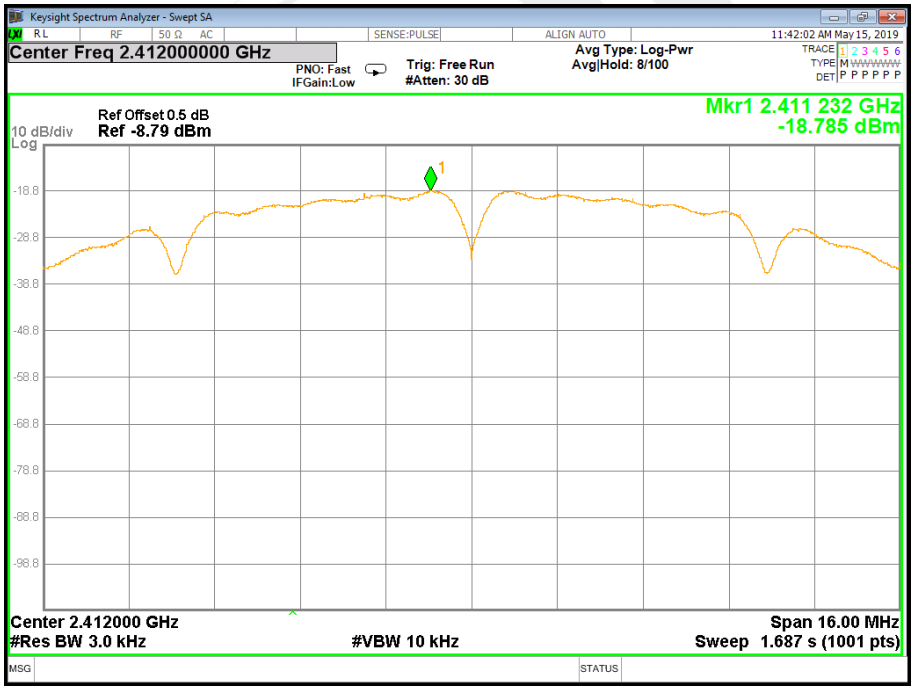
Note:
1.Antenna A Power> Antenna B Power, Both antenna A and B have been test,Only show the worst data of Antenna A

Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX b Mode /CH01, CH06, CH11

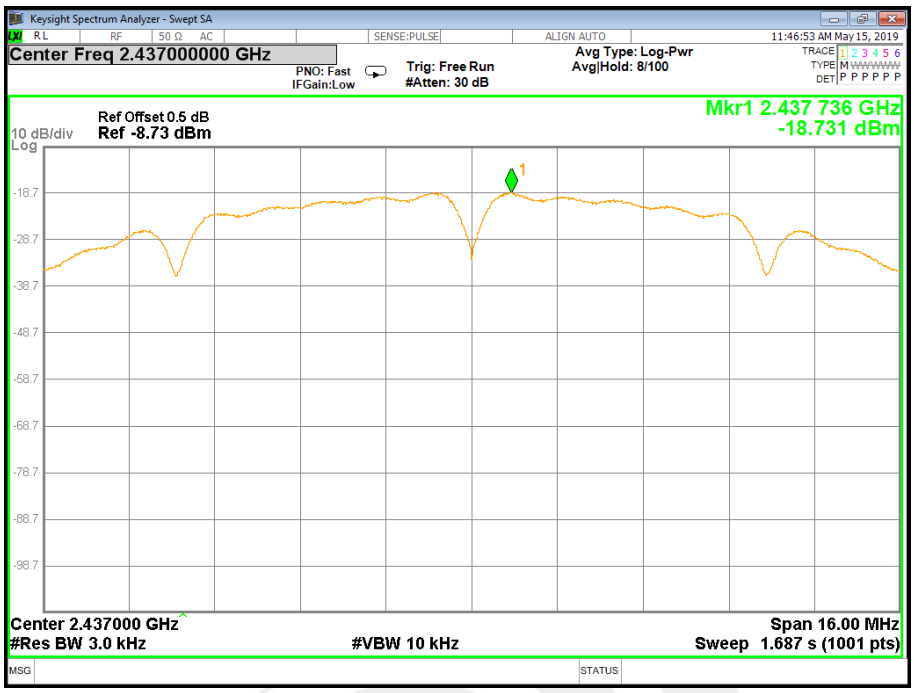
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-18.79	-19.79	--	≤8	PASS
2437	-18.73	-19.65	--	≤8	PASS
2462	-18.88	-19.94	--	≤8	PASS

Antenna A

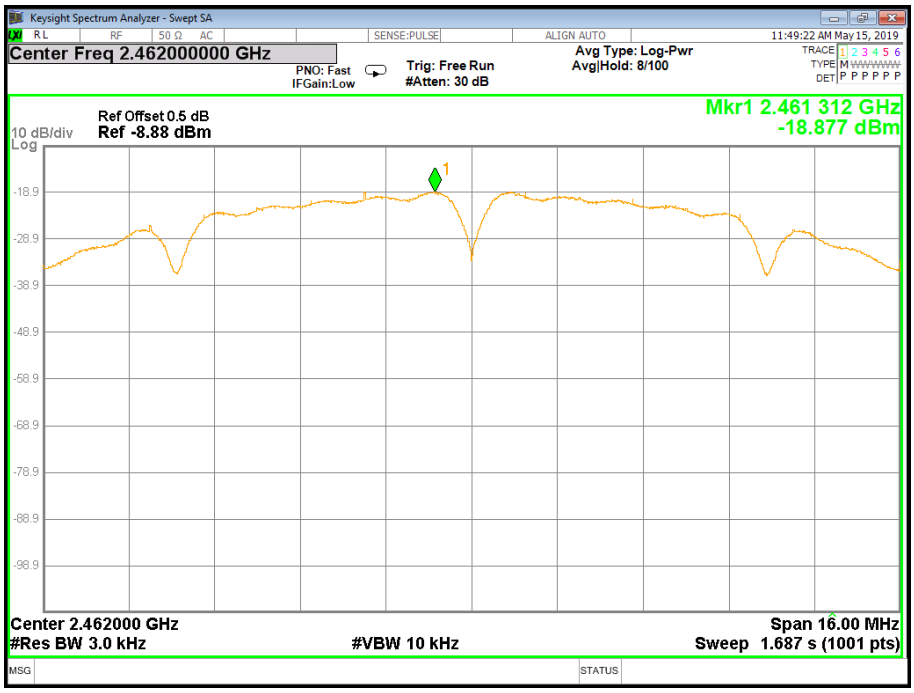
TX CH01



TX CH06



TX CH11

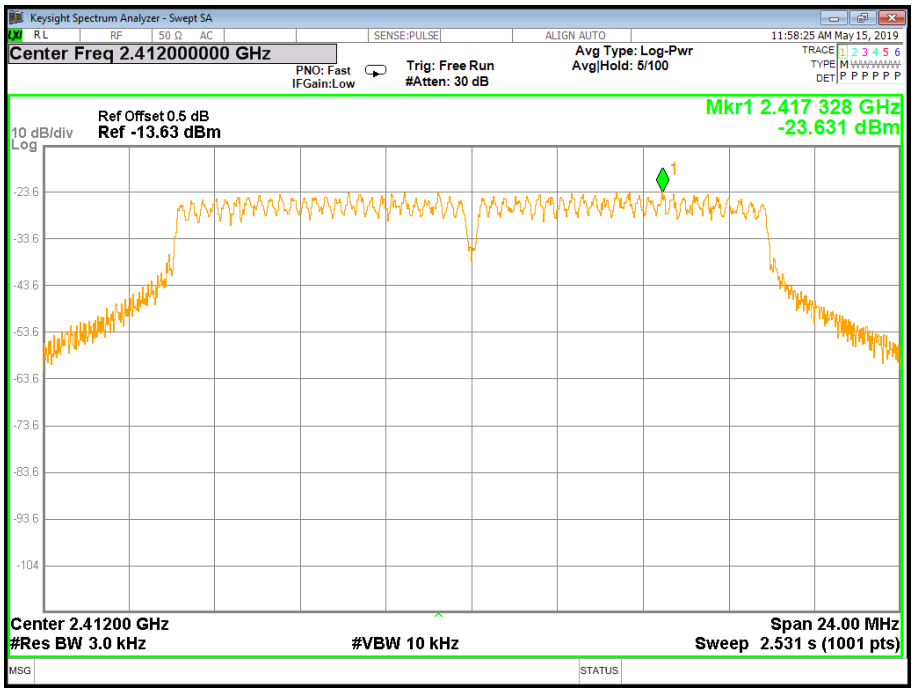


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX g Mode /CH01, CH06, CH11

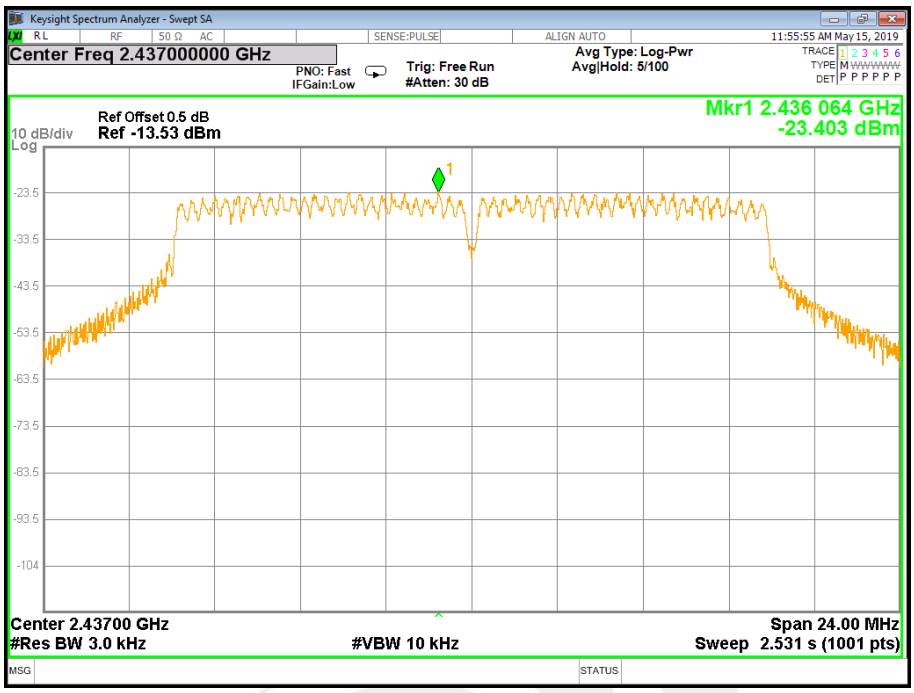
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-23.63	-24.84	--	≤8	PASS
2437	-23.40	-24.61	--	≤8	PASS
2462	-23.46	-24.68	--	≤8	PASS

Antenna A

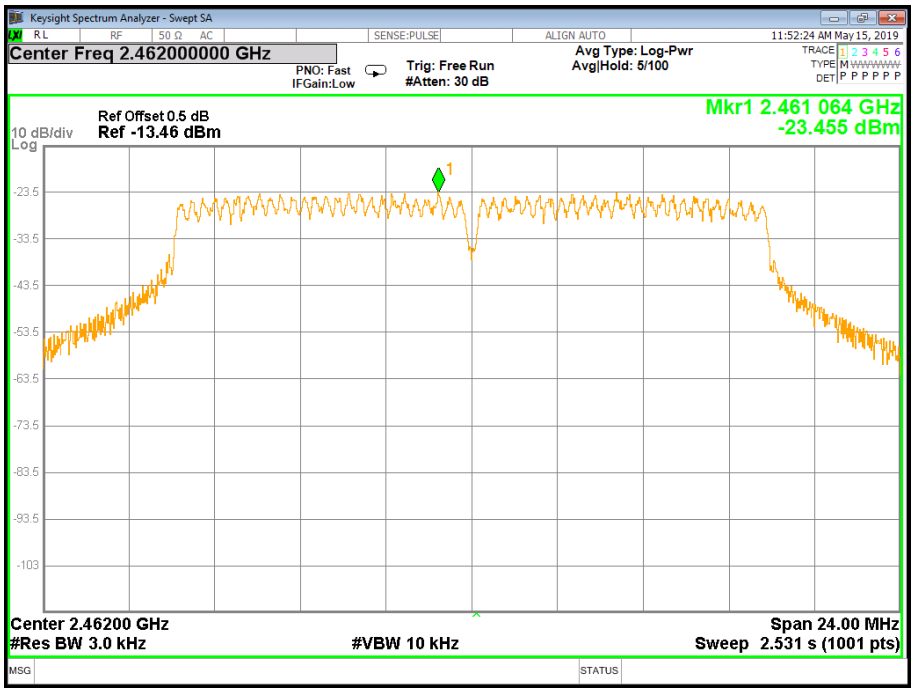
TX CH01



TX CH06



TX CH11

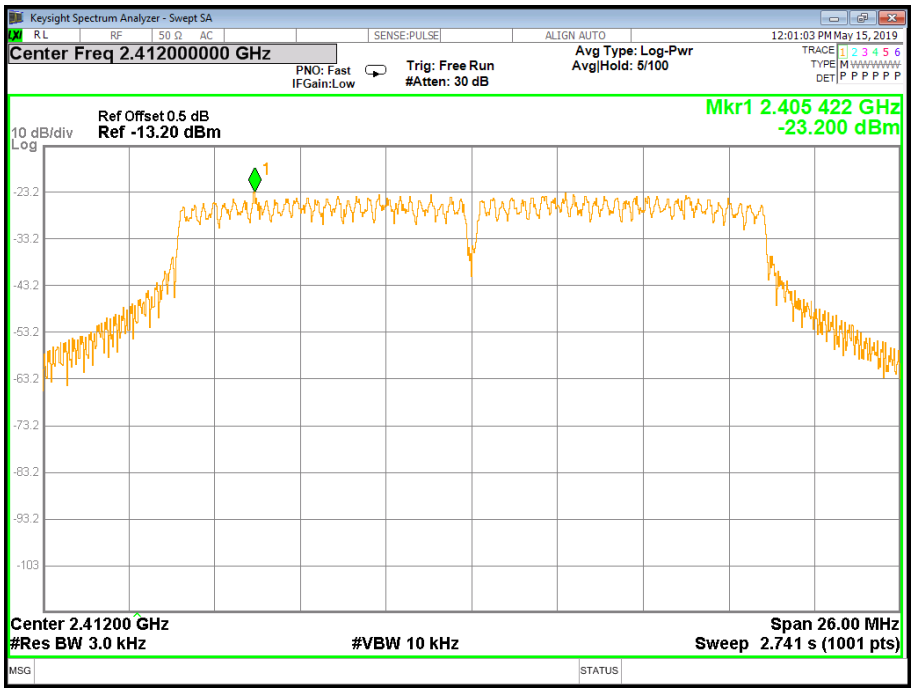


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(20M) /CH01, CH06, CH11

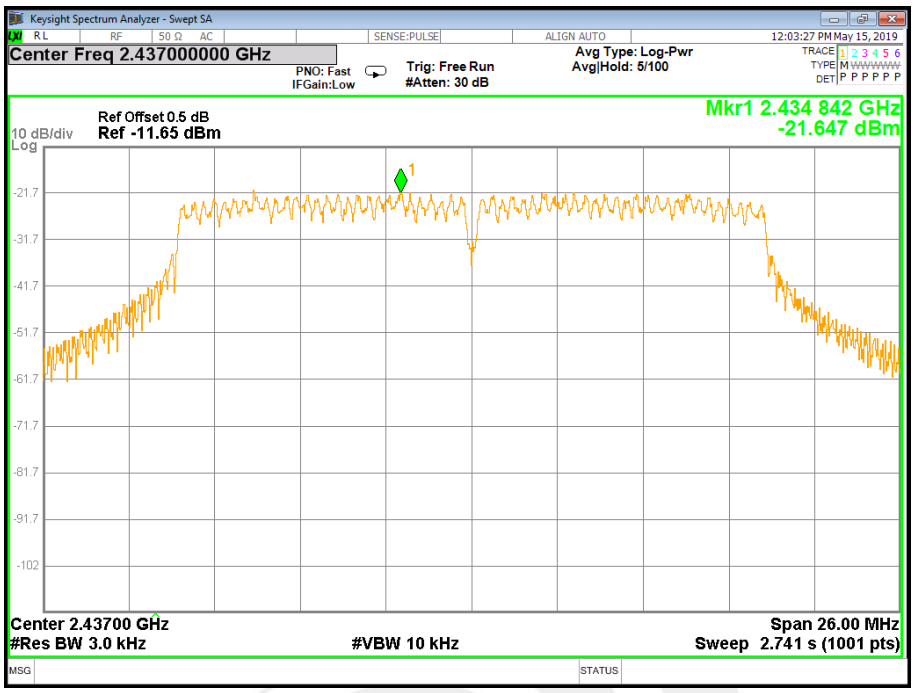
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2412	-23.20	-24.61	-20.84	≤8	PASS
2437	-21.65	-22.67	-19.12	≤8	PASS
2462	-21.21	-22.42	-18.76	≤8	PASS

Antenna A

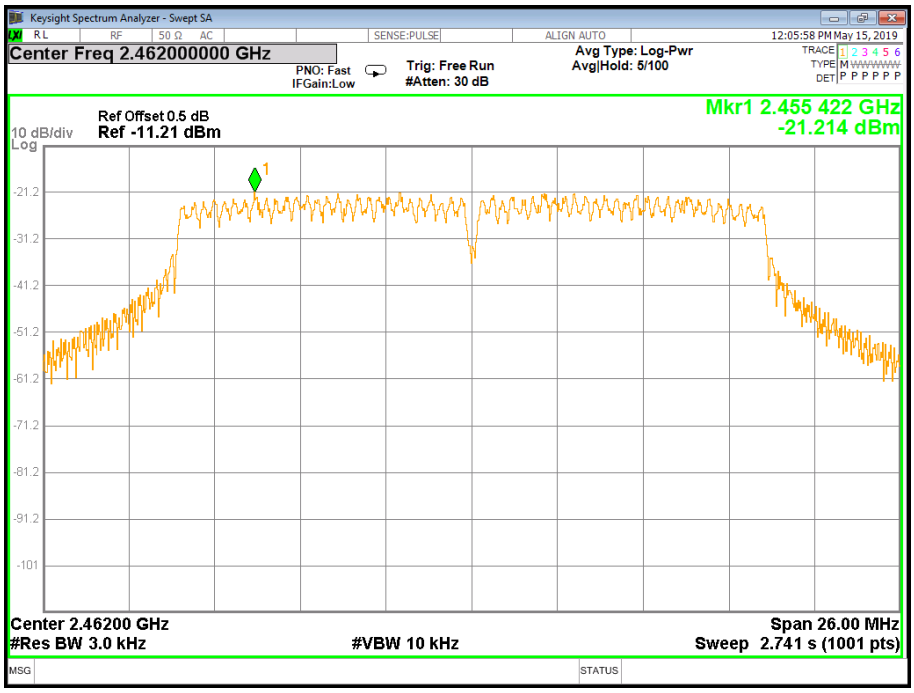
TX CH01



TX CH06



TX CH11

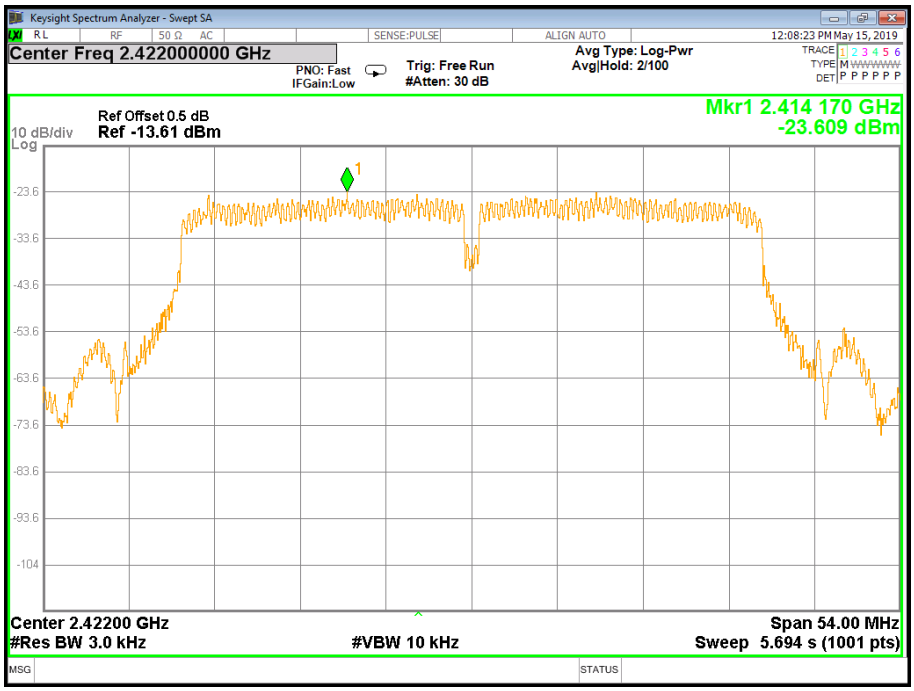


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(40M) /CH03, CH06, CH09

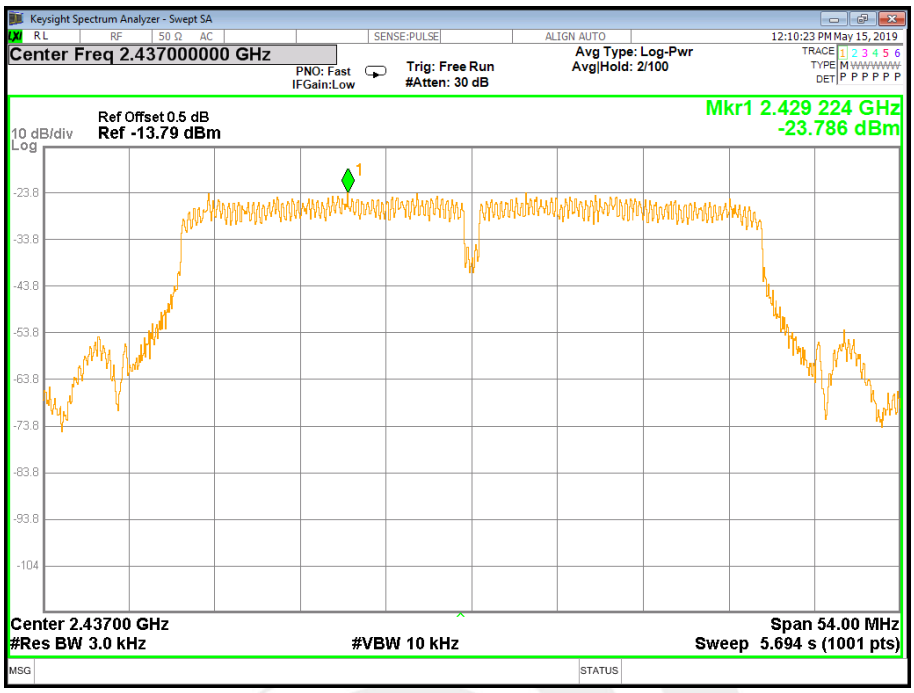
Frequency	Power Density			Limit (dBm)	Result
	ANT A (dBm)	ANT B (dBm)	TOTAL (dBm)		
2422	-23.61	-24.52	-21.03	≤8	PASS
2437	-23.79	-24.81	-21.26	≤8	PASS
2452	-21.59	-22.67	-19.09	≤8	PASS

Antenna A

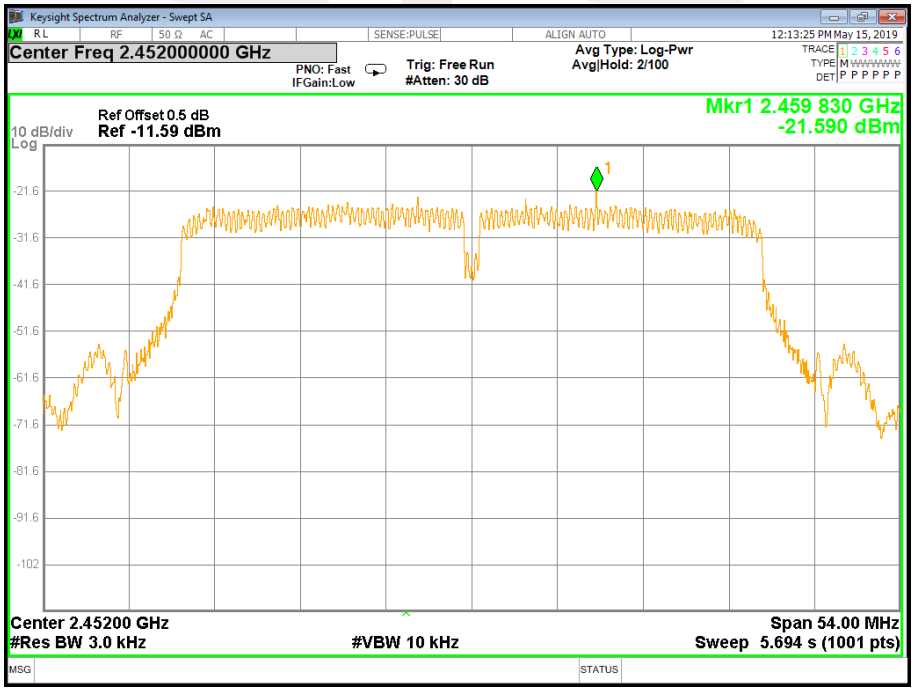
TX CH03



TX CH06



TX CH09



6. BANDWIDTH TEST

6.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	≥500KHz (6dB bandwidth)	2400-2483.5	PASS

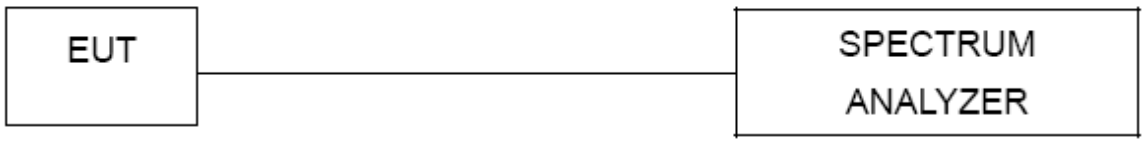
6.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be≥6 dB.

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

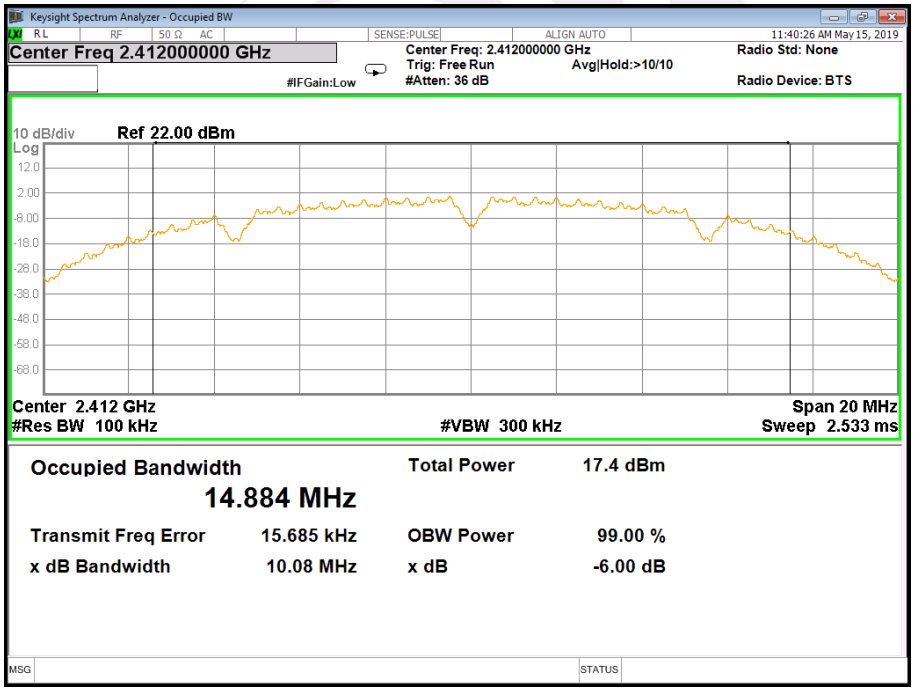
Note: Antenna A Power> Antenna B Power, Both antenna A and B have been test,Only show the worst data of Antenna A

Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX b Mode /CH01, CH06, CH11

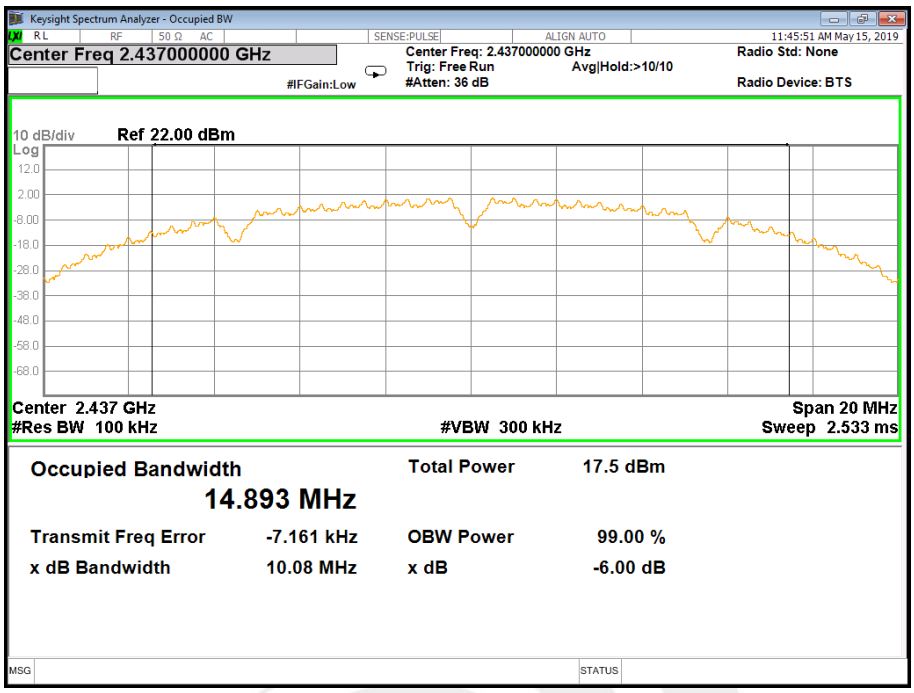
Frequency	6dB Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B		
2412 MHz	10.08	10.07	≥500KHz	PASS
2437 MHz	10.08	10.04	≥500KHz	PASS
2462 MHz	10.08	10.05	≥500KHz	PASS

Antenna A

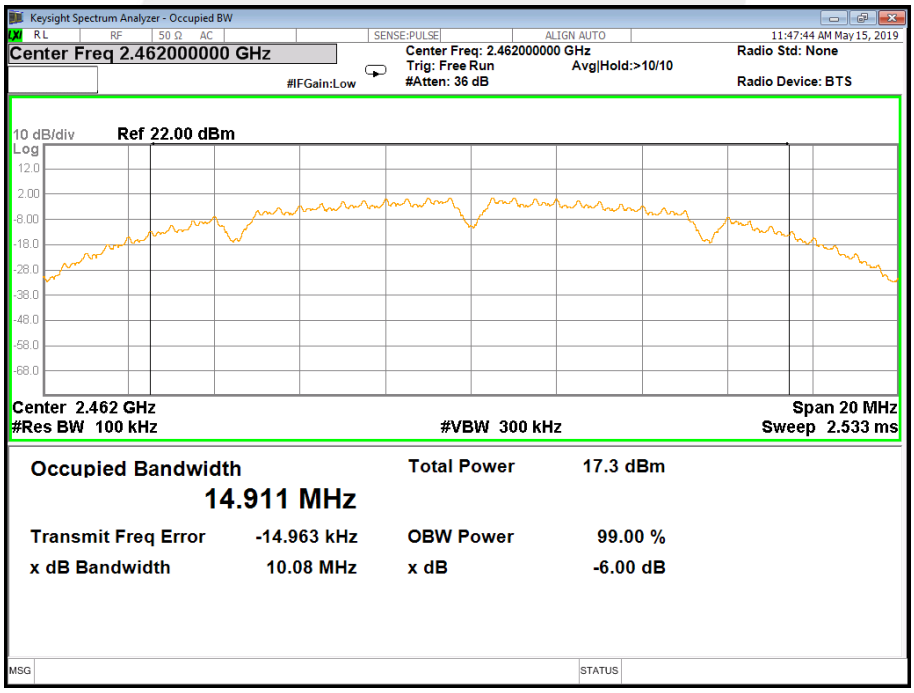
TX CH 01



TX CH 06



TX CH 11

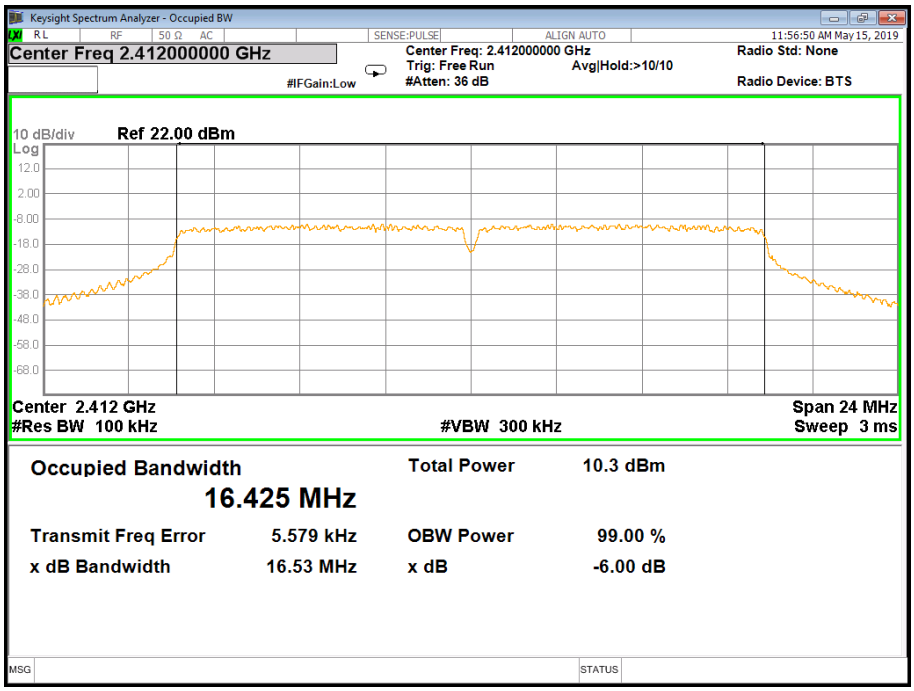


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX g Mode /CH01, CH06, CH11

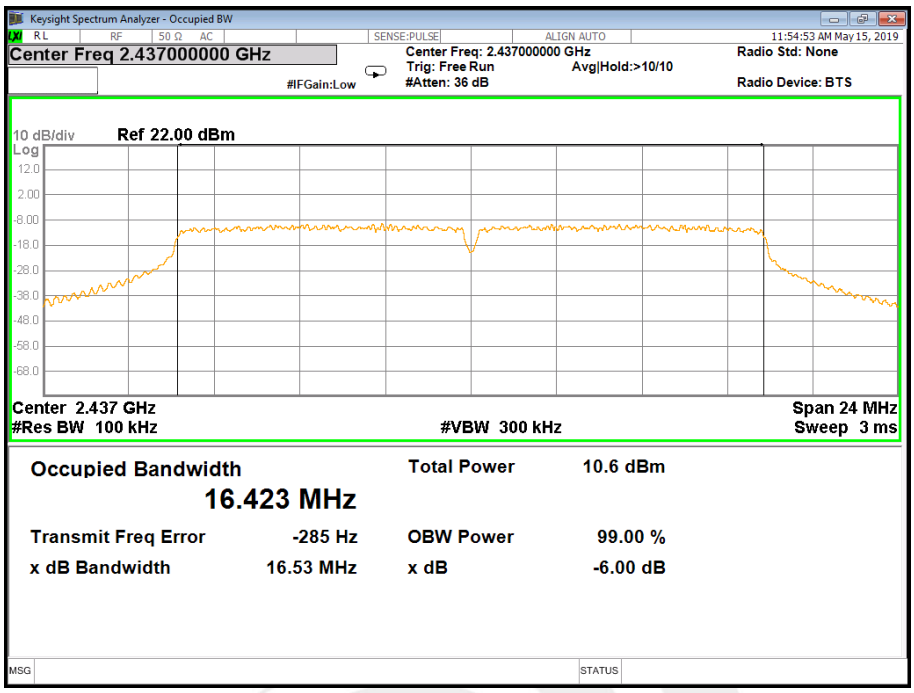
Frequency	6dB Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B		
2412 MHz	16.53	16.49	≥500KHz	PASS
2437 MHz	16.53	16.51	≥500KHz	PASS
2462 MHz	16.52	16.50	≥500KHz	PASS

Antenna A

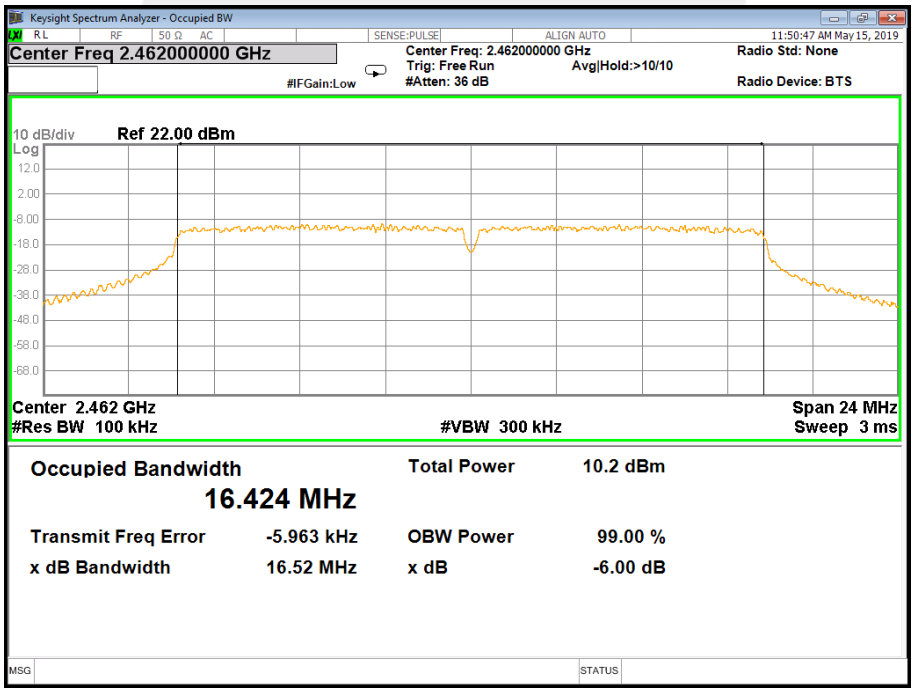
TX CH 01



TX CH 06



TX CH 11

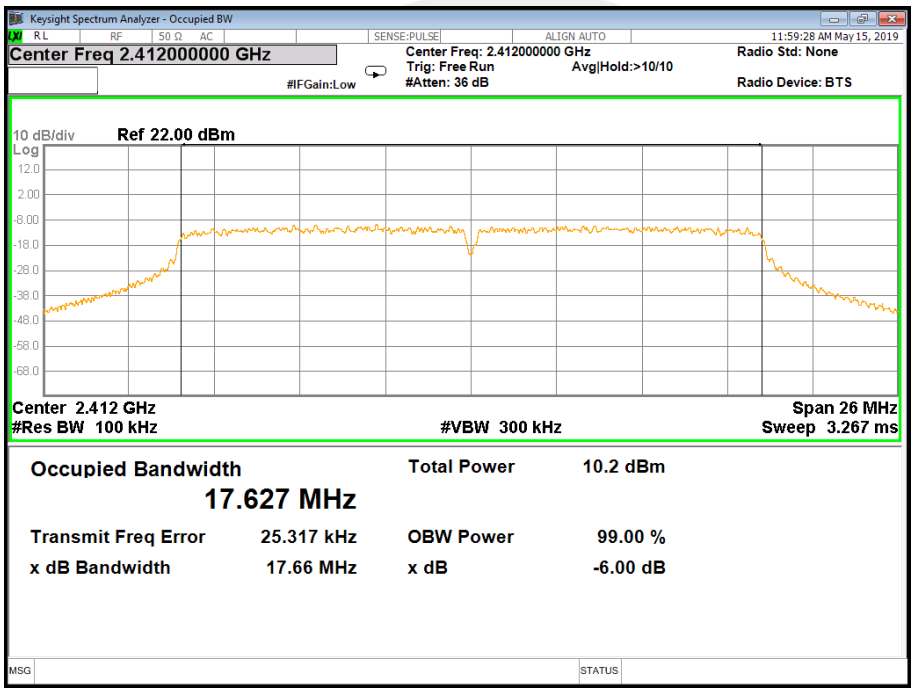


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(20M) /CH01, CH06, CH11

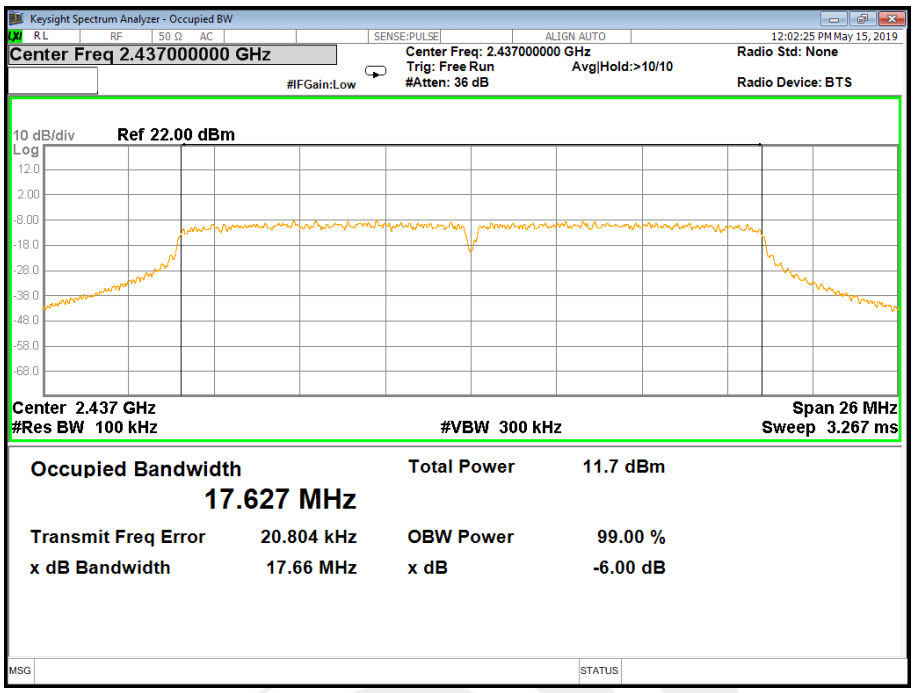
Frequency	6dB Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B		
2412 MHz	17.66	17.65	≥500KHz	PASS
2437 MHz	17.66	17.63	≥500KHz	PASS
2462 MHz	17.66	17.64	≥500KHz	PASS

Antenna A

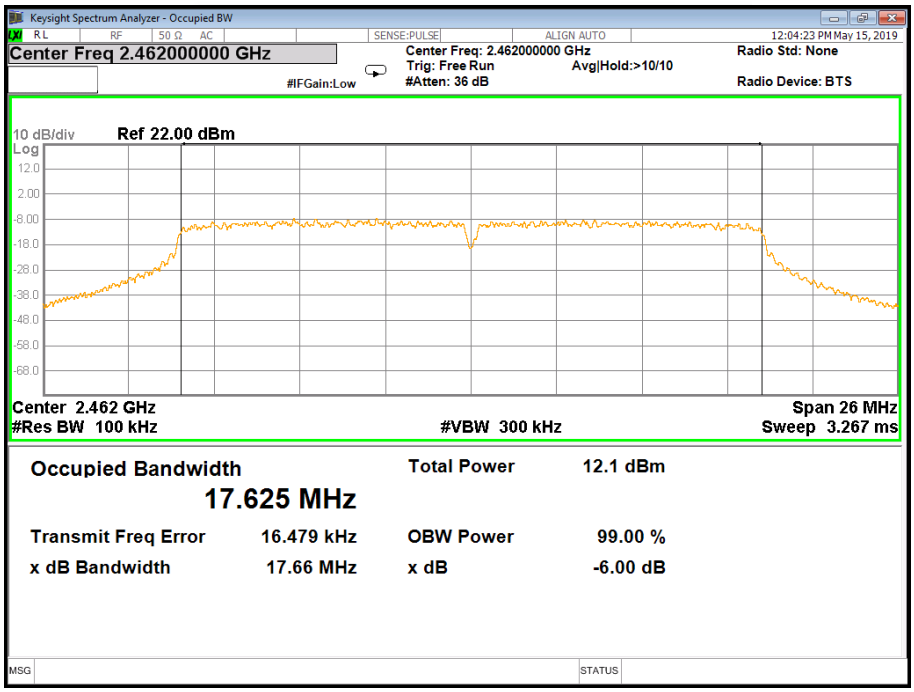
TX CH 01



TX CH 06



TX CH 11

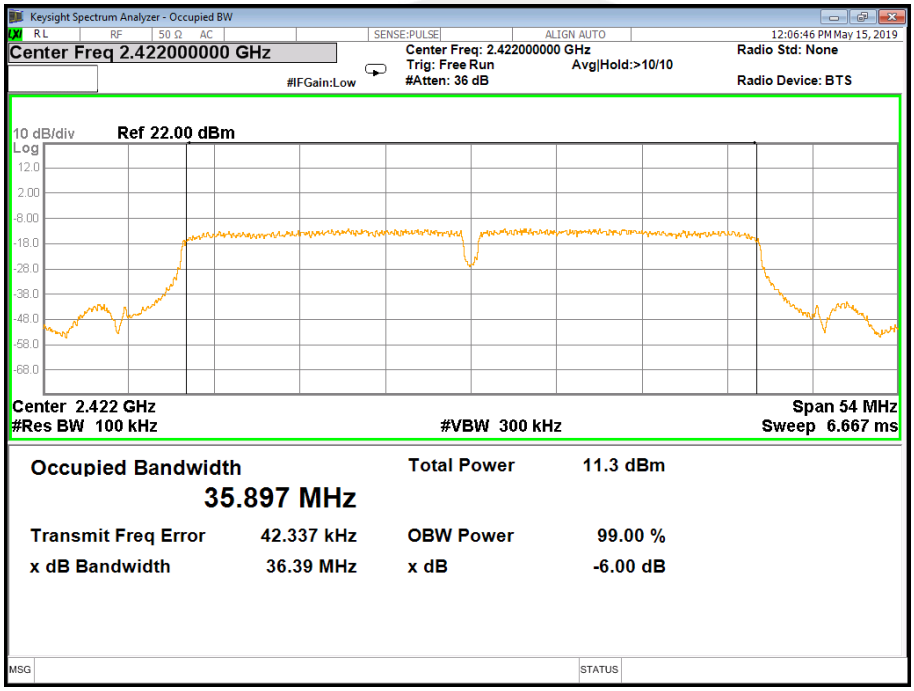


Temperature :	25 ℃	Relative Humidity :	60%
Test Voltage :	DC 5V	Test Mode :	TX n Mode(40M) /CH03, CH06, CH09

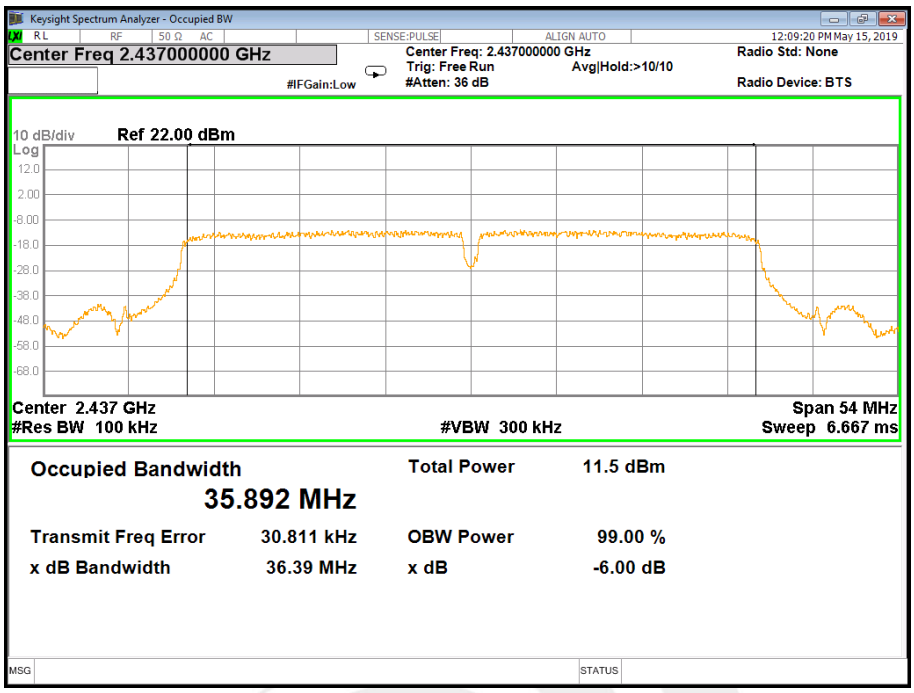
Frequency	6dB Bandwidth (MHz)		Channel Separation (KHz)	Result
	ANTENNA -A	ANTENNA -B		
2422 MHz	36.39	36.35	≥500KHz	PASS
2437 MHz	36.39	36.37	≥500KHz	PASS
2452 MHz	36.39	36.35	≥500KHz	PASS

Antenna A

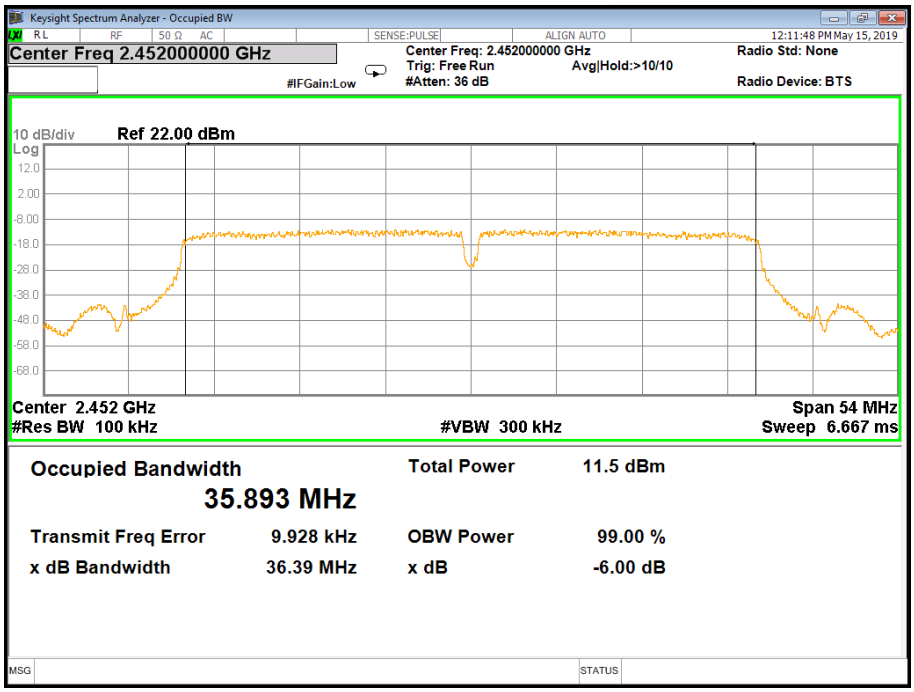
TX CH 03



TX CH 06



TX CH 09



7. PEAK OUTPUT POWER TEST

7.1 LIMIT

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

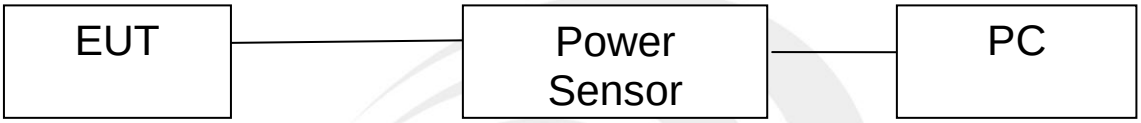
7.2 TEST PROCEDURE

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 :	DC 5V		

Power

TX 802.11b Mode								
Test Channe	Frequency	PK Powe ANT A	PK Powe ANT B	PK Powe 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	6.72	5.32	--	4.61	3.31	--	30
CH06	2437	6.74	5.47	--	4.57	3.28	--	30
CH11	2462	6.40	5.16	--	4.27	3.11	--	30

TX 802.11g Mode								
Test Channe	Frequency	PK Powe ANT A	PK Powe ANT B	PK Powe 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	9.08	8.12	--	-0.23	-1.28	--	30
CH06	2437	9.03	8.21	--	-0.30	-1.57	--	30
CH11	2462	8.72	8.08	--	-0.55	-1.69	--	30

TX 802.11n20 Mode								
Test Channe	Frequency	PK Powe ANT A	PK Powe ANT B	PK Powe 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	7.33	5.17	9.39	-0.42	-1.58	2.05	30
CH06	2437	7.18	5.43	9.40	-0.36	-1.62	2.07	30
CH11	2462	7.15	5.64	9.47	-0.68	-1.87	1.78	30

TX 802.11n40 Mode								
Test Channe	Frequency	PK Powe ANT A	PK Powe ANT B	PK Powe 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	6.97	5.52	9.32	-0.92	-1.83	1.66	30
CH06	2437	6.89	5.37	9.21	-0.99	-2.01	1.54	30
CH09	2452	6.65	5.24	9.01	-1.17	-2.43	1.26	30

8. ANTENNA REQUIREMENT

8.1 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.

8.2 EUT ANTENNA

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

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※※※※※

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