Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 Fax: +86-755-26636041

FCC PART 15 SUBPART C TEST REPORT

Part 15.247

Report Reference No.....:	**CTL1604271477-WF01**
Compiled by (position+printed name+signature) .:	File administrators Jacky Chen
Name of the organization performing the tests (position+printed name+signature) .:	Test Engineer Tracy Qi
Approved by (position+printed name+signature) .:	Manager Tracy Qi
Date of issue.....:	July 08, 2016
Test Laboratory Name .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address .....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Applicant's name.....:	**Bright Beacon (Beijing) Technology Co., LTD**
Address .....:	B340, Ming You Industrious Purchasing Center, Xixiang Baoyuan Rd., Bao'an Dis., Shenzhen, China
Test specification:	
Standard .....:	FCC Part 15.247: Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
TRF Originator.....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF.....:	Dated 2011-01

Test item description .....:	CloudBeacon
FCC ID……..:	**2AERL-ZS-0007-3-1**
Trade Mark .....:	CloudBeacon
Model/Type reference .....:	ZS-0007-3-1
Modulation .....:	802.11b DSSS, 802.11g/n: OFDM
Work Frequency Range .....:	802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz): 2422~2452
Antenna Type .....:	Internal Antenna
Antenna Gain.....:	2.5dBi
Result .....:	**Positive**

TEST REPORT

Test Report No. :	CTL1604271477-WF01	July 08, 2016 Date of issue

Equipment under Test	:	CloudBeacon
Model /Type	:	ZS-0007-3-1
Applicant	:	**Bright Beacon (Beijing) Technology Co., LTD**
Address	:	B340, Ming You Industrious Purchasing Center, Xixiang Baoyuan Rd., Bao'an Dis., Shenzhen, China
Manufacturer	:	**Bright Beacon (Beijing) Technology Co., LTD**
Address	:	B340, Ming You Industrious Purchasing Center, Xixiang Baoyuan Rd., Bao'an Dis., Shenzhen, China

Test Result according to the standards on page 4:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

ANSI C63.4-2014

KDB Publication No. 558074 D01 v03r03 Guidance on Measurements for Digital Transmission Systems

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	June 23, 2016
Testing commenced on	:	June 23, 2016
Testing concluded on	:	July 08, 2016

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	●	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		○	Other (specified in blank below)		

Description of the test mode

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

IEEE 802.11n (HT40)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
3	2422	8	2447
4	2427	9	2452
5	2432		
6	2437		
7	2442		

2.3. Short description of the Equipment under Test (EUT)

Name of EUT	CloudBeacon
Model Number	ZS-0007-3-1
Antenna Type	Internal

WIFI	
Operation frequency	802.11b/g/n(HT20):2412MHz-2462MHz (SISO mode) 802.11n(HT40):2422-2452MHz (MIMO mode)
Modulation Type	802.11b DSSS, 802.11g/n: OFDM
Channel number:	802.11b/802.11g/802.11n(HT20): 11 802.11n(HT40):7
Channel separation:	5MHz

Note: This report is only for WIFI function.

Directional gain of MIMO mode:
2.5+10log 2=5.51dBi

2.4. EUT operation mode

Test Mode:

1. The EUT has been tested under normal operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel low (2412MHz), mid (2437MHz) and high (2462MHz) for 802.11b/g/n(HT20) and Channel low (2422MHz), mid (2437MHz) and high (2452MHz) for 802.11 n HT40 with highest data rate are chosen for full testing.
3. Test Mode:

Test Mode(TM)	Description	Remark
1	Transmitting	802.11 b 2412MHz, 2437MHz, 2462MHz
2	Transmitting	802.11 g 2412MHz, 2437MHz, 2462MHz
3	Transmitting	802.11 n HT20 2412MHz, 2437MHz, 2462MHz
4	Transmitting	802.11 n HT40 2422MHz, 2437MHz, 2452MHz

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

○ - supplied by the manufacturer

● - supplied by the lab

○ AC adapter Manufacturer : Guandexin
Model No. : GDP06BV-0501000-3C

● Notebook PC(FCC DOC Approval) Manufacturer : DELL
Model No. : PP18L

2.6. NOTE

1. The EUT is a CloudBeacon,The functions of the EUT listed as below:

	Test Standards	Reference Report
WLAN 802.11b/g, 802.11n	FCC Part 15 Subpart C (Section15.247)	CTL1604271477-WF01
	FCC Per 47 CFR 2.1091(b)	CTL1410302624-WM

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
802.11b	√	—	—	—
802.11g	√	—	—	—
802.11n(20MHz)	√	—	—	—
802.11n(40MHz)	√	—	—	—

3. The EUT incorporates a MIMO function,Physically,the EUT provides two completed transmitter and two completed receivers.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCCID: 2AERL-ZS-0007-3-1 filing to comply with of the FCC part15.247 Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 (2013) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

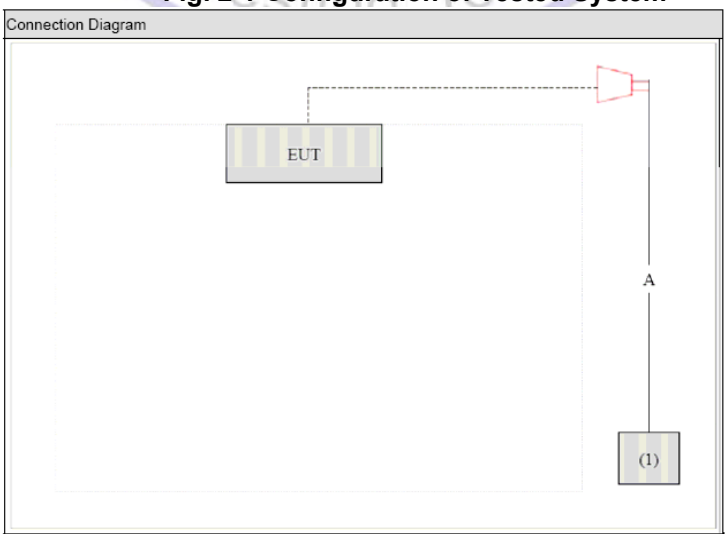
3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Signal Cable Type		Signal cable Description
A	Coaxial Cable	Shielded, >5m

3.5. Duty Cycle

Operated Mode for Worst Duty Cycle		
☐ Operated normally mode for worst duty cycle		
☒ Operated test mode for worst duty cycle		
Mode	Duty Cycle (%)	Duty Factor (dB)
11b	100	0
11g	100	0
11n HT20	100	0
11n HT40	100	0

3.6. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~12.75GHz	4.32dB	(1)
Radiated Emission	12.75GHz-25 GHz	4.68dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.7. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-ROADBAND ANTENNA	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	Daze	ZN30900A	N/A	2016/05/19	2017/05/18
LISN	R&S	ENV216	3560.6550.12	2016/06/02	2017/06/01
LISN	R&S	ESH2-Z5	860014/010	2016/06/02	2017/06/01
ISN	FCC	F-071115-1057-1-09	11229	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2016/06/02	2017/06/01
Radio Communication Tester	R&S	CMU200	115419	2016/05/22	2017/05/21
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2016/05/20	2017/05/19
Power Meter	Agilent	U2531A	TW53323507	2016/05/21	2017/05/20
Power Sensor	Agilent	U2021XA	MY5365004	2016/05/21	2017/05/20
Climate Chamber	ESPEC	EL-10KA	A20120523	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
RF Cable	HUBER+SUHNER	RG214	N/A	2016/05/20	2017/05/19

3.8. Summary of Test Result

FCC PART 15		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
AC Power Conducted Emission	Normal Link	11 Mbps	1
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
	11n(20MHz)/OFDM	65Mbps	1/6/11
	11n(40MHz)/OFDM	150Mbps	3/6/9
Radiated Emission 30MHz~1GHz	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
	11n(20MHz)/OFDM	65Mbps	1/6/11
	11n(40MHz)/OFDM	150Mbps	3/6/9
Radiated Emission 1GHz~10th Harmonic	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
	11n(20MHz)/OFDM	65Mbps	1/6/11
	11n(40MHz)/OFDM	150Mbps	3/6/9
Band Edge Compliance of RF Emission	11b/DSSS	11 Mbps	1/11
	11g/OFDM	54 Mbps	1/11
	11n(20MHz)/OFDM	65Mbps	1/11
	11n(40MHz)/OFDM	150Mbps	3/9

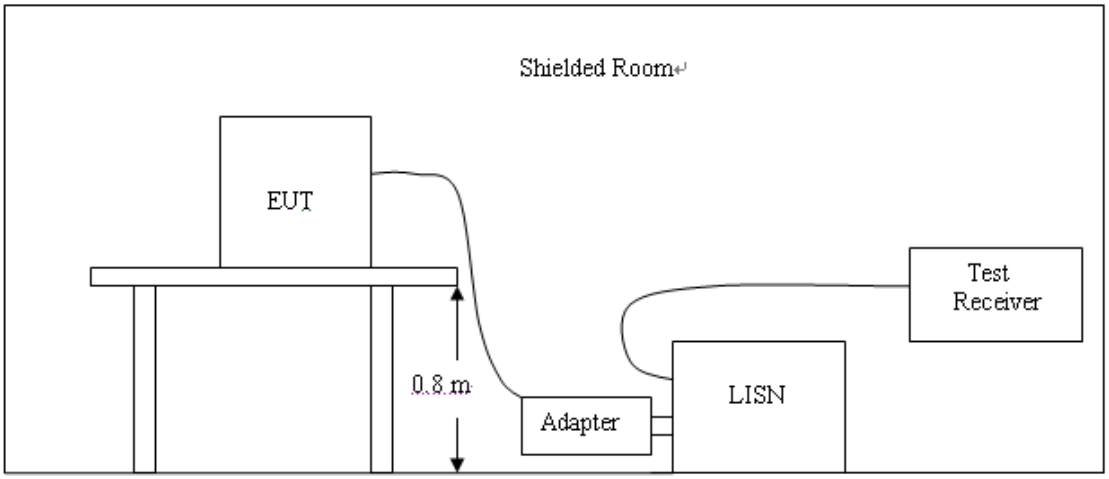
Note1: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

Note2: This device use MIMO 2X2 antennas, for 802.11b/g mode, based exploratory test, when transmit with Antenna 1 have worse emissions, so the final radiated spurious emissions were tested with Antenna 1. For 802.11n mode, all the radiated spurious emissions and band edge test were performed with two antennas transmit synchronous.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμv)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

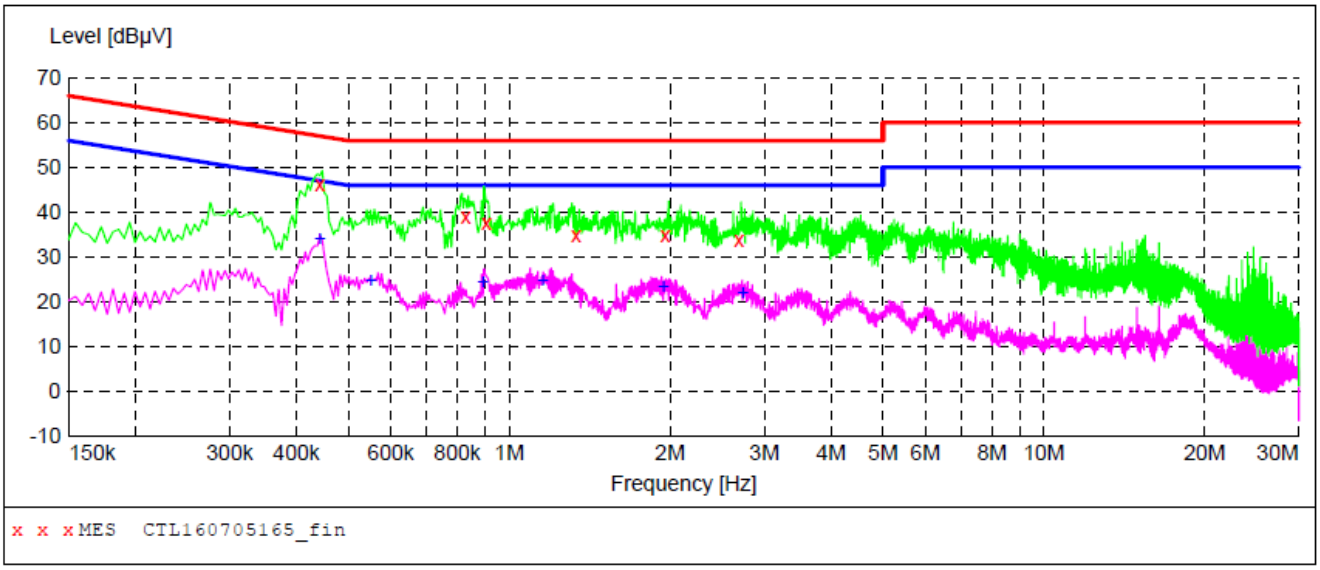
1. Please follow the guidelines in ANSI C63.4-2014
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

The RBW/VBW for 150KHz to 30MHz: 9KHz

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL160705165_fin"

7/5/2016 8:24PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.442501	46.30	10.2	57	10.7	QP	N	GND
0.829501	38.90	10.2	56	17.1	QP	N	GND
0.906001	37.60	10.2	56	18.4	QP	N	GND
1.333501	34.80	10.3	56	21.2	QP	N	GND
1.959001	34.90	10.3	56	21.1	QP	N	GND
2.692501	33.80	10.4	56	22.2	QP	N	GND

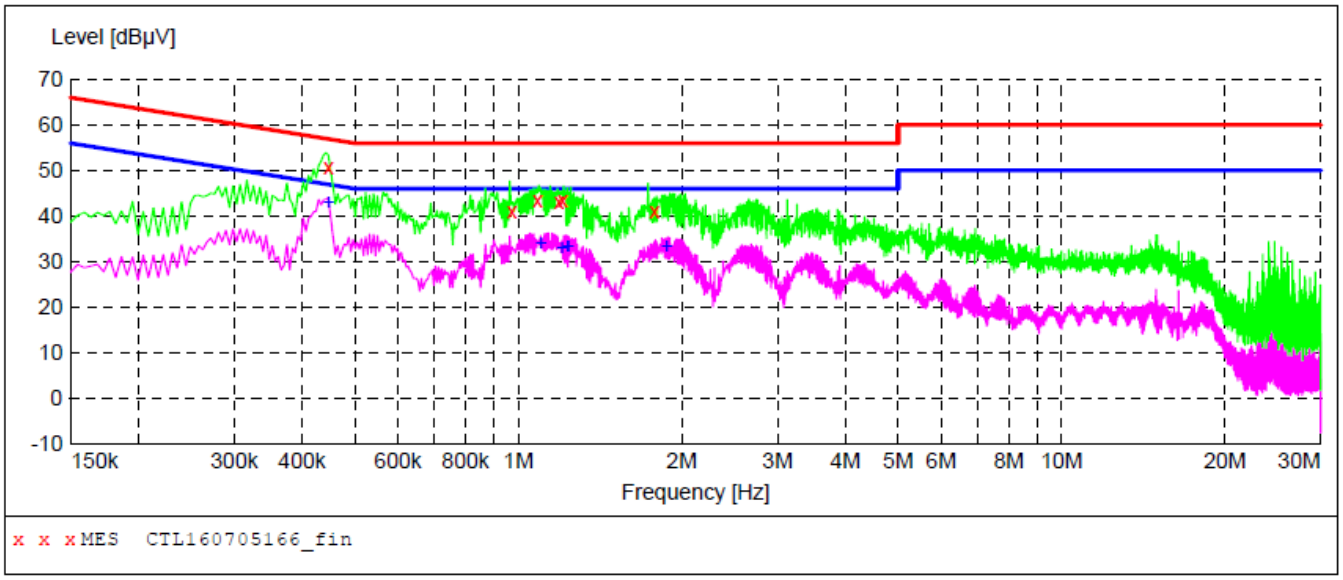
MEASUREMENT RESULT: "CTL160705165_fin2"

7/5/2016 8:24PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.442501	34.10	10.2	47	12.9	AV	N	GND
0.550501	24.80	10.2	46	21.2	AV	N	GND
0.892501	24.60	10.2	46	21.4	AV	N	GND
1.153501	24.80	10.3	46	21.2	AV	N	GND
1.941001	23.30	10.3	46	22.7	AV	N	GND
2.733001	22.20	10.4	46	23.8	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL160705166_fin"

7/5/2016 8:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.447001	50.60	10.2	57	6.3	QP	L1	GND
0.973501	41.10	10.3	56	14.9	QP	L1	GND
1.086001	43.40	10.3	56	12.6	QP	L1	GND
1.189501	43.10	10.3	56	12.9	QP	L1	GND
1.207501	43.30	10.3	56	12.7	QP	L1	GND
1.779001	41.10	10.3	56	14.9	QP	L1	GND

MEASUREMENT RESULT: "CTL160705166_fin2"

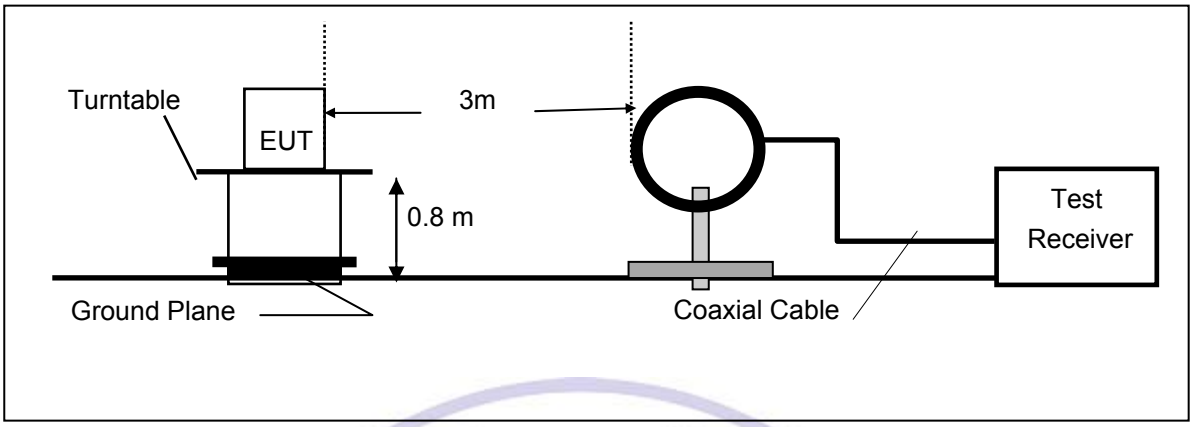
7/5/2016 8:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.447001	43.10	10.2	47	3.8	AV	L1	GND
1.099501	34.10	10.3	46	11.9	AV	L1	GND
1.203001	33.20	10.3	46	12.8	AV	L1	GND
1.230001	33.30	10.3	46	12.7	AV	L1	GND
1.234501	33.40	10.3	46	12.6	AV	L1	GND
1.873501	33.50	10.3	46	12.5	AV	L1	GND

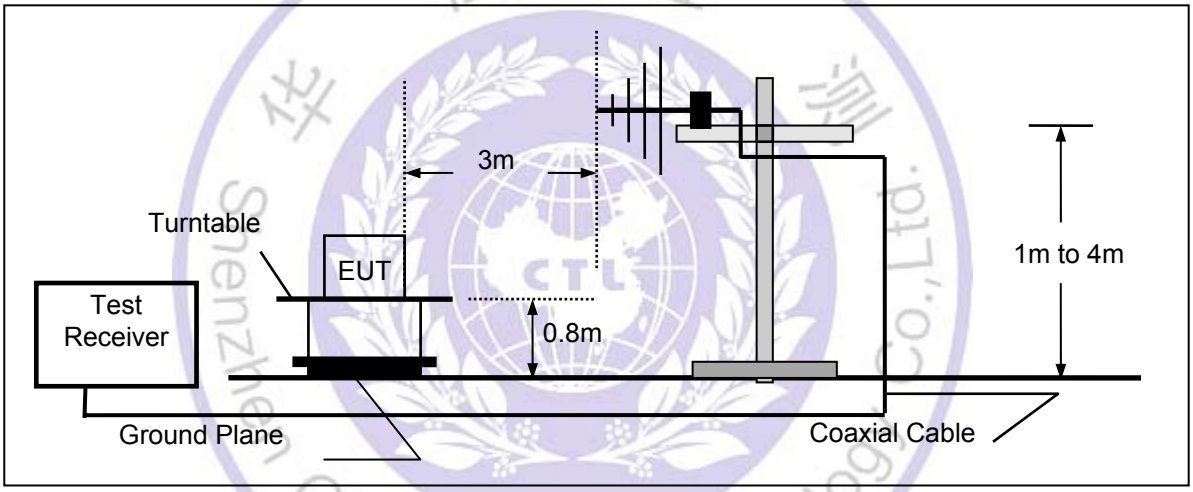
4.2. Radiated Emission and bandedgeTest

TEST CONFIGURATION

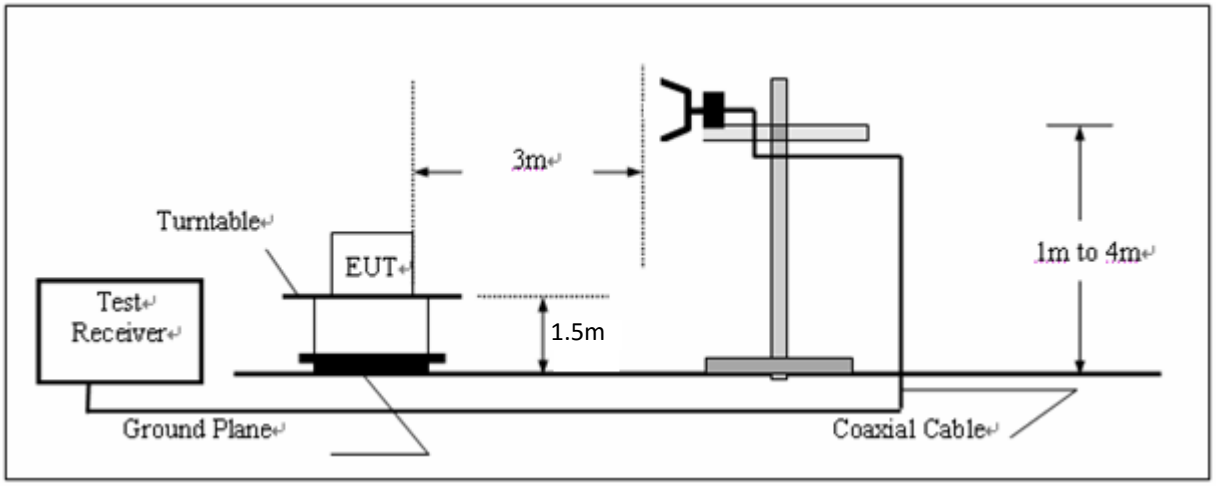
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



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	

TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r03 (Measurement Guidelines of DTS).
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f >1 GHz, 100 kHz for f < 1 GHz; VBW ≧RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Repeat above procedures until all frequency measurements have been completed.

Note:
When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

Remark： For above 1GHz, RBW 1MHz, VBW 3MHz, Peak detector for PK value, RMS detector for AV value.

LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

TEST RESULTS

9KHz-30MHz:

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

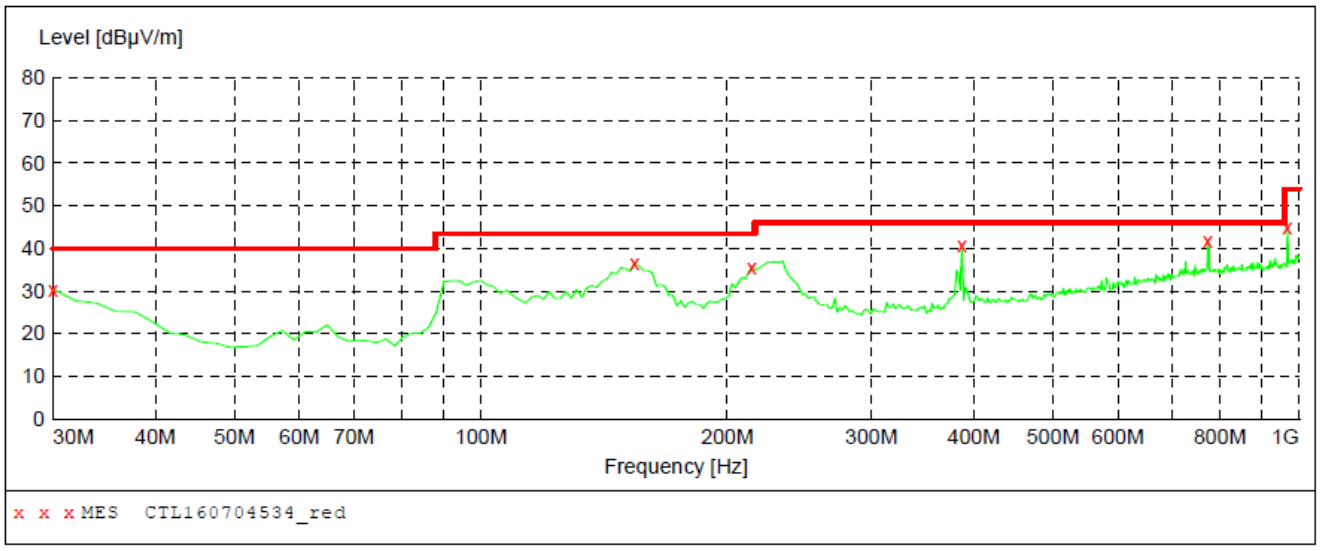
Note: The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Dstance extrapolation factor= 40 log (specific distance/ test distance) (dB);
Limit line= specific limits (dBuV) + distance extrapolation factor.

Below 1GHz:
All SISO and MIMO mode have been tested， only worse case SISO mode ANT 1 (802.11b mode, the middle channel) is reported.

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



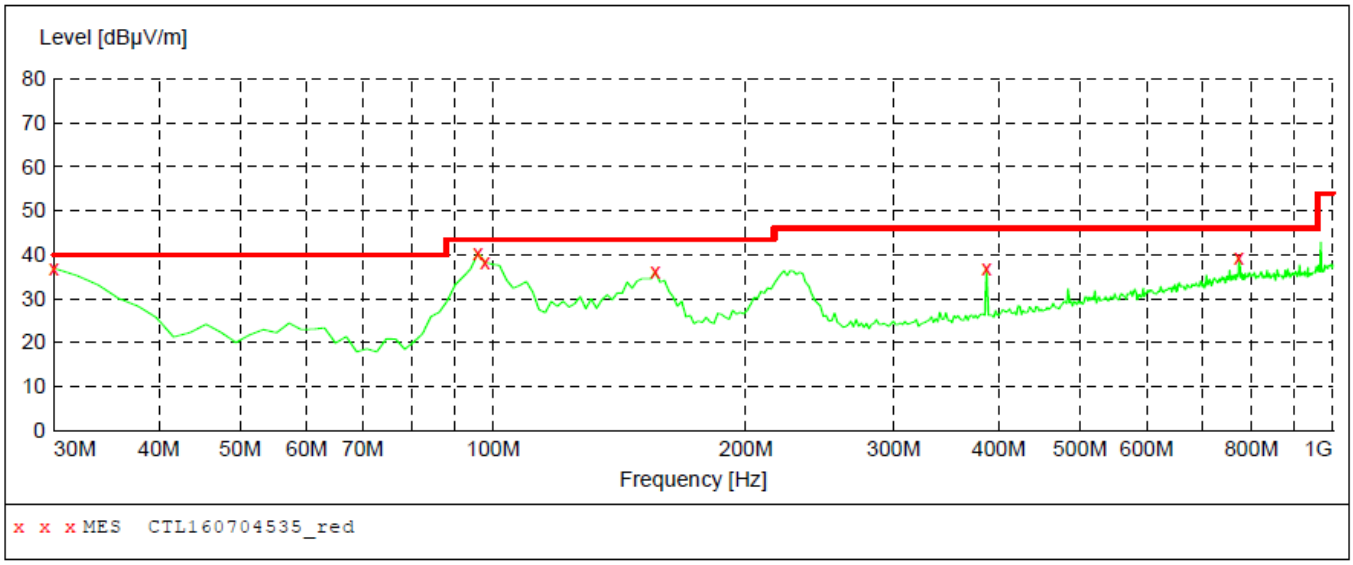
MEASUREMENT RESULT: "CTL160704534_red"

7/4/2016 8:09PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	30.40	20.8	40.0	9.6	---	0.0	0.00	HORIZONTAL
154.160000	36.60	13.7	43.5	6.9	---	0.0	0.00	HORIZONTAL
214.300000	35.70	14.0	43.5	7.8	---	0.0	0.00	HORIZONTAL
386.960000	40.60	17.7	46.0	5.4	---	0.0	0.00	HORIZONTAL
773.020000	41.70	24.4	46.0	4.3	---	0.0	0.00	HORIZONTAL
967.020000	45.00	26.7	53.9	8.9	---	0.0	0.00	HORIZONTAL

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



MEASUREMENT RESULT: "CTL160704535_red"

7/4/2016 8:11PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	36.90	20.8	40.0	3.1	---	0.0	0.00	VERTICAL
95.960000	40.40	10.2	43.5	3.1	---	0.0	0.00	VERTICAL
97.900000	38.20	10.7	43.5	5.3	---	0.0	0.00	VERTICAL
156.100000	36.10	13.7	43.5	7.4	---	0.0	0.00	VERTICAL
386.960000	36.90	17.7	46.0	9.1	---	0.0	0.00	VERTICAL
773.020000	39.50	24.4	46.0	6.5	---	0.0	0.00	VERTICAL

Above 1GHz:

802.11b ：Ant 1 and Ant 2 have been tested , only worse case Ant 1 is reported

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	2412	82.8	30.8	113.6	Fundamental	/	PK
	V	3200	14.8	31.1	45.9	54(note3)	8.1	PK
	V	2390	39.2	32.2	71.4	74	2.6	PK
	V	2390	16.9	32.2	49.1	54	4.9	AV
	V	2400	39.7	32.1	71.8	74	2.2	PK
	V	2400	18.2	32.1	50.3	54	3.7	AV
	V	4824	8.0	42.6	50.6	54(note3)	3.4	PK
	V	7236	20.6	46.5	67.1	74	6.9	PK
	V	7236	1.2	46.5	47.7	54	6.3	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
6	V	2437	82.6	31.2	113.8	Fundamental	/	PK
	V	3200	13.0	31.1	44.1	54(note3)	9.9	PK
	V	4876	18.0	32.8	50.8	54(note3)	3.2	PK
	V	7311	19.0	46.8	65.8	74	8.2	PK
	V	7311	-1.4	46.1	44.7	54	9.3	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
11	V	2462.3	81.8	30.9	112.7	Fundamental	/	PK
	V	3200	14.4	31.1	45.5	54(note3)	8.5	PK
	V	2483.5	34.6	30.2	64.8	74	9.2	PK
	V	2483.5	14.9	30.2	45.1	54	8.9	AV
	V	4927	19.3	32.5	51.8	54(note3)	2.2	PK
	V	7386	21.1	46.3	67.4	74	6.6	PK
	V	7386	1.3	46.3	47.6	54	6.4	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.
2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

802.11g ：Ant 1 and Ant 2 have been tested , only worse case Ant 1 is reported

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	2411.9	81.8	30.8	112.6	Fundamental	/	PK
	V	3200	13.1	31.1	44.2	54(note3)	9.8	PK
	V	2390	37.6	32.2	69.8	74	4.2	PK
	V	2390	18.2	32.2	50.4	54	3.6	AV
	V	2400	38.7	32.1	70.8	74	3.2	PK
	V	2400	18.8	32.1	50.9	54	3.1	AV
	V	4824	9.3	42.6	51.9	54(note3)	2.1	PK
	V	7236	20.9	46.5	67.4	74	6.6	PK
	V	7236	2.0	46.5	48.5	54	5.5	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
6	V	2437	81.2	31.2	112.4	Fundamental	/	PK
	V	3200	15.6	31.1	46.7	54(note3)	7.3	PK
	V	4876	19.0	32.8	51.8	54(note3)	2.2	PK
	V	7311	24.1	46.8	70.9	74	3.1	PK
	V	7311	2.7	46.1	48.8	54	5.2	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
11	V	2462.3	82.1	30.9	113.0	Fundamental	/	PK
	V	3200	12.6	31.1	43.7	54(note3)	10.3	PK
	V	2483.5	35.5	30.2	65.7	74	8.3	PK
	V	2483.5	15.6	30.2	45.8	54	8.2	AV
	V	4927	19.1	32.5	51.6	54(note3)	2.4	PK
	V	7386	20.6	46.3	66.9	74	7.1	PK
	V	7386	0.1	46.3	46.4	54	7.6	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.
2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

802.11n(20MHz), KEEPING MIMO TX MODE

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	2411.9	81.9	30.8	112.7	Fundamental	/	PK
	V	3200	11.7	31.1	42.8	54(note3)	11.2	PK
	V	2390	38.0	32.2	70.2	74	3.8	PK
	V	2390	17.4	32.2	49.6	54	4.4	AV
	V	2400	39.3	32.1	71.4	74	2.6	PK
	V	2400	18.8	32.1	50.9	54	3.1	AV
	V	4824	7.5	42.6	50.1	54(note3)	3.9	PK
	V	7236	20.2	46.5	66.7	74	7.3	PK
	V	7236	1.7	46.5	48.2	54	5.8	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
6	V	2437	81.2	31.2	112.4	Fundamental	/	PK
	V	3200	13.5	31.1	44.6	54(note3)	9.4	PK
	V	4876	16.9	32.8	49.7	54(note3)	4.3	PK
	V	7311	20.7	46.8	67.5	74	6.5	PK
	V	7311	0.7	46.1	46.8	54	7.2	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
11	V	2462.3	81.2	30.9	112.1	Fundamental	/	PK
	V	3200	12.5	31.1	43.6	54(note3)	10.4	PK
	V	2483.5	33.0	30.2	63.2	74	10.8	PK
	V	2483.5	15.5	30.2	45.7	54	8.3	AV
	V	4927	17.7	32.5	50.2	54(note3)	3.8	PK
	V	7386	20.8	46.3	67.1	74	6.9	PK
	V	7386	1.5	46.3	47.8	54	6.2	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.
2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

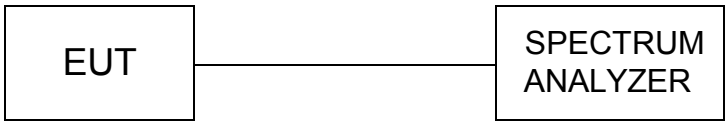
802.11n(40MHz), KEEPING MIMO TX MODE

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
3	V	2422	80.4	30.8	111.2	Fundamental	/	PK
	V	3200	15.6	31.1	46.7	54(note3)	7.3	PK
	V	2390	36.9	32.2	69.1	74	4.9	PK
	V	2390	18.7	32.2	50.9	54	3.1	AV
	V	2400	38.3	32.1	70.4	74	3.6	PK
	V	2400	17.1	32.1	49.2	54	4.8	AV
	V	4844	7.8	42.9	50.7	54(note3)	3.3	PK
	V	7266	18.0	46.8	64.8	74	9.2	PK
	V	7266	-0.7	46.8	46.1	54	7.9	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
6	V	2437	79.5	31.2	110.7	Fundamental	/	PK
	V	3200	14.3	31.1	45.4	54(note3)	8.6	PK
	V	4876	16.9	32.8	49.7	54(note3)	4.3	PK
	V	7311	19.9	46.8	66.7	74	7.3	PK
	V	7311	1.8	46.1	47.9	54	6.1	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
9	V	2452	80.3	30.9	111.2	Fundamental	/	PK
	V	3200	14.5	31.1	45.6	54(note3)	8.4	PK
	V	2483.5	37.2	30.2	67.4	74	6.6	PK
	V	2483.5	18.0	30.2	48.2	54	5.8	AV
	V	4967	17.9	32.5	50.4	54(note3)	3.6	PK
	V	7356	21.8	46.1	67.9	74	6.1	PK
	V	7356	-1.4	46.1	44.7	54	9.3	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.
2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

4.3. 6dB Bandwidth Measurement

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r03 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. 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. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

LIMIT

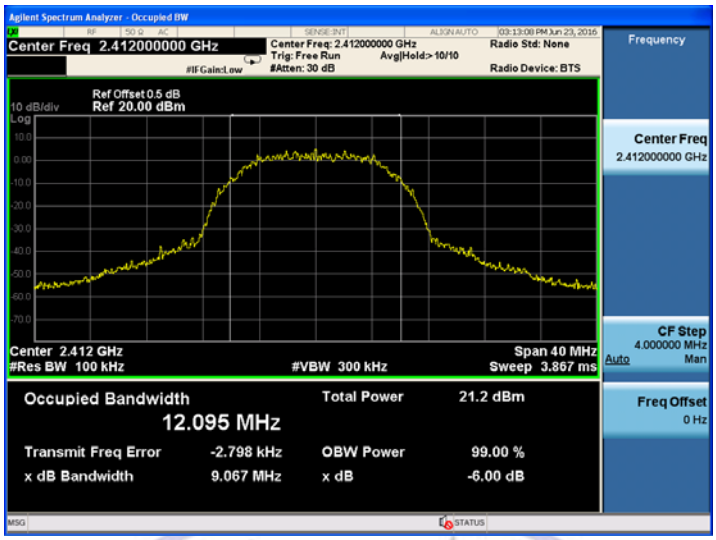
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

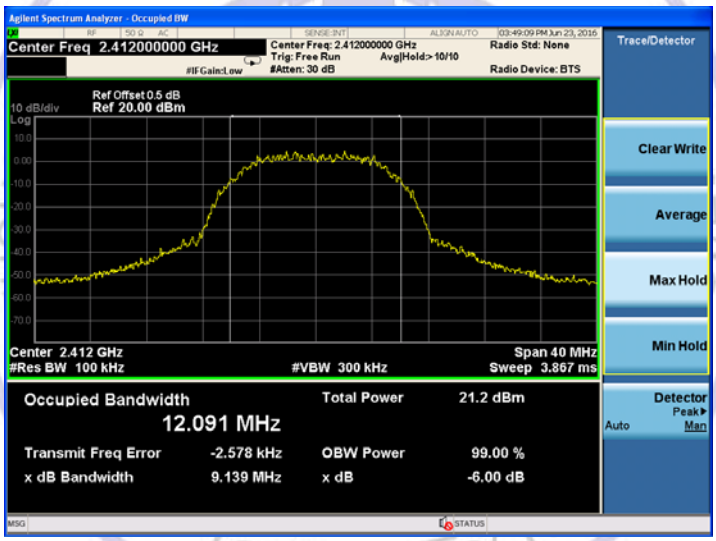
Mode	CHANNEL	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS/FAIL
		Ant 1 6dB	Ant 2 6dB		
802.11b	1	9.067	9.139	0.5	PASS
	6	9.049	9.083	0.5	PASS
	11	9.074	8.859	0.5	PASS
802.11g	1	16.52	16.52	0.5	PASS
	6	16.52	16.51	0.5	PASS
	11	16.52	16.50	0.5	PASS
802.11n HT20	1	17.65	17.68	0.5	PASS
	6	17.67	17.68	0.5	PASS
	11	17.66	16.68	0.5	PASS
802.11n HT40	3	36.43	36.46	0.5	PASS
	6	36.40	36.39	0.5	PASS
	9	36.47	36.39	0.5	PASS

For 802.11b:

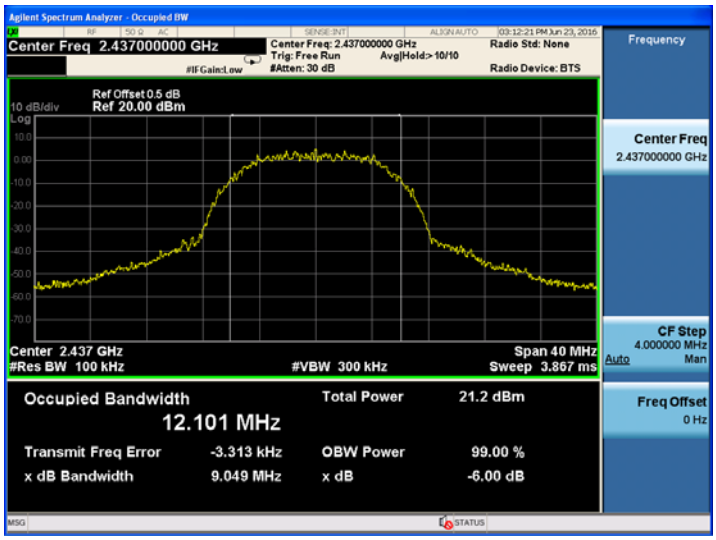
CH1 @ANT 1



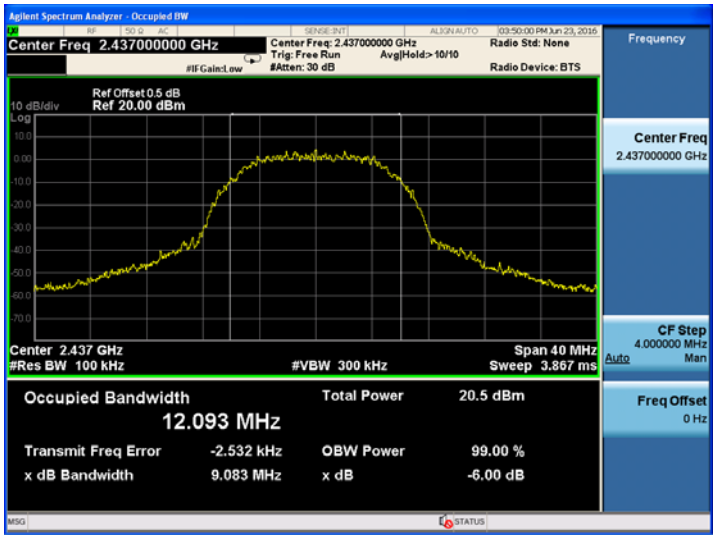
CH1 @ANT 2



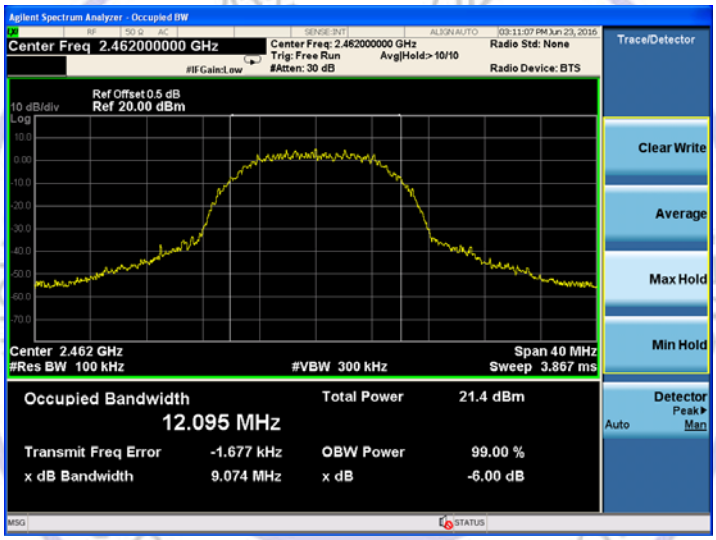
CH6 @ANT 1



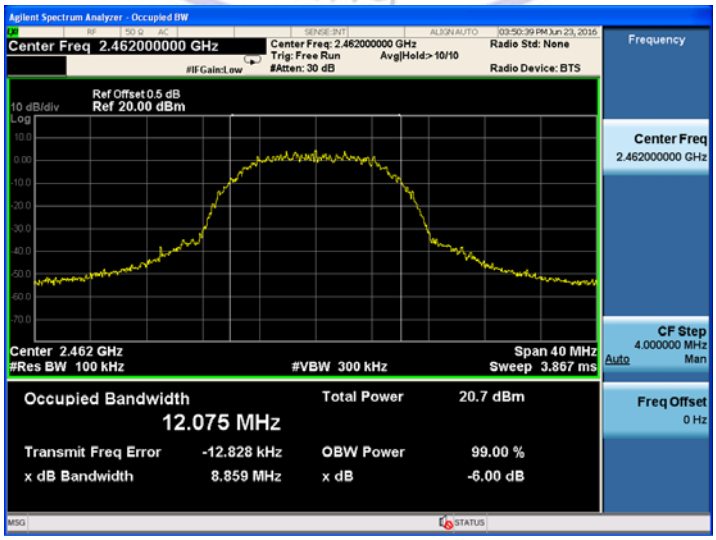
CH6 @ANT 2



CH11 @ANT 1

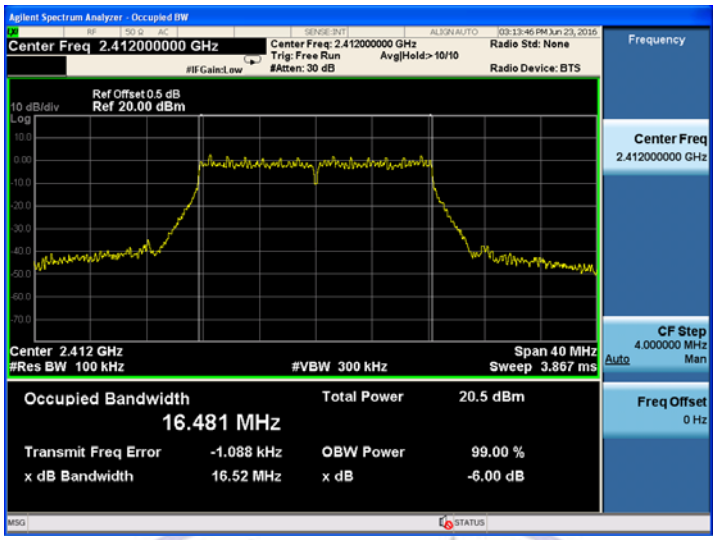


CH11 @ANT 2

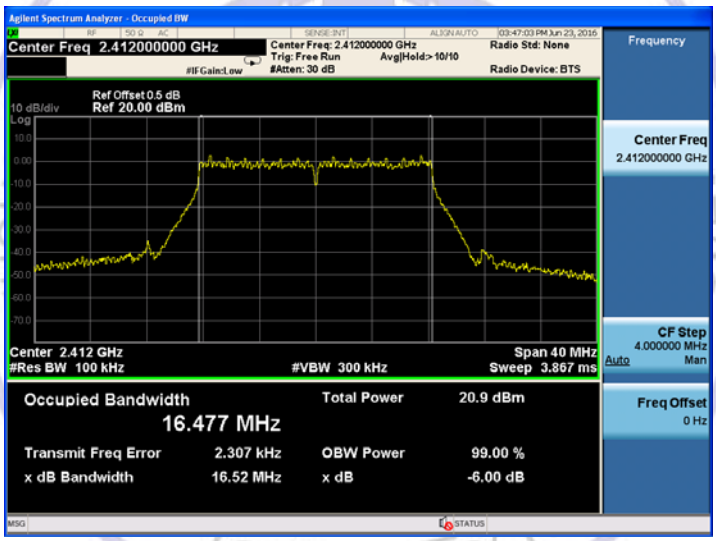


For 802.11g:

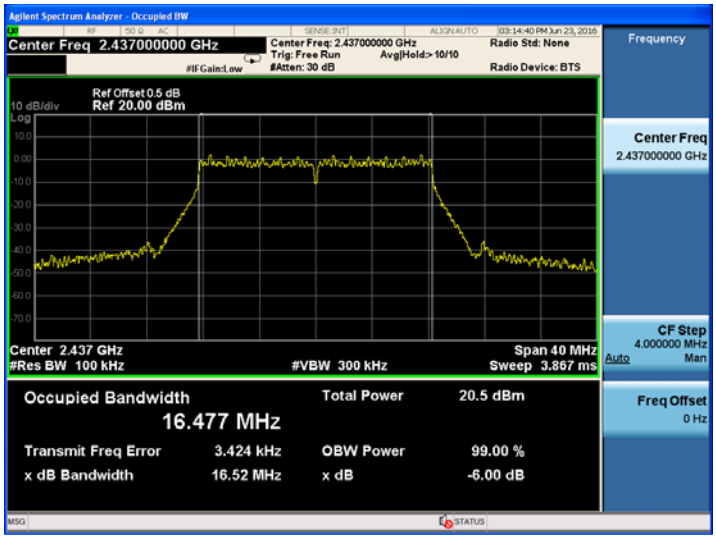
CH1 @ANT 1



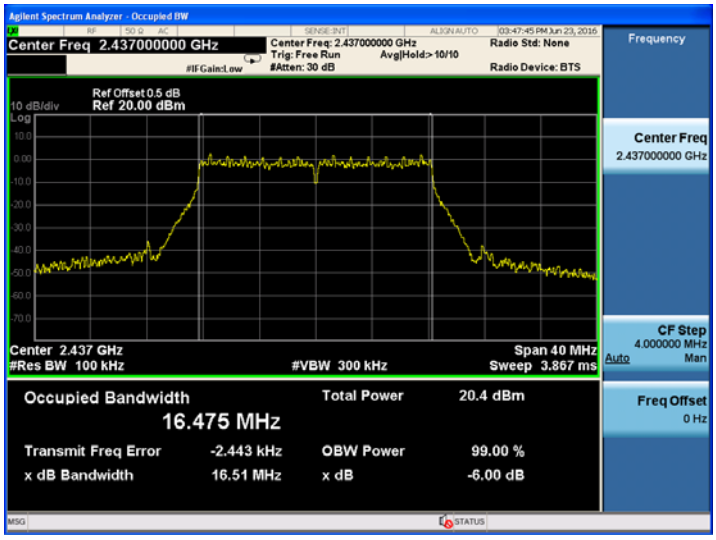
CH1 @ANT 2



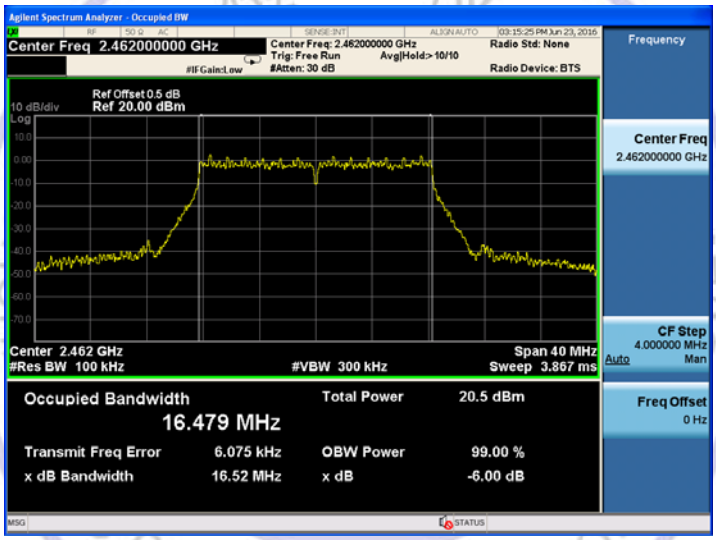
CH6 @ ANT 1



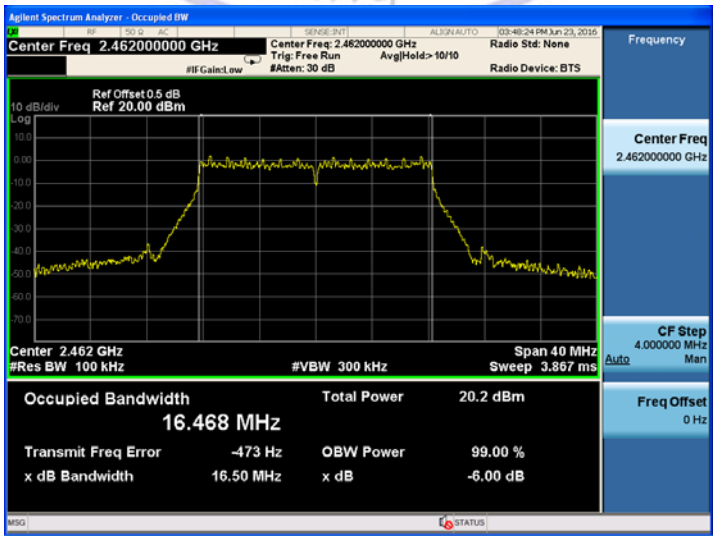
CH6 @ANT 2



CH11 @ANT 1

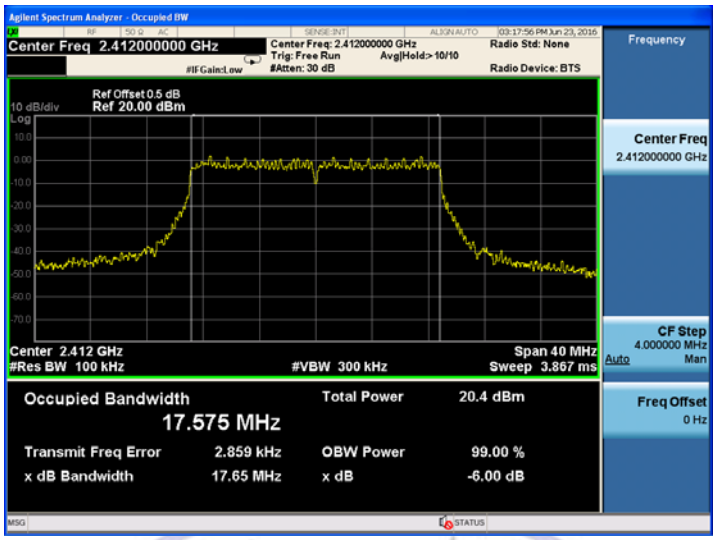


CH11 @ANT 2

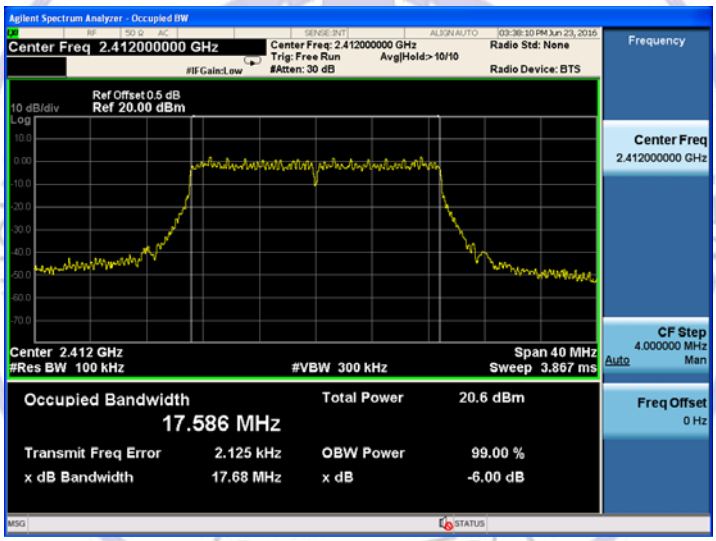


For 802.11n (20MHz) Mode:

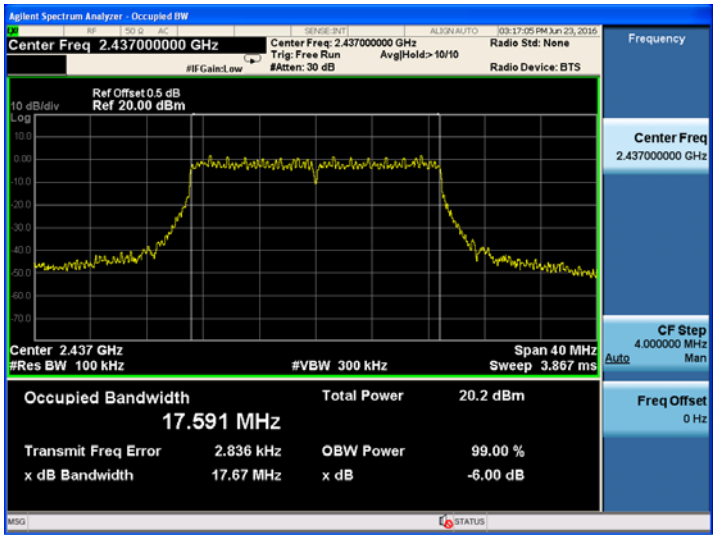
CH1 @ANT 1



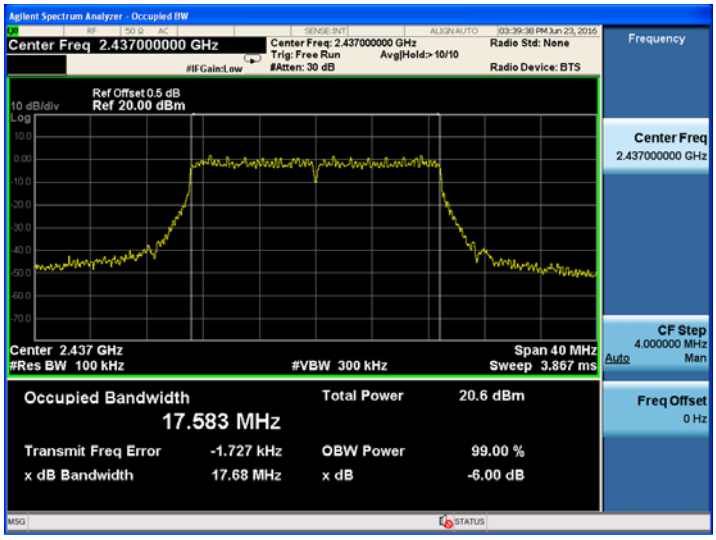
CH1 @ANT 2



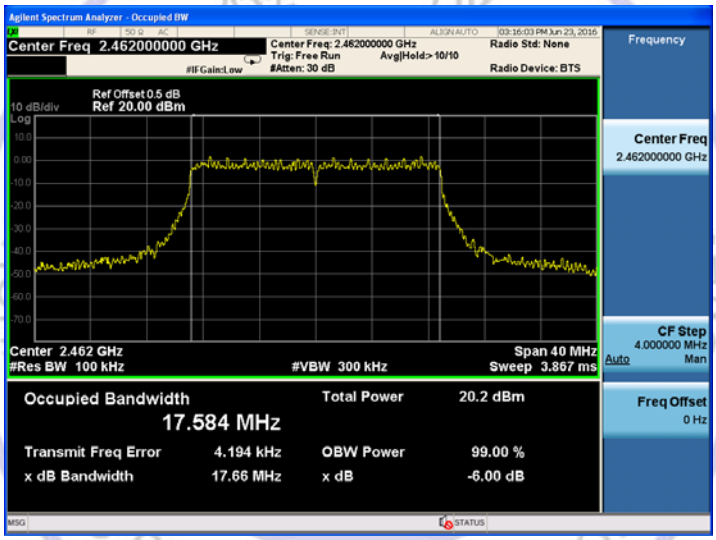
CH6 @ANT 1



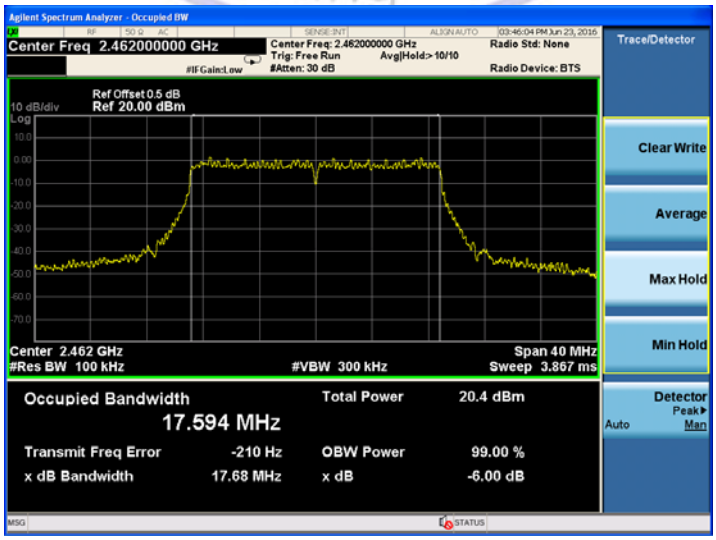
CH6 @ANT 2



CH11 @ANT 1

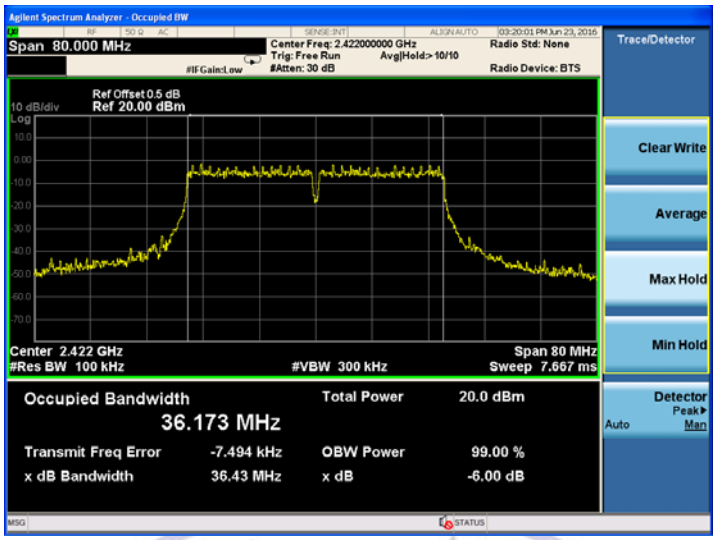


CH11 @ANT 2

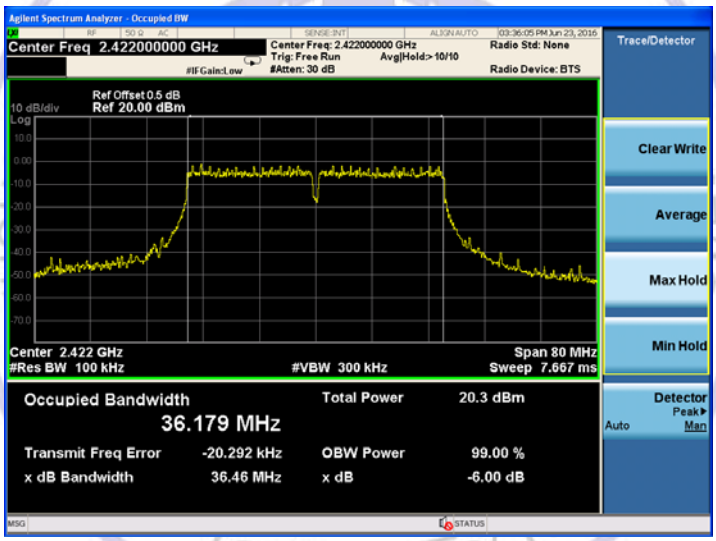


For 802.11n (40MHz) Mode:

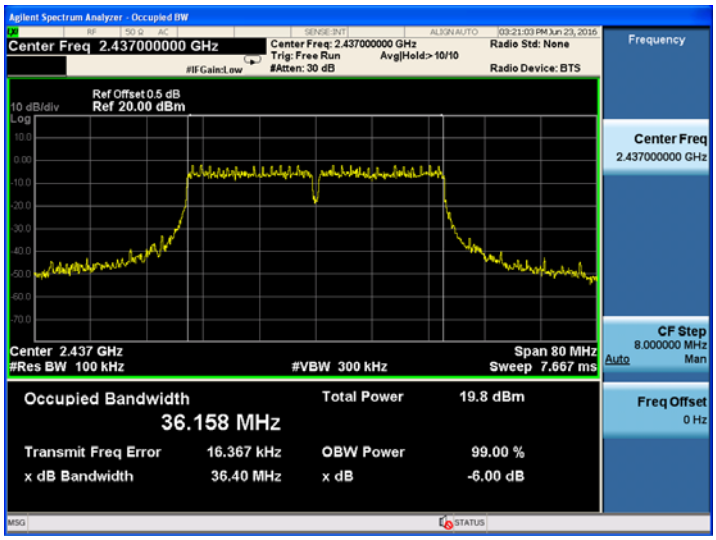
CH3 @ANT 1



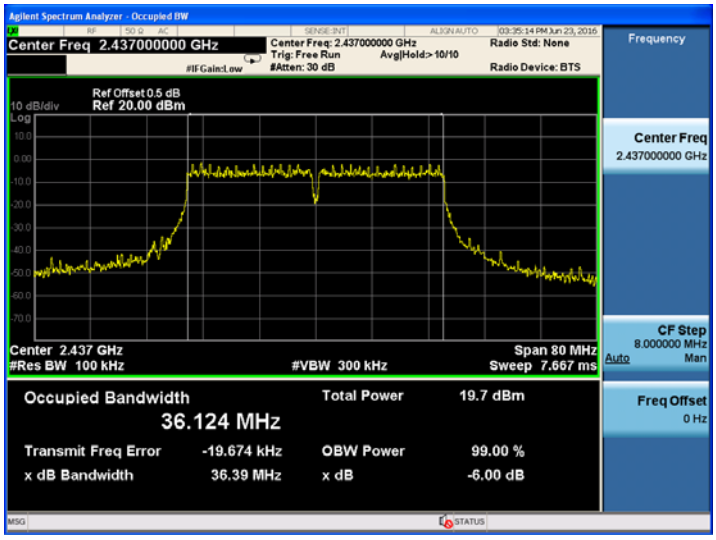
CH3 @ANT 2



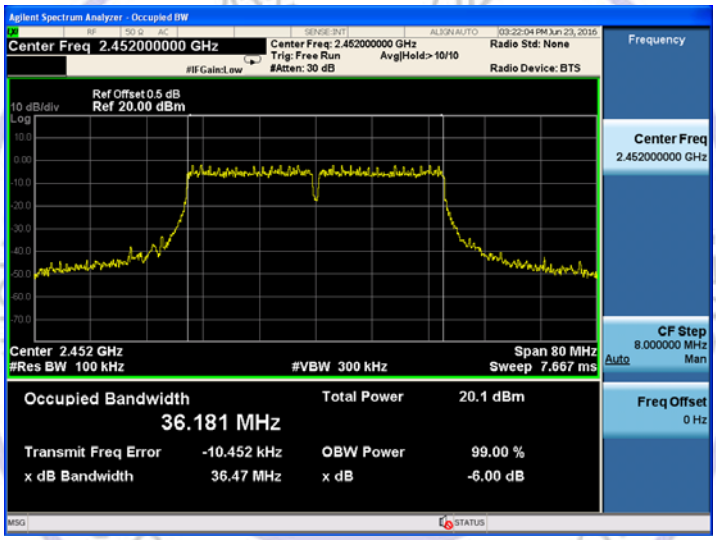
CH6 @ANT 1



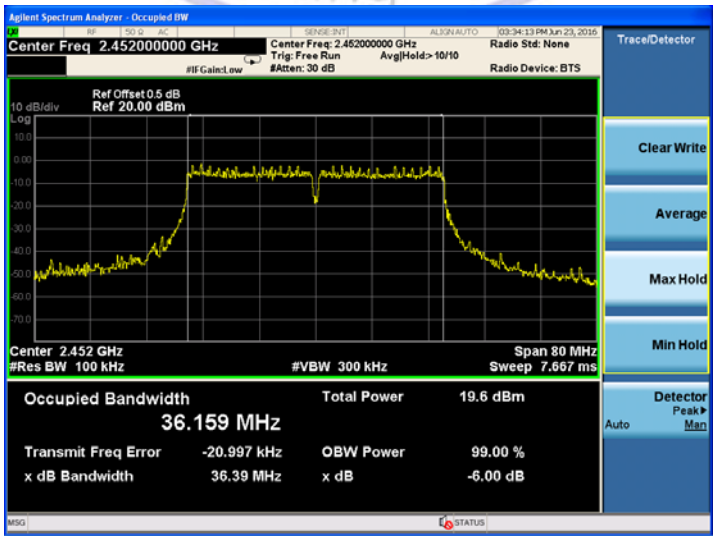
CH6 @ANT 2



CH9 @ANT 1

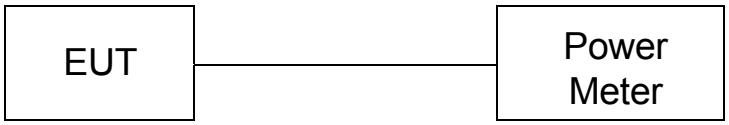


CH9 @ANT 2



4.4. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to C63.10 -2013 and KDB558074 D01 v03r03,The EUT was directly connected to the power meter / spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

Use the wideband power meter to test peak power and record the result.

LIMIT

The Peak Output Power Measurement limits are 30dBm.

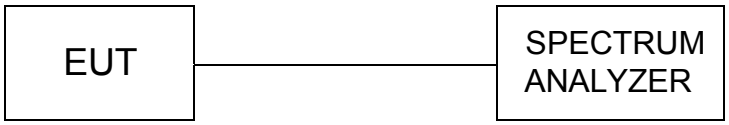
TEST RESULTS

Mode	Channel	Peak Power Output (dBm)			Peak Power Limit (dBm)	PASS / FAIL
		Ant1	Ant 2	Total		
802.11b	1	17.44	17.70	N/A	30	PASS
	6	17.52	17.13	N/A	30	PASS
	11	17.64	17.38	N/A	30	PASS
802.11g	1	16.62	16.58	N/A	30	PASS
	6	16.50	16.22	N/A	30	PASS
	11	16.48	16.50	N/A	30	PASS
802.11n HT20	1	13.58	13.43	16.52	30	PASS
	6	13.40	13.52	16.47	30	PASS
	11	13.61	13.51	16.57	30	PASS
802.11n HT40	3	12.21	12.14	15.19	30	PASS
	6	12.33	13.01	15.69	30	PASS
	9	12.58	12.47	15.54	30	PASS

Note: The test results including the cable lose.

4.5. Power Spectral Density Measurement

TEST CONFIGURATION



TEST PROCEDURE

The EUT was tested according to KDB558074 D01 v03r03 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW≥10KHz, SPAN to 1.5 times greater than the EBW,.

LIMIT

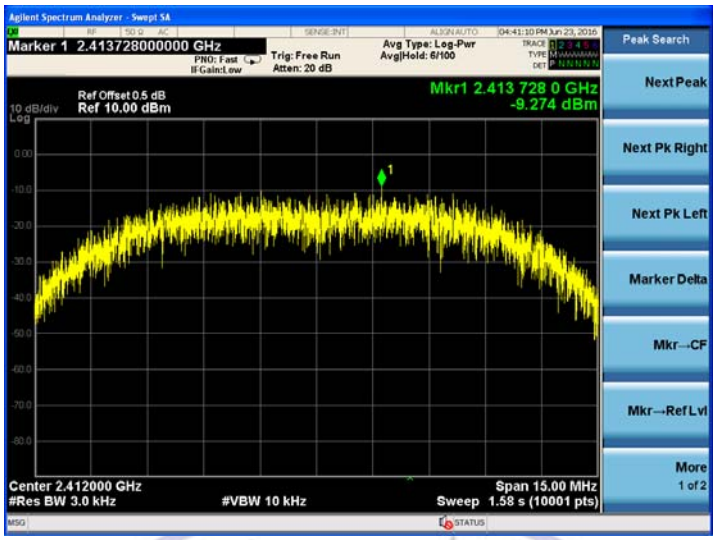
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

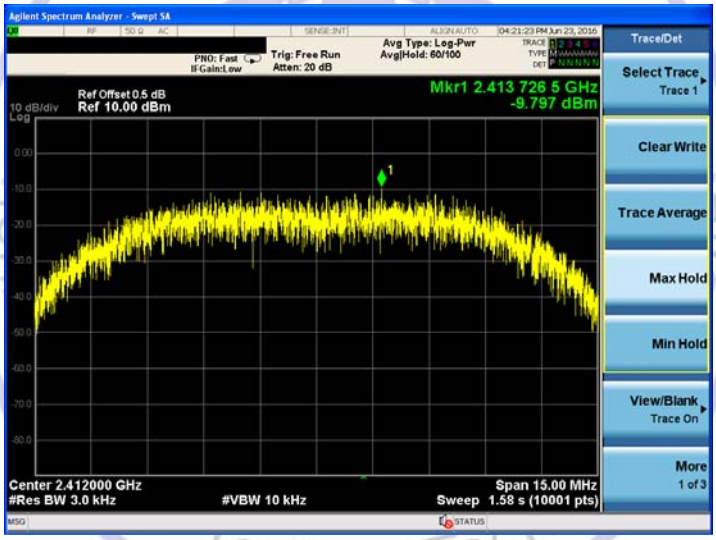
Mode	Channel	Channel Frequency (MHz)	PSD (dBm/3KHz)			Maximum limit (dBm/ 3KHz)	PASS / FAIL
			Ant1	Ant 2	Total		
802.11b	1	2412	-9.274	-9.797	N/A	8	PASS
	6	2437	-9.098	-9.398	N/A	8	PASS
	11	2462	-9.063	-9.082	N/A	8	PASS
802.11g	1	2412	-13.926	-12.888	N/A	8	PASS
	6	2437	-12.767	-14.959	N/A	8	PASS
	11	2462	-13.339	-14.268	N/A	8	PASS
802.11n HT20	1	2412	-13.942	-13.348	-10.62	8	PASS
	6	2437	-13.009	-14.343	-10.61	8	PASS
	11	2462	-13.481	-15.147	-11.22	8	PASS
802.11n HT40	3	2422	-18.781	-19.658	-16.19	8	PASS
	6	2437	-18.892	-20.225	-16.50	8	PASS
	9	2452	-18.779	-20.192	-16.42	8	PASS

For 802.11b Mode:

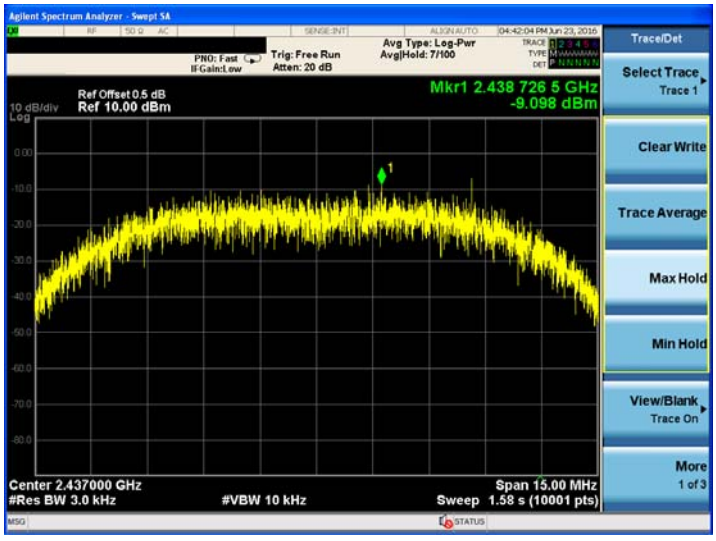
CH1 @ANT 1



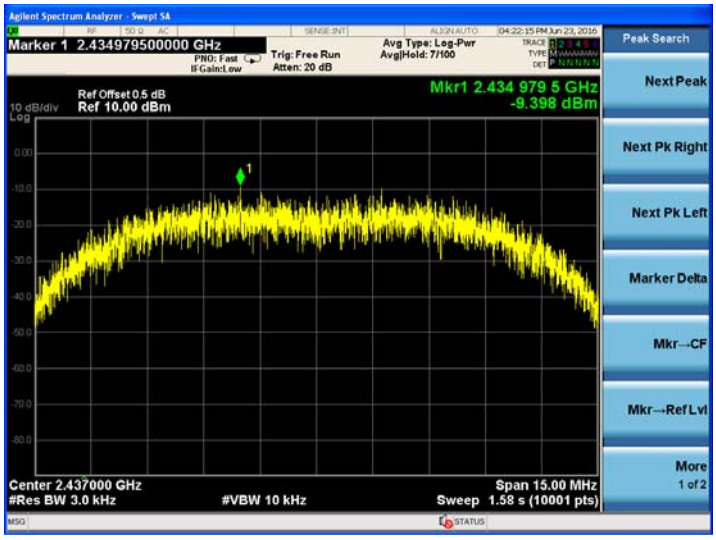
CH1 @ANT 2



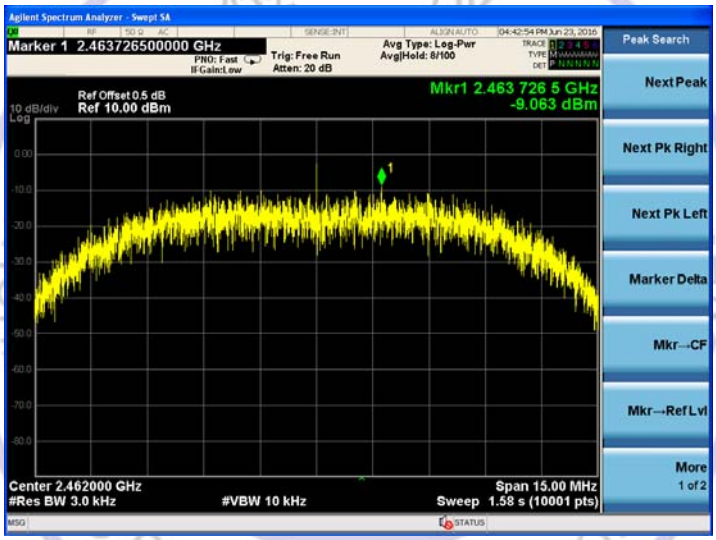
CH6 @ANT 1



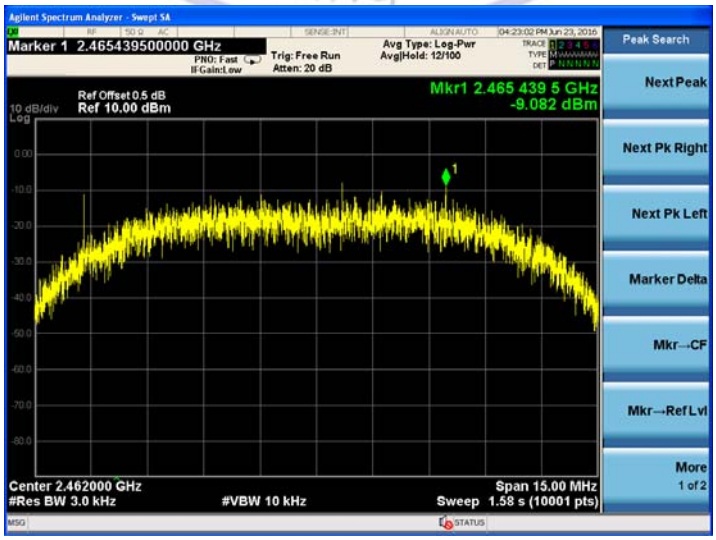
CH6 @ANT 2



CH11 @ANT 1

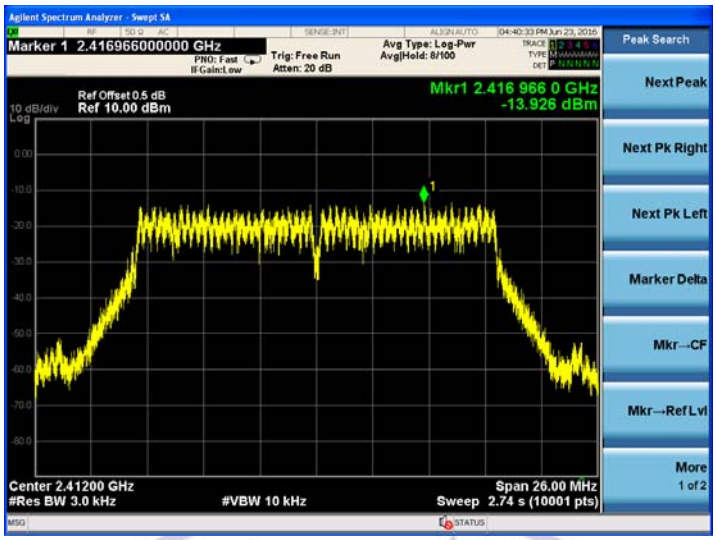


CH11 @ANT 2

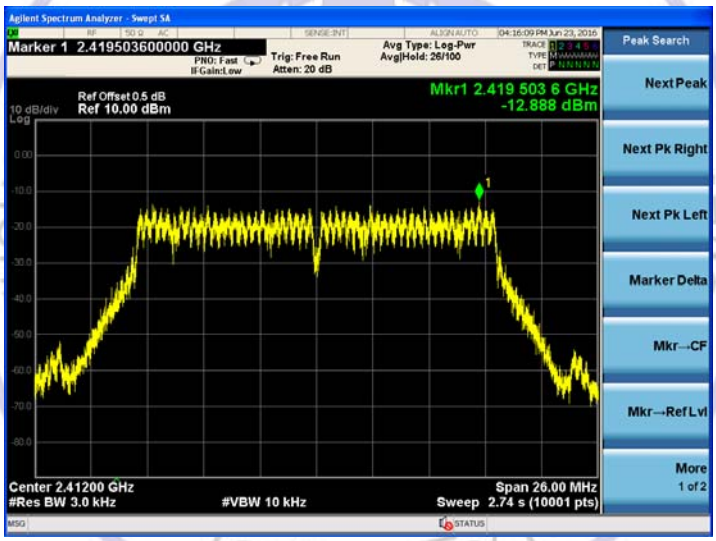


For 802.11g Mode:

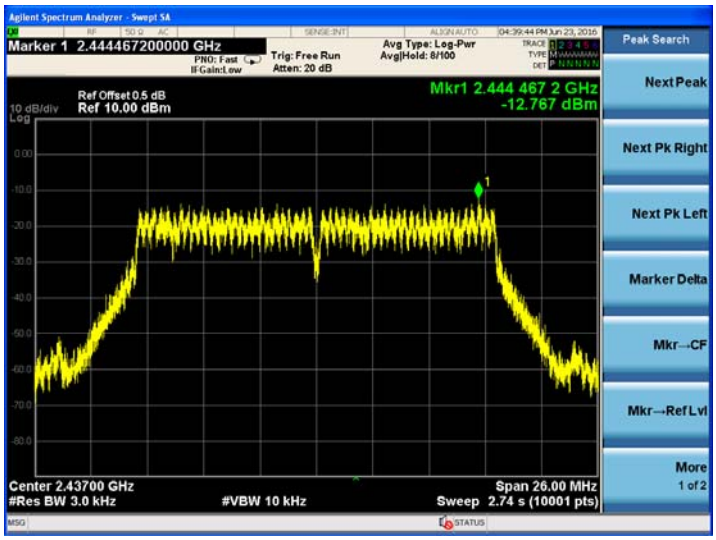
CH1 @ANT 1



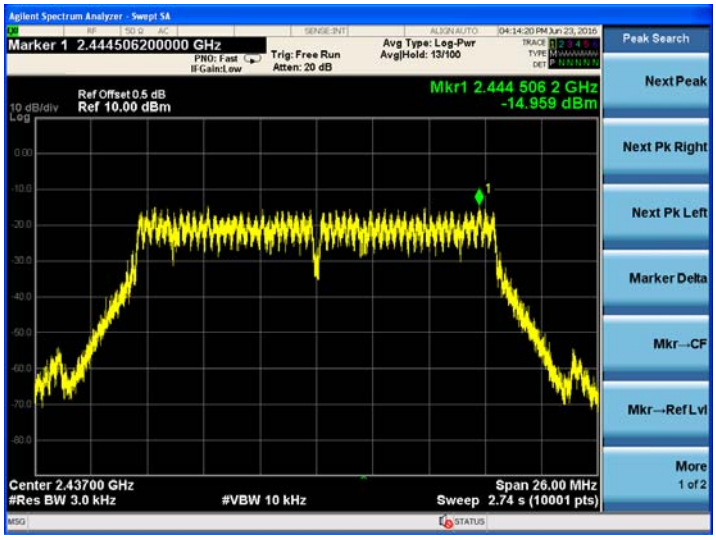
CH1 @ANT 2



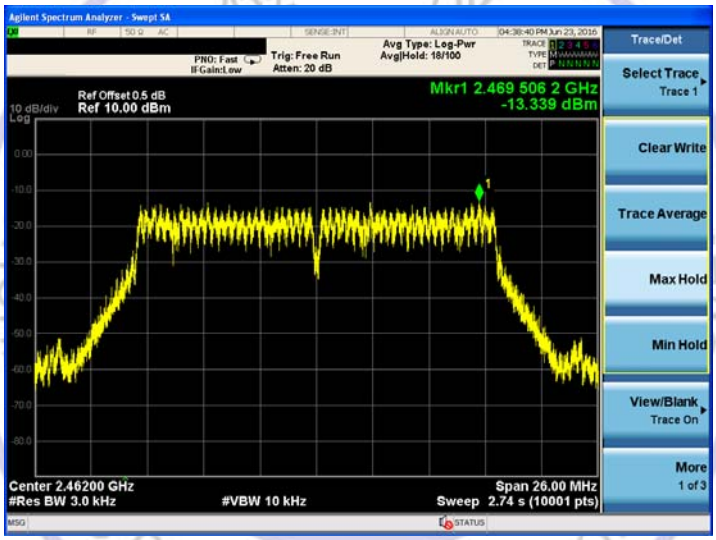
CH6 @ANT 1



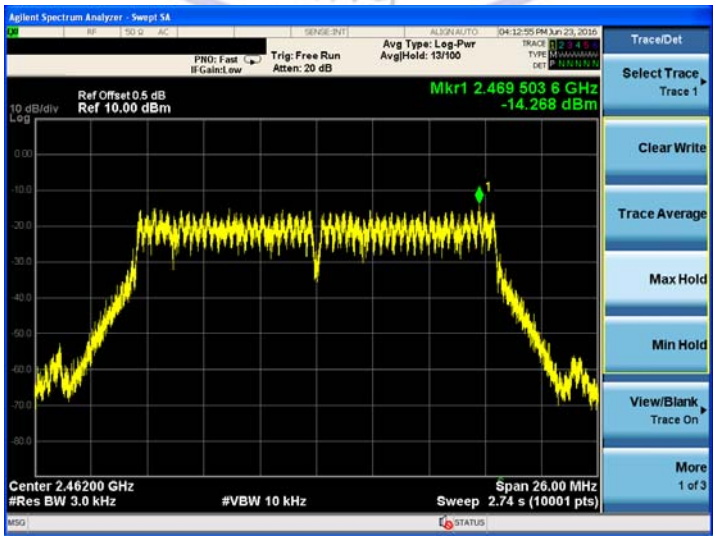
CH6 @ANT 2



CH11 @ANT 1

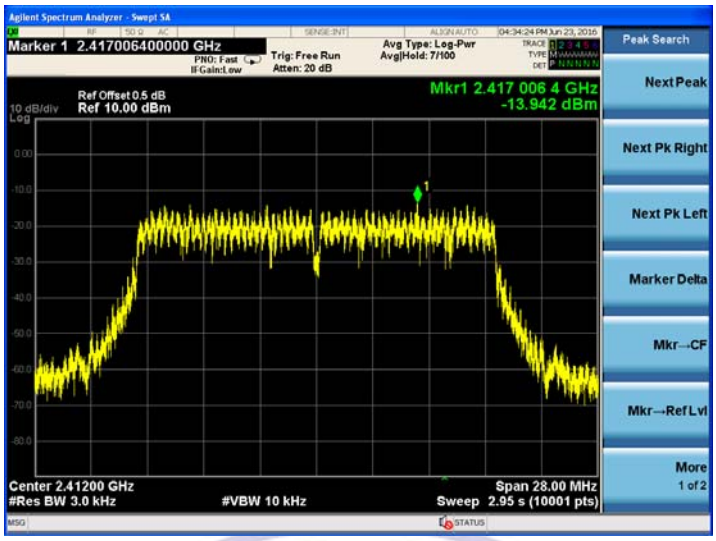


CH11 @ANT 2

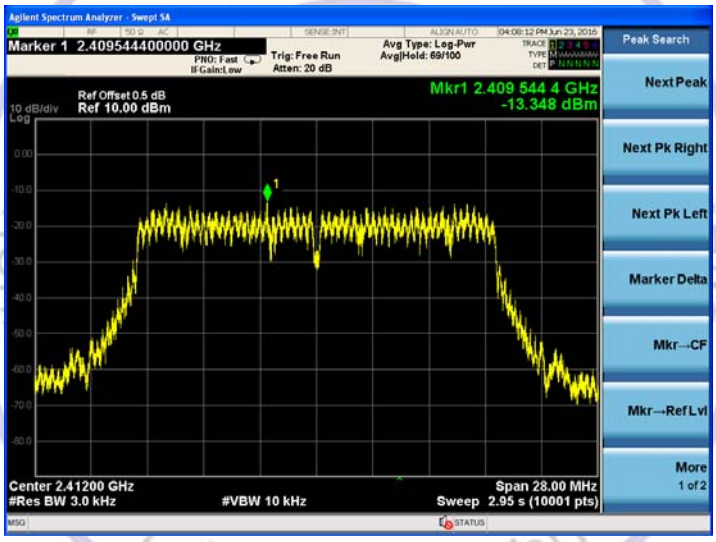


For 802.11n (20MHz) Mode:

CH1 @ANT 1



CH1 @ANT 2



CH6 @ANT 1