



FCC/IC RADIO TEST REPORT

Applicant : Leadtek Research, Inc.

Address : 18F., No.166, Jian-Yi Rd., Chung-Ho Dist., New Taipei
City, Taiwan, R.O.C.

Equipment : Wi-Fi Smart Power Plug

Model No. : S202

Trade Name : LEADTEK

FCC ID : I2IS202

IC : 2969A-S202

I HEREBY CERTIFY THAT :

The sample was received on Jun. 24, 2016 and the testing was carried out on Jul. 11, 2016 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Ray Chou

Assistant Manager

Laboratory Accreditation:

☒ Cerpass Technology Corporation Test Laboratory

NVLAP LAB Code:	200954-0
TAF LAB Code:	1439

☐ Cerpass Technology(SuZhou) Co., Ltd.

NVLAP LAB Code:	200814-0
CNAS LAB Code:	L5515



CONTENTS

1. Summary of Test Procedure and Test Results	5
1.1 Applicable Standards	5
2. Test Configuration of Equipment under Test	6
2.1 Feature of Equipment under Test	6
2.2 Carrier Frequency of Channels	6
2.3 Test Mode and Test Software	6
2.4 Description of Test System	7
2.5 General Information of Test	7
2.6 Measurement Uncertainty	8
2.7 Duty cycle	9
3. Test Equipment and Ancillaries Used for Tests	10
4. Antenna Requirements	11
4.1 Standard Applicable	11
4.2 Antenna Construction and Directional Gain	11
5. Test of AC Power Line Conducted Emission	12
5.1 Test Limit	12
5.2 Test Procedures	12
5.3 Typical Test Setup	12
5.4 Test Result and Data	13
6. Test of Spurious Emission (Radiated)	15
6.1 Test Limit	15
6.2 Test Procedures	15
6.3 Typical Test Setup	16
6.4 Test Result and Data (9KHz ~ 30MHz)	17
6.5 Test Result and Data (30MHz ~ 1GHz)	17
6.6 Test Result and Data (1GHz ~ 25GHz)	18
6.7 Restricted Bands of Operation	27
6.8 Restrict Band Emission Measurement Data	28
7. Test of Spurious Emission (Conducted)	30
7.1 Test Limit	30
7.2 Test Procedure	30
7.3 Test Setup Layout	30
7.4 Test Result and Data	31
8. 6dB Bandwidth & 99% Bandwidth	35
8.1 Test Limit	35
8.2 Test Procedures	35
8.3 Test Setup Layout	35
8.4 Test Result and Data	36
6dB Bandwidth	40
99% Bandwidth	41
9. Maximum Peak Output Power	42
9.1 Test Limit	42
9.2 Test Procedures	42
9.3 Test Setup Layout	42
9.4 Test Result and Data	43



10.Power Spectral Density 44
10.1 Test Limit 44
10.2 Test Procedures 44
10.3 Test Setup Layout..... 44
10.4 Test Result and Data 45

\



History of this test report

☒ ORIGINAL

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10: 2013

KDB 558074 D01 DTS Meas Guidance v03r05

FCC Rules and Regulations Part 15 Subpart C §15.247

RSS-247 Issue 1 May 2015

RSS-Gen

Performed Test Item	Normative References	Test Performed	Deviation	Result
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.207	Yes	N/A	Pass
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.209 RSS-Gen Issue 4 November 2014 Section 6.13	Yes	No	Pass
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(d) RSS-247 Issue 1 May 2015 Section 5.5	Yes	No	Pass
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2014 15.247(d) RSS-247 Issue 1 May 2015 Section 5.5	Yes	No	Pass
6dB Bandwidth & 99% Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(a)(2) RSS-247 Issue 1 May 2015 Section 5.2(1) RSS-Gen Section 6.6	Yes	No	Pass
Output Power	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(b)(3) RSS-247 Issue 1 May 2015 Section 5.4(4)	Yes	No	Pass
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(e) RSS-247 Issue 1 May 2015 Section 5.2(2)	Yes	No	Pass



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Equipment	Wi-Fi Smart Power Plug
Model No.	S202
Spreading	802.11b: CCK, DQPSK, DBPSK 802.11g: 64 QAM, 16 QAM, QPSK, BPSK 802.11n(20MHz): BPSK, QPSK, 16QAM, 64QAM
Frequency Range	802.11b/g/n(20MHz): 2412-2462MHz
Number of Channels	802.11b/g/n (20MHz):11
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n(20MHz): MCS0-MCS7
Antenna Type	PCB Antenna 2dBi (declare by applicant)

2.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20 (2412MHz~2462MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	*11	2462
*06	2437	---	---

Note: Channels remarked * are selected to perform test.

2.3 Test Mode and Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- The complete test system included EUT for the RF test.
- An executive program, "artgui.exe" which transmits and receives data through Wireless.
- The EUT had been tested under operating condition
After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.
EUT staying in continuous transmitting mode was programmed.
- Test modes:
Mode 1: IEEE 802.11b
Mode 2: IEEE 802.11g
Mode 3: IEEE 802.11n



2.4 Description of Test System

The EUT has been tested as an independent unit together without any other necessary accessories or support units.

2.5 General Information of Test

☒	Test Site	CerpPASS Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582
	FCC	TW1079, TW1061,390316, 228391, 641184
	IC	4934B-1, 4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-3428, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz
☐	Test Site	CerpPASS Technology (Suzhou) Co.,Ltd Address: No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China Tel: +86-512-6917-5888 Fax: +86-512-6917-5666
	FCC	916572, 331395
	IC	7290A-1, 7290A-2
	VCCI	T-343 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test G-227 for radiated disturbance above 1GHz
Frequency Range Investigated:		Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25000MHz
Test Distance:		The test distance of radiated emission from antenna to EUT is 3 M.



2.6 Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	LINE/NEUTRAL	± 2.71 dB
Radiated Emission	30 MHz ~ 25GHz	Vertical	± 4.11 dB
		Horizontal	± 4.10 dB
Occupied Bandwidth	---	---	± 7500 Hz
Maximum Peak Output Power	---	---	± 1.4 dB
Power Spectral Density	---	---	± 2.2 dB

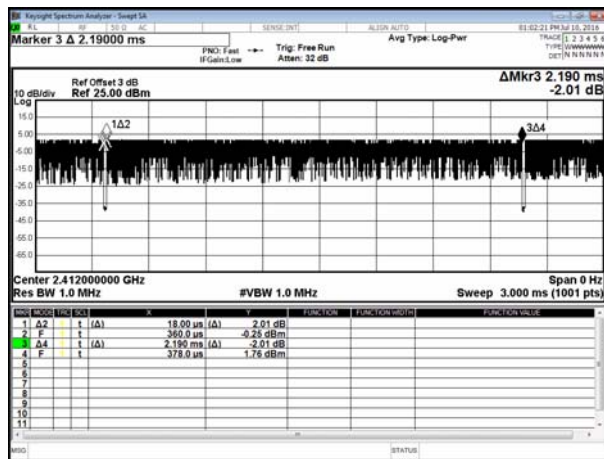


2.7 Duty cycle

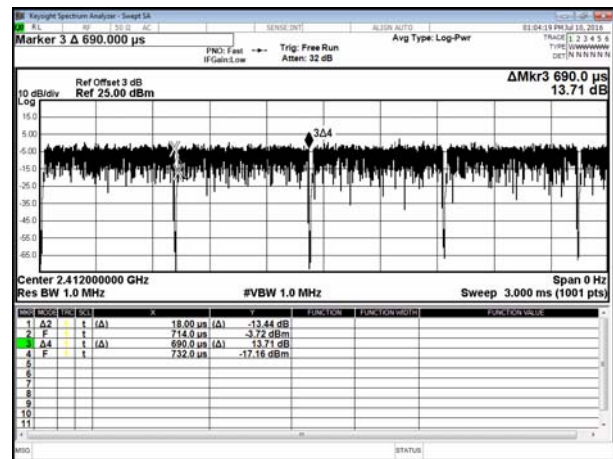
Test Item	Duty cycle
Test Date	2016-07-10

Mode	Frequency (MHz)	Measurement (%)
802.11b	2412	99.2
802.11g	2412	97.6
802.11n(20MHz)	2412	97.5

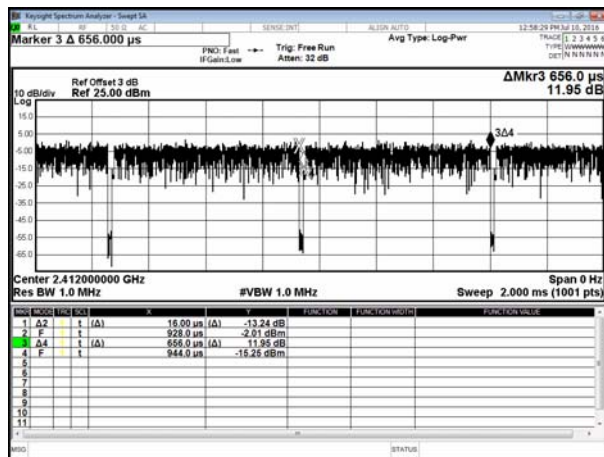
Transmit at channel 1 by 802.11b



Transmit at channel 1 by 802.11g



Transmit at channel 1 by 802.11n(20MHz)





3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Test Receiver	R&S	ESCI	100564	2016.02.22	2017.02.21
LISN	SCHWARZBECK	NSLK 8127	8127748	2015.10.22	2016.10.21
LISN	SCHWARZBECK	NSLK 8127	8127749	2015.10.22	2016.10.21
Pulse Limiter with 10dB Attenuation	SCHWARZBECK	VTSD 9561-F	9561-F106	2016.02.22	2017.02.21
Temperature/ Humidity Meter	mingle	ETH529	N/A	2016.02.22	2017.02.21
AMPLIFIER	HP	8447F	3113A05915	2016.02.22	2017.02.21
Loop Antenna	R&S	HFH2-Z2	100150	2016.04.16	2017.04.15
BILOG Antenna	SCHAFFNER	CBL6112D	22241	2016.02.24	2017.02.23
Horn Antenna	Sunol	DRH-118	A072913	2015.09.30	2016.09.29
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2016.04.16	2017.04.15
Preamplifier	COM-POWER	PA-840	711885	2016.03.26	2017.03.25
Temp&Humidity&barometer	mingle	ETH529	N/A	2016.02.19	2017.02.18
Preamplifier	Feld	AFS44-0010180 0-25- 10P-44	1579008	2015.09.30	2016.09.29
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY4509258 2	2016.06.06	2017.06.05
MXG VECTOR SIGNAL GENERATOR	Agilent	N5182B	MY5305012 7	2016.06.06	2017.06.05
EXA Signal Analyzer	Agilent	N9020A	US46220290	2016.06.06	2017.06.05
Power sensor	e-channel	ERS-180T-24	TW5451026	2016.06.25	2017.06.24
Series Power Meter	ANRITSU	ML24958A	1224005	2016.03.27	2016.03.26



4. Antenna Requirements

4.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Antenna Construction and Directional Gain

No.	Antenna Type	Antenna Gain
1	PCB Antenna	2dBi



5. Test of AC Power Line Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 6.2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

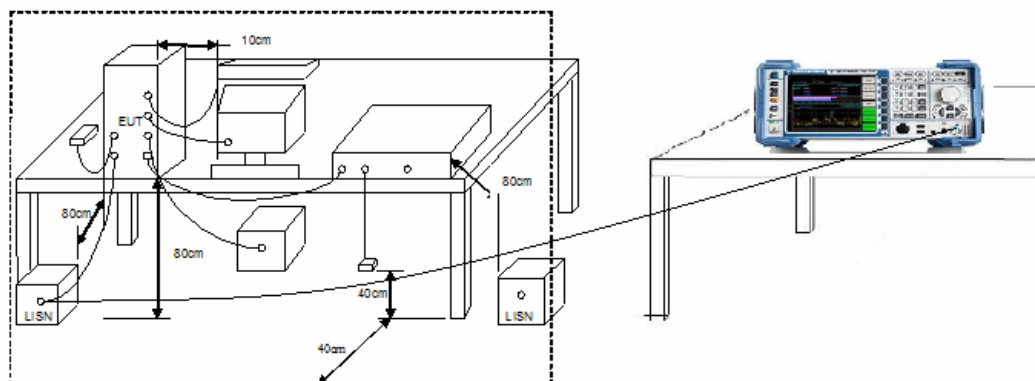
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.2 Test Procedures

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of Oct 2014 KDB558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

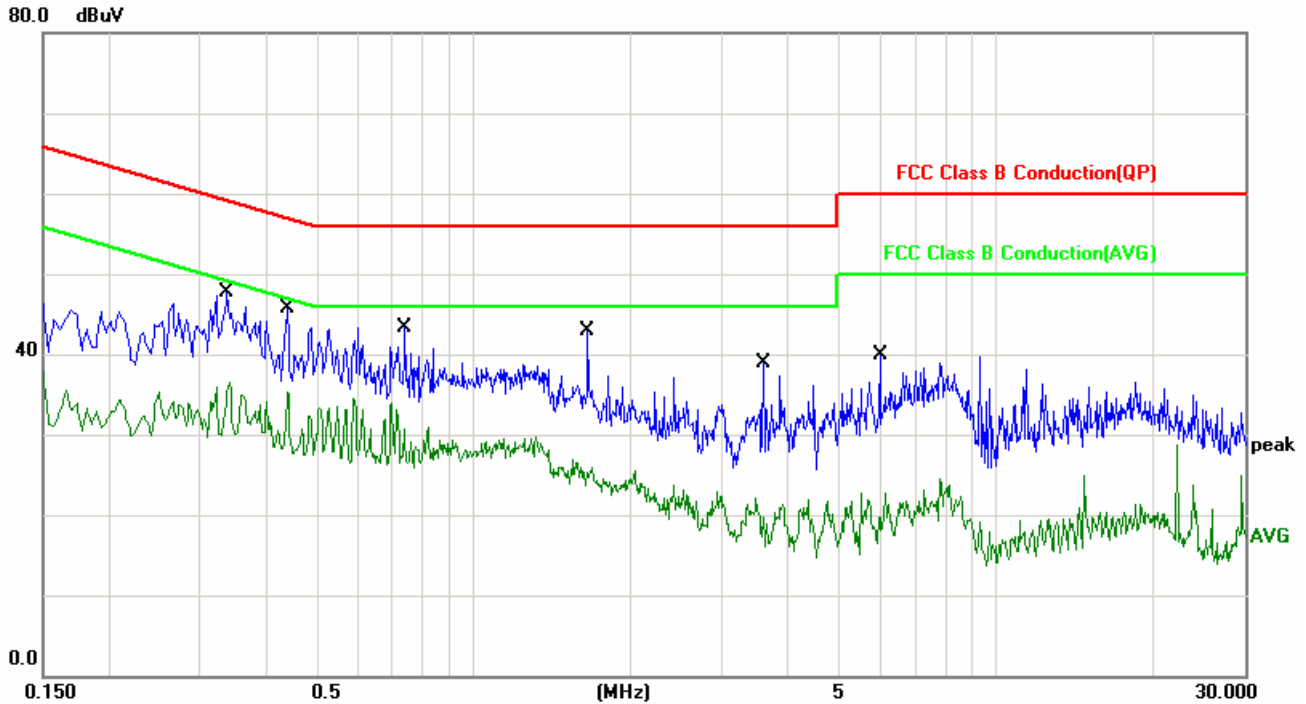
5.3 Typical Test Setup





5.4 Test Result and Data

Test Mode :	Normal	Phase :	Line
Temperature :	20°C	Humidity:	51%
Pressur(mbar) :	1002	Date:	2016/07/10

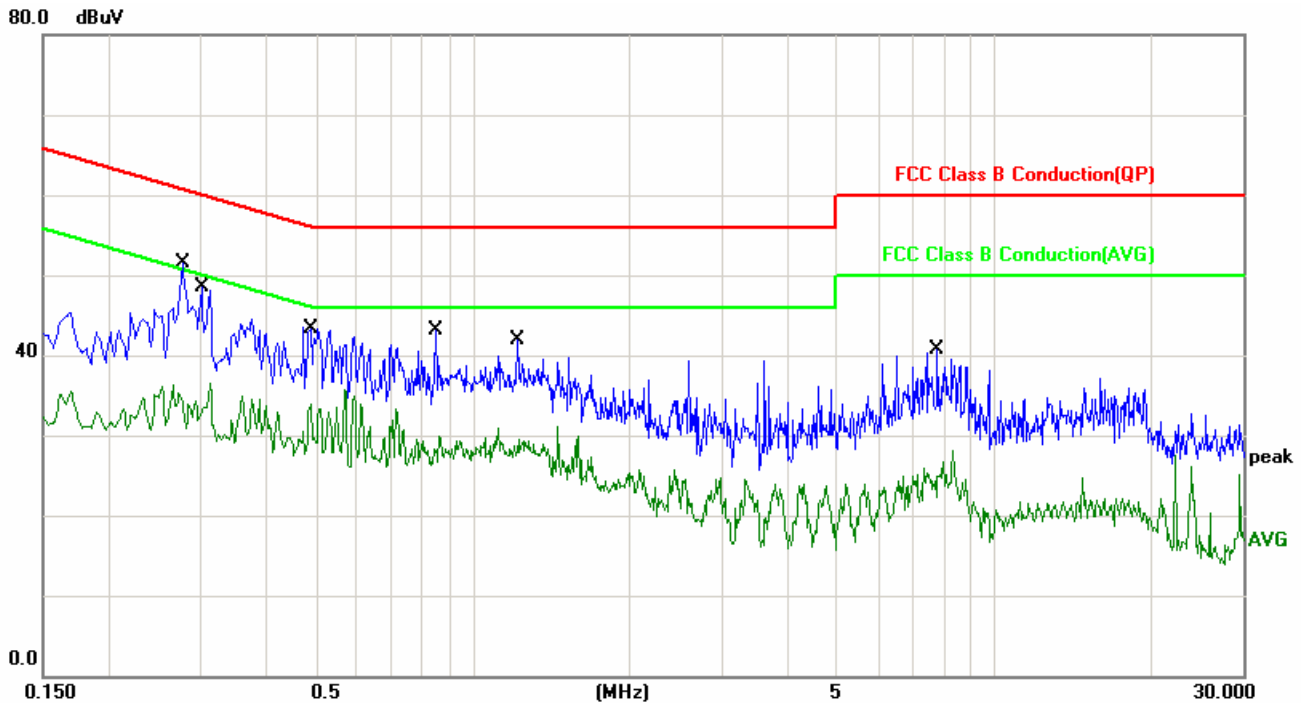


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3379	10.14	28.85	38.99	59.25	-20.26	QP
2	0.3379	10.14	21.69	31.83	49.25	-17.42	AVG
3	0.4420	10.14	24.16	34.30	57.02	-22.72	QP
4	0.4420	10.14	18.31	28.45	47.02	-18.57	AVG
5	0.7420	10.16	24.01	34.17	56.00	-21.83	QP
6	0.7420	10.16	18.18	28.34	46.00	-17.66	AVG
7	1.6620	10.78	19.72	30.50	56.00	-25.50	QP
8	1.6620	10.78	13.53	24.31	46.00	-21.69	AVG
9	3.6020	10.70	16.13	26.83	56.00	-29.17	QP
10	3.6020	10.70	6.97	17.67	46.00	-28.33	AVG
11	6.0059	10.36	17.66	28.02	60.00	-31.98	QP
12	6.0059	10.36	5.93	16.29	50.00	-33.71	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator



Test Mode :	Normal	Phase :	Neutral
Temperature :	20°C	Humidity :	51%
Pressur(mbar) :	1002	Date :	2016/07/10



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2779	10.13	31.56	41.69	60.88	-19.19	QP
2	0.2779	10.13	22.83	32.96	50.88	-17.92	AVG
3	0.3020	10.13	30.14	40.27	60.19	-19.92	QP
4	0.3020	10.13	21.37	31.50	50.19	-18.69	AVG
5	0.4900	10.14	30.72	40.86	56.17	-15.31	QP
6	0.4900	10.14	25.11	35.25	46.17	-10.92	AVG
7	0.8500	10.16	23.69	33.85	56.00	-22.15	QP
8	0.8500	10.16	17.57	27.73	46.00	-18.27	AVG
9	1.2220	10.17	23.99	34.16	56.00	-21.84	QP
10	1.2220	10.17	18.46	28.63	46.00	-17.37	AVG
11	7.7780	10.38	20.64	31.02	60.00	-28.98	QP
12	7.7780	10.38	11.61	21.99	50.00	-28.01	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator



6. Test of Spurious Emission (Radiated)

6.1 Test Limit

FCC §15.247(d), RSS-247 Issue1 Clause 5.5

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. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/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

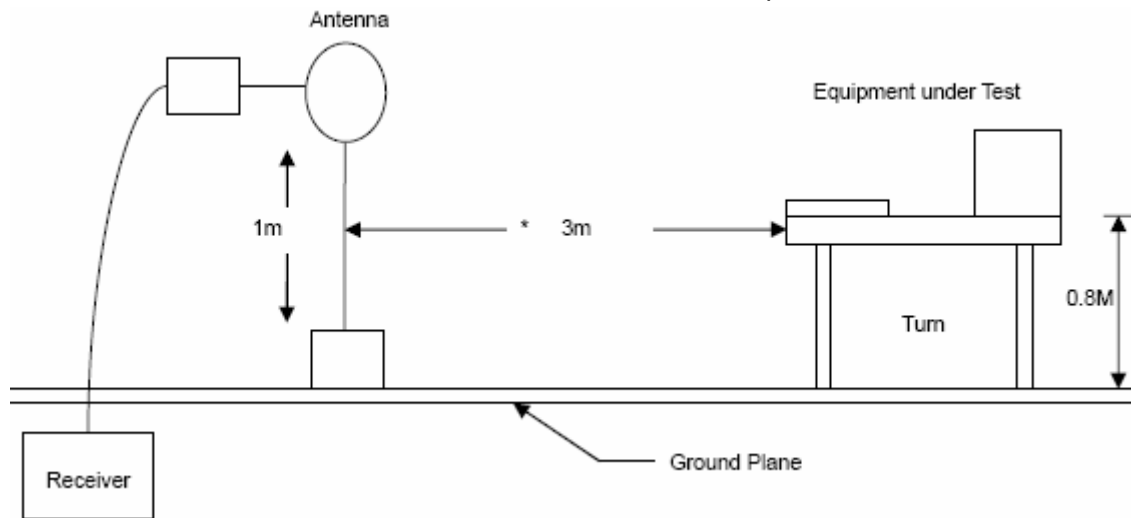
6.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter for frequency below 1GHz and 1.5meter for frequency above 1GHz above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than AVG limit (that means the emission level in peak mode also complies with the limit in AVG mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in AVG mode again and reported.

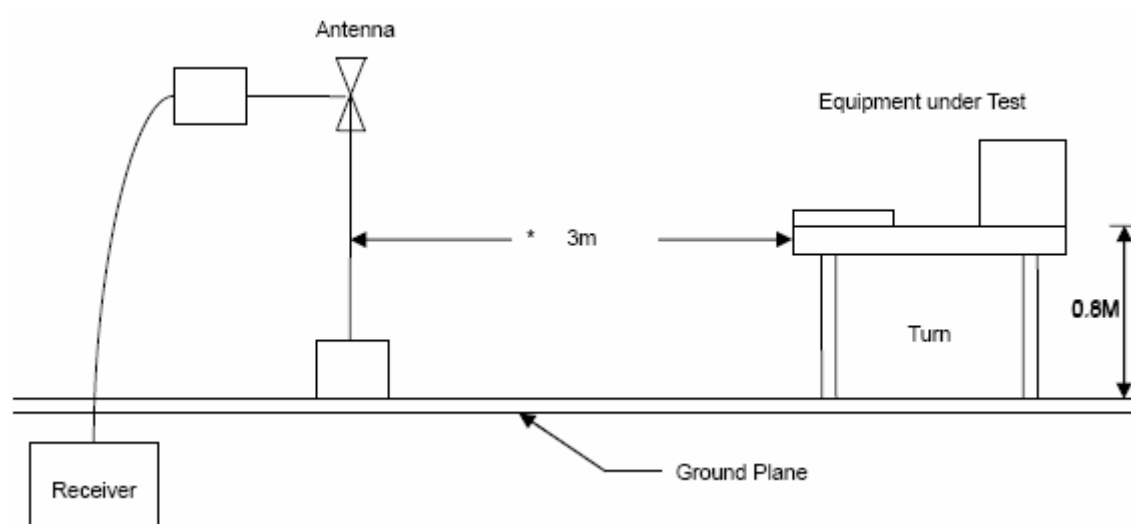


6.3 Typical Test Setup

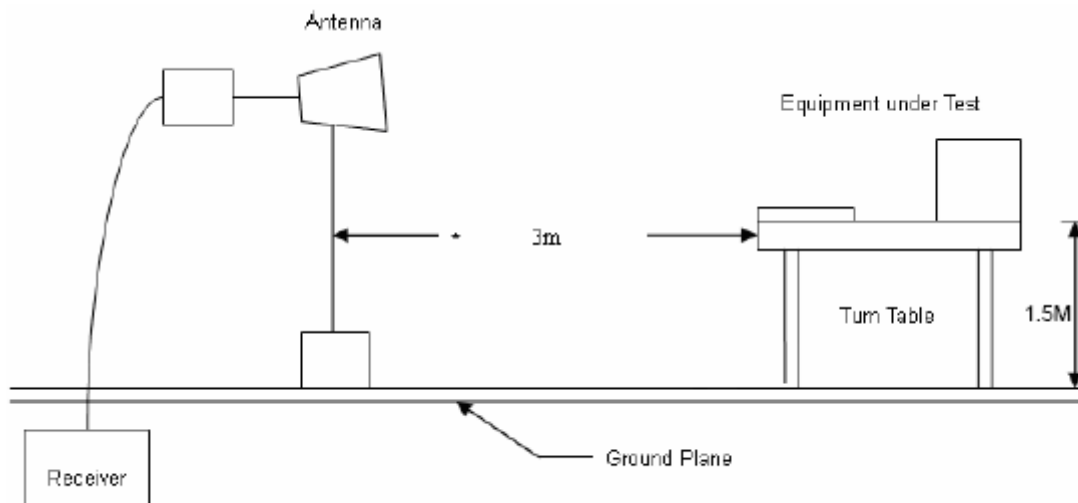
Below 30MHz Test Setup



30M - 1GHz Test Setup



Above 1GHz Test Setup





6.4 Test Result and Data (9KHz ~ 30MHz)

The 9kHz-30MHz spurious emission is under limit 20dB more.

6.5 Test Result and Data (30MHz ~ 1GHz)

Power	:	AC 120V	Temperature	:	24 °C
Test Mode	:	Normal Link	Humidity	:	54 %
Test date	:	Jul. 10, 2016	Atmospheric Pressure	:	1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector mode (PK/QP)
207.5099	H	-9.50	41.59	32.09	43.50	-11.41	QP
276.3798	H	-8.82	47.10	38.28	46.00	-7.72	QP
311.3000	H	-8.37	41.28	32.91	46.00	-13.09	QP
414.1200	H	-4.88	36.79	31.91	46.00	-14.09	QP
504.3299	H	-2.30	33.26	30.96	46.00	-15.04	QP
762.3500	H	1.73	29.11	30.84	46.00	-15.16	QP
33.8800	V	-5.41	31.38	25.97	40.00	-14.03	QP
207.5100	V	-9.50	34.64	25.14	43.50	-18.36	QP
275.4100	V	-8.94	39.91	30.97	46.00	-15.03	QP
612.0000	V	-1.47	35.76	34.29	46.00	-11.71	QP
679.8999	V	-1.55	41.46	39.91	46.00	-6.09	QP
692.5100	V	-1.21	32.80	31.59	46.00	-14.41	QP

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor

**6.6 Test Result and Data (1GHz ~ 25GHz)**

Power	:	AC 120V	Temperature	:	24 °C
Test Mode	:	802.11b (2412MHz)	Humidity	:	54 %
Test date	:	Jul. 10, 2016	Atmospheric Pressure	:	1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	59.16	48.15	74.00	-25.85	peak
1637.500	H	-6.82	48.32	41.50	74.00	-32.50	peak
2955.000	H	0.47	41.31	41.78	74.00	-32.22	peak
4825.000	H	8.27	57.14	65.41	74.00	-8.59	peak
4825.000	H	8.27	43.59	51.86	54.00	-2.14	AVG
5632.500	H	9.35	32.89	42.24	74.00	-31.76	peak
7247.500	H	13.05	32.07	45.12	74.00	-28.88	peak
1127.500	V	-11.01	55.67	44.66	74.00	-29.34	peak
1935.000	V	-6.82	52.41	45.59	74.00	-28.41	peak
2955.000	V	-2.82	45.13	42.31	74.00	-31.69	peak
4825.000	V	0.47	40.87	41.34	74.00	-32.66	peak
4825.000	V	8.27	59.15	67.42	74.00	-6.58	AVG
6270.000	V	8.27	43.19	51.46	54.00	-2.54	peak
7375.000	V	13.05	33.61	46.66	74.00	-27.34	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11b (2437MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	58.72	47.71	74.00	-26.29	peak
1637.500	H	-6.82	48.75	41.93	74.00	-32.07	peak
2955.000	H	0.47	40.94	41.41	74.00	-32.59	peak
4910.000	H	8.43	55.91	64.34	74.00	-9.66	peak
4910.000	H	8.43	43.26	51.69	54.00	-2.31	AVG
6270.000	H	10.37	32.41	42.78	74.00	-31.22	peak
7077.500	H	12.38	32.68	45.06	74.00	-28.94	peak
1127.500	V	-11.01	53.54	42.53	74.00	-31.47	peak
1637.500	V	-6.82	46.20	39.38	74.00	-34.62	peak
2955.000	V	0.47	40.86	41.33	74.00	-32.67	peak
4910.000	V	8.43	56.13	64.56	74.00	-9.44	peak
4910.000	V	8.43	43.52	51.95	54.00	-2.05	AVG
5590.000	V	9.24	32.77	42.01	74.00	-31.99	peak
7247.500	V	13.05	32.79	45.84	74.00	-28.16	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	:	AC 120V	Temperature	:	24 °C
Test Mode	:	802.11b (2462MHz)	Humidity	:	54 %
Test date	:	Jul. 10, 2016	Atmospheric Pressure	:	1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	58.99	47.98	74.00	-26.02	peak
2870.000	H	-0.10	41.90	41.80	74.00	-32.20	peak
3295.000	H	2.32	39.42	41.74	74.00	-32.26	peak
4952.500	H	8.51	55.31	63.82	74.00	-10.18	peak
4952.500	H	8.51	42.36	50.87	54.00	-3.13	AVG
6355.000	H	10.40	31.54	41.94	74.00	-32.06	peak
7417.500	H	13.71	32.99	46.70	74.00	-27.30	peak
1127.500	V	-11.01	53.58	42.57	74.00	-31.43	peak
1595.000	V	-7.06	49.80	42.74	74.00	-31.26	peak
2020.000	V	-4.64	44.91	40.27	74.00	-33.73	peak
2955.000	V	0.47	41.32	41.79	74.00	-32.21	peak
4952.500	V	8.51	56.27	64.78	74.00	-9.22	peak
4952.500	V	8.51	42.53	51.04	54.00	-2.96	AVG
6100.000	V	10.30	32.52	42.82	74.00	-31.18	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11g (2412MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	59.80	48.79	74.00	-25.21	peak
2445.000	H	-2.82	43.16	40.34	74.00	-33.66	peak
2955.000	H	0.47	41.26	41.73	74.00	-32.27	peak
4825.000	H	8.27	55.34	63.61	74.00	-10.39	peak
4825.000	H	8.27	41.85	50.12	54.00	-3.88	AVG
6015.000	H	10.27	31.71	41.98	74.00	-32.02	peak
6992.500	H	12.06	31.90	43.96	74.00	-30.04	peak
1127.500	V	-11.01	53.55	42.54	74.00	-31.46	peak
1637.500	V	-6.82	48.59	41.77	74.00	-32.23	peak
2020.000	V	-4.64	45.85	41.21	74.00	-32.79	peak
4442.500	V	7.37	33.83	41.20	74.00	-32.80	peak
4825.000	V	8.27	55.76	64.03	74.00	-9.97	peak
4825.000	V	8.27	42.98	51.25	54.00	-2.75	AVG
6822.500	V	11.50	32.63	44.13	74.00	-29.87	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11g (2437MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	47.85	36.84	74.00	-37.16	peak
2445.000	H	-2.82	41.95	39.13	74.00	-34.87	peak
2912.500	H	0.18	38.83	39.01	74.00	-34.99	peak
4910.000	H	8.43	50.00	58.43	74.00	-15.57	peak
4910.000	H	8.43	38.14	46.57	54.00	-7.43	AVG
6142.500	H	10.32	29.97	40.29	74.00	-33.71	peak
7332.500	H	13.38	32.26	45.64	74.00	-28.36	peak
1127.500	V	-11.01	53.67	42.66	74.00	-31.34	peak
1850.000	V	-5.59	47.90	42.31	74.00	-31.69	peak
2020.000	V	-4.64	51.31	46.67	74.00	-27.33	peak
2955.000	V	0.47	41.21	41.68	74.00	-32.32	peak
4910.000	V	8.43	54.86	63.29	74.00	-10.71	peak
4910.000	V	8.43	43.28	51.71	54.00	-2.29	AVG
6227.500	V	10.35	32.27	42.62	74.00	-31.38	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11g (2462MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	58.93	47.92	74.00	-26.08	peak
1637.500	H	-6.82	49.35	42.53	74.00	-31.47	peak
2870.000	H	-0.10	41.61	41.51	74.00	-32.49	peak
3295.000	H	2.32	38.13	40.45	74.00	-33.55	peak
4952.500	H	8.51	56.03	64.54	74.00	-9.46	peak
4952.500	H	8.51	42.31	50.82	54.00	-3.18	AVG
6907.500	H	11.78	33.14	44.92	74.00	-29.08	peak
1127.500	V	-11.01	52.95	41.94	74.00	-32.06	peak
1637.500	V	-6.82	48.07	41.25	74.00	-32.75	peak
2020.000	V	-4.64	44.97	40.33	74.00	-33.67	peak
2955.000	V	0.47	42.09	42.56	74.00	-31.44	peak
4952.500	V	8.51	55.16	63.67	74.00	-10.33	peak
4952.500	V	8.51	42.63	51.14	54.00	-2.86	AVG
6822.500	V	11.50	32.86	44.36	74.00	-29.64	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	802.11n HT20 (2412MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	57.97	46.96	74.00	-27.04	peak
2445.000	H	-2.82	45.67	42.85	74.00	-31.15	peak
2955.000	H	0.47	42.11	42.58	74.00	-31.42	peak
3252.500	H	2.10	37.16	39.26	74.00	-34.74	peak
4825.000	H	8.27	56.75	65.02	74.00	-8.98	peak
4825.000	H	8.27	42.46	50.73	54.00	-3.27	AVG
7247.500	H	13.05	38.93	51.98	74.00	-22.02	peak
1127.500	V	-11.01	55.67	44.66	74.00	-29.34	peak
1637.500	V	-6.82	52.41	45.59	74.00	-28.41	peak
2445.000	V	-2.82	45.13	42.31	74.00	-31.69	peak
2955.000	V	0.47	40.87	41.34	74.00	-32.66	peak
4825.000	V	8.27	56.65	64.92	74.00	-9.08	peak
4825.000	V	8.27	43.19	51.46	54.00	-2.54	AVG
7247.500	V	13.05	33.61	46.66	74.00	-27.34	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11n HT20 (2437MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	58.56	47.55	74.00	-26.45	peak
2445.000	H	-2.82	45.28	42.46	74.00	-31.54	peak
2955.000	H	0.47	41.06	41.53	74.00	-32.47	peak
3252.500	H	2.10	37.98	40.08	74.00	-33.92	peak
4910.000	H	8.43	56.68	65.11	74.00	-8.89	peak
4910.000	H	8.43	43.27	51.70	54.00	-2.30	AVG
7332.500	H	13.38	38.41	51.79	74.00	-22.21	peak
1127.500	V	-11.01	56.75	45.74	74.00	-28.26	peak
1637.500	V	-6.82	51.51	44.69	74.00	-29.31	peak
2020.000	V	-4.64	45.41	40.77	74.00	-33.23	peak
2870.000	V	-0.10	41.77	41.67	74.00	-32.33	peak
4910.000	V	8.43	57.15	65.58	74.00	-8.42	peak
4910.000	V	8.43	44.06	52.49	54.00	-1.51	AVG
7332.500	V	13.38	37.55	50.93	74.00	-23.07	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: AC 120V	Temperature	: 24 °C
Test Mode	: 802.11n HT20(2462MHz)	Humidity	: 54 %
Test date	: Jul. 10, 2016	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)	Detector mode (PK/QP)
1127.500	H	-11.01	58.14	47.13	74.00	-26.87	peak
1637.500	H	-6.82	52.81	45.99	74.00	-28.01	peak
2955.000	H	0.47	41.24	41.71	74.00	-32.29	peak
3295.000	H	2.32	38.44	40.76	74.00	-33.24	peak
4952.500	H	8.51	58.16	66.67	74.00	-7.33	peak
4952.500	H	8.51	44.39	52.90	54.00	-1.10	AVG
7417.500	H	13.71	37.60	51.31	74.00	-22.69	peak
1127.500	V	-11.01	56.14	45.13	74.00	-28.87	peak
1637.500	V	-6.82	48.37	41.55	74.00	-32.45	peak
2020.000	V	-4.64	44.54	39.90	74.00	-34.10	peak
2870.000	V	-0.10	41.44	41.34	74.00	-32.66	peak
4952.500	V	8.51	57.31	65.82	74.00	-8.18	peak
4952.500	V	8.51	44.13	52.64	54.00	-1.36	AVG
7417.500	V	13.71	34.61	48.32	74.00	-25.68	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



6.7 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz



6.8 Restrict Band Emission Measurement Data

Test Date: Jul. 10, 2016

Temperature: 26°C

Atmospheric pressure: 1018 hPa

Humidity: 47%

Modulation Standard: 802.11b

Channel 1				Fundamental Frequency: 2412 MHz			
Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Ant-Pol H/V
2390.000	-3.05	53.17	50.12	74.00	-23.88	peak	H
2390.000	-3.05	39.76	36.71	54.00	-17.29	AVG	H
2390.000	-3.05	52.34	49.29	74.00	-24.71	peak	V
2390.000	-3.05	36.98	33.93	54.00	-20.07	AVG	V
Channel 11				Fundamental Frequency: 2462 MHz			
2483.500	-2.65	52.66	50.01	74.00	-23.99	peak	H
2483.500	-2.65	36.77	34.12	54.00	-19.88	AVG	H
2483.500	-2.65	52.08	49.43	74.00	-24.57	peak	V
2483.500	-2.65	36.29	33.64	54.00	-20.36	AVG	V

Modulation Standard: 802.11g

Channel 1				Fundamental Frequency: 2412 MHz			
Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Ant-Pol H/V
2390.000	-3.05	64.71	61.66	74.00	-12.34	peak	H
2390.000	-3.05	48.72	45.67	54.00	-8.33	AVG	H
2390.000	-3.05	57.90	54.85	74.00	-19.15	peak	V
2390.000	-3.05	42.58	39.53	54.00	-14.47	AVG	V
Channel 11				Fundamental Frequency: 2462 MHz			
2483.500	-2.65	64.46	61.81	74.00	-12.19	peak	H
2483.500	-2.65	49.31	46.66	54.00	-7.34	AVG	H
2483.500	-2.65	61.06	58.41	74.00	-15.59	peak	V
2483.500	-2.65	45.77	43.12	54.00	-10.88	AVG	V



Modulation Standard: 802.11n HT20

Channel 1				Fundamental Frequency: 2412 MHz			
Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Ant-Pol H/V
2390.000	-3.05	66.27	63.22	74.00	-10.78	peak	H
2390.000	-3.05	51.49	48.44	54.00	-5.56	AVG	H
2390.000	-3.05	60.45	57.40	74.00	-16.60	peak	V
2390.000	-3.05	45.72	42.67	54.00	-11.33	AVG	V
Channel 11				Fundamental Frequency: 2462 MHz			
2483.500	-2.65	68.58	65.93	74.00	-8.07	peak	H
2483.500	-2.65	52.79	50.14	54.00	-3.86	AVG	H
2483.500	-2.65	62.76	60.11	74.00	-13.89	peak	V
2483.500	-2.65	46.59	43.94	54.00	-10.06	AVG	V

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector peak mode) for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector sample mode) for Average detection at frequency above 1GHz.



7. Test of Spurious Emission (Conducted)

7.1 Test Limit

Below 30dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

KDB 558074 D01v03r02 - Section 11.2 & Section 11.3

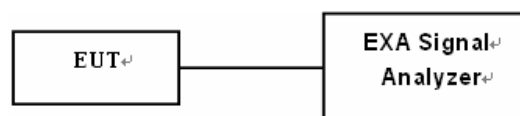
1. Reference level measurement

- (a) Set instrument center frequency to DTS channel center frequency
- (b) Set the span to ≥ 1.5 times the DTS bandwidth
- (c) Set the RBW = 100 kHz
- (d) Set the VBW $\geq 3 \times$ RBW
- (e) Detector = peak
- (f) Sweep time = auto couple
- (g) Trace mode = max hold
- (h) Allow trace to fully stabilize

2. Emission level measurement

- (a) Set the center frequency and span to encompass frequency range to be measured
- (b) RBW = 100kHz
- (c) VBW = 300kHz
- (d) Detector = Peak
- (e) Trace mode = max hold
- (f) Sweep time = auto couple
- (g) The trace was allowed to stabilize

7.3 Test Setup Layout





7.4 Test Result and Data

Test Date: Jul. 10, 2016

Temperature: 24°C

Atmospheric pressure: 1014 hPa

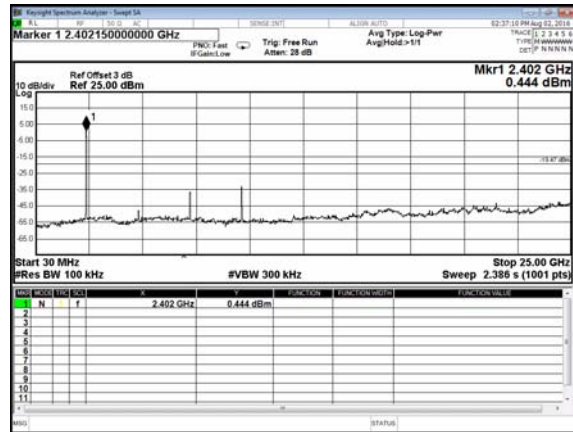
Humidity: 47%

Modulation Standard	Frequency (MHz)	Test Result
802.11b	2412	Pass
	2437	Pass
	2462	Pass
802.11g	2412	Pass
	2437	Pass
	2462	Pass
802.11n HT20	2412	Pass
	2437	Pass
	2462	Pass

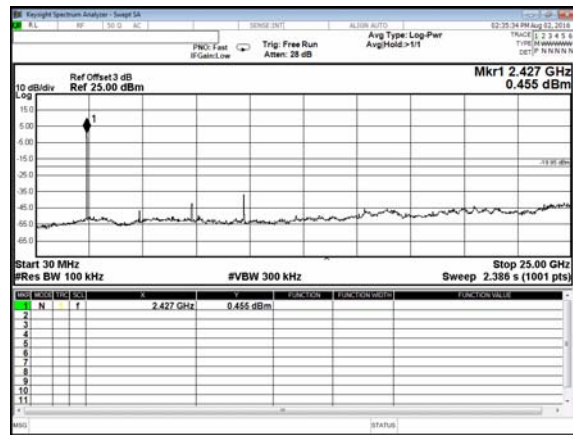
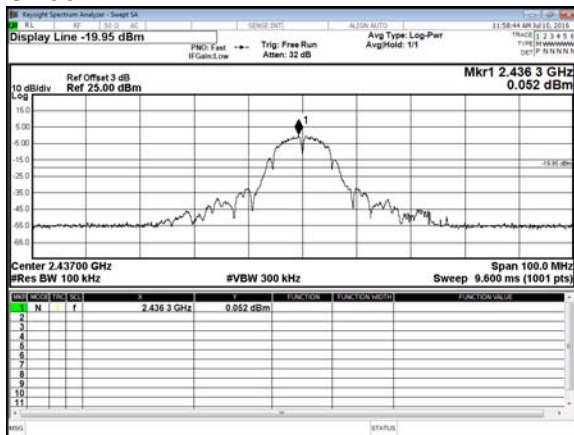
Note: Test plots refer to the following pages.



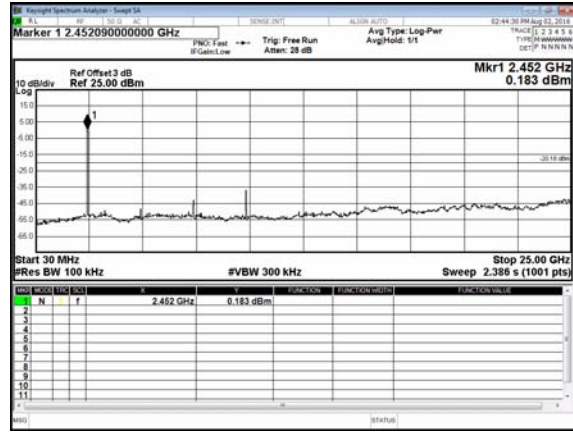
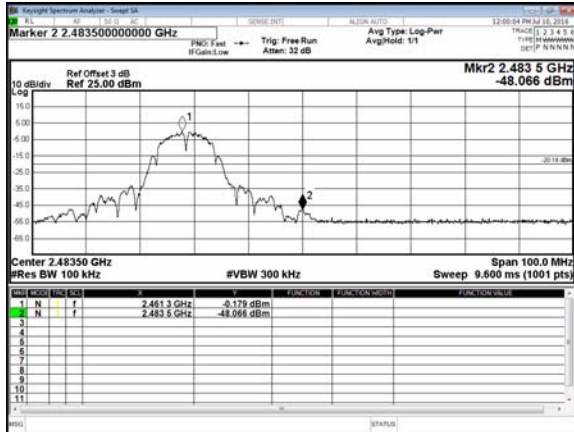
Modulation Type: 802.11b
CH01



CH06

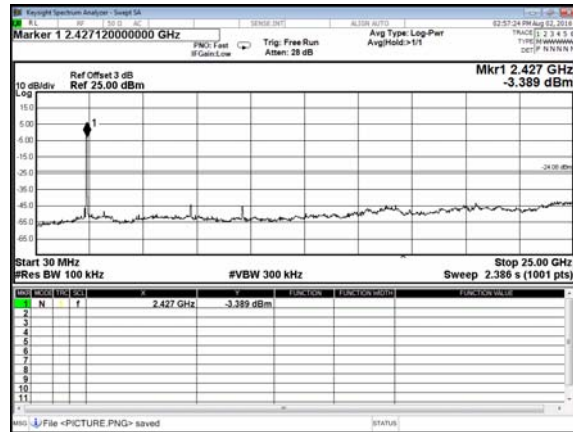
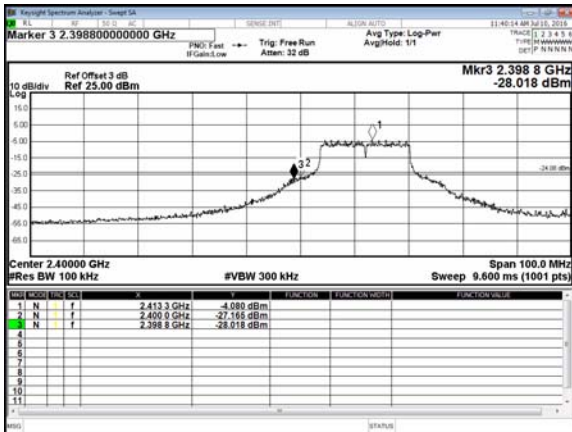


CH11

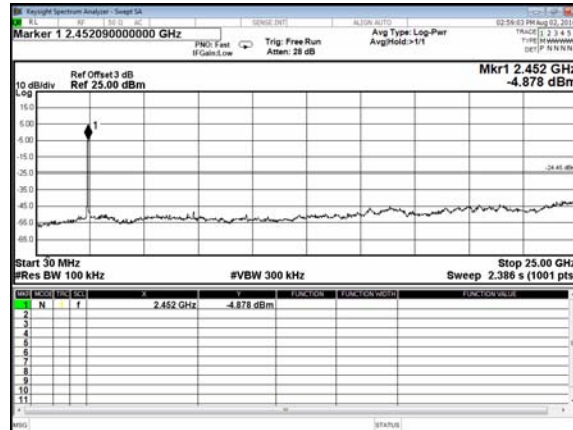
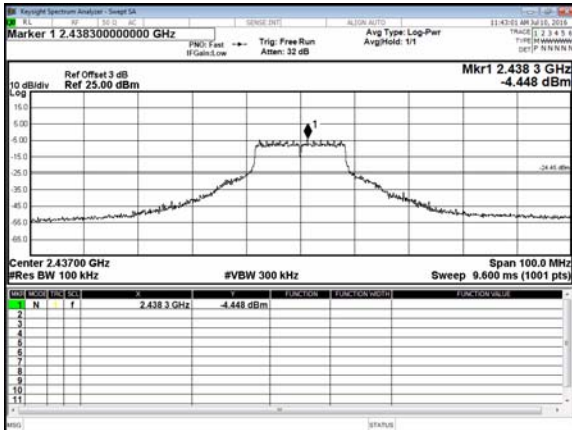




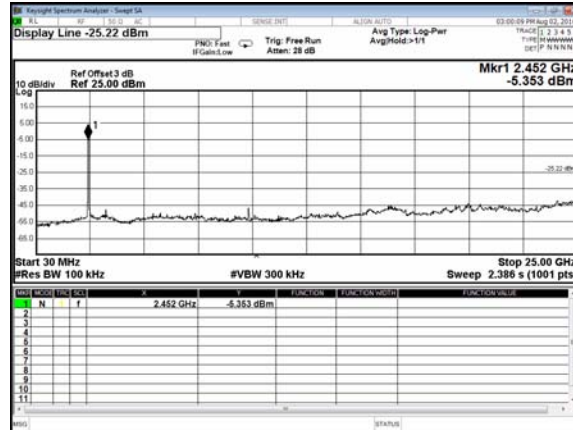
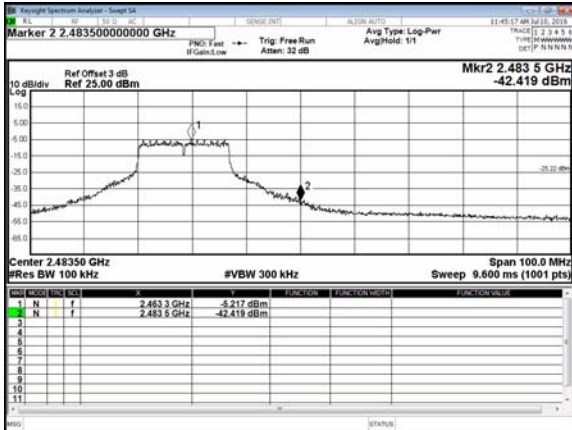
Modulation Type: 802.11g
CH01



CH06

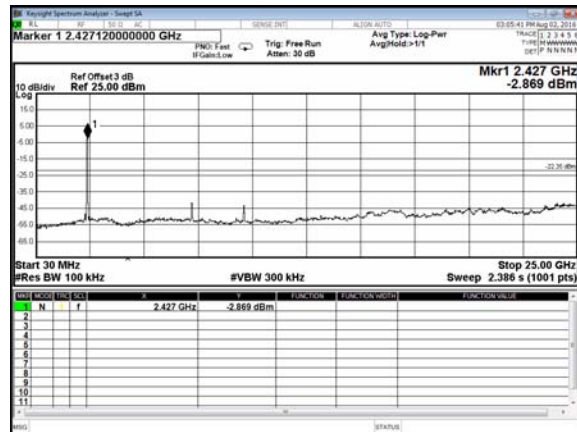
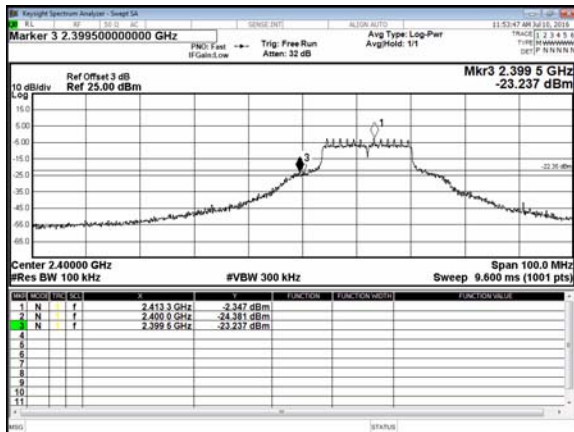


CH11

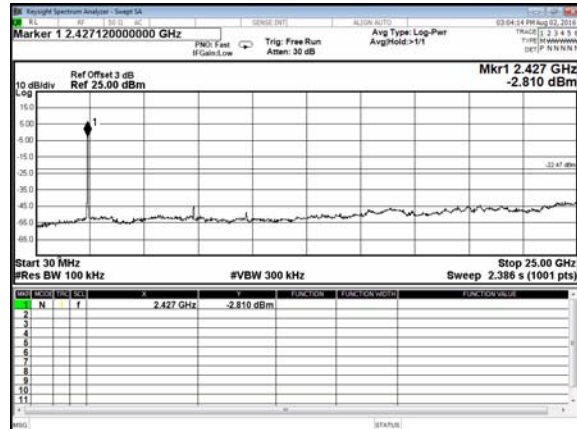
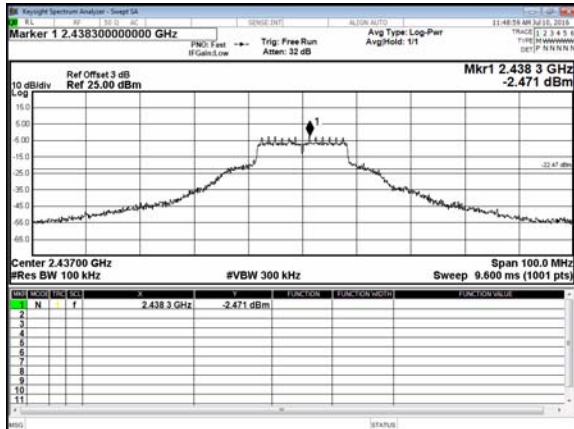




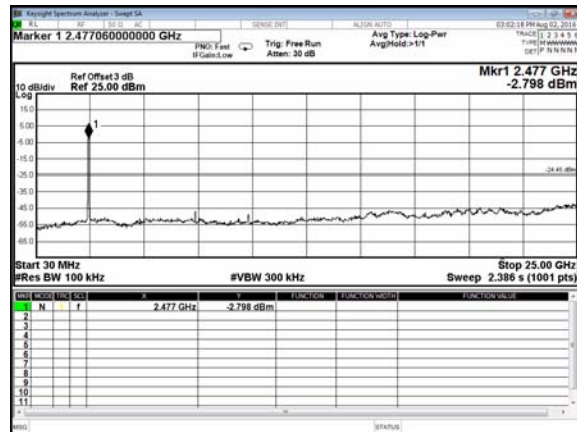
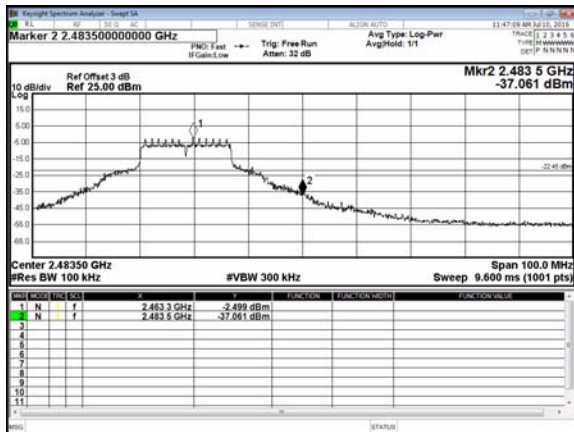
Modulation Type: 802.11n HT20
CH01



CH06



CH11





8. 6dB Bandwidth & 99% Bandwidth

8.1 Test Limit

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

According to RSS-247 issue 1, §5.2

(1) The minimum 6 dB bandwidth shall be 500 kHz.

8.2 Test Procedures

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set RBW of spectrum analyzer to 100KHz and VBW $\geq 3 \times$ RBW.
- c. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- d. The 6dB Bandwidth was measured and recorded.

8.3 Test Setup Layout



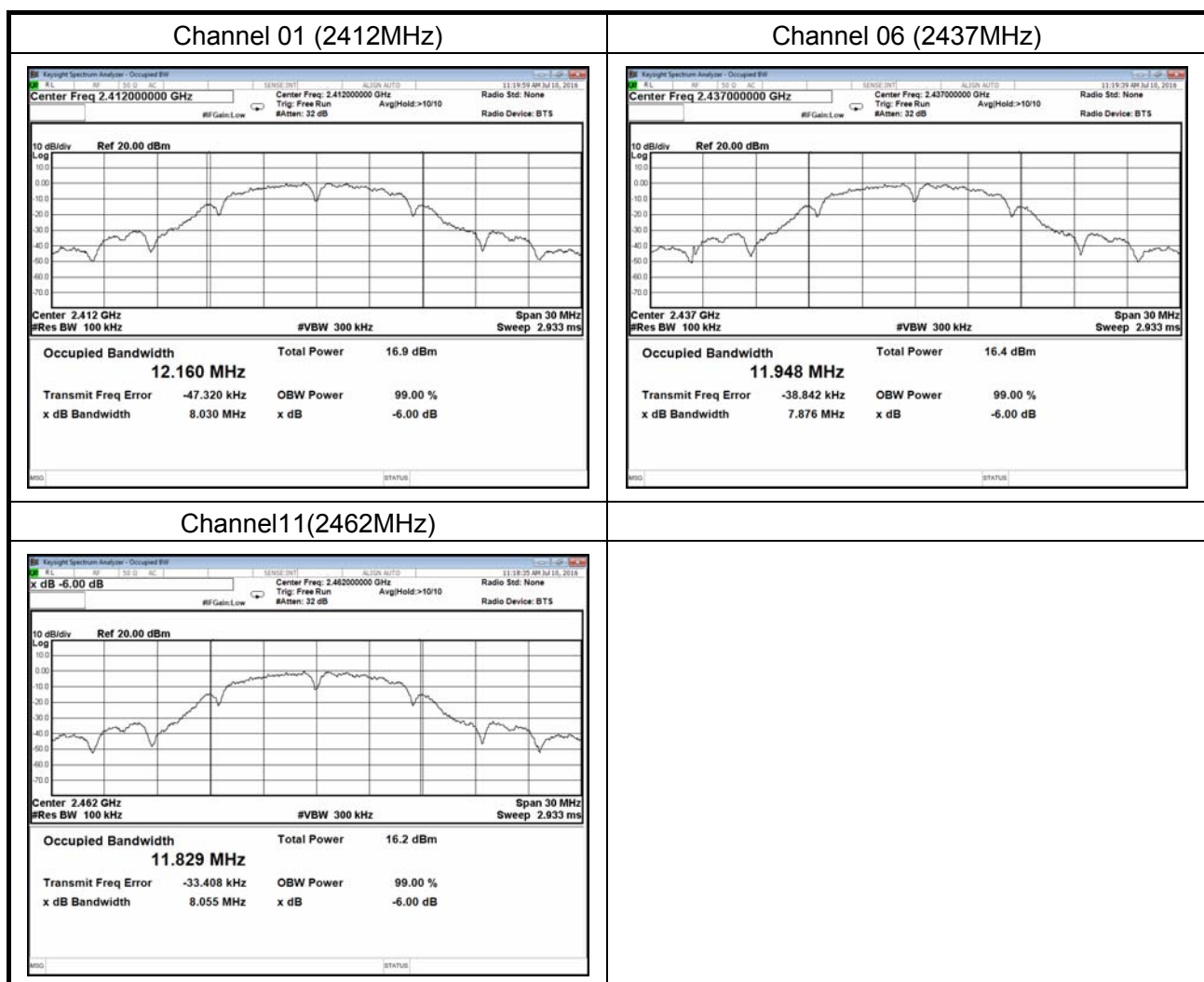


8.4 Test Result and Data

Test Mode	Transmit by 802.11b
Test Date	2016-07-11

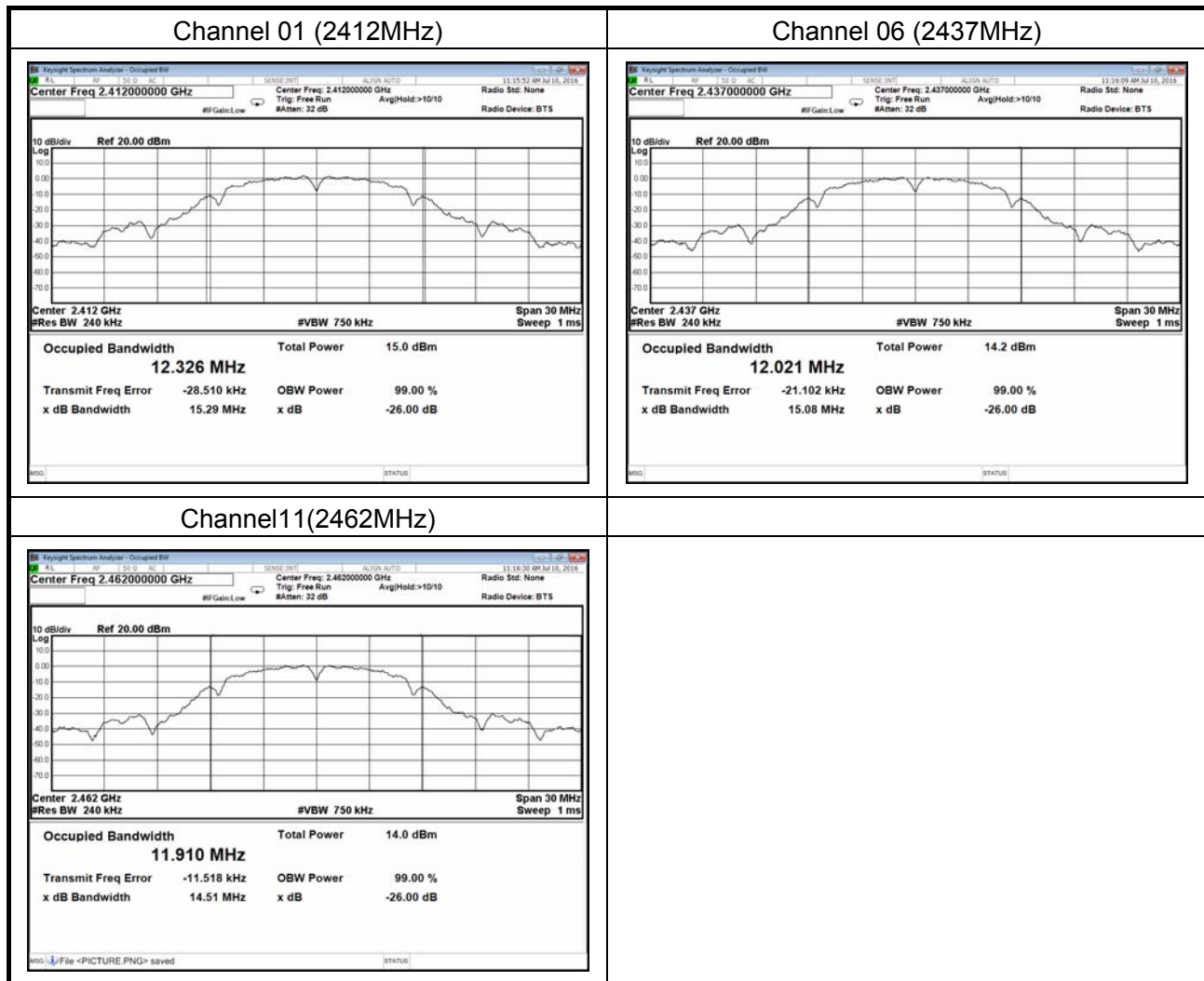
Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
01	2412	8.03	12.33	Pass
06	2437	7.88	12.02	Pass
11	2462	8.06	11.91	Pass

6dB Bandwidth





99% Bandwidth

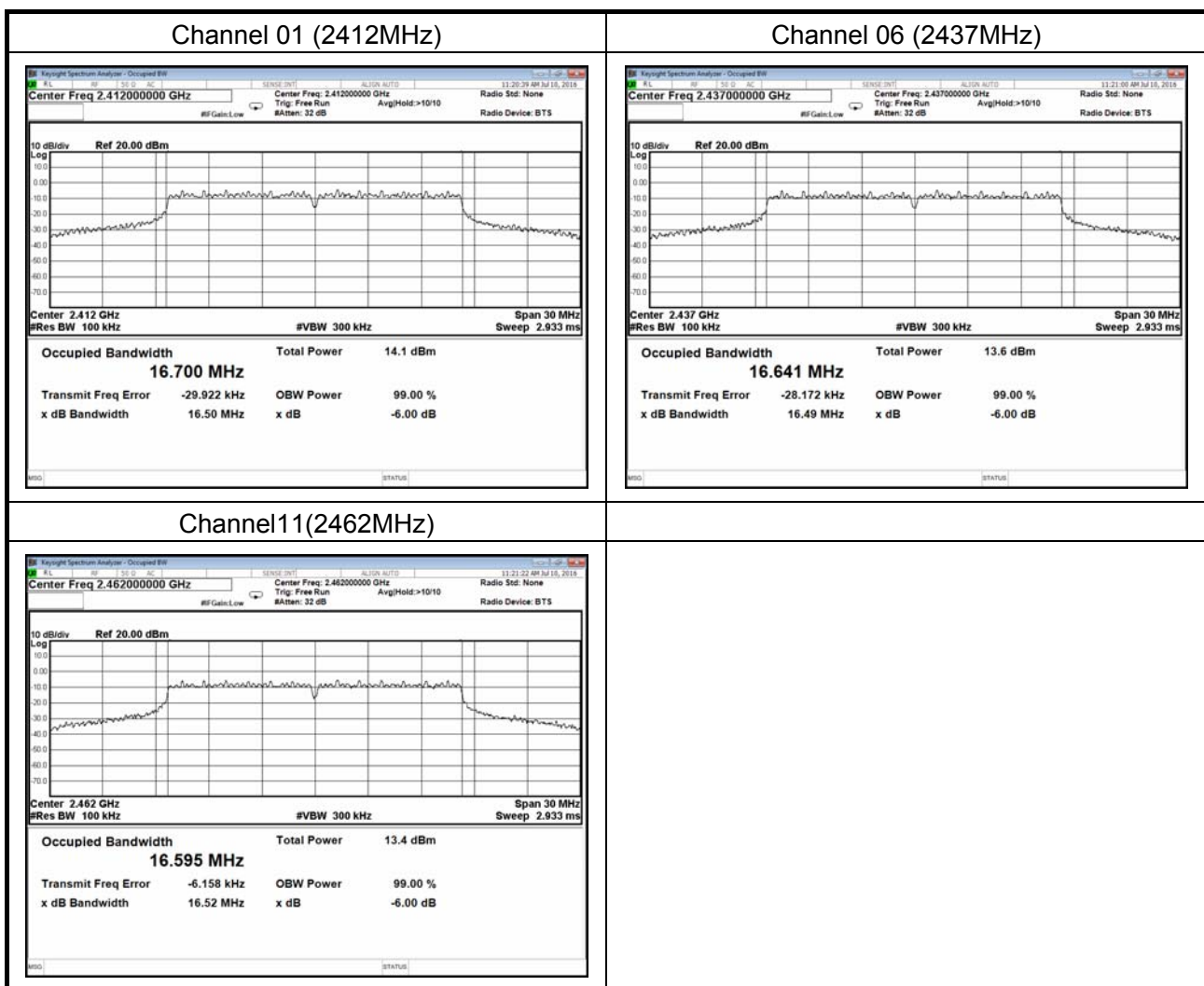




Test Mode	Transmit by 802.11g
Test Date	2016-07-11

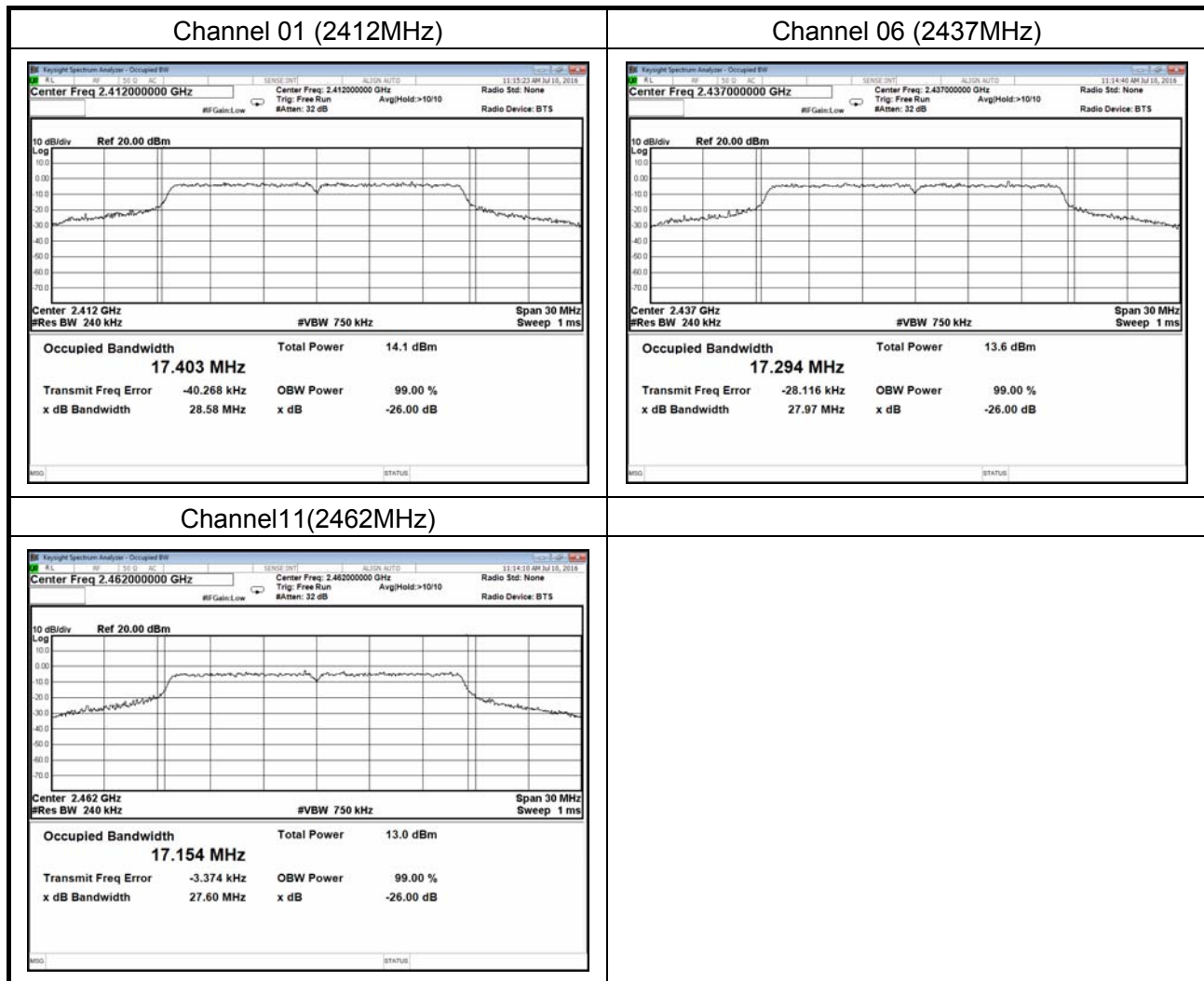
Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
01	2412	16.50	17.40	Pass
06	2437	16.49	17.29	Pass
11	2462	16.52	17.15	Pass

6dB Bandwidth





99% Bandwidth

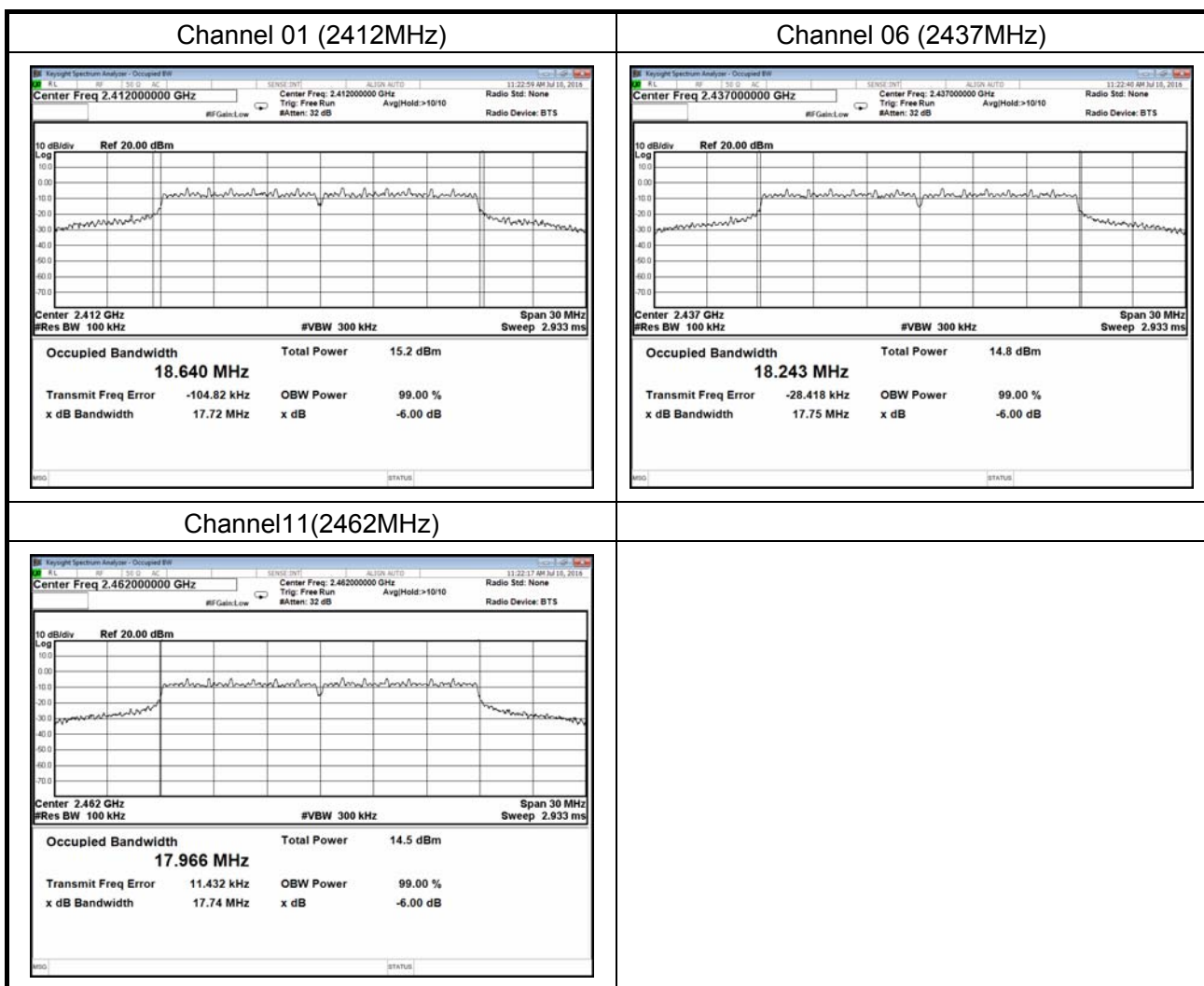




Test Mode	Transmit by 802.11n (20MHz)
Test Date	2016-07-11

Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
01	2412	17.72	18.98	Pass
06	2437	17.75	18.16	Pass
11	2462	17.74	17.83	Pass

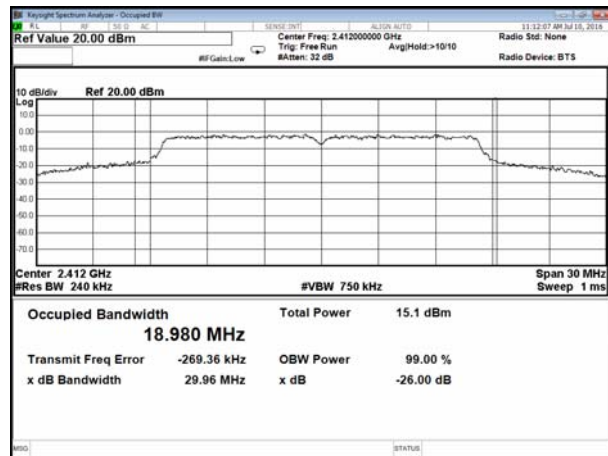
6dB Bandwidth



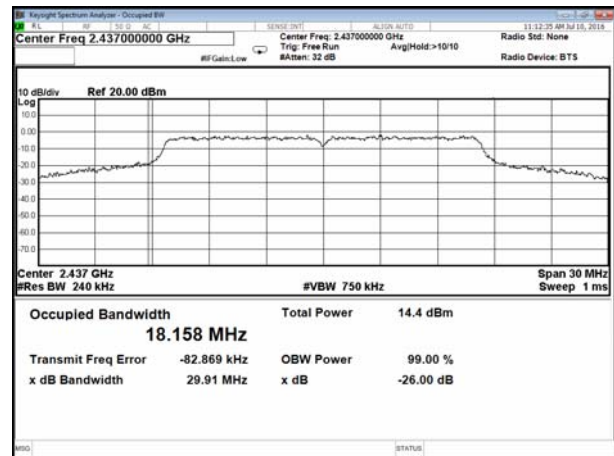


99% Bandwidth

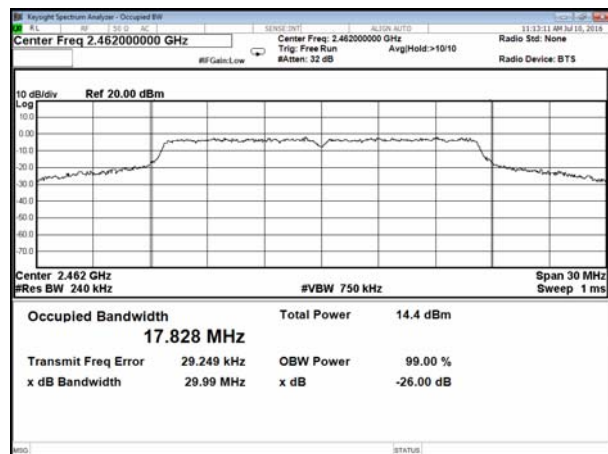
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel11(2462MHz)





9. Maximum Peak Output Power

9.1 Test Limit

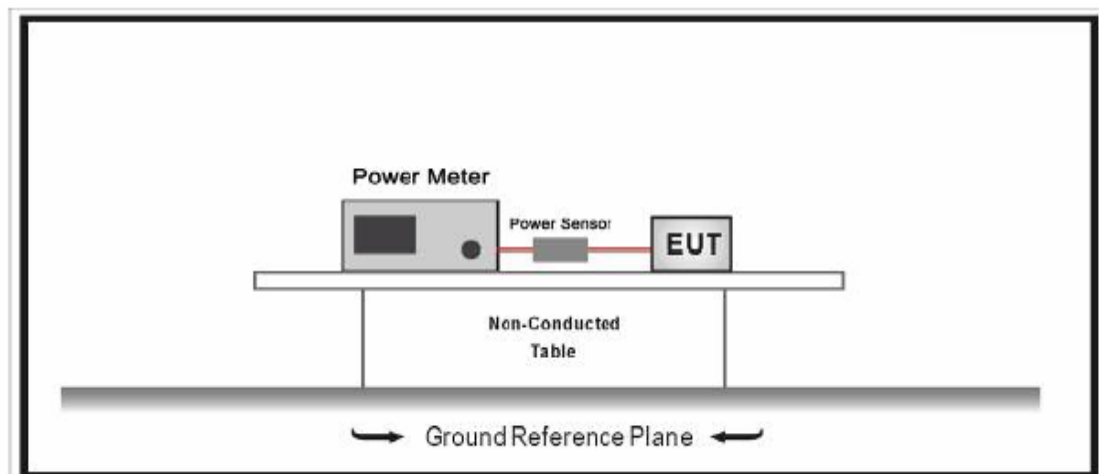
The Maximum Peak Output Power Measurement is 30dBm.

9.2 Test Procedures

Test procedure refers to KDB558074 D01v03r05, section 9.1.2 PKPM1 Peak power meter method.

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

9.3 Test Setup Layout





9.4 Test Result and Data

Test Date: Jul. 10, 2016

Temperature: 24°C

Atmospheric pressure: 1016 hPa

Humidity: 46%

Modulation Type	Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
IEEE 802.11b	01	2412	12.30	16.982
	06	2437	11.88	15.417
	11	2462	11.48	14.060
IEEE 802.11g	01	2412	15.21	33.189
	06	2437	14.84	30.479
	11	2462	14.52	28.314
IEEE 802.11n HT20	01	2412	16.12	40.926
	06	2437	15.68	36.983
	11	2462	15.50	35.481



10. Power Spectral Density

10.1 Test Limit

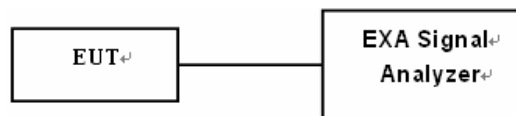
The Maximum of Power Spectral Density Measurement is 8dBm.

10.2 Test Procedures

Test procedure refers to section 10.3 Method AVGPSD-1.

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- g) Sweep time = auto couple.
- h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

10.3 Test Setup Layout



**10.4 Test Result and Data**

Test Date: Jul. 10, 2016

Temperature: 24°C

Atmospheric pressure: 1014 hPa

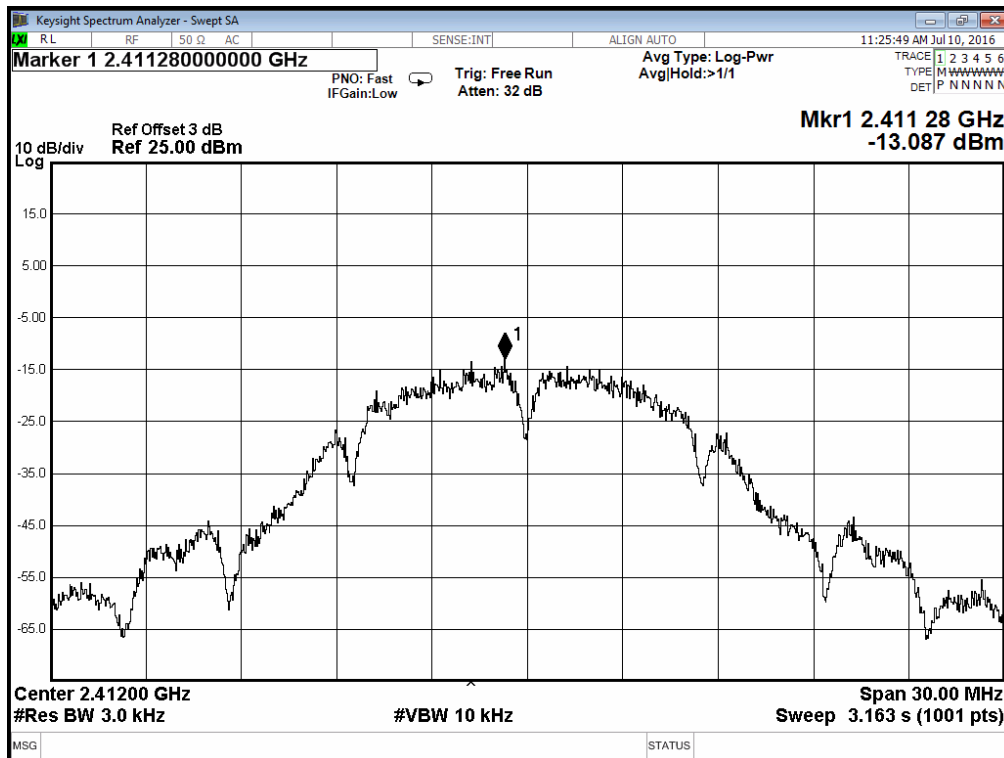
Humidity: 47%

Modulation Type	Frequency (MHz)	Power Spectral Density (dBm)
IEEE 802.11b	2412	-13.087
	2437	-13.257
	2462	-13.876
IEEE 802.11g	2412	-18.524
	2437	-18.155
	2462	-18.508
IEEE 802.11n HT20	2412	-17.713
	2437	-18.218
	2462	-18.481



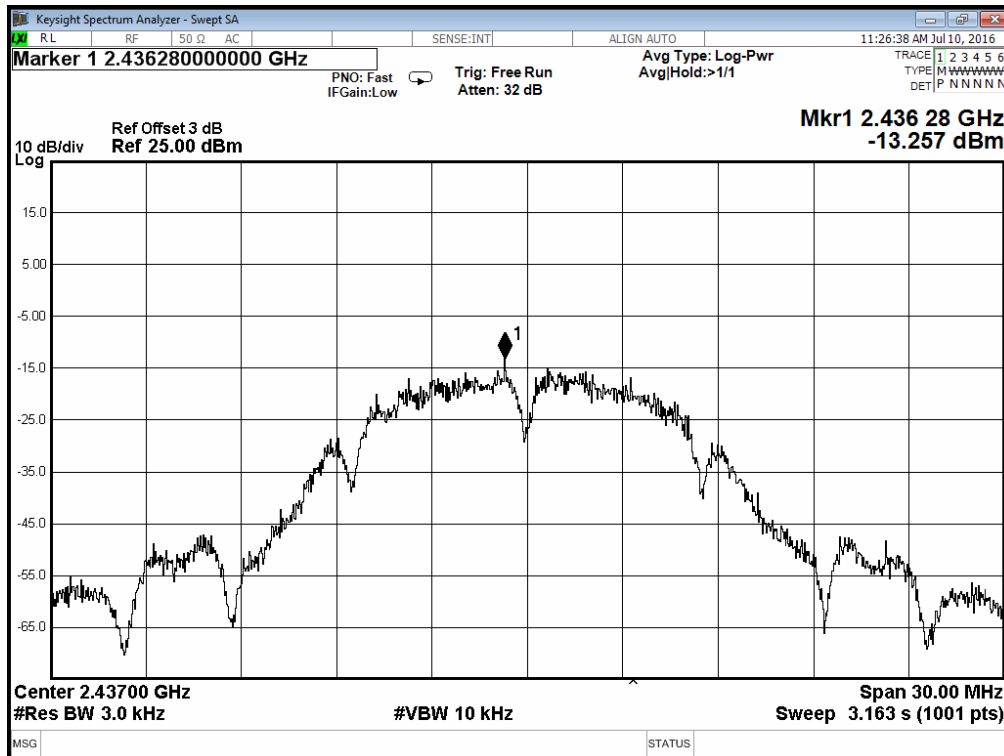
Modulation Standard: 802.11b

Channel: 01



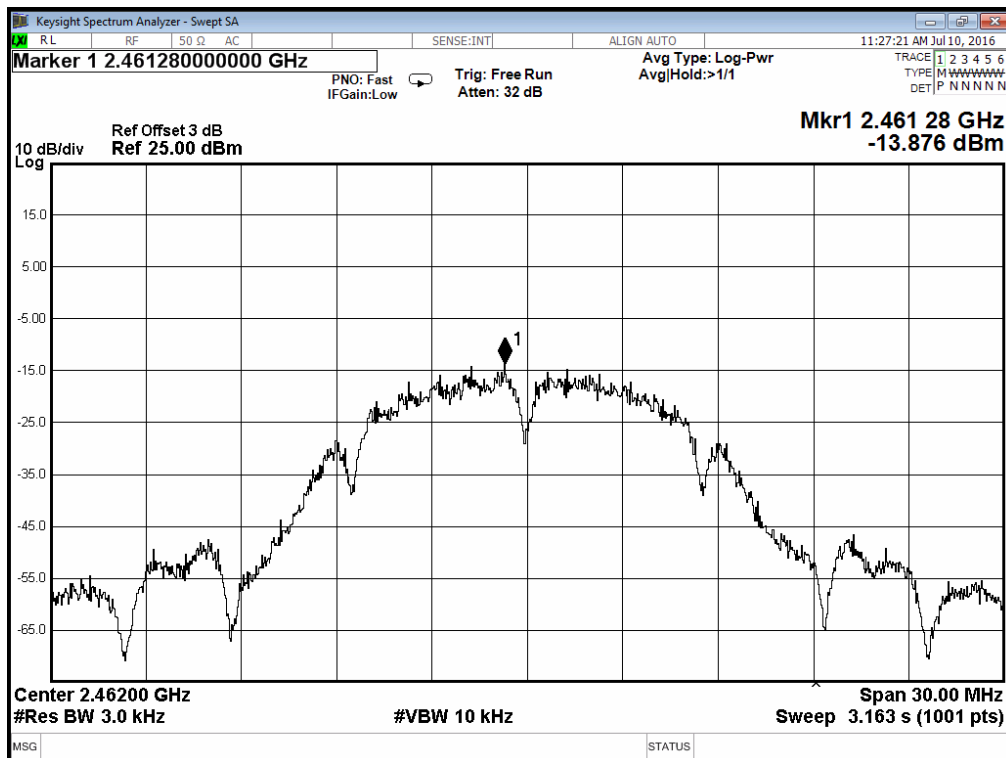
Modulation Standard: 802.11b

Channel: 06

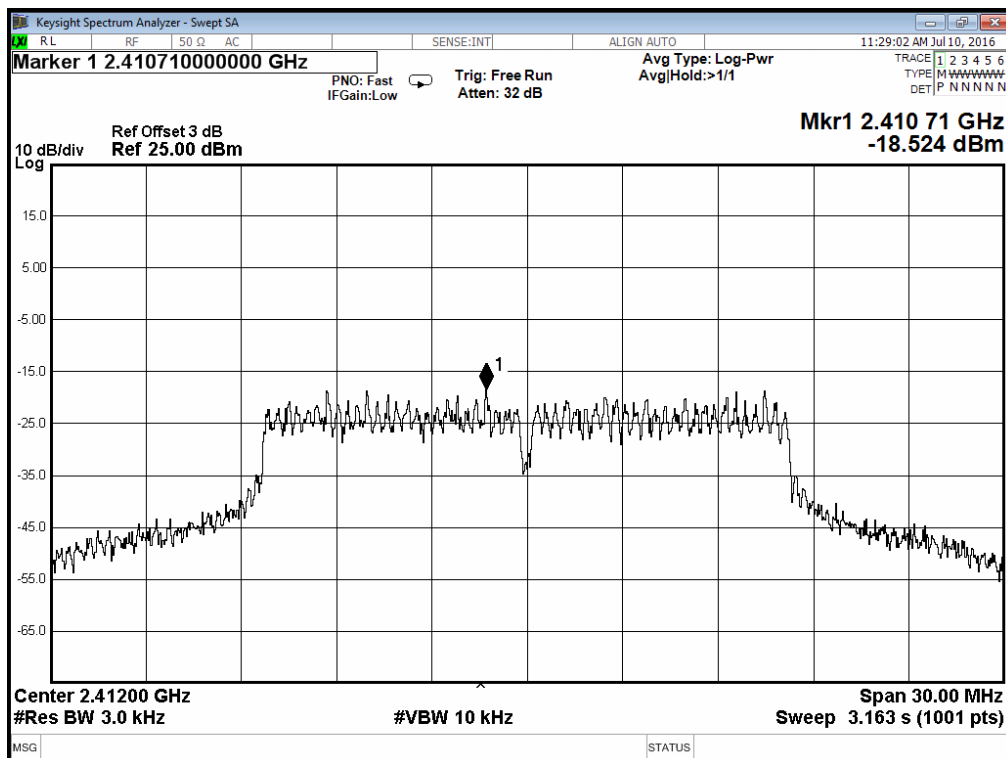




Modulation Standard: 802.11b
Channel: 11



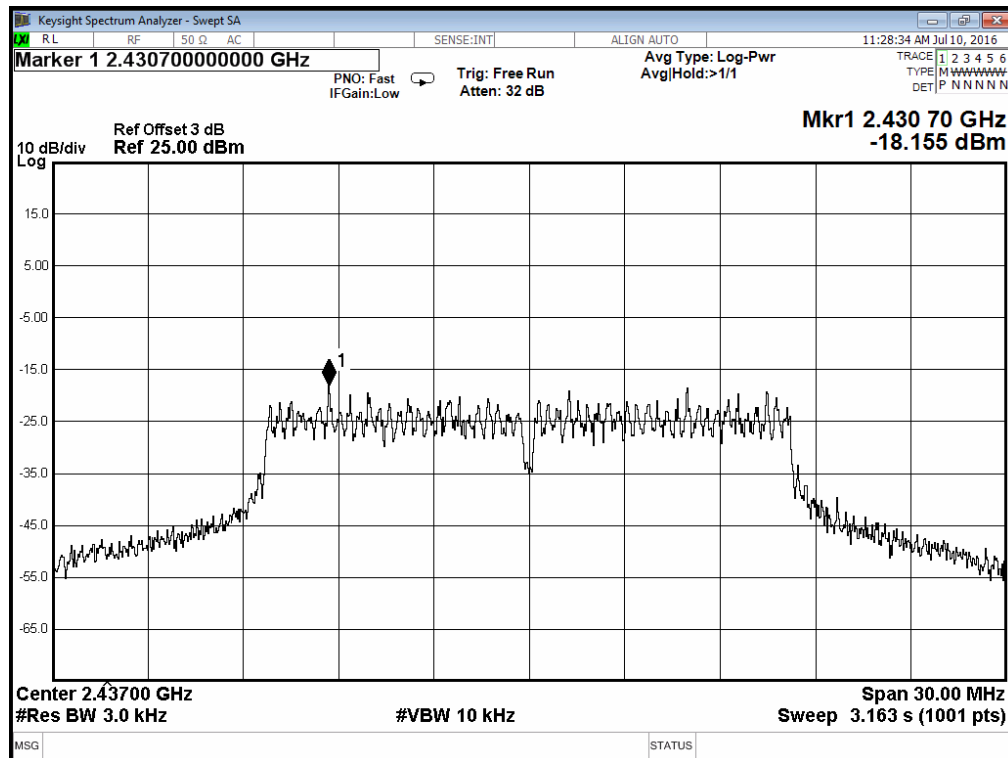
Modulation Standard: 802.11g
Channel: 01





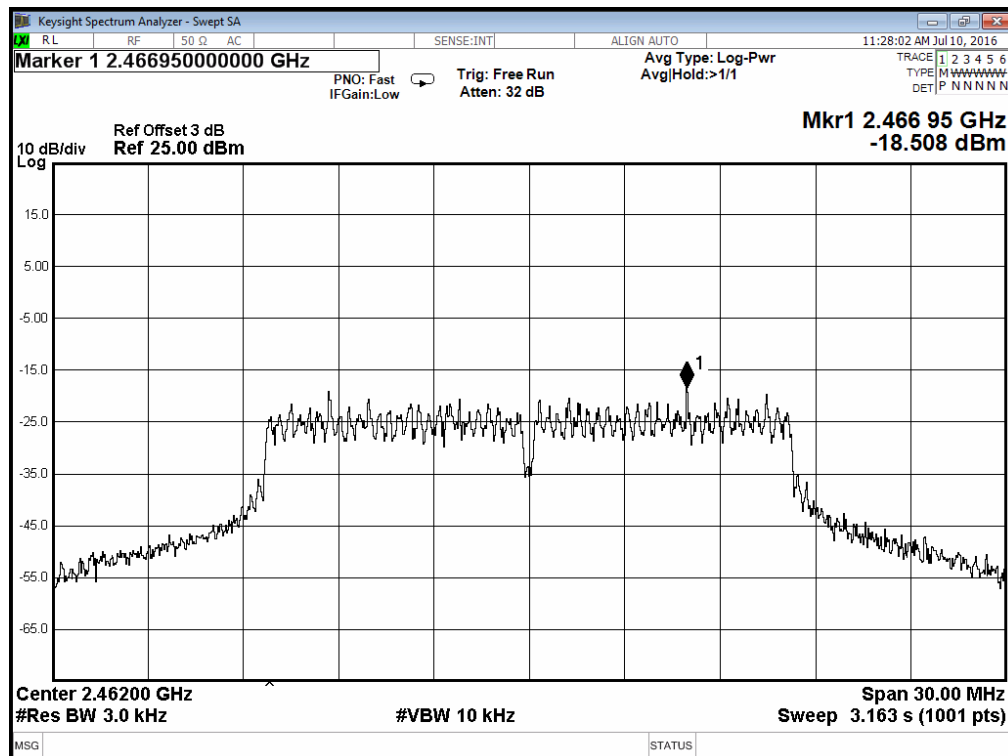
Modulation Standard: 802.11g

Channel: 06



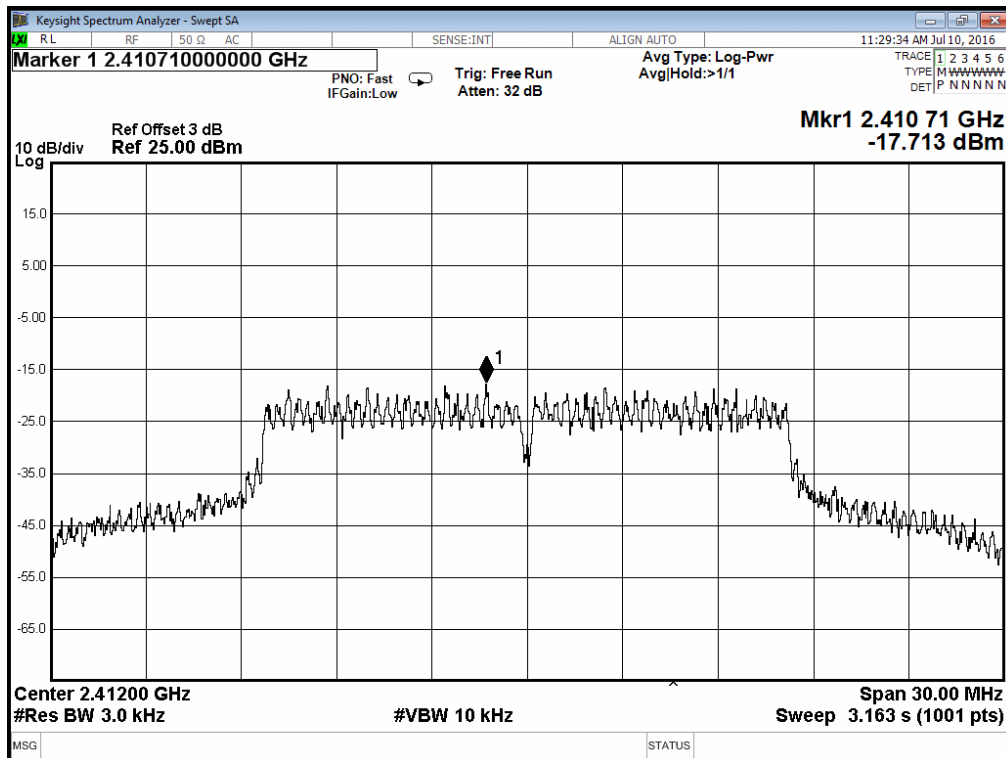
Modulation Standard: 802.11g

Channel: 11

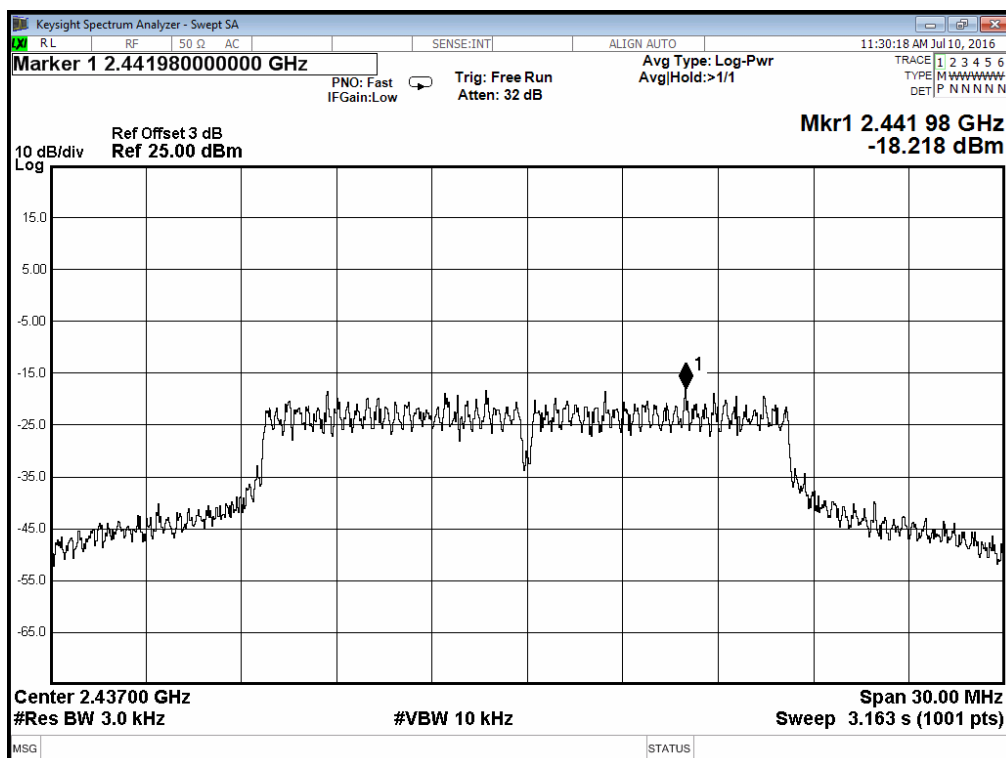




Modulation Standard: 802.11n HT20
Channel: 01



Modulation Standard: 802.11n HT20
Channel: 06





Modulation Standard: 802.11n HT20
Channel: 11

