FCC TEST REPORT

According to

CFR47 §15.247

Applicant	:	**Lily Robotics, Inc.**
Address	:	**374 Harriet Street, San Francisco, California, United States 94103.**
Manufacturer	:	**Weifang GoerTek Electronics Co.,Ltd**
Address	:	**Gaoxin 2 Road,Free Trade Zone,Weifang,Shandong,261205,P.R.China**
Equipment	:	**Lily Camera**
Model No.	:	**Lily Camera**
FCC ID	:	**2AHWSLILY01**
IC ID	:	**21337-LILY01**

■ The test result refers exclusively to the test presented test model / sample.

■ Without written approval of ***Cerpass Technology (Suzhou) Co., Ltd.*** the test report shall not be reproduced exc- ept in full.

I HEREBY CERTIFY THAT :
The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.10 – 2013** and the energy emitted by this equipment was ***passed.***
CISPR PUB. 22 and FCC Part 15 in both radiated and conducted emission class B limits. Testing was carried out on May 30 th,2016~Nov 13th, 2016 at ***Cerpass Technology (Suzhou) Co., Ltd.***

Approved by:

Miro Chueh
EMC/RF 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**

Release History

Attachment No.	Version	Date	Description
SEFI1604229-C	Rev 01	2016-11-14	Initial release

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1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

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
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 15.215(c)	Yes	No	Pass
Occupied 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)	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

WIFI Module	AP6234
Spreading	802.11b: DSSS 802.11g / n: OFDM
Frequency Range	802.11b/g/n(20MHz): 2412-2462MHz 802.11n(40MHz): 2422-2452MHz
Number of Channels	802.11b/g/n (20MHz):11 802.11n (40MHz): 7
Data Rate	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 150Mbps
Antenna Type	See antenna requirement

Power Supply	Model No.:	A15-105P1A	
	AC/DC COMBO ADAPTER	INPUT:	100-240V~2.5A 50-60Hz
		OUTPUT:	12.6V,7.5A
		USB OUTPUT:	5V,2A
	DC POWER ADAPTER	INPUT:	10-15V~5A MAX
		OUTPUT:	12.6V,2.5A MAX
		USB OUTPUT:	5V,2A
	AC Power Code	Non-Shielded,1.5 m	
	DC Power Cable	Non-Shielded,1.0 m	
Car Charger	INPUT:	DC:12V	
	OUTPUT:	DC:12V	
	Shielded,1.5M		
USB Cable	Non-Shielded,1.0 m		

2.2 Carrier Frequency of Channels

For 2.4G 802.11b, 802.11g, 802.11n (20MHz)

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	---	---

For 2.4G 802.11n (40MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	---	08	2447
02	---	09	2452
03	2422	---	---
04	2427	---	---
05	2432	---	---
06	2437	---	---
07	2442	---	---

2.3 Power Setting Levels

Mode	Frequency (MHz)	Power Setting
802.11b	2412	16
	2437	16
	2462	16
802.11g	2412	14
	2437	15
	2462	13
802.11n(20MHz)	2412	12
	2437	14
	2462	12
802.11n(40MHz)	2422	10
	2437	12
	2452	10

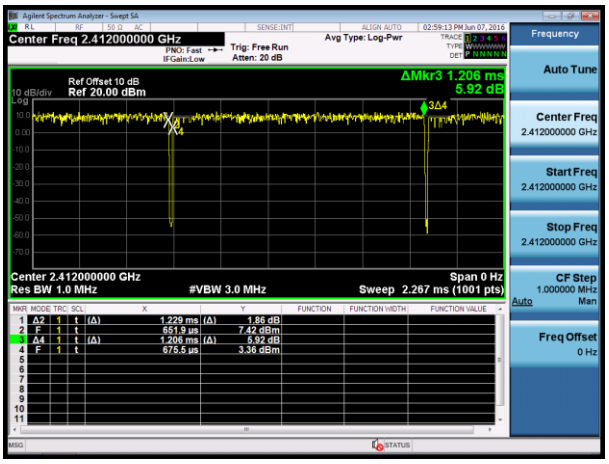
Note: putty software is used for power transmition control offered by the manufactory.

2.4 Duty cycle

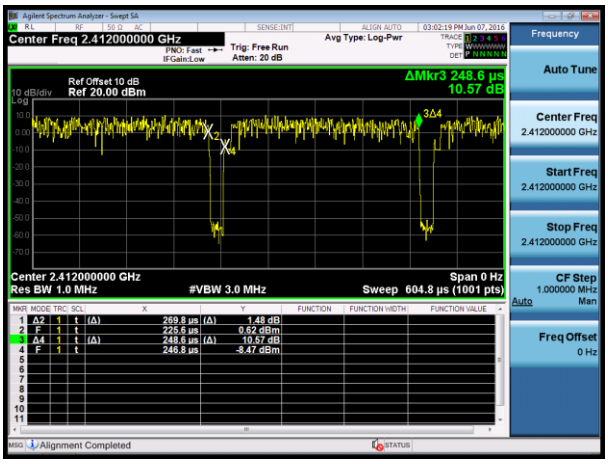
Test Item	Duty cycle

Mode	Frequency (MHz)	Measurement (%)
802.11b	2412	98.1
802.11g	2412	92.1
802.11n(20MHz)	2412	92.2
802.11n(40MHz)	2422	87.5

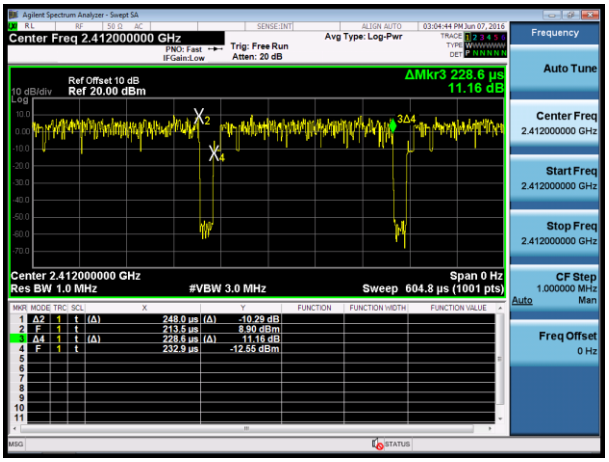
Transmit at 2412MHz by 802.11b



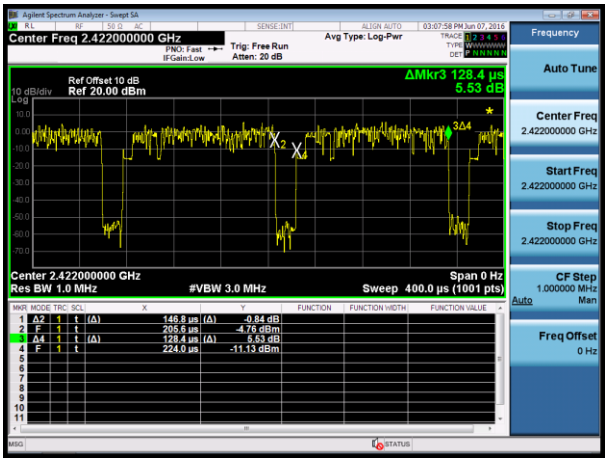
Transmit at 2412MHz by 802.11g



Transmit at 2412MHz by 802.11n(20MHz)



Transmit at 2422MHz by 802.11 n(40MHz)



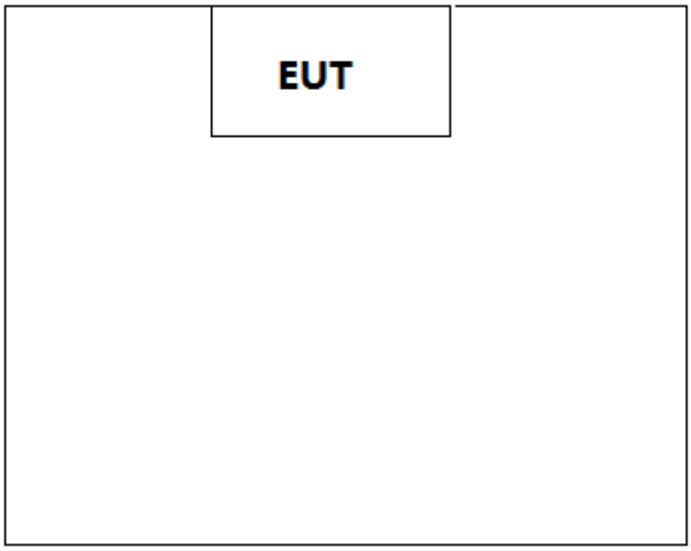
2.5 Test Manner

Test Manner	
1	During testing, the interface cables and equipment positions were varied according to C63.10.
2	Adjust the EUT at the test mode and the test channel. Then test.
Test mode	
1	Transmit by 802.11b
2	Transmit by 802.11g
3	Transmit by 802.11n (20MHz)
4	Transmit by 802.11n (40MHz)

2.6 Description of Test System

No	Device	Manufacturer	Model No.	Description
1	Notebook PC	SONY	PCG-71811P	N/A

2.7 Configuration of Tested System

Connection Diagram


2.8 General Information of Test

Test Site:	Cerpass Technology (Suzhou) Co., Ltd
Performand Location :	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China
NVLAP LAB Code :	200814-0
FCC Registration Number :	916572, 331395
IC Registration Number :	7290A-1, 7290A-2

2.9 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

3. Antenna Requirements

3.1 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.

3.2 Antenna Construction and Directional Gain

Antenna Type	FPC Antenna
Antenna Gain	3.18 dBi For 2400MHz~2500MHz

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4. Test of Conducted Emission

4.1 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.

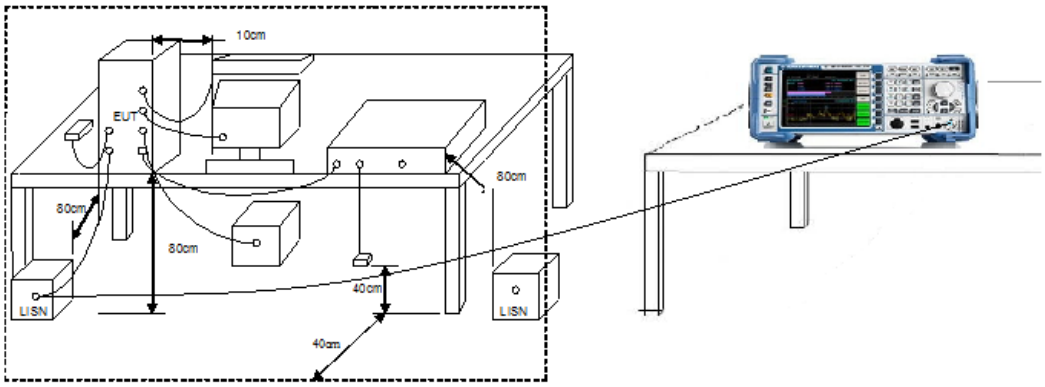
Frequency (MHz)	Quasi Peak (dB μ V)	AVG (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

4.2 Test Procedures

The EUT was setup according to ANSI C63.10, 2013. 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.

4.3 Typical Test Setup

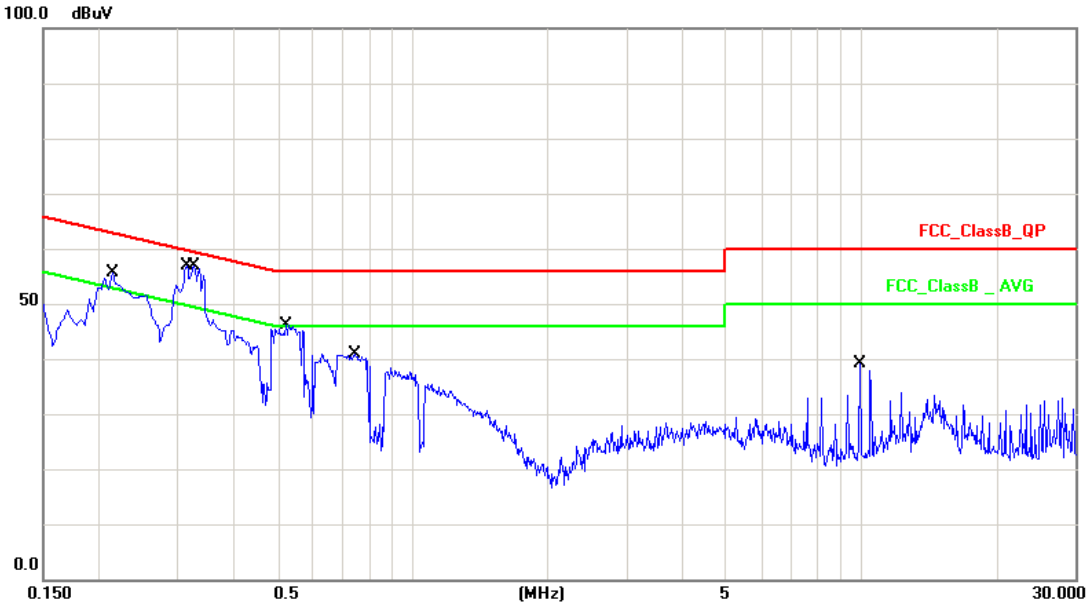


4.4 Measurement Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100565	2016.03.24	2017.03.23
AMN	R&S	ESH2-Z5	100182	2016.09.04	2017.09.03
Two-Line V-Network	R&S	ENV216	100325	2015.12.04	2016.12.03
ISN	FCC	FCC-TLISN-T2-02	20379	2016.03.24	2017.03.23
ISN	FCC	FCC-TLISN-T4-02	20380	2016.03.24	2017.03.23
ISN	FCC	FCC-TLISN-T8-02	20381	2016.03.24	2017.03.23
ISN	TESEQ	ISN ST08	30175	2016.03.24	2017.03.23
Current Probe	R&S	EZ-17	100303	2016.04.04	2017.04.03
Passive Voltage Probe	R&S	ESH2-Z3	100026	2016.03.29	2017.03.28
Pulse Limiter	R&S	ESH3-Z2	100529	2016.03.29	2017.03.28
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2016.03.31	2017.03.30

4.5 Test Result and Data

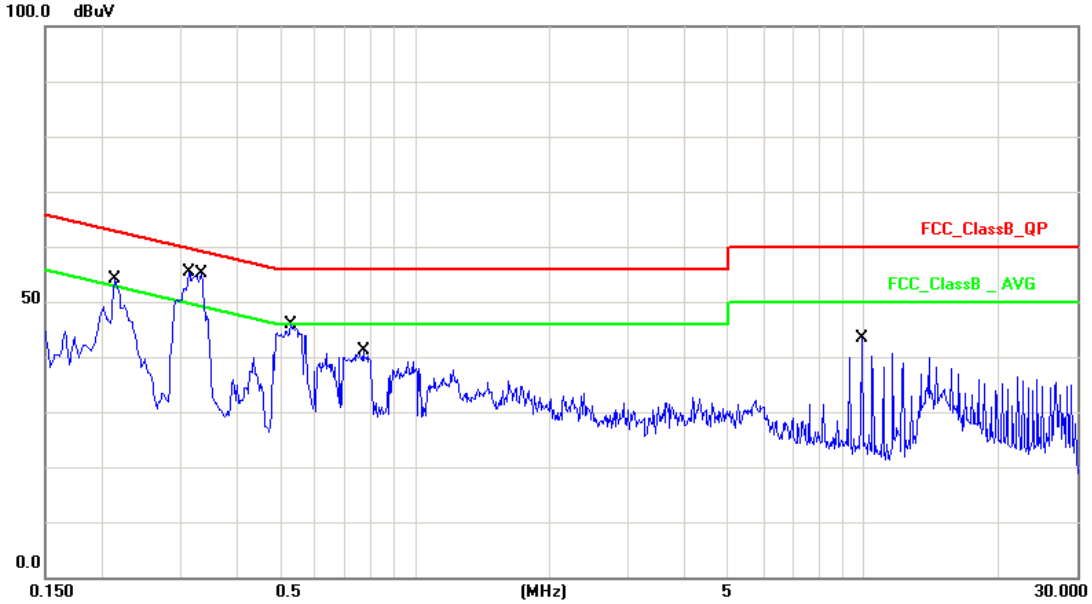
Test Mode :	Mode 1: Normal Operation with wifi on		
AC Power :	AC 120V/60Hz	Phase :	LINE
Temperature :	22°C	Humidity :	50%
Pressure(mbar) :	1002	Date:	2016/11/08



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2140	10.12	42.06	52.18	63.04	-10.86	QP
2	0.2140	10.12	30.46	40.58	53.04	-12.46	AVG
3	0.3140	10.14	42.19	52.33	59.86	-7.53	QP
4	0.3140	10.14	29.80	39.94	49.86	-9.92	AVG
5	0.3260	10.14	42.10	52.24	59.55	-7.31	QP
6	0.3260	10.14	30.90	41.04	49.55	-8.51	AVG
7	0.5220	10.16	32.97	43.13	56.00	-12.87	QP
8	0.5220	10.16	16.95	27.11	46.00	-18.89	AVG
9	0.7460	10.14	28.32	38.46	56.00	-17.54	QP
10	0.7460	10.14	10.51	20.65	46.00	-25.35	AVG
11	9.9220	10.25	27.41	37.66	60.00	-22.34	QP
12	9.9220	10.25	27.47	37.72	50.00	-12.28	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test Mode :	Mode 1: Normal Operation with wifi on		
AC Power :	AC 120V/60Hz	Phase :	NEUTRAL
Temperature :	22°C	Humidity :	50%
Pressure(mbar) :	1002	Date:	2016/11/08



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2140	10.13	40.24	50.37	63.04	-12.67	QP
2	0.2140	10.13	23.23	33.36	53.04	-19.68	AVG
3	0.3140	10.14	40.38	50.52	59.86	-9.34	QP
4	0.3140	10.14	26.01	36.15	49.86	-13.71	AVG
5	0.3339	10.14	39.87	50.01	59.35	-9.34	QP
6	0.3339	10.14	27.93	38.07	49.35	-11.28	AVG
7	0.5299	10.15	32.97	43.12	56.00	-12.88	QP
8	0.5299	10.15	15.70	25.85	46.00	-20.15	AVG
9	0.7700	10.16	27.93	38.09	56.00	-17.91	QP
10	0.7700	10.16	11.01	21.17	46.00	-24.83	AVG
11	9.9180	10.26	30.84	41.10	60.00	-18.90	QP
12	9.9180	10.26	30.04	40.30	50.00	-9.70	AVG

Note: Measurement Level = Reading Level + Correct Factor

5. Test of Radiated Emission

5.1 Test Limit

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

5.2 Test Procedures

KDB 558074 D01v03r05 - Section 12.0 & Section 12.1

5.3 Test Setting

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz

7.8.3. Average Field Strength Measurements

1.Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2.RBW = 1MHz

3.VBW ⩾ 1/T

4.De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode

5.Detector = Peak

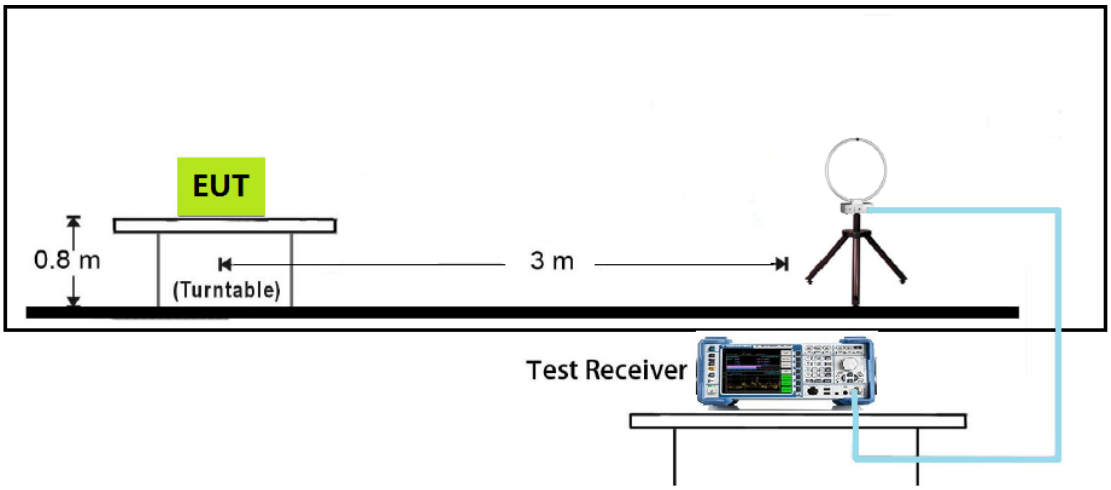
6.Sweep time = auto

7.Trace mode = max hold

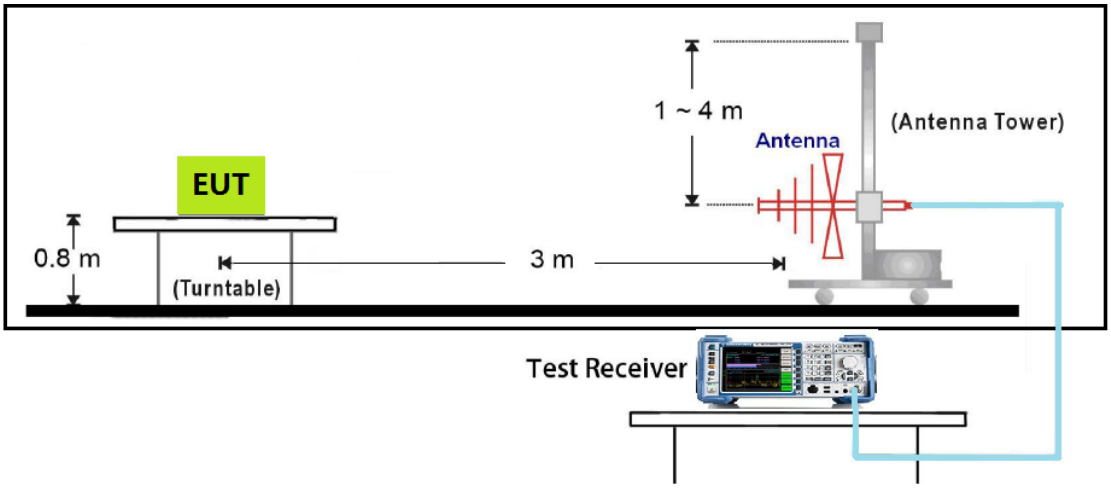
8.Allow max hold to run for at least 50 times (1/duty cycle) traces

5.4 Typical Test Setup

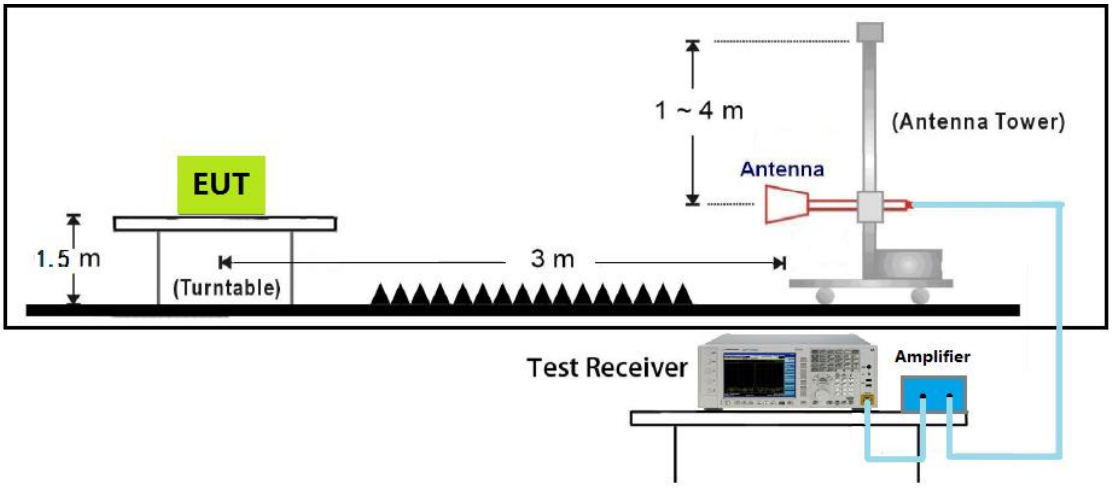
9kHZ~30MHz Test Setup



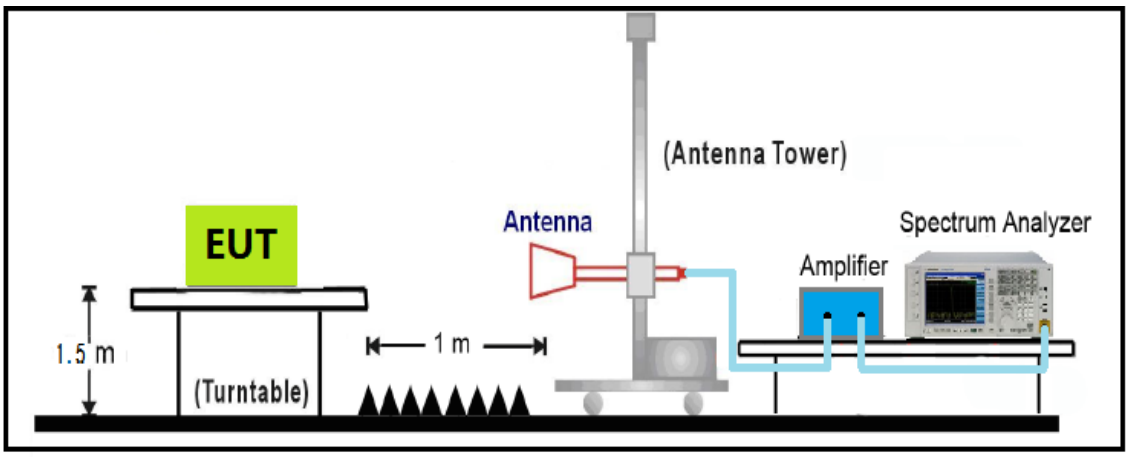
Below 1GHz Test Setup



1GHz~18GHz Test Setup



18GHz~40GHz Test Setup



5.5 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESCI	101183	2016.03.29	2017.03.28
Spectrum Analyzer	N9010A	Agilent	MY53400169	2016.11.11	2017.11.10
Spectrum Analyzer	R&S	FSP40	100324	2016.03.24	2017.03.23
H64 Preamplifier	HP	8447F	3113A05582	2016.03.24	2017.03.23
Preamplifier	songyi	EM330	60618	2016.03.29	2017.03.28
Preamplifier	Agilent	8449B	3008A02342	2016.03.29	2017.03.28
Preamplifier	COM-POWER	PA-840	711885	2016.03.29	2017.03.28
Bilog Antenna	Sunol Science	JB1	A072414-1	2016.04.22	2017.04.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2016.04.20	2017.04.19
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2016.04.20	2017.04.19
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2016.03.31	2017.03.30
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A

5.6 Test Result and Data

The worst case of Radiated Emission below 1GHz:

Engineer :Ternence	**Site : EMC Lab AC 102**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Normal Link**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	159.9800	-7.48	46.83	39.35	43.50	-4.15	QP	H
2	266.6800	-9.76	45.49	35.73	46.00	-10.27	QP	H
3	335.5500	-6.50	42.56	36.06	46.00	-9.94	QP	H
4	362.7100	-6.87	39.93	33.06	46.00	-12.94	QP	H
5	396.6600	-5.95	38.61	32.66	46.00	-13.34	QP	H
6	600.3600	-1.94	37.95	36.01	46.00	-9.99	QP	H

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	31.9400	-3.21	39.50	36.29	40.00	-3.71	QP	V
2	44.5500	-8.40	42.20	33.80	40.00	-6.20	QP	V
3	159.9800	-7.48	47.48	40.00	43.50	-3.50	QP	V
4	266.6800	-9.76	51.43	41.67	46.00	-4.33	QP	V
5	600.3600	-1.94	38.98	37.04	46.00	-8.96	QP	V
6	693.4800	0.52	34.38	34.90	46.00	-11.10	QP	V

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Above 1G:

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11b at 2412MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4824.00	-3.88	46.23	42.35	74.00	-31.65	peak	H
2	7236.00	0.61	44.76	45.37	74.00	-28.63	peak	H
3	4824.00	-3.88	46.19	42.31	74.00	-31.69	peak	V
4	7236.00	0.61	45.77	46.38	74.00	-27.62	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11b at 2437MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4874.00	-3.85	47.65	43.80	74.00	-30.20	peak	H
2	7311.00	0.79	44.80	45.59	74.00	-28.41	peak	H
3	4874.00	-3.85	45.01	41.16	74.00	-32.84	peak	V
4	7311.00	0.79	45.21	46.00	74.00	-28.00	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11b at 2462MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4924.00	-3.82	47.42	43.60	74.00	-30.40	peak	H
2	7386.00	0.97	44.95	45.92	74.00	-28.08	peak	H
3	4924.00	-3.82	45.32	41.50	74.00	-32.50	peak	V
4	7386.00	0.97	45.53	46.50	74.00	-27.50	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11g at 2412MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4824.00	-3.88	45.06	41.18	74.00	-32.82	peak	H
2	7236.00	0.61	44.66	45.27	74.00	-28.73	peak	H
3	4824.00	-3.88	45.29	41.41	74.00	-32.59	peak	V
4	7236.00	0.61	44.67	45.28	74.00	-28.72	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11g at 2437MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4874.00	-3.85	45.28	41.43	74.00	-32.57	peak	H
2	7311.00	0.79	44.42	45.21	74.00	-28.79	peak	H
3	4874.00	-3.85	46.02	42.17	74.00	-31.83	peak	V
4	7311.00	0.79	44.14	44.93	74.00	-29.07	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11g at 2462MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4924.00	-3.82	45.12	41.30	74.00	-32.70	peak	H
2	7386.00	0.97	45.53	46.50	74.00	-27.50	peak	H
3	4924.00	-3.82	45.64	41.82	74.00	-32.18	peak	V
4	7386.00	0.97	45.68	46.65	74.00	-27.35	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(20MHz) at 2412MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4824.00	-3.88	45.93	42.05	74.00	-31.95	peak	H
2	7236.00	0.61	45.38	45.99	74.00	-28.01	peak	H
3	4824.00	-3.88	45.77	41.89	74.00	-32.11	peak	V
4	7236.00	0.61	45.22	45.83	74.00	-28.17	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(20MHz) at 2437MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4874.00	-3.85	46.25	42.40	74.00	-31.60	peak	H
2	7311.00	0.79	44.78	45.57	74.00	-28.43	peak	H
3	4874.00	-3.85	46.00	42.15	74.00	-31.85	peak	V
4	7311.00	0.79	46.01	46.80	74.00	-27.20	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(20MHz) at 2462MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4924.00	-3.82	46.36	42.54	74.00	-31.46	peak	H
2	7386.00	0.97	45.26	46.23	74.00	-27.77	peak	H
3	4924.00	-3.82	45.65	41.83	74.00	-32.17	peak	V
4	7386.00	0.97	45.05	46.02	74.00	-27.98	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(40MHz) at 2422MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4844.00	-3.86	45.13	41.27	74.00	-32.73	peak	H
2	7266.00	0.68	45.00	45.68	74.00	-28.32	peak	H
3	4844.00	-3.86	45.24	41.38	74.00	-32.62	peak	V
4	7266.00	0.68	45.17	45.85	74.00	-28.15	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(40MHz) at 2437MHz**

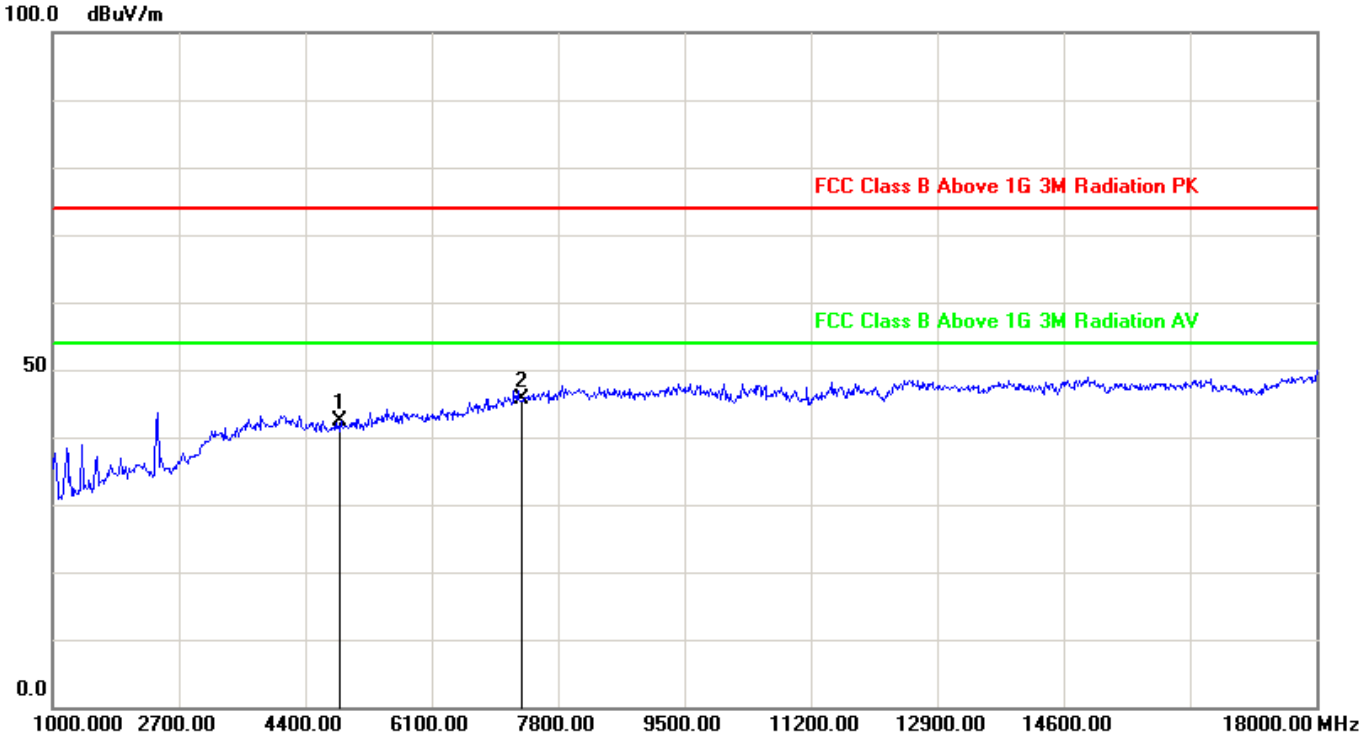
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4874.00	-3.85	45.28	41.43	74.00	-32.57	peak	H
2	7311.00	0.79	44.87	45.66	74.00	-28.34	peak	H
3	4874.00	-3.85	44.98	41.13	74.00	-32.87	peak	V
4	7311.00	0.79	44.74	45.53	74.00	-28.47	peak	V

Engineer : Ternence	**Site : EMC Lab AC 102**
Limit : FCC_15_03M_PK	**Margin : 6**
EUT : Lily Camera	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	**Note : Transmit 802.11n(40MHz) at 2452MHz**

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	AntPol. H/V
1	4904.00	-3.83	44.79	40.96	74.00	-33.04	peak	H
2	7356.00	0.90	45.95	46.85	74.00	-27.15	peak	H
3	4904.00	-3.83	46.19	42.36	74.00	-31.64	peak	V
4	7356.00	0.90	44.73	45.63	74.00	-28.37	peak	V

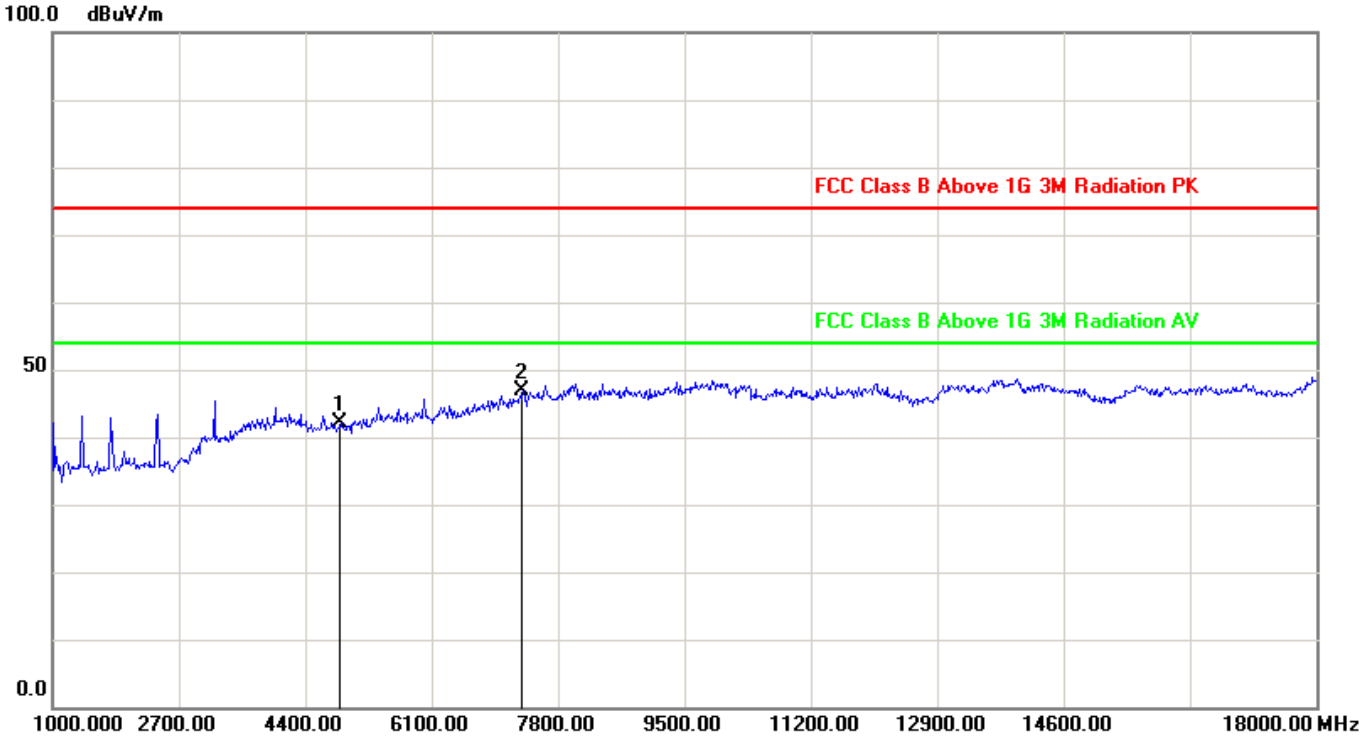
The worst case of Radiated Emission 1~18GHz:

Site: AC102	Time: 2016/11/11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Lily Camera	Power: AC 120V/60Hz
Note: Mode:Transmit 802.11n(20MHz) at 2437MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4874.000	-3.85	46.25	42.40	74.00	-31.60	peak
2	7311.000	0.79	44.78	45.57	74.00	-28.43	peak

Site: AC102	Time: 2016/11/11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Lily Camera	Power: AC 120V/60Hz
Note: Mode: Transmit 802.11n(20MHz) at 2437MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4874.000	-3.85	46.00	42.15	74.00	-31.85	peak
2	7311.000	0.79	46.01	46.80	74.00	-27.20	peak

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

6. Maximum Output Power

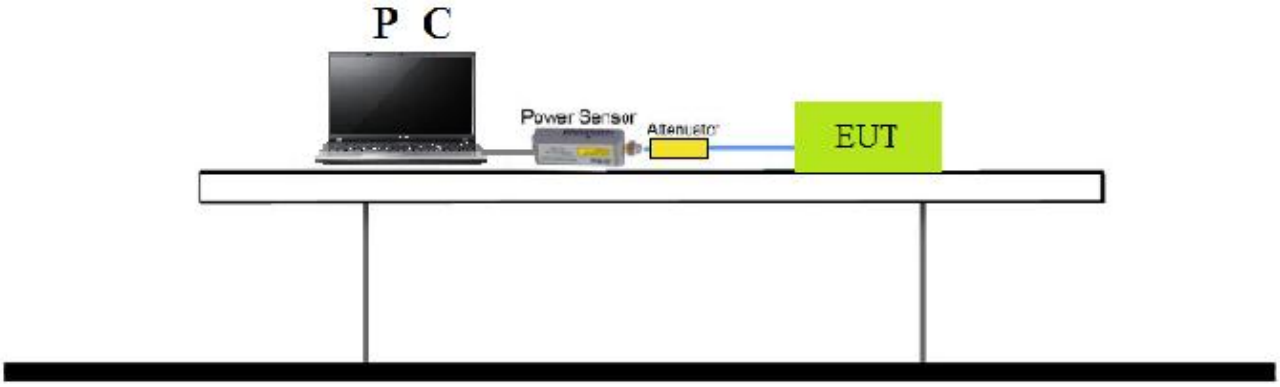
6.1 Test Limit

The Maximum Output Power Measurement is 1W (30dBm).

6.2 Test Procedure

KDB 558074 D01v03r05 - Section 9.1.2 PKPM1 Peak Power Method (for signals with BW ≤50MHz) Out power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

6.3 Test Setup Layout



6.4 Measurement Equipment

Instrument	Manufacturer	Type No.	Serial No.	Calibration Date	Valid Date.
PC	Lenovo	E40-70	MP078UQV	N/A	N/A
POWER SENSOR	Agilent	U2021XA	MY53260020	2016/03/27	2017/03/26
Series Power Meter	ANRITSU	ML2495A	1224005	2016/03/27	2017/03/26
Temperature/Humidity Meter	Zhicheng	ZC1-11	CEP-TH-003	2016/03/31	2017/03/30

6.5 Test Result and Data

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

MCS Index for 802.11n	Spatial Streams	Data Rate(Mbps)					
		802.11b	802.11g	20MHz Bandwidth		40MHz Bandwidth	
				800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	6.5	7.2	13.5	15.0
1	1	2	9	13.0	14.4	27.0	30.0
2	1	5.5	12	19.5	21.7	40.5	45.0
3	1	11	18	26.0	28.9	54.0	60.0
4	1	--	24	39.0	43.3	81.0	90.0
5	1	--	36	52.0	57.8	108.0	120.0
6	1	--	48	58.5	65.0	121.5	135.0
7	1	--	54	65.0	72.2	135.0	150.0
8	2	--	--	13.0	14.4	27.0	30.0
9	2	--	--	26.0	28.9	54.0	60.0
10	2	--	--	39.0	43.3	81.0	90.0
11	2	--	--	52.0	57.8	108.0	120.0
12	2	--	--	78.0	86.7	162.0	180.0
13	2	--	--	104.0	115.6	216.0	240.0
14	2	--	--	117.0	130.0	243.0	270.0
15	2	--	--	130.0	144.0	270.0	300.0

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11b

Channel No.	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Required Limit (dBm)	Result
01	2412	16.76	20.31	30	Pass
06	2437	17.15	20.47	30	Pass
11	2462	17.32	20.63	30	Pass

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11g

Channel No.	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Required Limit (dBm)	Result
01	2412	13.54	21.93	30	Pass
06	2437	14.52	22.78	30	Pass
11	2462	13.41	21.92	30	Pass

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11n (20MHz)

Channel No.	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Required Limit (dBm)	Result
01	2412	12.05	21.09	30	Pass
06	2437	13.16	21.76	30	Pass
11	2462	11.79	20.43	30	Pass

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11n (40MHz)

Channel No.	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Required Limit (dBm)	Result
03	2422	10.05	22.06	30	Pass
06	2437	11.16	23.47	30	Pass
09	2452	9.67	20.95	30	Pass

7. Occupied Bandwidth

7.1 Test Limit

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725- 5850 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 Test Procedures

According to KDB 558074 D01v03r05 - Section 8.1.

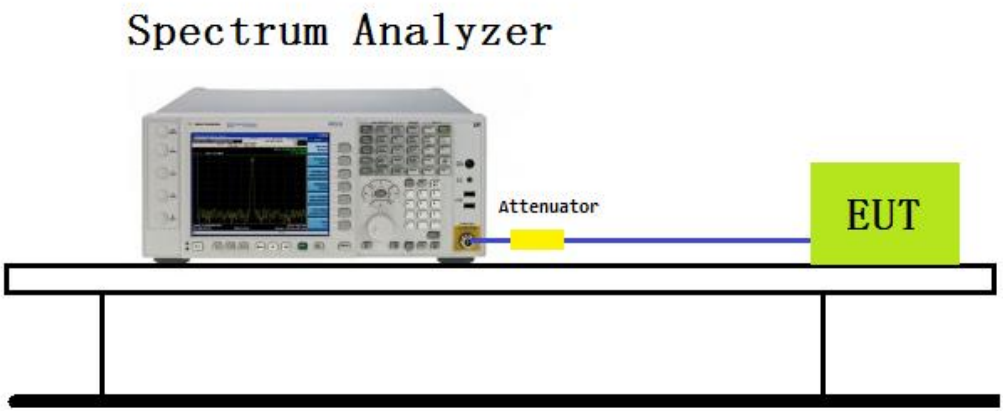
a. The transmitter output was connected to the spectrum analyzer.

b. Set RBW of spectrum analyzer to 100KHz and VBW ⩾ 3x 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.

7.3 Test Setup Layout



7.4 Measurement Equipment

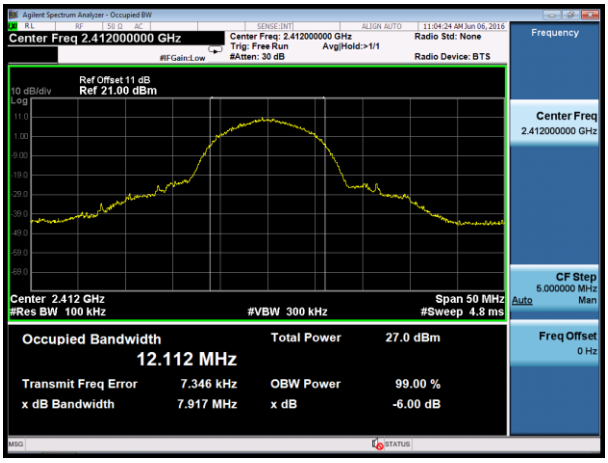
Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	N9010A	Agilent	MY53400169	2016.11.11	2017.11.10

7.5 Test Result and Data

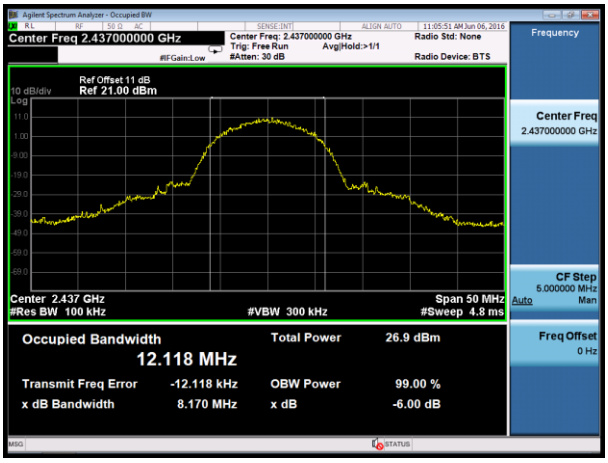
Test Item	Occupied Bandwidth
Test Mode	Transmit by 802.11b

Channel No.	Frequency (MHz)	6 dB bandwidth (MHz)	99% Occupied Bandwidth (kHz)	Result
01	2412	7.917	12112	Pass
06	2437	8.170	12118	Pass
11	2462	8.419	12118	Pass

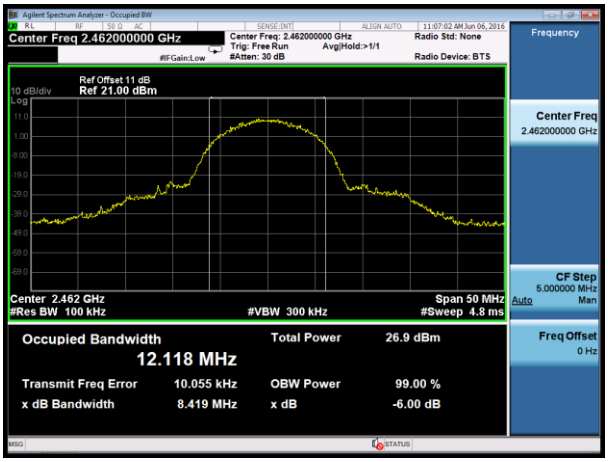
Channel 01 (2412MHz)



Channel 06 (2437MHz)



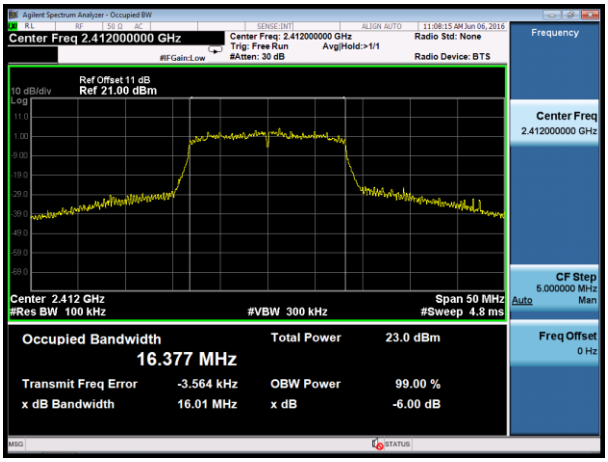
Channel11(2462MHz)



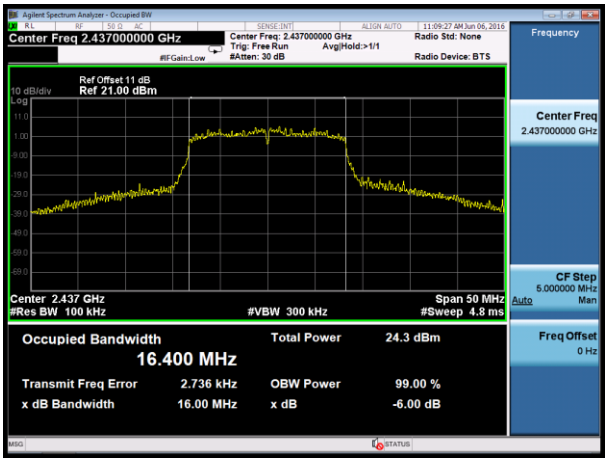
Test Item	Occupied Bandwidth
Test Mode	Transmit by 802.11g

Channel No.	Frequency (MHz)	6 dB bandwidth (MHz)	99% Occupied Bandwidth (kHz)	Result
01	2412	16.010	16377	Pass
06	2437	16.000	16400	Pass
11	2462	15.720	16356	Pass

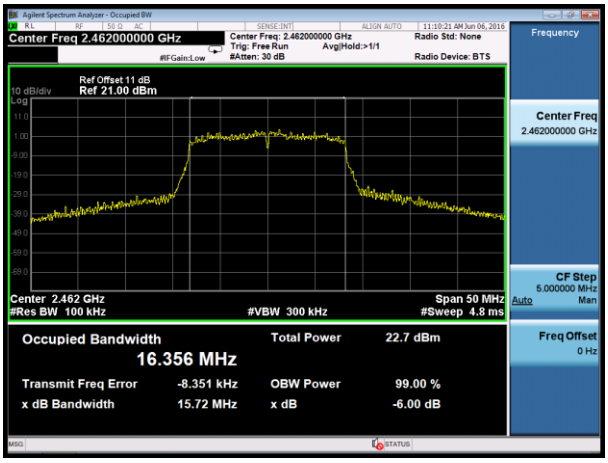
Channel 01 (2412MHz)



Channel 06 (2437MHz)



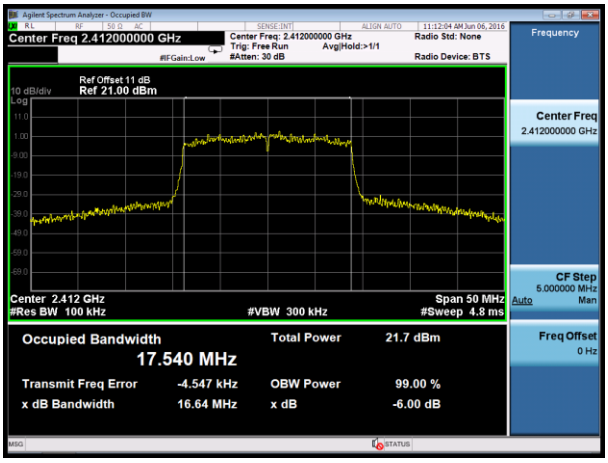
Channel11(2462MHz)



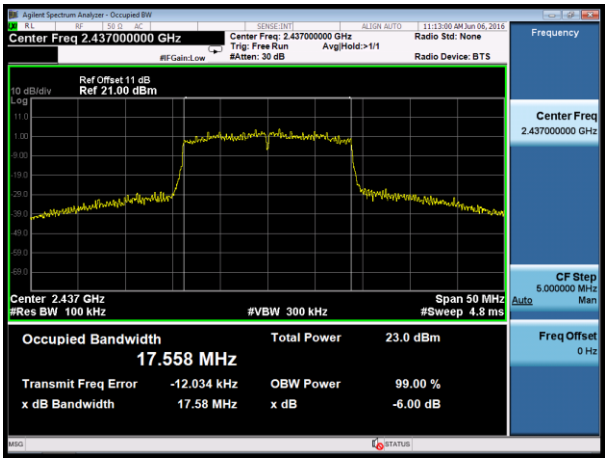
Test Item	Occupied Bandwidth
Test Mode	Transmit by 802.11n (20MHz)

Channel No.	Frequency (MHz)	6 dB bandwidth (MHz)	99% Occupied Bandwidth (kHz)	Result
01	2412	16.640	17540	Pass
06	2437	17.580	17558	Pass
11	2462	17.020	17539	Pass

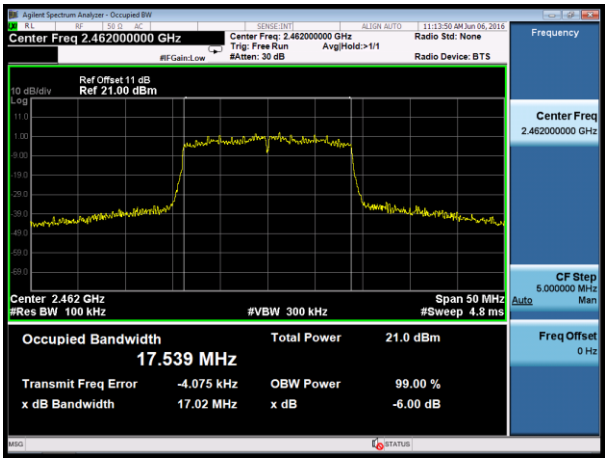
Channel 01 (2412MHz)



Channel 06 (2437MHz)



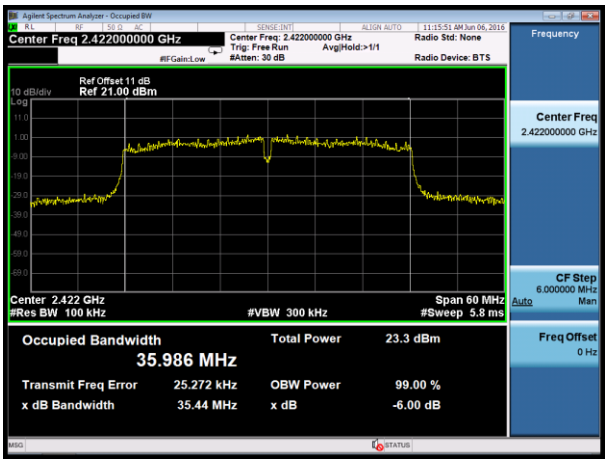
Channel11(2462MHz)



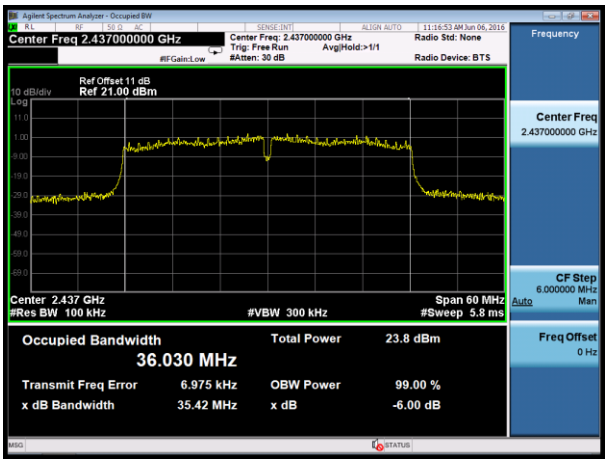
Test Item	Occupied Bandwidth
Test Mode	Transmit by 802.11n (40MHz)

Channel No.	Frequency (MHz)	6 dB bandwidth (MHz)	99% Occupied Bandwidth (kHz)	Result
03	2422	35.440	35986	Pass
06	2437	35.420	36030	Pass
09	2452	36.140	35991	Pass

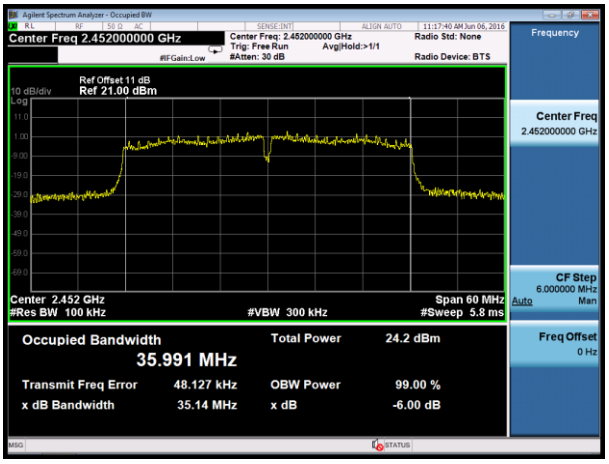
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



8. Power Spectral Density

8.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

8.2 Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. (Actually we use 3kHz RBW)

d) Set the VBW ≥ 3 × RBW.

e) Detector = peak.

f) Sweep time = auto couple.

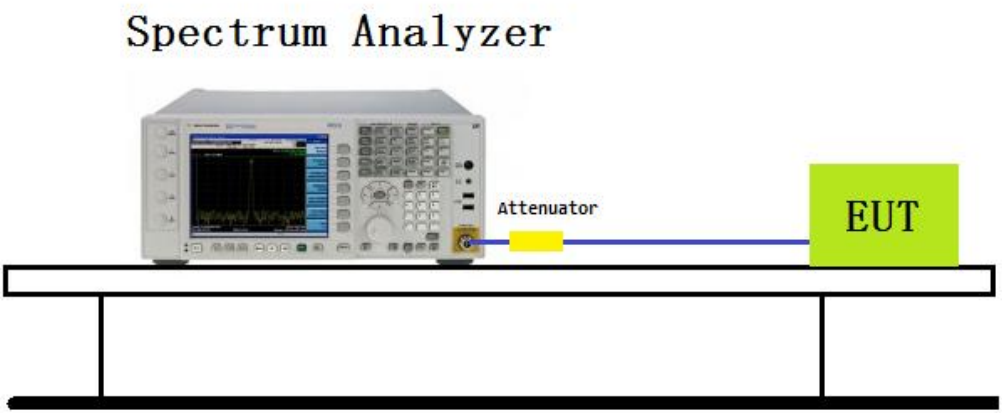
g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the band.

j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.3 Test Setup Layout



8.4 Measurement Equipment

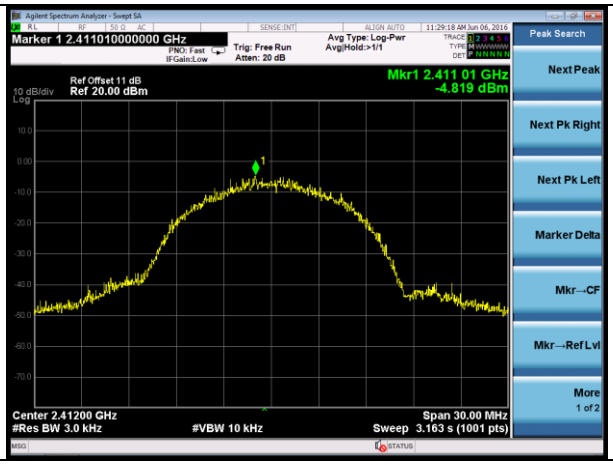
Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	N9010A	Agilent	MY53400169	2016.11.11	2017.11.10

8.5 Test Result and Data

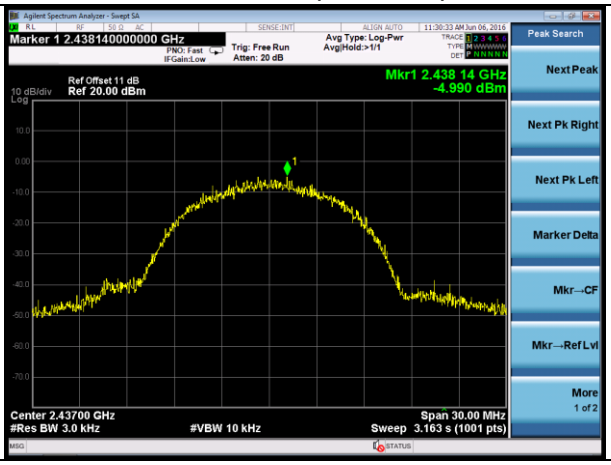
Test Item	Power Spectral Density
Test Mode	Transmit by 802.11b

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
01	2412	-4.819	8	Pass
06	2437	-4.990	8	Pass
11	2462	-4.627	8	Pass

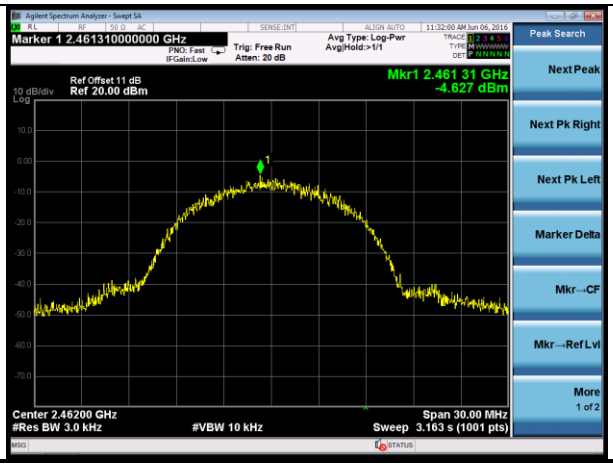
Channel 01 (2412MHz)



Channel 06 (2437MHz)



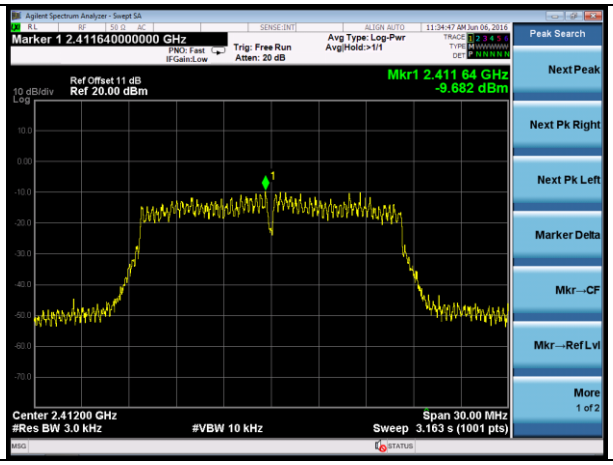
Channel 11 (2462MHz)



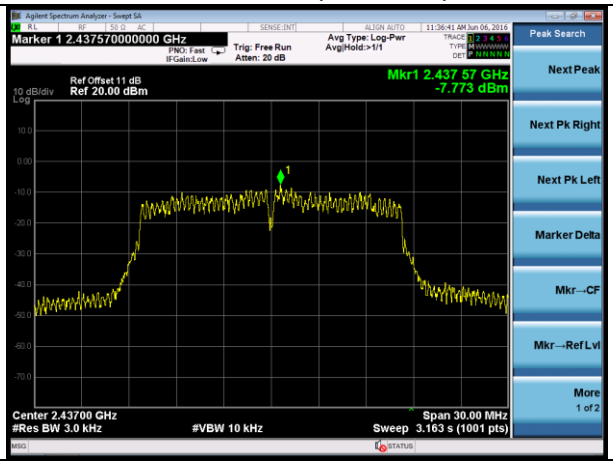
Test Item	Power Spectral Density
Test Mode	Transmit by 802.11g

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
01	2412	-9.682	8	Pass
06	2437	-7.773	8	Pass
11	2462	-9.958	8	Pass

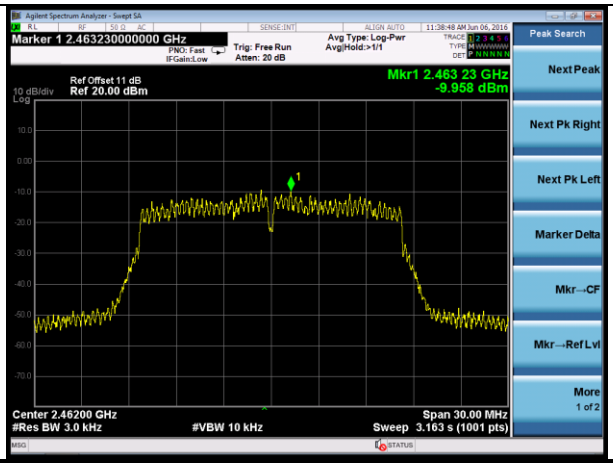
Channel 01 (2412MHz)



Channel 06 (2437MHz)



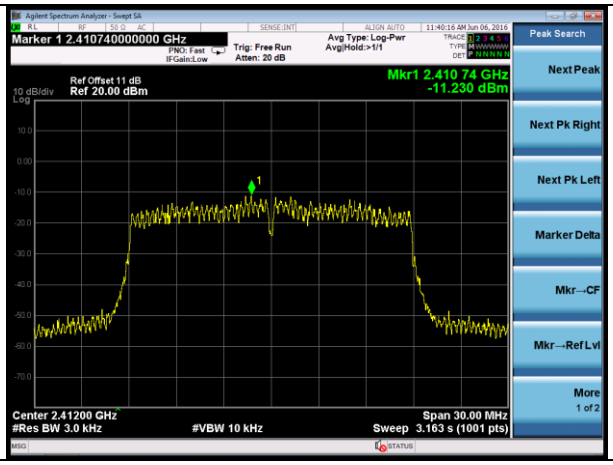
Channel 11 (2462MHz)



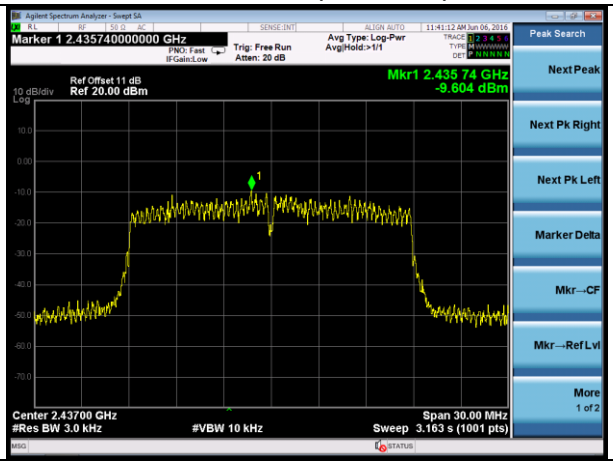
Test Item	Power Spectral Density
Test Mode	Transmit by 802.11n (20MHz)

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
01	2412	-11.230	8	Pass
06	2437	-9.604	8	Pass
11	2462	-11.032	8	Pass

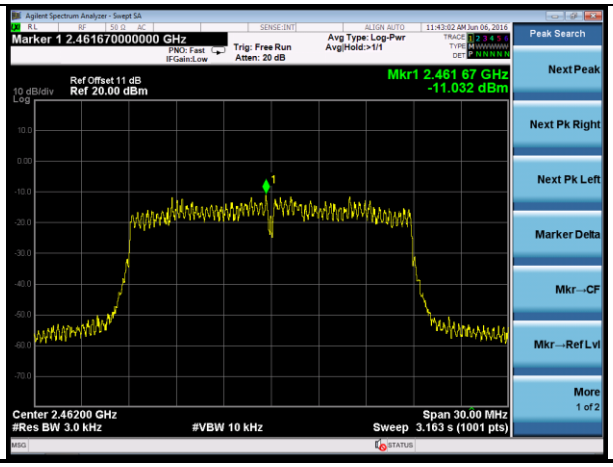
Channel 01 (2412MHz)



Channel 06 (2437MHz)



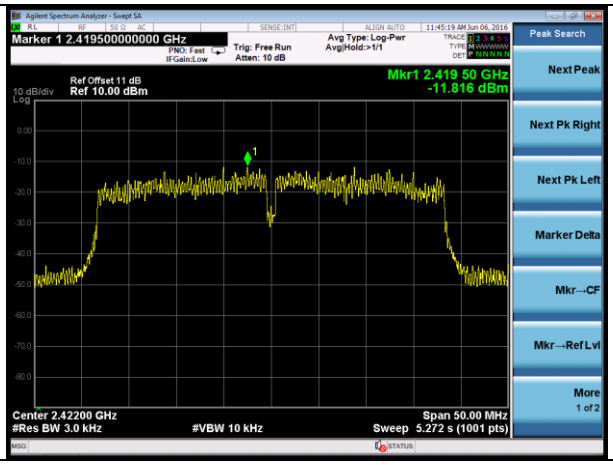
Channel 11 (2462MHz)



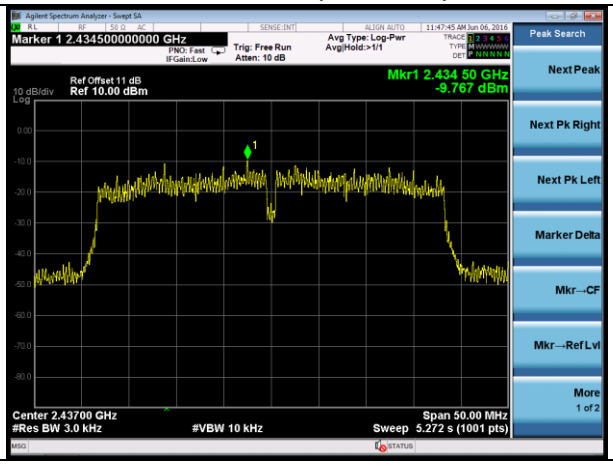
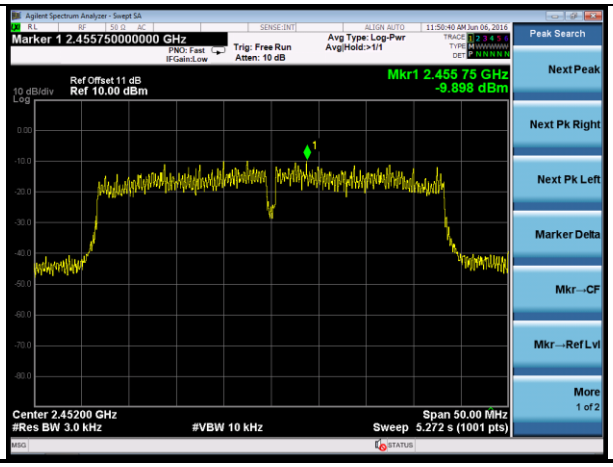
Test Item	Power Spectral Density
Test Mode	Transmit by 802.11n (40MHz)

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
03	2422	-11.816	8	Pass
06	2437	-9.767	8	Pass
09	2452	-9.898	8	Pass

Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)