FCC RADIO TEST REPORT

Applicant	:	Ultracker Technology Co. Ltd
Address	:	14F-1, No.888, Jingguo Rd., Taoyuan Dist., 330, Taiwan, R.O.C.
Equipment	:	Ultracker US360 camera
Model No.	:	ALETAS1
Trade Name	:	Ultracker
FCC ID	:	2AOUOALETAS1

I HEREBY CERTIFY THAT :

The sample was received on Nov. 13, 2017 and the testing was carried out on Jan. 19, 2018 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:

Mark Liao / Assistant Manager

Tested by:

Spree Yei / Engineer

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

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History of this test report

Report No.	Issue Date	Description
TEFI1711083	Jan. 22, 2018	Original

1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.4:2014

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.247

KDB558074

KDB662911

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. AC Power Line Conducted Emission	Pass
15.209 15.205	. Radiated Spurious Emission	Pass
15.247(d)	. Conducted Spurious Emission	Pass
15.247(a)(2)	. 6dB Bandwidth	Pass
15.247(b)	. Maximum Peak and Average Output Power	Pass
15.247(e)	. Power Spectral Density	Pass

This EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report.

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency Range	2.4G: 2412-2462MHz
Modulation Type	OFDM, DSSS
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS7, HT20
Antenna Type/gain	PIFA Antenna / 3.66 dBi

2.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT20 (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

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
b. The complete test system included EUT for RF test.
c. An executive program," Iwpriv Command" under WIN 7 was executed to transmit and receive data via WLAN.
d. The following test modes were performed for the test:

Test Mode	Operating Description
1	802.11b (1Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
For conduction and radiation test (below 1GHz) test, caused "Test Mode 2" generated the worst case, it was reported as the final data. For radiation test (above 1GHz), caused "Test Mode 1~3" generated the worst case, they were reported as the final data.	

2.4 Description of Test System

The test system is without Peripheral.

2.5 General Information of Test

Test Site	**Cerpass 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, TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25,000MHz	
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	±2.9076 dB
Radiated Emission	9 kHz ~ 25,000 MHz	Vertical / Horizontal	±0.948 dB
Spurious Emission (Conducted)	-	-	±4.011 dB
Maximum Peak and Average Output Power	-	-	±0.322 dB
Power Spectral Density	-	-	±0.322 dB
Bandwidth	-	-	74.224Hz

3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI3	100443	2017/03/07	2018/03/06
LISN	Schwarzbeck	NSLK 8127	8127-568	2017/02/15	2018/02/14
Pulse Limiter	R&S	ESH3-Z2	101934	2017/02/14	2018/02/13
Bilog Antenna	Schwarzbeck	VULB9168	369	2017/03/15	2018/03/14
Active Loop Antenna	EMCO	6507	40855	2017/05/15	2018/05/14
Horn Antenna	EMCO	3115	31589	2017/02/18	2018/02/17
Horn Anrenna	EMCO	3116	31970	2017/03/29	2018/03/28
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200207	2017/03/17	2018/03/16
Preamplifier	EM	EM330	60660	2017/02/25	2018/02/24
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2017/09/20	2018/09/19
Preamplifier	Agilent	8449B	3008A01954	2017/02/09	2018/02/08
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2017/11/10	2018/11/09
MXG MW Analog Signal Generator	KEYSIGHT	N5183A	MY50142931	2017/03/17	2018/03/16
Spectrum Analyzer	R&S	FSP40	100219	2017/07/01	2018/06/30
BLUETOOTH TESTER	R&S	CBT	101133	2017/03/10	2018/03/09
Attenuator	KEYSIGHT	8491B	MY39250703	2017/03/07	2018/03/06
Rotary Attenuator	Agilent	8495B	MY42146680	2017/03/13	2018/03/12
Temp & Humi chamber	T-MACHINE	TMJ-9712	T-12-040111	2017/09/04	2018/09/03
Series Power Meter	Anritsu	ML2495A	1224005	2017/03/01	2018/02/28
Power Sensor	Anritsu	MA2411B	1207295	2017/03/01	2018/02/28
Cable	HUBER SUHNER	SUCOFLEX 102	28422/2	2017/02/25	2018/02/24
Cable	HUBER SUHNER	SUCOFLEX 102	28418/2	2017/02/25	2018/02/24
Software	Farad	Ez-EMC	ver.ct3a1	N/A	N/A
Software	AUDIX	E3	V8.2014-8-6	N/A	N/A
Software	Keysight	N7607B Signal Studio	v2.0.0.1	N/A	N/A
Software	Keysight	Inservice MonitorUtility	N/A	N/A	N/A

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

Antenna Type	PIFA Antenna
Antenna Gain	3.66 dBi

5. Test of AC Power Line Conducted Emission

The EUT is powered from Battery; this test item is not applicable.

6. Test of Radiated Spurious Emission

6.1 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).

Frequency (MHz)	Field Strength (microvolt/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

a. The EUT was placed on a rotatable table top 0.8 meter above ground.

b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.

c. The table was rotated 360 degrees to determine the position of the highest radiation.

d. 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.

e. 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.

f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.

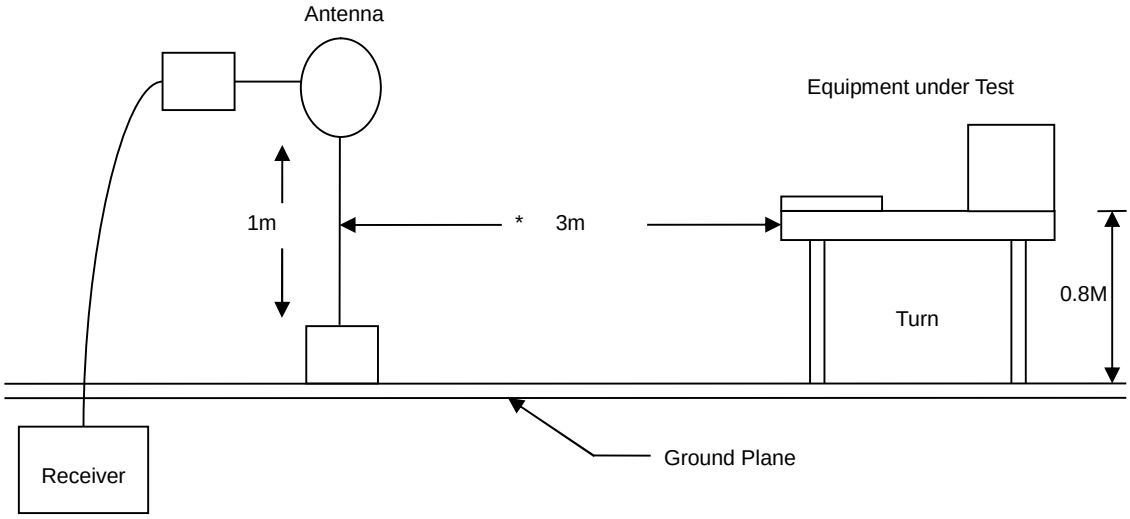
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

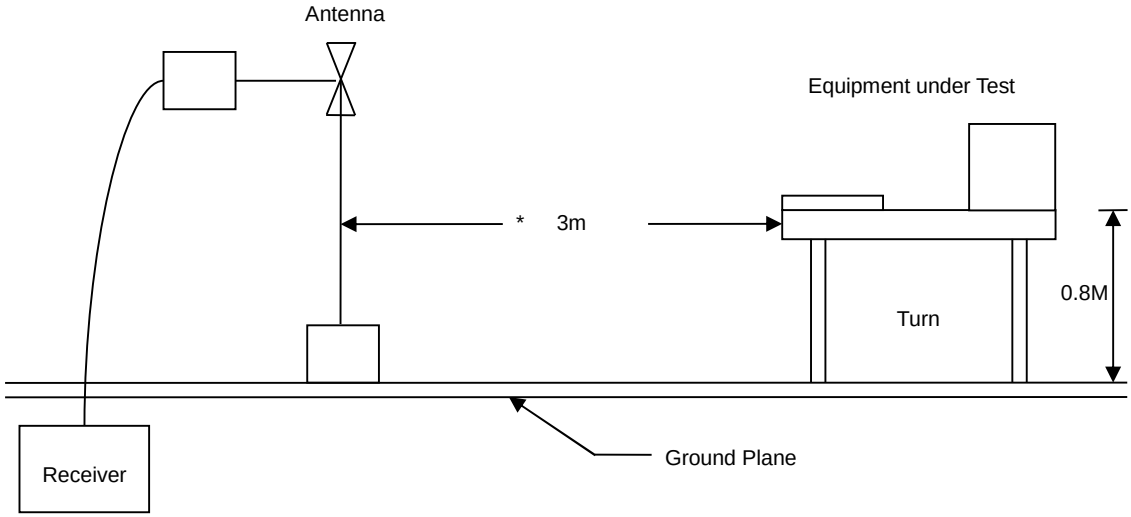
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

6.3 Typical Test Setup

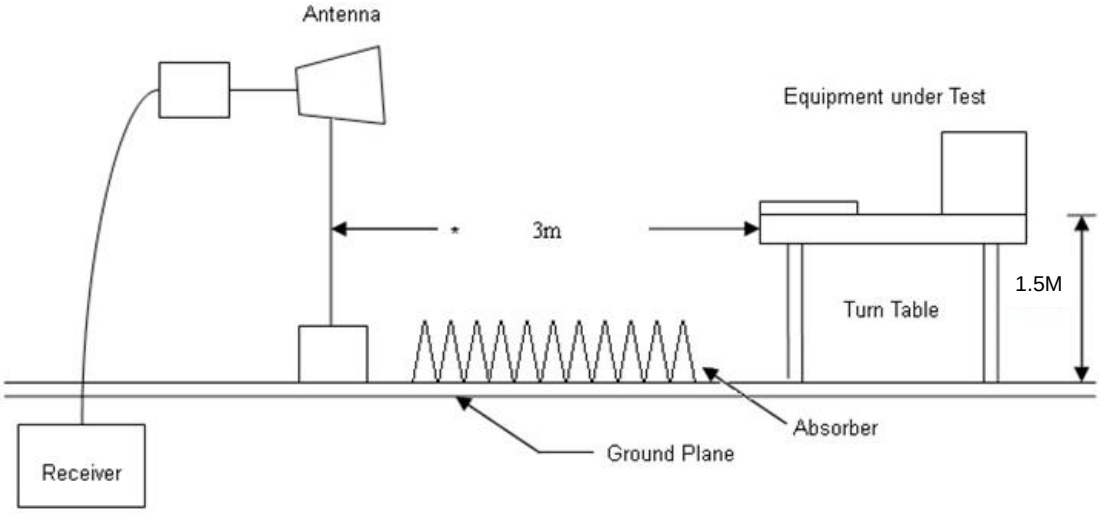
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

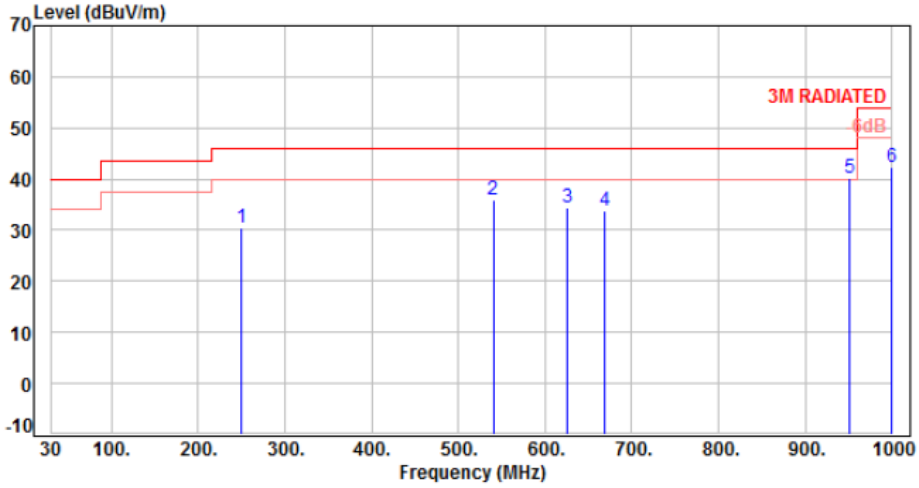


6.4 Test Result and Data (9KHz ~ 30MHz)

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

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

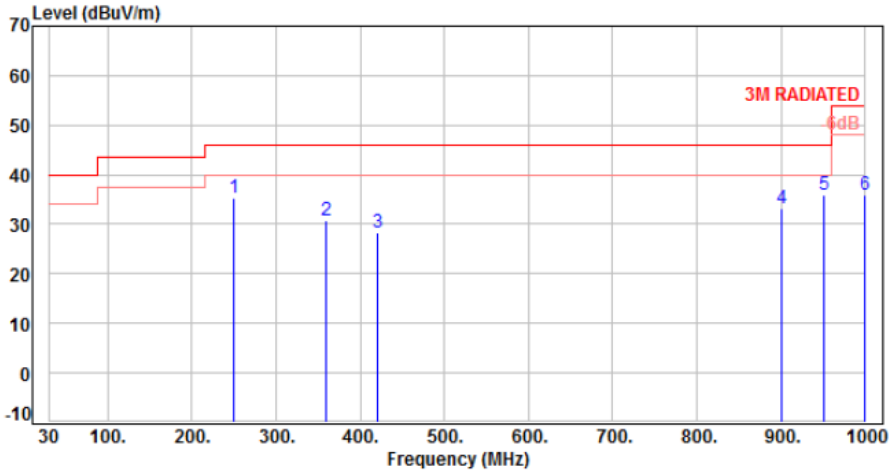
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 2	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	250.19	-10.63	40.97	30.34	46.00	-15.66	Peak	400	0	P
2	540.22	-3.17	39.02	35.85	46.00	-10.15	Peak	400	0	P
3	625.58	-1.38	35.67	34.29	46.00	-11.71	Peak	400	0	P
4	668.26	-0.75	34.69	33.94	46.00	-12.06	Peak	400	0	P
5	950.53	3.78	36.38	40.16	46.00	-5.84	Peak	400	0	P
6	1000.00	4.06	38.23	42.29	54.00	-11.71	Peak	400	0	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 2	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %

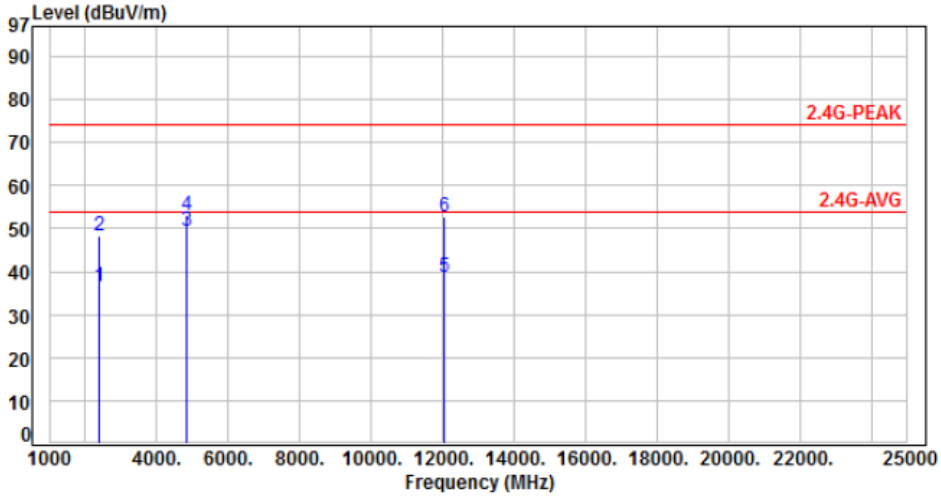


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	250.19	-10.63	46.10	35.47	46.00	-10.53	Peak	100	0	P
2	359.80	-7.20	37.99	30.79	46.00	-15.21	Peak	100	0	P
3	419.94	-5.50	33.93	28.43	46.00	-17.57	Peak	100	0	P
4	900.09	2.89	30.28	33.17	46.00	-12.83	Peak	100	0	P
5	950.53	3.78	32.04	35.82	46.00	-10.18	Peak	100	0	P
6	1000.00	4.06	31.83	35.89	54.00	-18.11	Peak	100	0	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

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

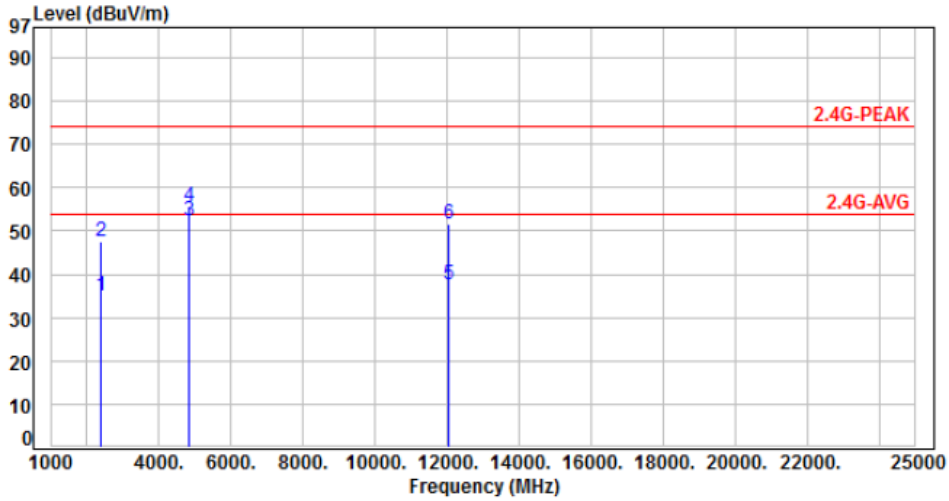
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 1, CH01	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	55.30	36.35	54.00	-17.65	Average	100	289	P
2	2390.00	-18.95	67.20	48.25	74.00	-25.75	Peak	100	289	P
3	4824.00	-13.23	62.77	49.54	54.00	-4.46	Average	100	214	P
4	4824.00	-13.23	66.30	53.07	74.00	-20.93	Peak	100	214	P
5	12060.00	-5.95	44.58	38.63	54.00	-15.37	Average	114	78	P
6	12060.00	-5.95	58.66	52.71	74.00	-21.29	Peak	114	78	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

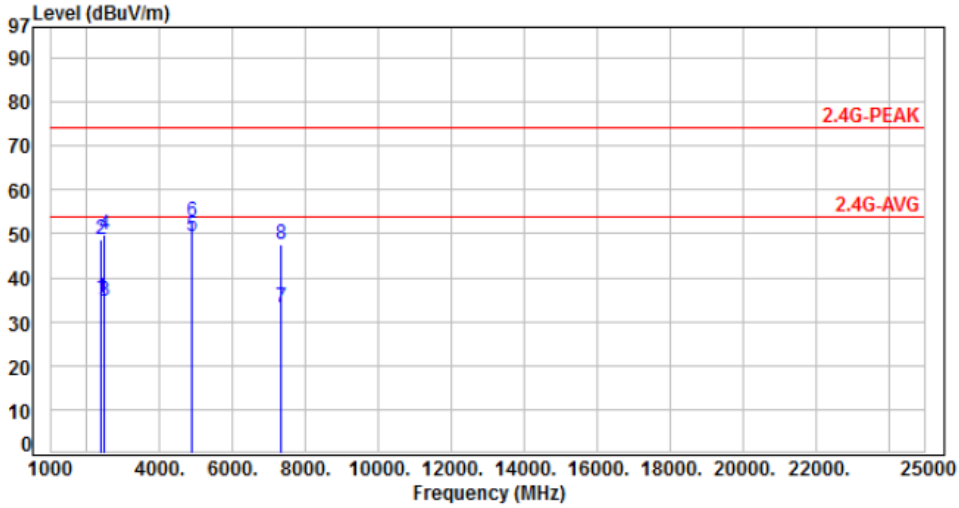
Power	:	DC 5V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH01	Temperature	:	22 °C
Test date	:	Jan. 15, 2018	Humidity	:	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	53.88	34.93	54.00	-19.07	Average	200	206	P
2	2390.00	-18.95	66.70	47.75	74.00	-26.25	Peak	200	206	P
3	4824.00	-13.23	65.60	52.37	54.00	-1.63	Average	100	84	P
4	4824.00	-13.23	68.90	55.67	74.00	-18.33	Peak	100	84	P
5	12060.00	-5.95	43.55	37.60	54.00	-16.40	Average	100	225	P
6	12060.00	-5.95	57.69	51.74	74.00	-22.26	Peak	100	225	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

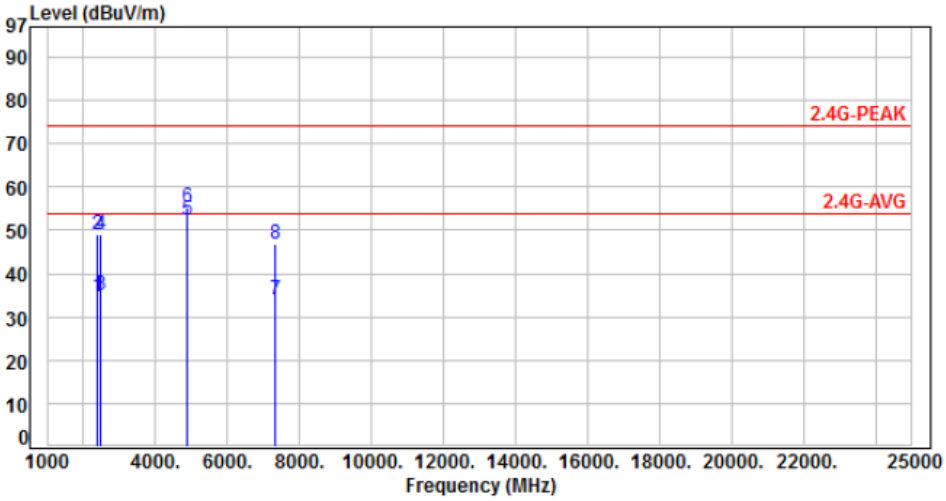
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 1, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	54.20	35.25	54.00	-18.75	Average	100	305	P
2	2390.00	-18.95	67.80	48.85	74.00	-25.15	Peak	100	305	P
3	2483.50	-18.71	53.30	34.59	54.00	-19.41	Average	100	305	P
4	2483.50	-18.71	68.50	49.79	74.00	-24.21	Peak	100	305	P
5	4874.00	-13.11	62.40	49.29	54.00	-4.71	Average	100	170	P
6	4874.00	-13.11	65.80	52.69	74.00	-21.31	Peak	100	170	P
7	7311.00	-10.18	43.54	33.36	54.00	-20.64	Average	102	55	P
8	7311.00	-10.18	57.65	47.47	74.00	-26.53	Peak	102	55	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

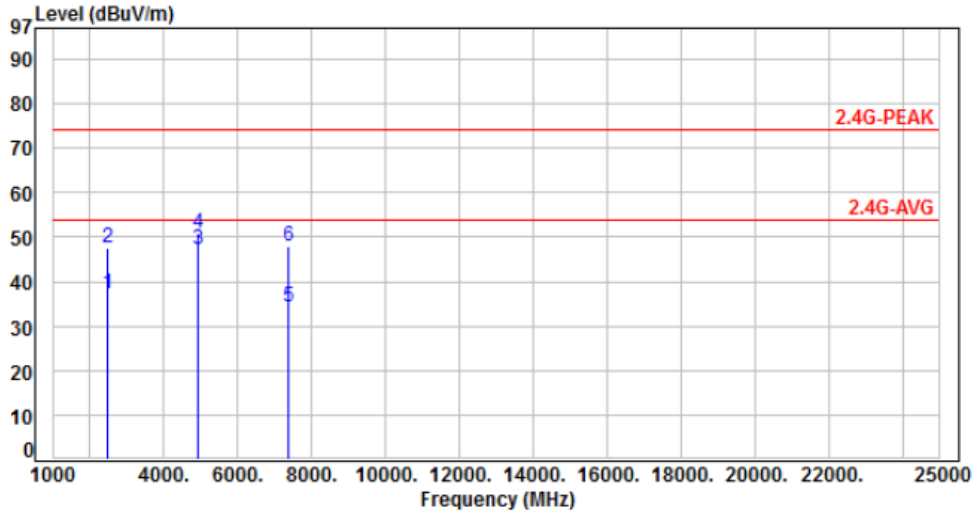
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 1, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	53.80	34.85	54.00	-19.15	Average	140	179	P
2	2390.00	-18.95	68.00	49.05	74.00	-24.95	Peak	140	179	P
3	2483.50	-18.71	53.70	34.99	54.00	-19.01	Average	140	179	P
4	2483.50	-18.71	67.80	49.09	74.00	-24.91	Peak	140	179	P
5	4874.00	-13.11	65.50	52.39	54.00	-1.61	Average	100	80	P
6	4874.00	-13.11	68.60	55.49	74.00	-18.51	Peak	100	80	P
7	7311.00	-10.18	44.21	34.03	54.00	-19.97	Average	105	350	P
8	7311.00	-10.18	56.92	46.74	74.00	-27.26	Peak	105	350	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

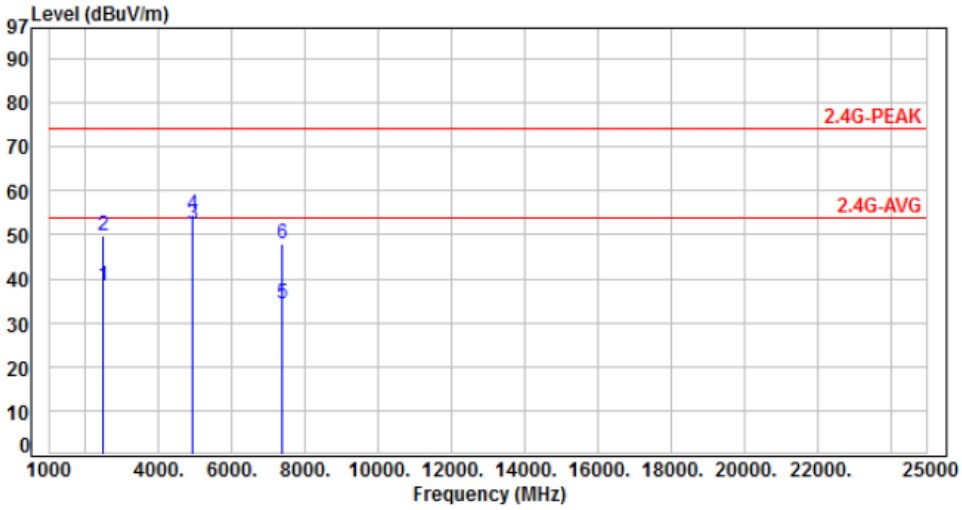
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 1, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2487.50	-18.70	55.80	37.10	54.00	-16.90	Average	120	61	P
2	2487.50	-18.70	66.10	47.40	74.00	-26.60	Peak	120	61	P
3	4924.00	-12.98	60.34	47.36	54.00	-6.64	Average	128	206	P
4	4924.00	-12.98	63.80	50.82	74.00	-23.18	Peak	128	206	P
5	7386.00	-10.00	44.25	34.25	54.00	-19.75	Average	104	61	P
6	7386.00	-10.00	58.10	48.10	74.00	-25.90	Peak	104	61	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

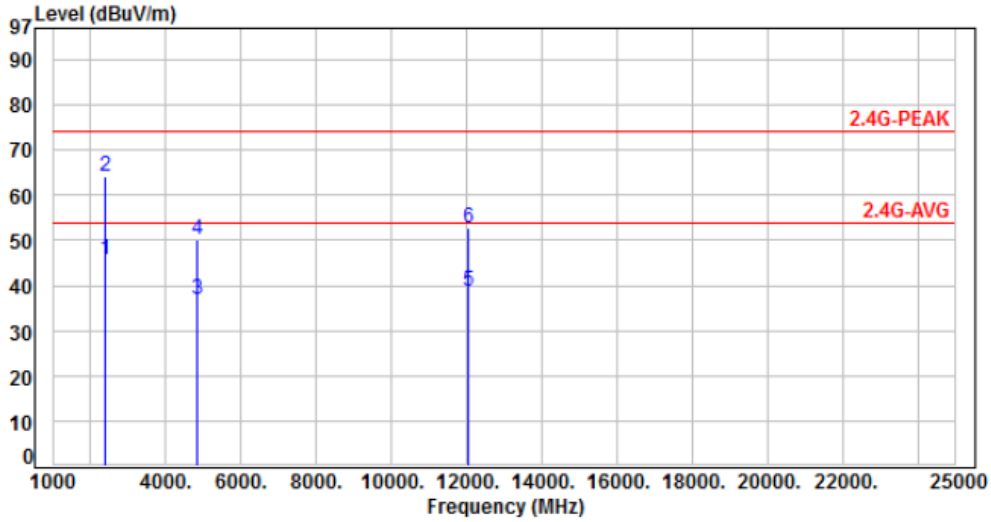
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 1, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2487.50	-18.70	57.00	38.30	54.00	-15.70	Average	100	281	P
2	2487.50	-18.70	68.50	49.80	74.00	-24.20	Peak	100	281	P
3	4924.00	-12.98	65.20	52.22	54.00	-1.78	Average	100	88	P
4	4924.00	-12.98	67.50	54.52	74.00	-19.48	Peak	100	88	P
5	7386.00	-10.00	44.24	34.24	54.00	-19.76	Average	100	341	P
6	7386.00	-10.00	57.84	47.84	74.00	-26.16	Peak	100	341	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

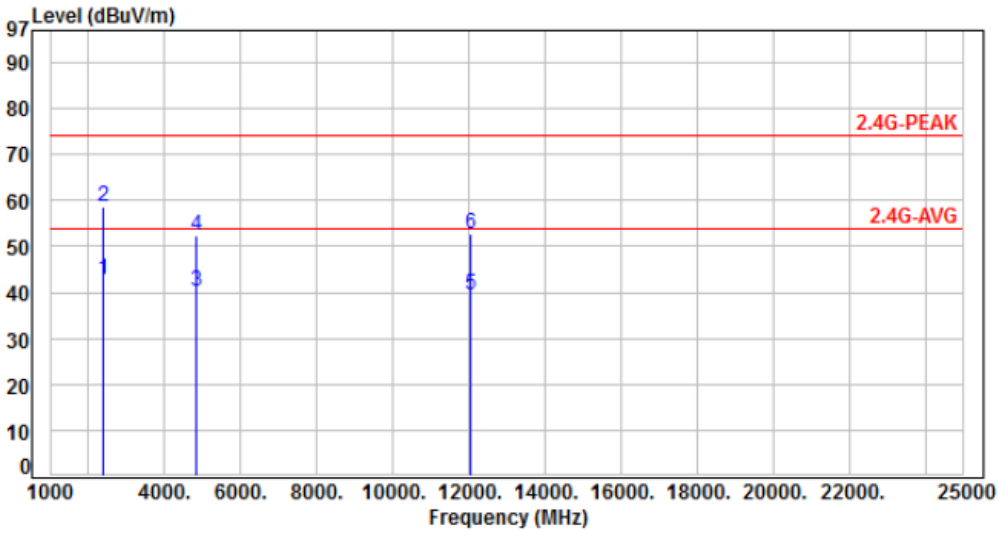
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 2, CH01	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	64.78	45.83	54.00	-8.17	Average	100	300	P
2	2390.00	-18.95	83.20	64.25	74.00	-9.75	Peak	100	300	P
3	4824.00	-13.23	50.20	36.97	54.00	-17.03	Average	100	166	P
4	4824.00	-13.23	63.50	50.27	74.00	-23.73	Peak	100	166	P
5	12060.00	-5.95	44.78	38.83	54.00	-15.17	Average	100	113	P
6	12060.00	-5.95	58.66	52.71	74.00	-21.29	Peak	100	113	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

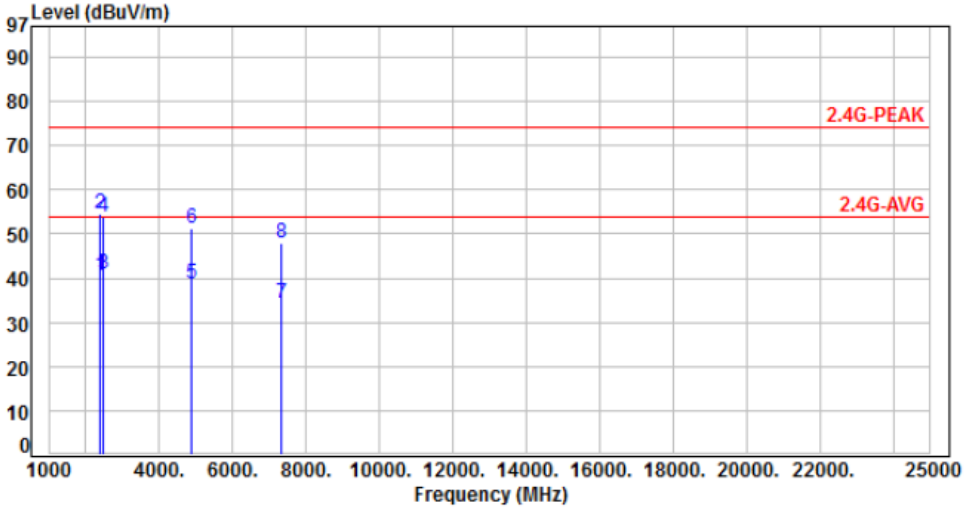
Power	:	DC 5V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH01	Temperature	:	22 °C
Test date	:	Jan. 15, 2018	Humidity	:	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	61.75	42.80	54.00	-11.20	Average	314	285	P
2	2390.00	-18.95	77.55	58.60	74.00	-15.40	Peak	314	285	P
3	4824.00	-13.23	53.40	40.17	54.00	-13.83	Average	100	75	P
4	4824.00	-13.23	65.52	52.29	74.00	-21.71	Peak	100	75	P
5	12060.00	-5.95	45.33	39.38	54.00	-14.62	Average	117	85	P
6	12060.00	-5.95	58.67	52.72	74.00	-21.28	Peak	117	85	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

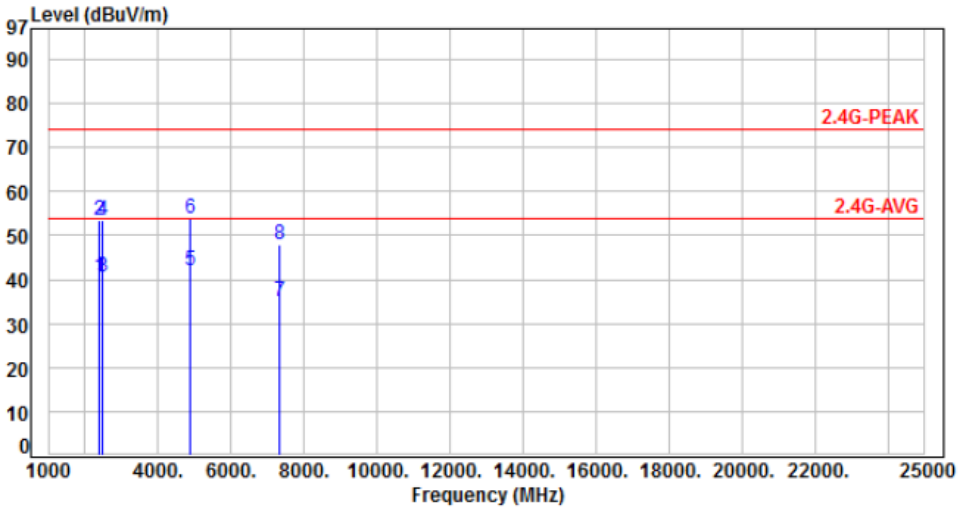
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 2, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	59.40	40.45	54.00	-13.55	Average	100	241	P
2	2390.00	-18.95	73.50	54.55	74.00	-19.45	Peak	100	241	P
3	2483.50	-18.71	59.60	40.89	54.00	-13.11	Average	100	241	P
4	2483.50	-18.71	72.40	53.69	74.00	-20.31	Peak	100	241	P
5	4874.00	-13.11	52.00	38.89	54.00	-15.11	Average	100	204	P
6	4874.00	-13.11	64.50	51.39	74.00	-22.61	Peak	100	204	P
7	7311.00	-10.18	44.57	34.39	54.00	-19.61	Average	112	141	P
8	7311.00	-10.18	58.02	47.84	74.00	-26.16	Peak	112	141	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

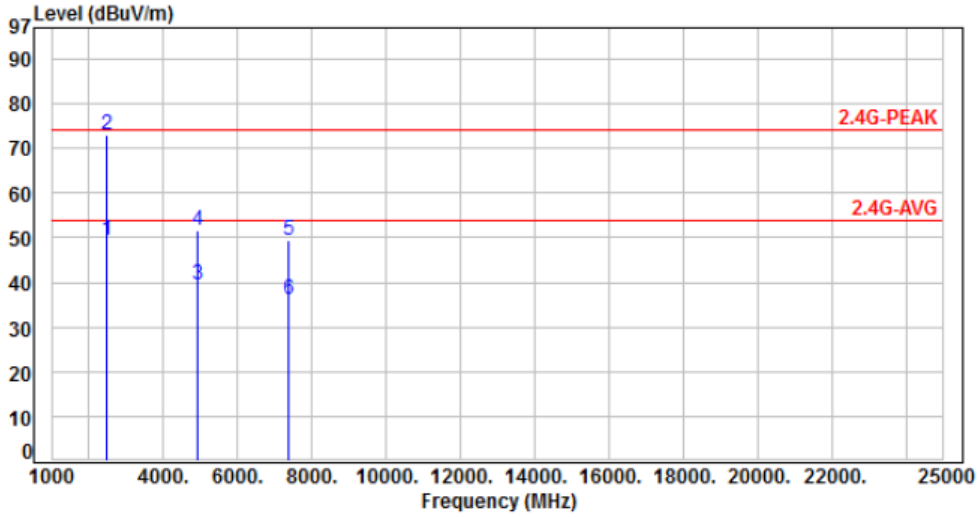
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 2, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	59.60	40.65	54.00	-13.35	Average	112	280	P
2	2390.00	-18.95	72.50	53.55	74.00	-20.45	Peak	112	280	P
3	2483.50	-18.71	59.40	40.69	54.00	-13.31	Average	112	280	P
4	2483.50	-18.71	72.10	53.39	74.00	-20.61	Peak	112	280	P
5	4874.00	-13.11	55.21	42.10	54.00	-11.90	Average	112	90	P
6	4874.00	-13.11	67.10	53.99	74.00	-20.01	Peak	112	90	P
7	7311.00	-10.18	45.22	35.04	54.00	-18.96	Average	100	44	P
8	7311.00	-10.18	57.98	47.80	74.00	-26.20	Peak	100	44	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

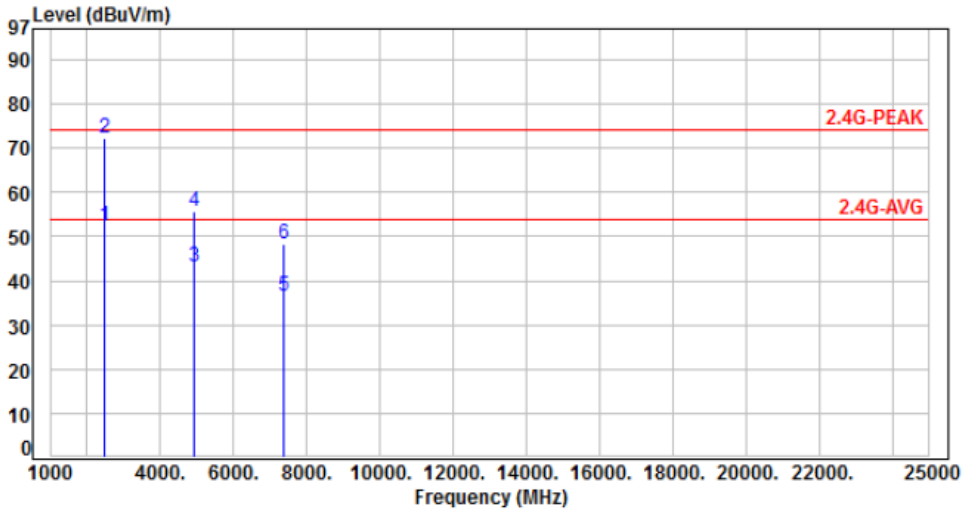
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 2, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-18.71	68.30	49.59	54.00	-4.41	Average	105	279	P
2	2483.50	-18.71	91.70	72.99	74.00	-1.01	Peak	105	279	P
3	4924.00	-12.98	52.40	39.42	54.00	-14.58	Average	112	184	P
4	4924.00	-12.98	64.70	51.72	74.00	-22.28	Peak	112	184	P
5	7386.00	-10.00	59.32	49.32	54.00	-4.68	Average	100	321	P
6	7386.00	-10.00	46.21	36.21	74.00	-37.79	Peak	100	321	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

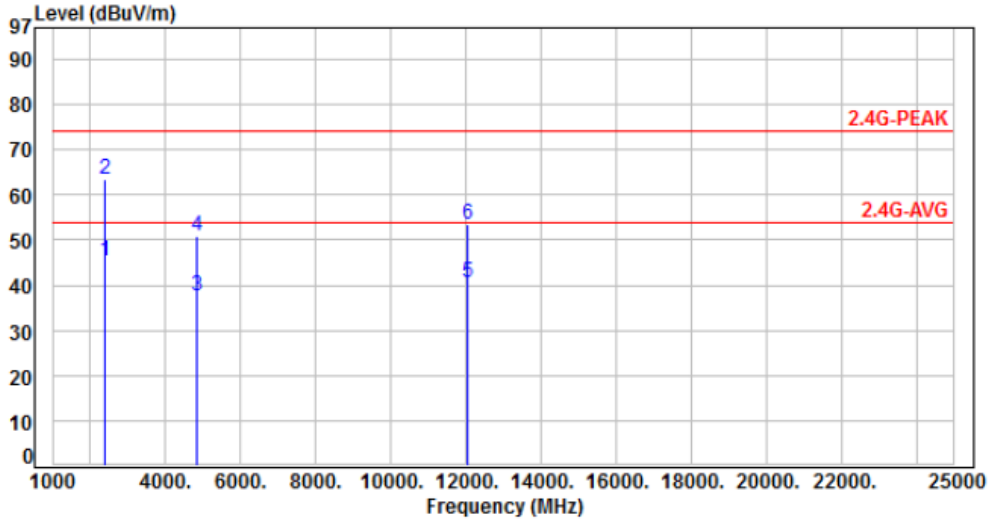
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 2, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-18.71	71.10	52.39	54.00	-1.61	Average	142	190	P
2	2483.50	-18.71	90.90	72.19	74.00	-1.81	Peak	142	190	P
3	4924.00	-12.98	56.30	43.32	54.00	-10.68	Average	100	85	P
4	4924.00	-12.98	68.70	55.72	74.00	-18.28	Peak	100	85	P
5	7386.00	-10.00	46.43	36.43	54.00	-17.57	Average	112	152	P
6	7386.00	-10.00	58.35	48.35	74.00	-25.65	Peak	112	152	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

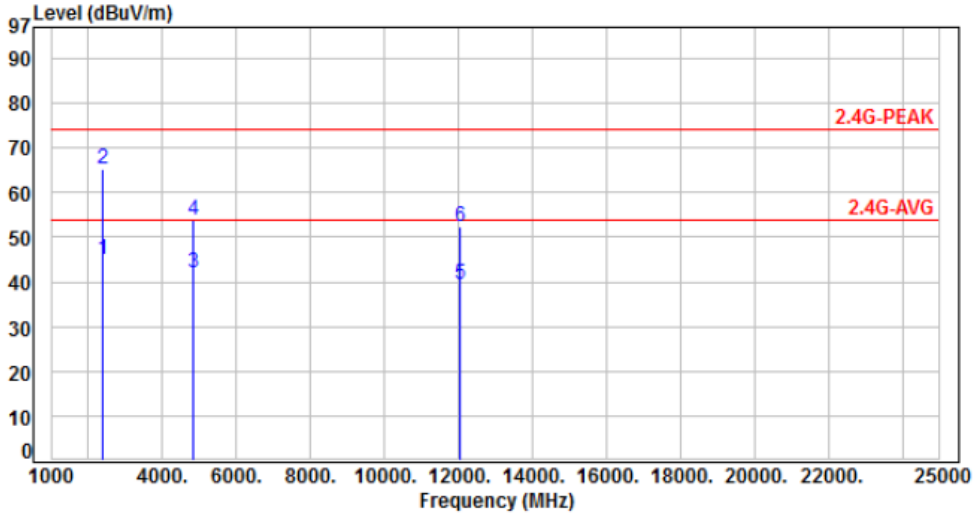
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 3, CH01	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	64.20	45.25	54.00	-8.75	Average	112	308	P
2	2390.00	-18.95	82.30	63.35	74.00	-10.65	Peak	112	308	P
3	4824.00	-13.23	51.00	37.77	54.00	-16.23	Average	100	163	P
4	4824.00	-13.23	64.20	50.97	74.00	-23.03	Peak	100	163	P
5	12060.00	-5.95	46.55	40.60	54.00	-13.40	Average	107	332	P
6	12060.00	-5.95	59.32	53.37	74.00	-20.63	Peak	107	332	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

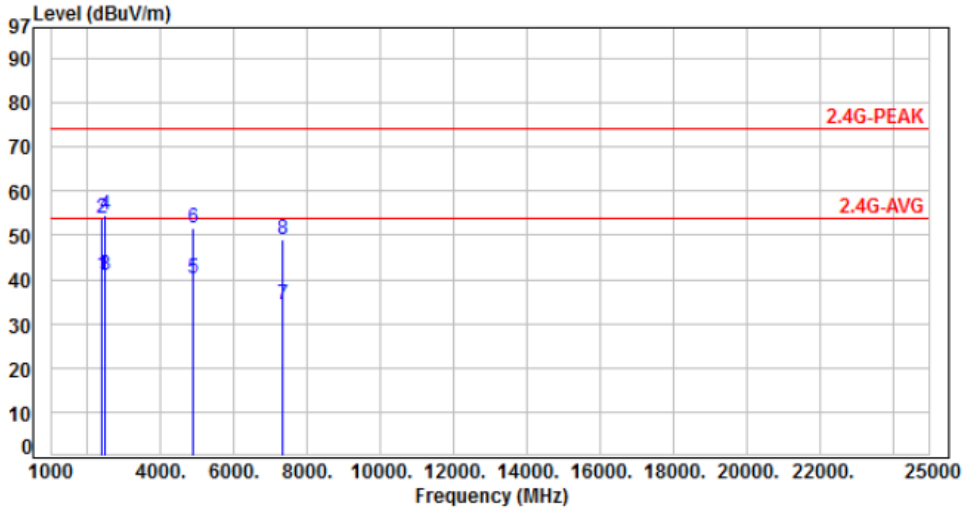
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 3, CH01	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	64.00	45.05	54.00	-8.95	Average	100	188	P
2	2390.00	-18.95	84.30	65.35	74.00	-8.65	Peak	100	188	P
3	4824.00	-13.23	55.10	41.87	54.00	-12.13	Average	100	85	P
4	4824.00	-13.23	66.90	53.67	74.00	-20.33	Peak	100	85	P
5	12060.00	-5.95	45.53	39.58	54.00	-14.42	Average	100	155	P
6	12060.00	-5.95	58.41	52.46	74.00	-21.54	Peak	100	155	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

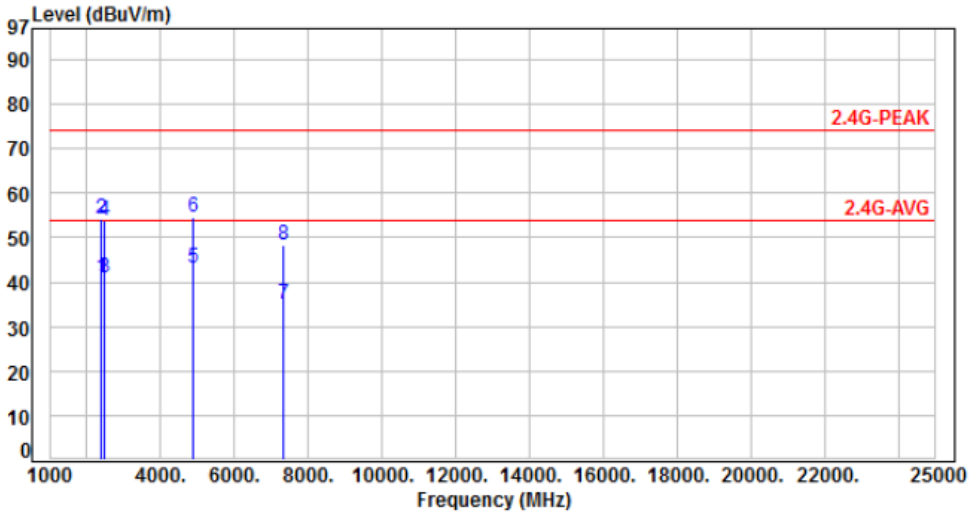
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 3, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	59.99	41.04	54.00	-12.96	Average	110	310	P
2	2390.00	-18.95	72.80	53.85	74.00	-20.15	Peak	110	310	P
3	2483.50	-18.71	59.60	40.89	54.00	-13.11	Average	110	310	P
4	2483.50	-18.71	73.30	54.59	74.00	-19.41	Peak	110	310	P
5	4874.00	-13.11	53.30	40.19	54.00	-13.81	Average	107	184	P
6	4874.00	-13.11	64.70	51.59	74.00	-22.41	Peak	107	184	P
7	7311.00	-10.18	44.66	34.48	54.00	-19.52	Average	100	78	P
8	7311.00	-10.18	59.31	49.13	74.00	-24.87	Peak	100	78	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

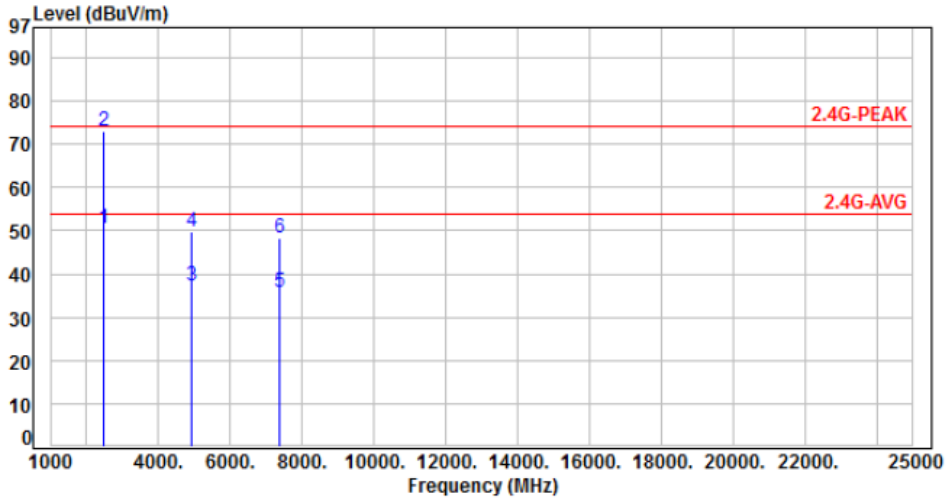
Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 3, CH06	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-18.95	60.00	41.05	54.00	-12.95	Average	118	189	P
2	2390.00	-18.95	73.30	54.35	74.00	-19.65	Peak	118	189	P
3	2483.50	-18.71	59.80	41.09	54.00	-12.91	Average	118	189	P
4	2483.50	-18.71	72.50	53.79	74.00	-20.21	Peak	118	189	P
5	4874.00	-13.11	56.20	43.09	54.00	-10.91	Average	100	85	P
6	4874.00	-13.11	67.60	54.49	74.00	-19.51	Peak	100	85	P
7	7311.00	-10.18	45.32	35.14	54.00	-18.86	Average	107	155	P
8	7311.00	-10.18	58.66	48.48	74.00	-25.52	Peak	107	155	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

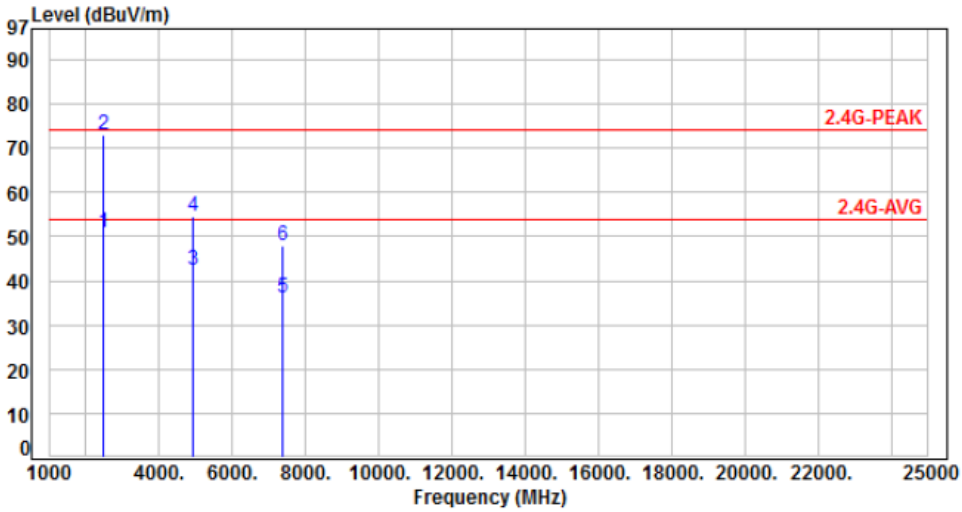
Power :	DC 5V	Pol/Phase :	VERTICAL
Test Mode :	Mode 3, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-18.71	69.10	50.39	54.00	-3.61	Average	110	291	P
2	2483.50	-18.71	91.60	72.89	74.00	-1.11	Peak	110	291	P
3	4924.00	-12.98	50.20	37.22	54.00	-16.78	Average	102	164	P
4	4924.00	-12.98	62.70	49.72	74.00	-24.28	Peak	102	164	P
5	7386.00	-10.00	45.87	35.87	54.00	-18.13	Average	100	56	P
6	7386.00	-10.00	58.38	48.38	74.00	-25.62	Peak	100	56	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor

Power :	DC 5V	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 3, CH11	Temperature :	22 °C
Test date :	Jan. 15, 2018	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-18.71	69.50	50.79	54.00	-3.21	Average	169	184	P
2	2483.50	-18.71	91.70	72.99	74.00	-1.01	Peak	169	184	P
3	4924.00	-12.98	55.30	42.32	54.00	-11.68	Average	105	77	P
4	4924.00	-12.98	67.50	54.52	74.00	-19.48	Peak	105	77	P
5	7386.00	-10.00	46.30	36.30	54.00	-17.70	Average	122	351	P
6	7386.00	-10.00	57.91	47.91	74.00	-26.09	Peak	122	351	P

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

7. Test of Conducted Spurious Emission

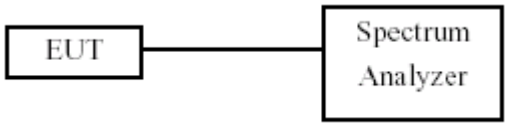
7.1 Test Limit

Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
b. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
c. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
d. The band edges was measured and recorded.

7.3 Test Setup Layout

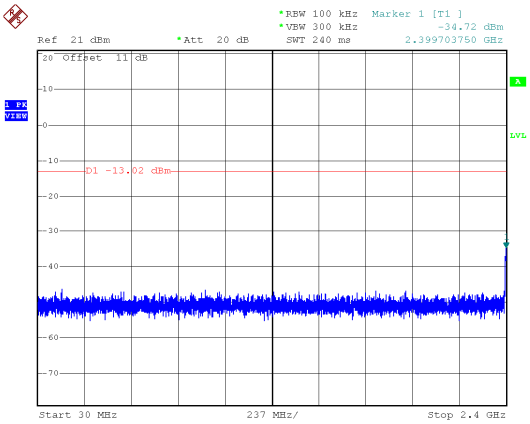


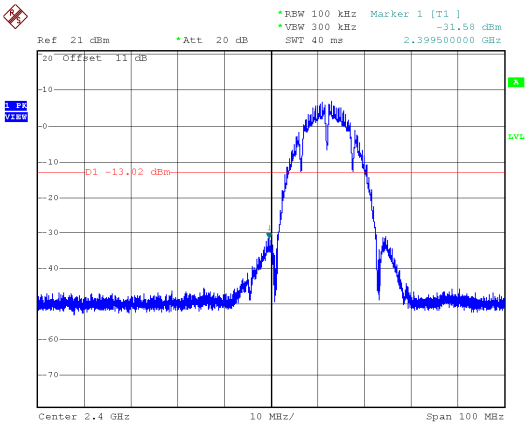
7.4 Test Result and Data

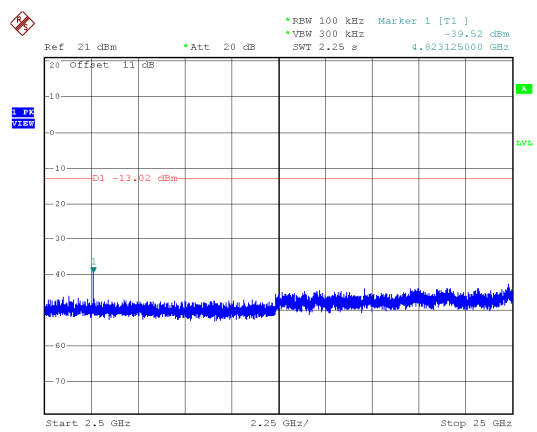
Test Result	:	PASS	Temperature	:	21°C
Test Date	:	Jan. 19, 2018	Humidity	:	64%

Note: Test plots refers to the following pages.

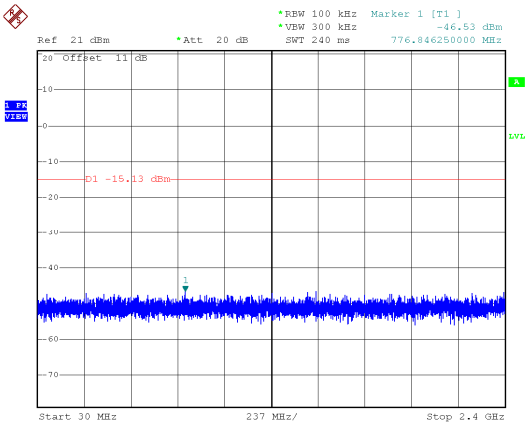
Modulation Type: 802.11b, CH 01

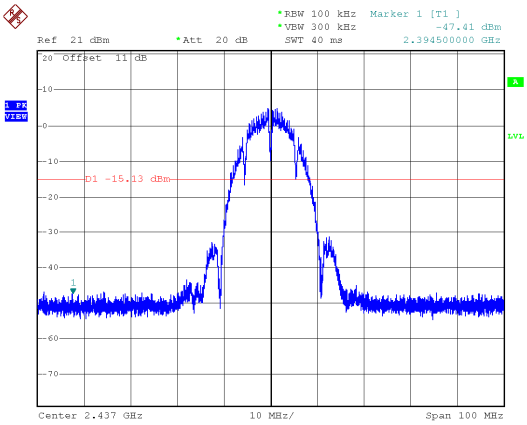


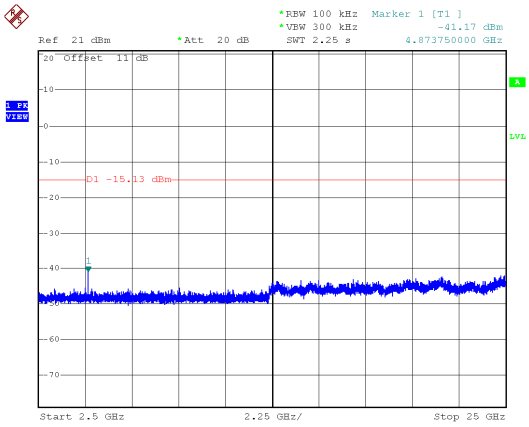




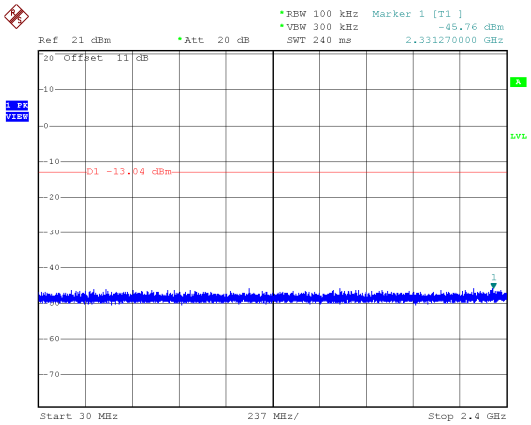
Modulation Type: 802.11b, CH 06

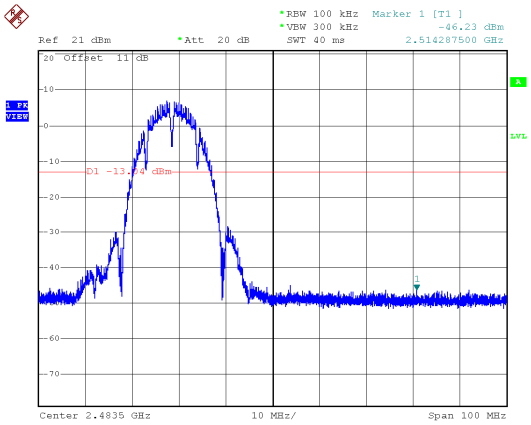


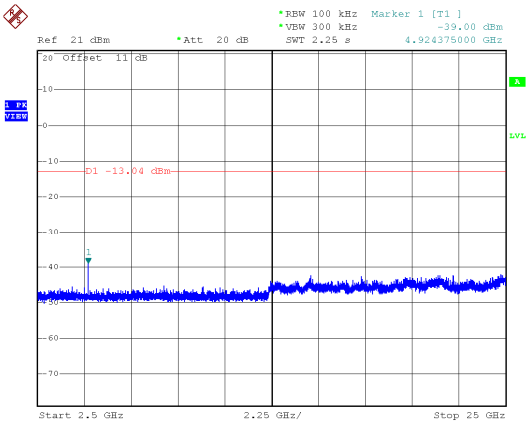




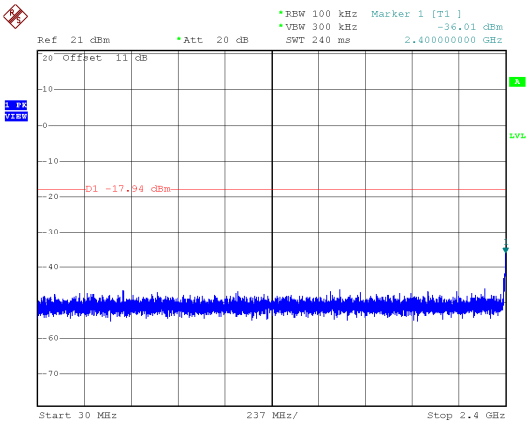
Modulation Type: 802.11b, CH 11

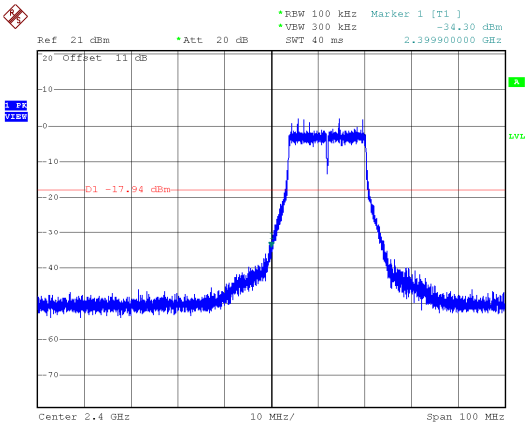


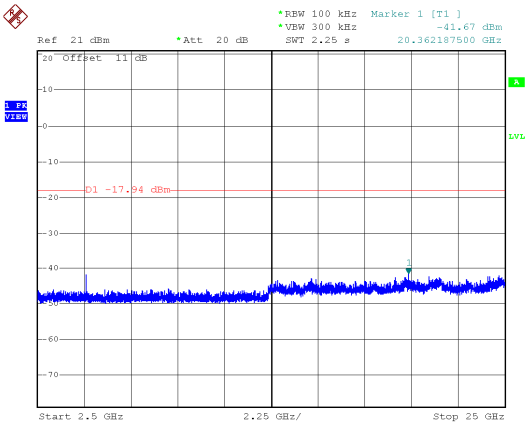




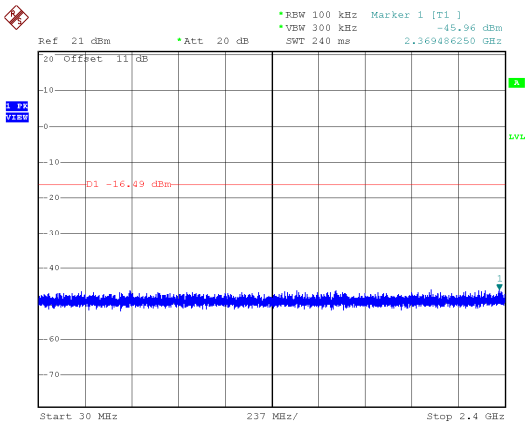
Modulation Type: 802.11g, CH 01

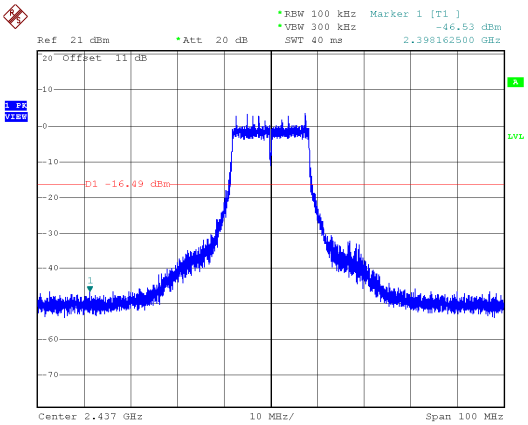


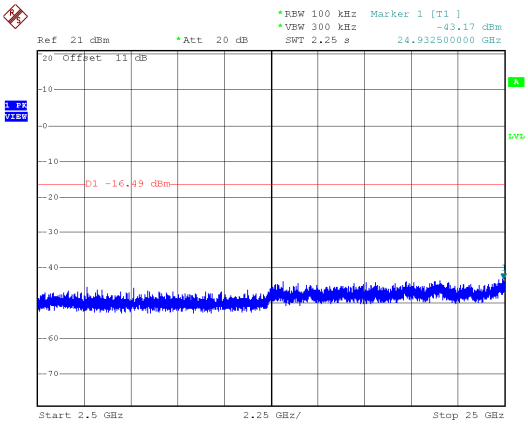




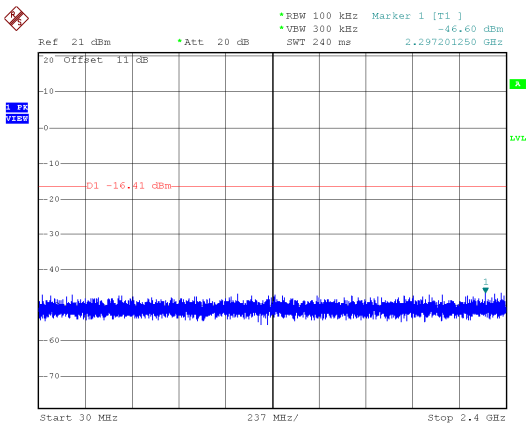
Modulation Type: 802.11g, CH 06

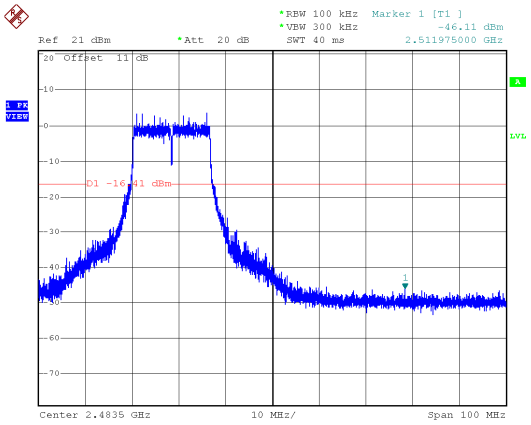


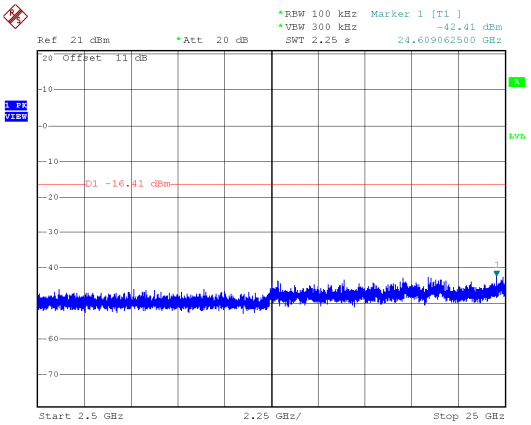




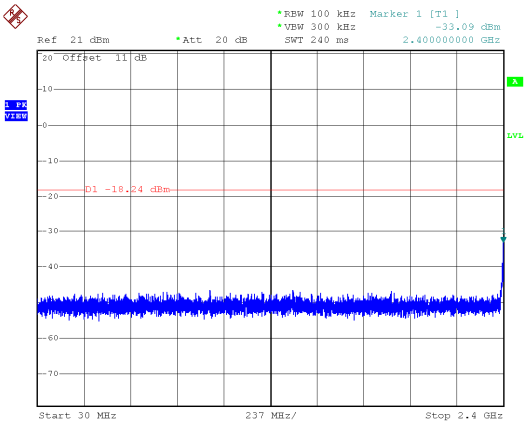
Modulation Type: 802.11g, CH 11

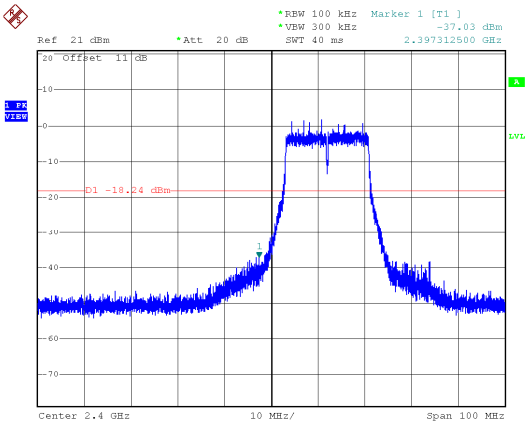


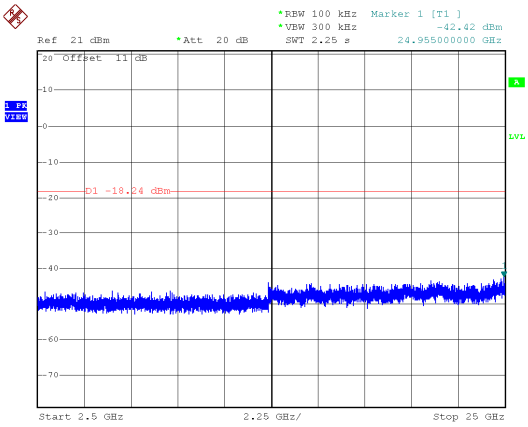




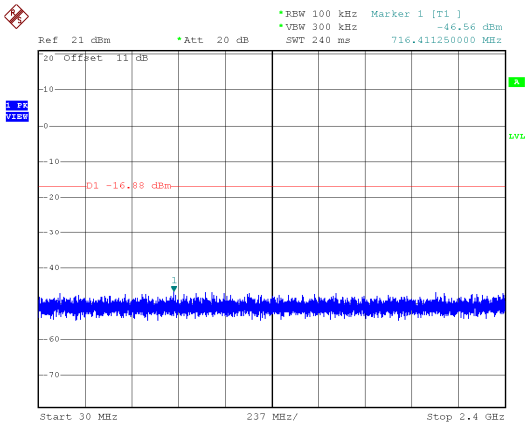
Modulation Type: 802.11n HT20, CH01

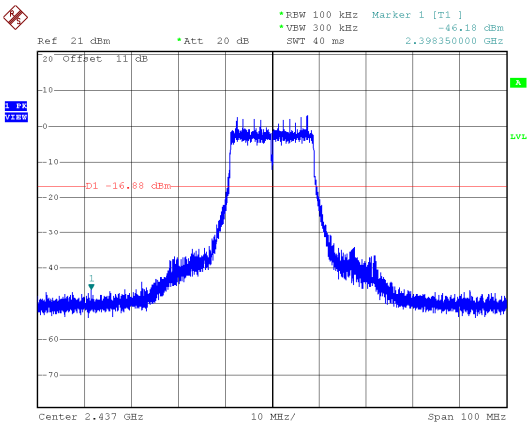


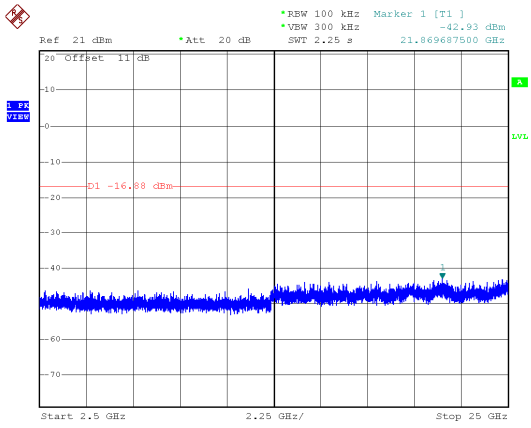




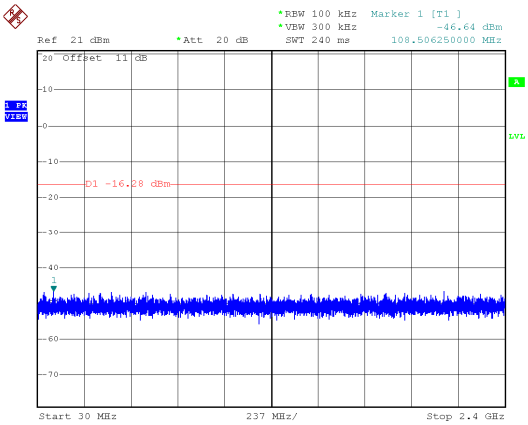
Modulation Type: 802.11n HT20, CH06

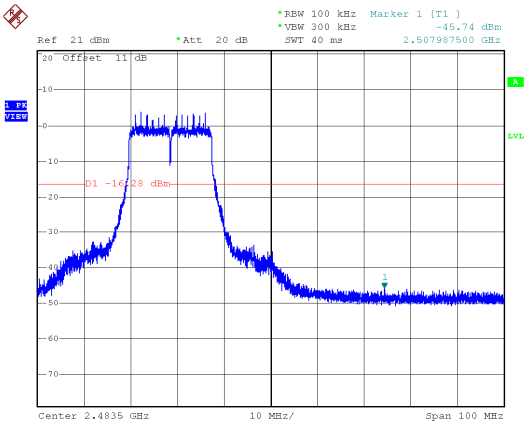


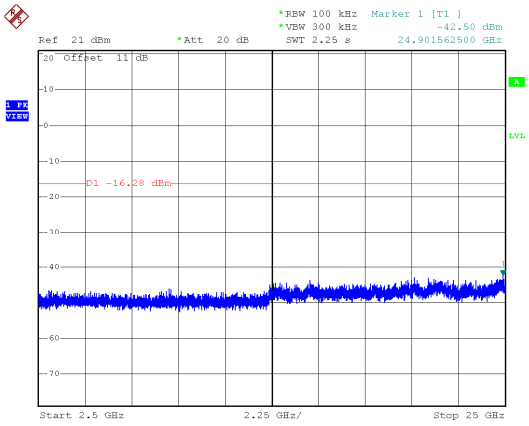




Modulation Type: 802.11n HT20, CH11







8. 6dB Bandwidth Measurement Data

8.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

8.2 Test Procedures

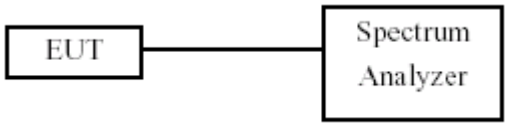
a. The transmitter output was connected to the spectrum analyzer.

b. Set RBW of spectrum analyzer to 1~5% of the emission bandwidth 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.

8.3 Test Setup Layout



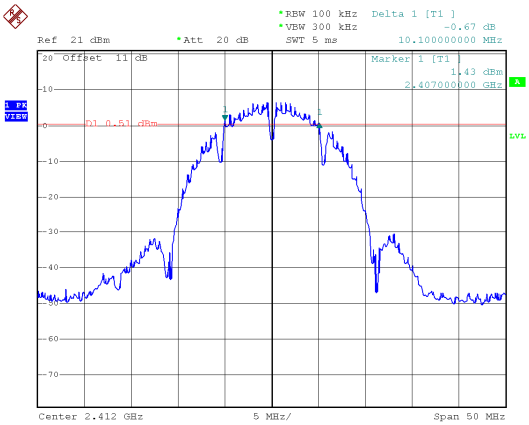
8.4 Test Result and Data

Temperature : 21°C Humidity : 64%

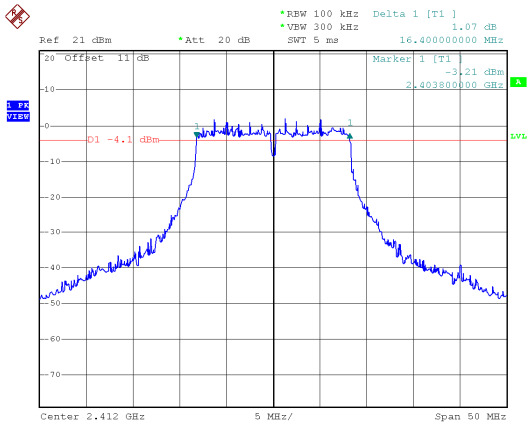
Test Date : Jan. 19, 2018

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
IEEE 802.11b (1Mbps)	01	2412	10.10	0.5
	06	2437	9.60	0.5
	11	2462	10.10	0.5
IEEE 802.11g (6Mbps)	01	2412	16.40	0.5
	06	2437	16.50	0.5
	11	2462	16.30	0.5
IEEE 802.11n HT20 (6.5Mbps)	01	2412	17.60	0.5
	06	2437	17.70	0.5
	11	2462	17.60	0.5

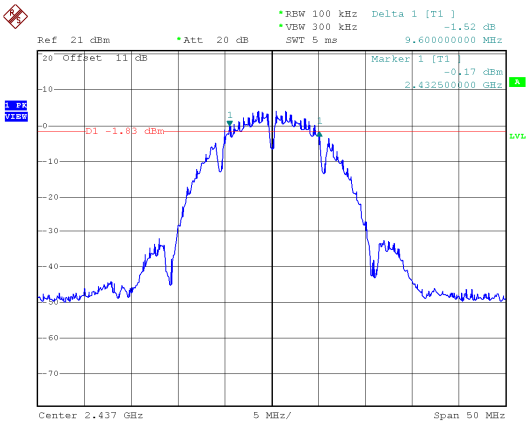
Modulation Type: 802.11b
CH01



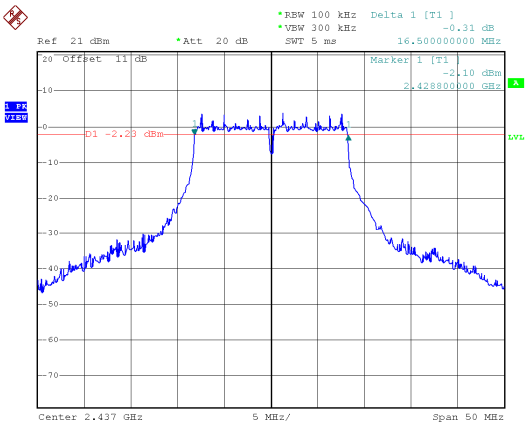
Modulation Type: 802.11g
CH01



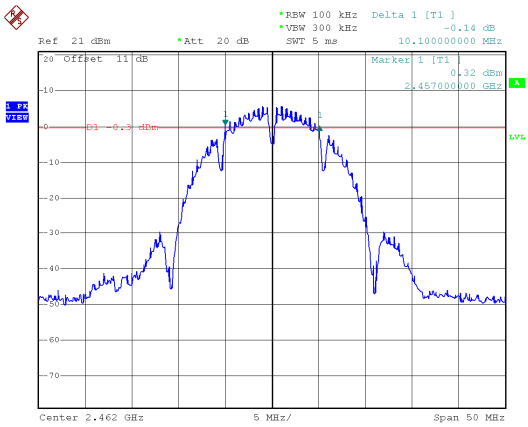
CH06



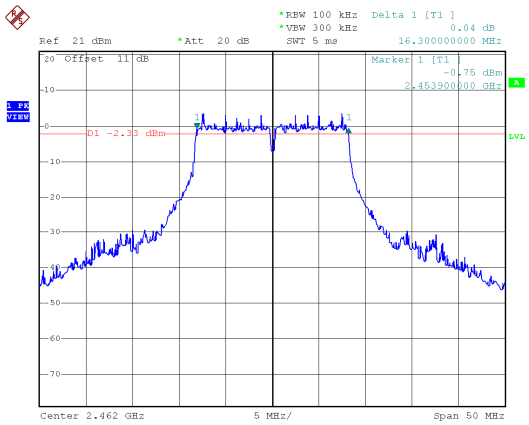
CH06



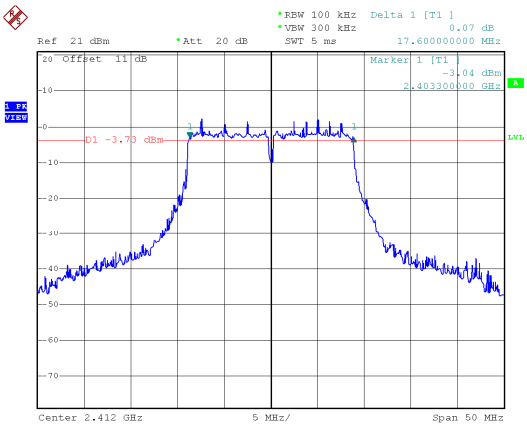
CH11



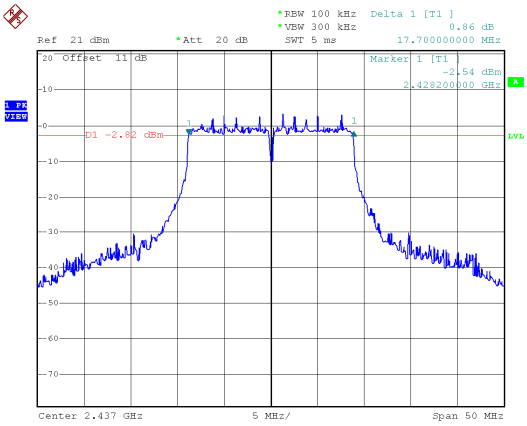
CH11



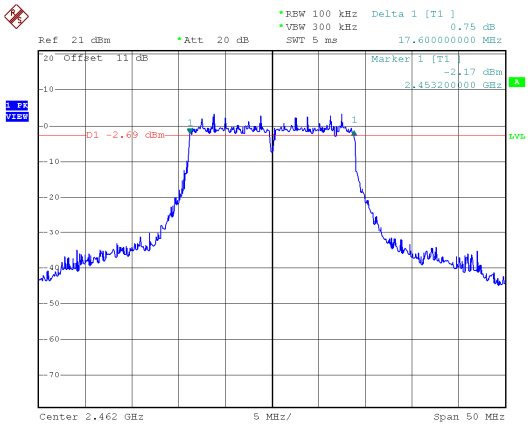
Modulation Type: 802.11n HT20
CH01



CH06



CH11



9. Maximum Peak and Average Output Power

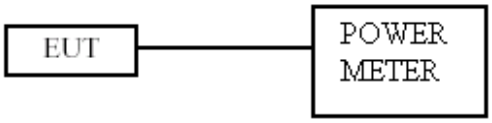
9.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.
If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

9.2 Test Procedures

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

Temperature : 21°C Humidity : 64%

Test Date : Jan. 19, 2018

Modulation Type	Channel	Frequency (MHz)	Peak Power Output (dBm)	Total Power (mW)	Total Power (dBm)	Power Limit (dBm)
IEEE 802.11b (1Mbps)	01	2412	17.63	57.943	17.63	30.00
	06	2437	15.4	34.674	15.40	30.00
	11	2462	17.58	57.280	17.58	30.00
IEEE 802.11g (6Mbps)	01	2412	22.09	161.808	22.09	30.00
	06	2437	22.34	171.396	22.34	30.00
	11	2462	22.67	184.927	22.67	30.00
IEEE 802.11n HT20 (6.5Mbps)	01	2412	22.49	177.419	22.49	30.00
	06	2437	22.52	178.649	22.52	30.00
	11	2462	22.75	188.365	22.75	30.00

Modulation Type	Channel	Frequency (MHz)	Avg. Power Output (dBm)	Total Power (mW)	Total Power (dBm)	Power Limit (dBm)
IEEE 802.11b (1Mbps)	01	2412	15.53	35.727	15.53	N/A
	06	2437	13.24	21.086	13.24	N/A
	11	2462	15.39	34.594	15.39	N/A
IEEE 802.11g (6Mbps)	01	2412	14.37	27.353	14.37	N/A
	06	2437	14.83	30.409	14.83	N/A
	11	2462	15.16	32.810	15.16	N/A
IEEE 802.11n HT20 (6.5Mbps)	01	2412	14.28	26.792	14.28	N/A
	06	2437	14.36	27.290	14.36	N/A
	11	2462	14.73	29.717	14.73	N/A

Note: Average power is for reference only.

10. Power Spectral Density

10.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

If transmitting antennas of directional gain greater than 6 dBi are used, the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

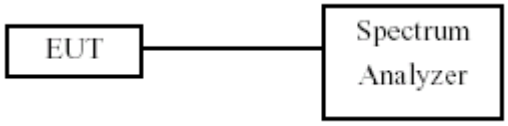
10.2 Test Procedures

a. The transmitter output was connected to spectrum analyzer.

b. The spectrum analyzer's resolution bandwidth were set at 3kHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.

c. The power spectral density was measured and recorded.

10.3 Test Setup Layout



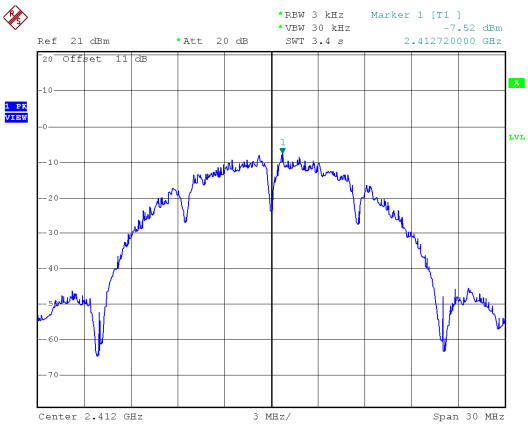
10.4 Test Result and Data

Temperature : 21°C Humidity : 64%

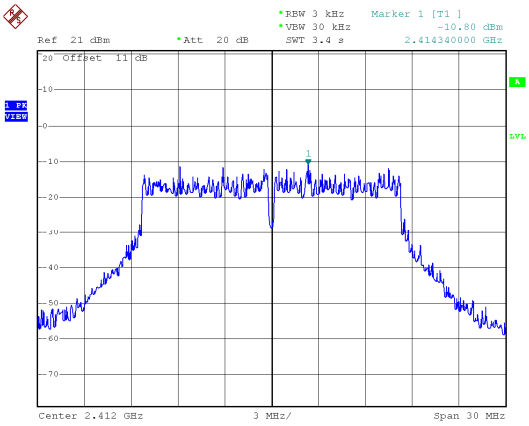
Test Date : Jan. 19, 2018

Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Sum chain (dBm)	Duty Cycle CF(dB)	Total PSD (dBm)	Limit (dBm)
IEEE 802.11b (1Mbps)	01	2412	-7.52	-7.52	0.00	-7.52	8.00
	06	2437	-10.77	-10.77	0.00	-10.77	8.00
	11	2462	-8.29	-8.29	0.00	-8.29	8.00
IEEE 802.11g (6Mbps)	01	2412	-10.8	-10.80	0.00	-10.80	8.00
	06	2437	-10.09	-10.09	0.00	-10.09	8.00
	11	2462	-10.26	-10.26	0.00	-10.26	8.00
IEEE 802.11n HT20 (6.5Mbps)	01	2412	-10.74	-10.74	0.00	-10.74	8.00
	06	2437	-11.89	-11.89	0.00	-11.89	8.00
	11	2462	-11.24	-11.24	0.00	-11.24	8.00

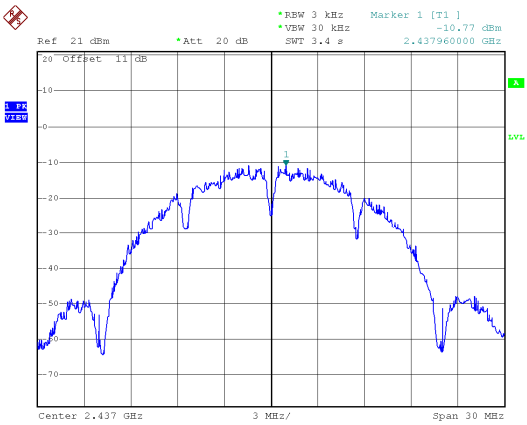
Modulation Type: 802.11b
CH01



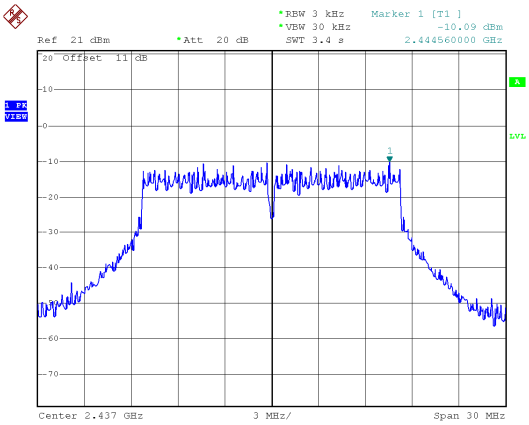
Modulation Type: 802.11g
CH01



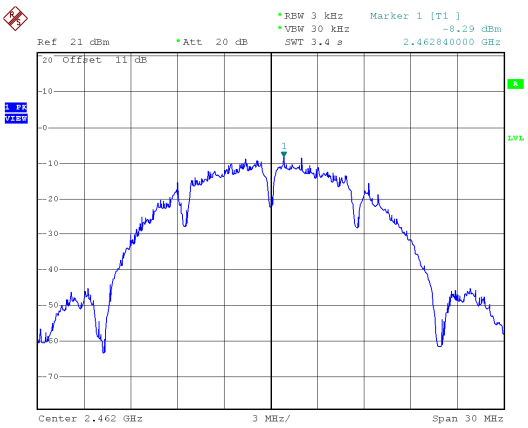
CH06



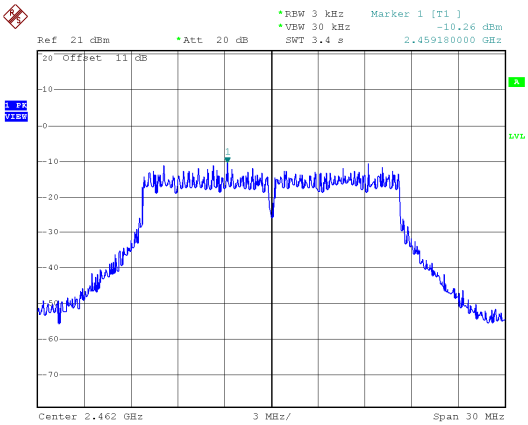
CH06



CH11



CH11



Modulation Type: 802.11n HT20
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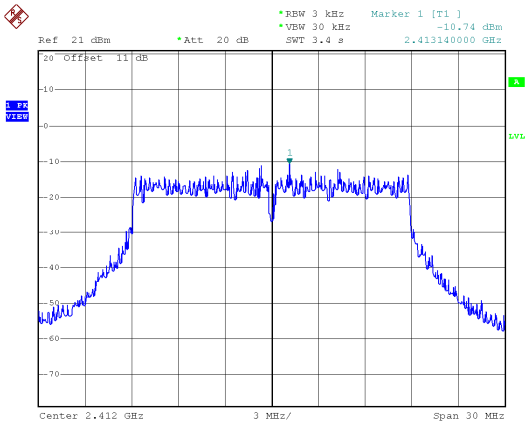

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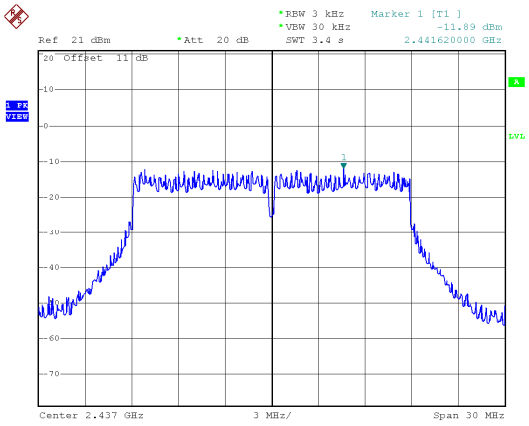
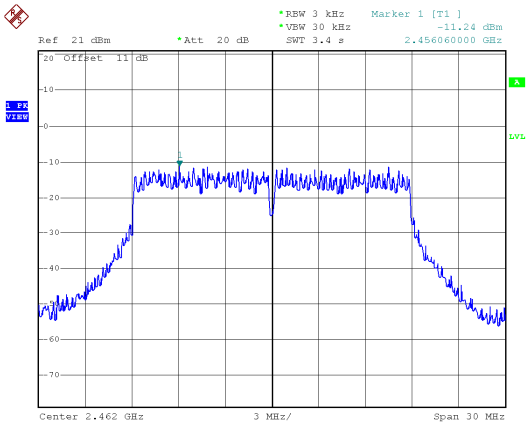
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