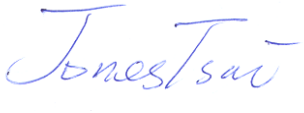
FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	MI
MODEL NAME	:	M1803E1A
FCC ID	:	2AFZZ-XME1A
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Apr. 20, 2018 and testing was completed on Jun. 07, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR842002C	Rev. 01	Initial issue of report	Jun. 11, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.19 dB at 2483.720 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 13.48 dB at 0.152 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.
The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	MI
Model Name	M1803E1A
FCC ID	2AFZZ-XME1A
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE/Bluetooth v4.2 LE/ Bluetooth v5.0 LE
IMEI Code	Conducted: 867252030140353/867252030140361 Conduction: 867252030157993/867252030158009 Radiation: 867252030140353/867252030140361
HW Version	P2
SW Version	MIUI 9
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT, the difference between two samples is for memory, the sample 1 is 6+64GB capacity and the sample 2 is 6+128GB capacity. According to the difference, we only choose sample 1 to perform full test.

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Maximum (Peak) Output Power to antenna</td><td><Ant. 1>
802.11b : 17.44 dBm (0.0555 W)
802.11g : 19.70 dBm (0.0933 W)
802.11n HT20 : 18.63 dBm (0.0729 W)
<Ant. 2>
802.11b : 17.88 dBm (0.0614 W)
802.11g : 20.31 dBm (0.1074 W)
802.11n HT20 : 19.28 dBm (0.0847 W)
MIMO <Ant. 1 + 2>
802.11g : 23.04 dBm (0.2014 W)
802.11n HT20 : 22.02 dBm (0.1592 W)</td></tr>
<tr><td>Antenna Type / Gain</td><td><Ant 1>
Dipole Antenna with gain 0.05 dBi
<Ant 2>
PIFA Antenna type with gain -4.45 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td><table><tr><td></td><td>Ant. 1</td><td>Ant. 2</td></tr><tr><td>802.11 b/g/n</td><td>V</td><td>V</td></tr><tr><td>802.11 g/n MIMO</td><td>V</td><td>V</td></tr></table></td></tr>
</table>

Note:

1. MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.
2. For 802.11g/ 11n HT 20 SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power
3. For 802.11g / 11n HT20 MIMO mode, the whole testing have assessed only 802.11g by referring to their maximum conducted power.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

SPORTON INTERNATIONAL INC. is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and under the FCC-recognized accredited testing laboratories by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No.58, Aly. 75, Ln. 564 Wenha 3rd Rd. Guishan Dist. Taoyuan City Taiwan TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	03CH13-HY	TW0007	214511

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Single Antenna

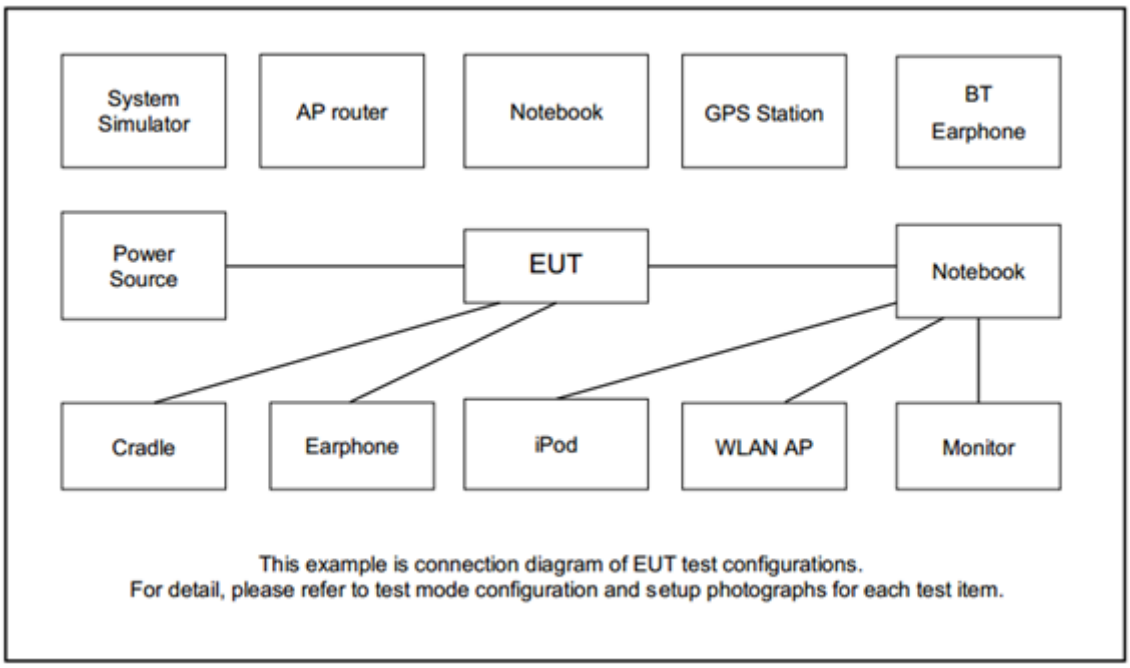
Modulation	Data Rate
802.11b	1 Mbps

MIMO Antenna

Modulation	Data Rate
802.11g	6 Mbps
802.11n HT20	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + Camera(Rear) + USB Cable 1(Charging from Adapter) + SIM 1
Remark: For Radiated Test Cases, The tests were performed with Adapter and USB Cable 1.	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
3.	NOTE BOOK	Dell	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 5.2 dB and 20dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 5.2 + 20 = 25.2 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

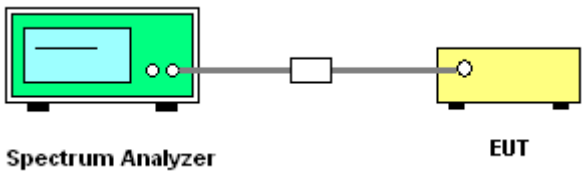
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

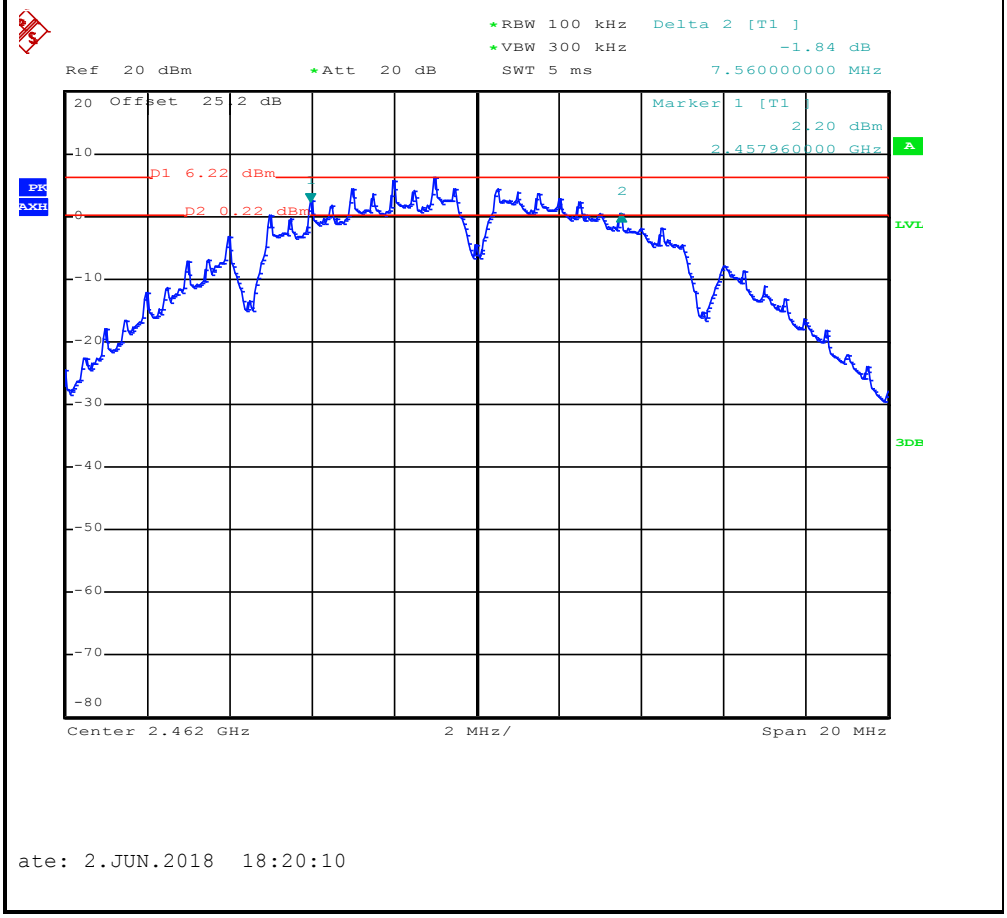
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

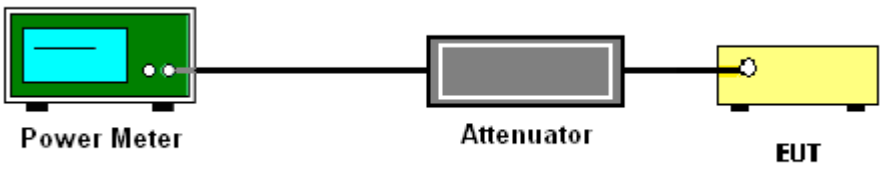
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

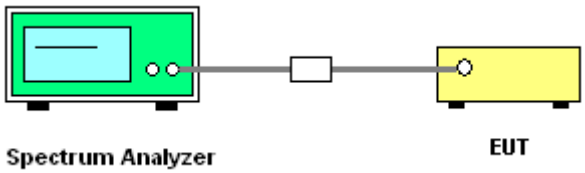
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   Method (1): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

   Method (2): Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)

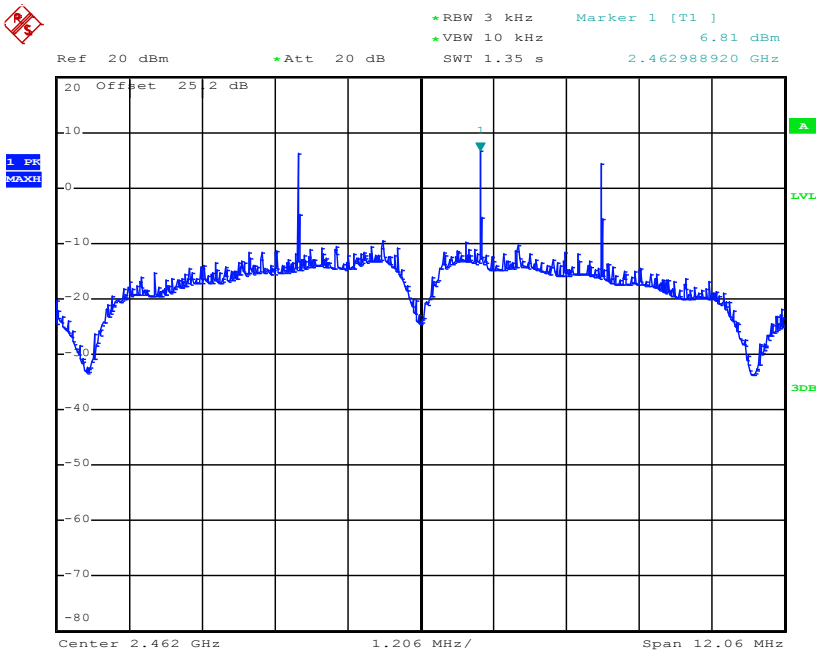
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



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3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

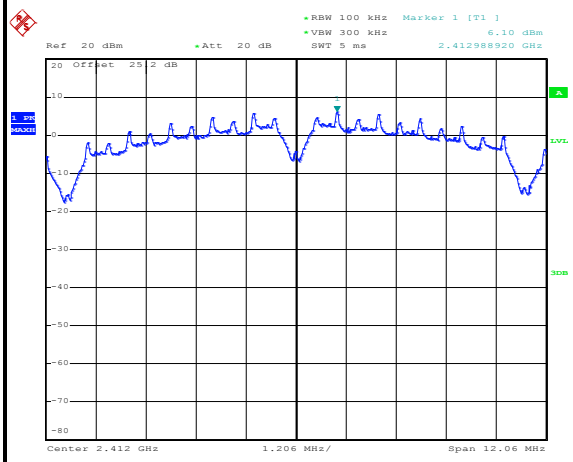
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Kai Liao/Shiang Wang/Luffy Lin	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

Number of TX = 1, Ant. 1 (Measured)

Test Mode :	802.11b	**Test Channel :**	01

100kHz PSD reference Level



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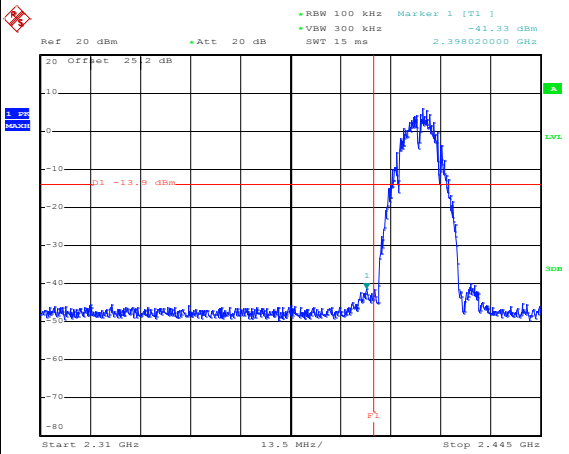
Channel Plot



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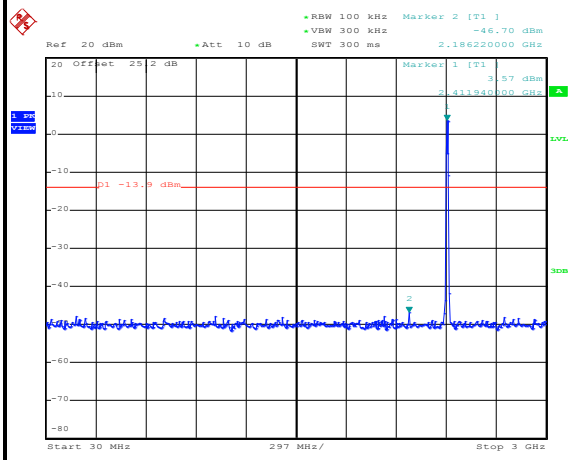
Spurious Emission 30MHz~3GHz



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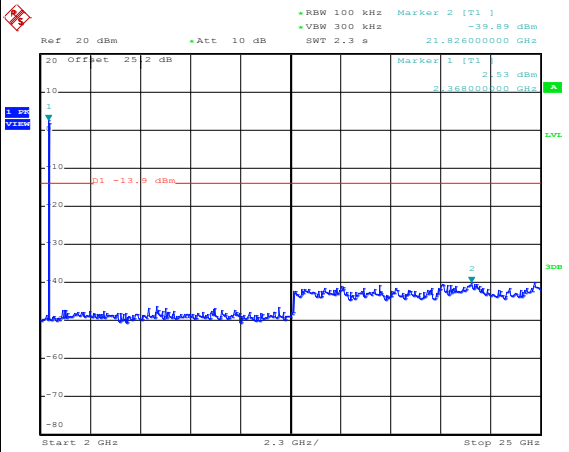
Spurious Emission 2GHz~25GHz



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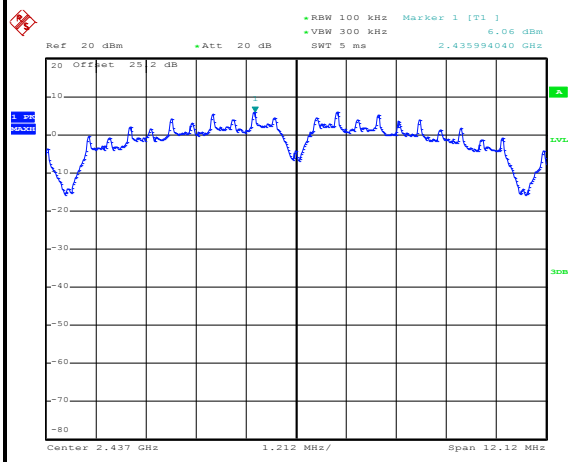
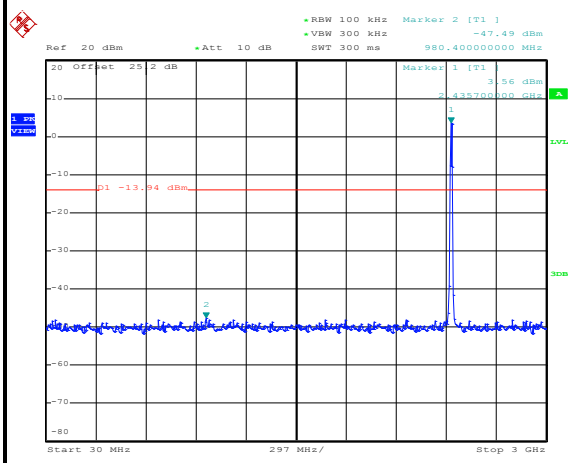
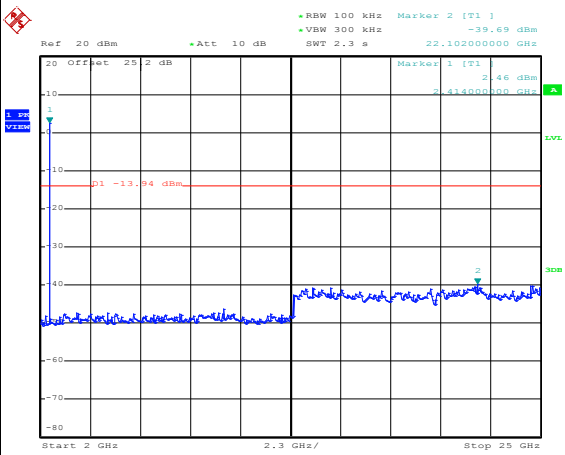
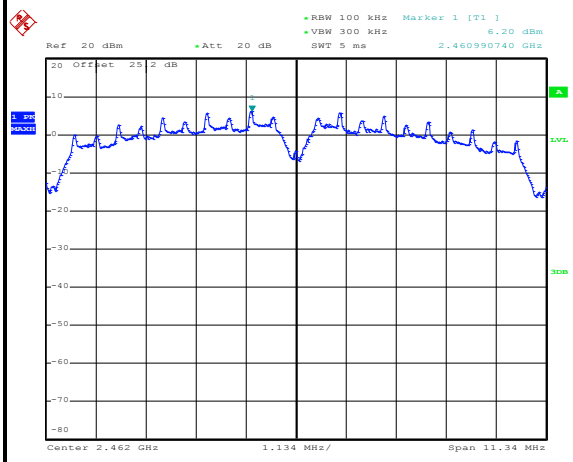
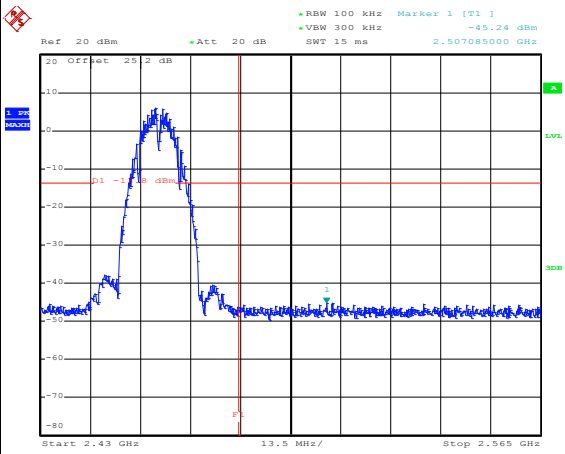
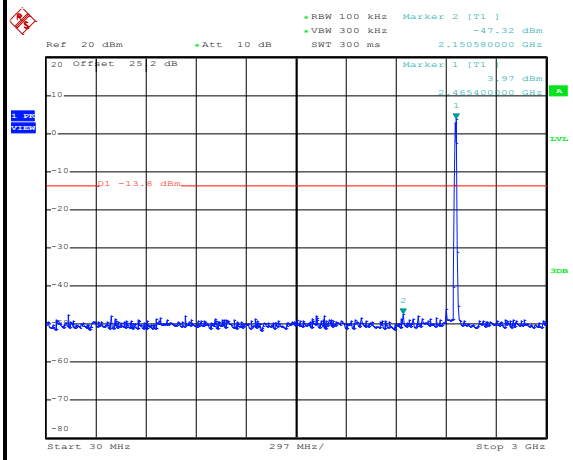
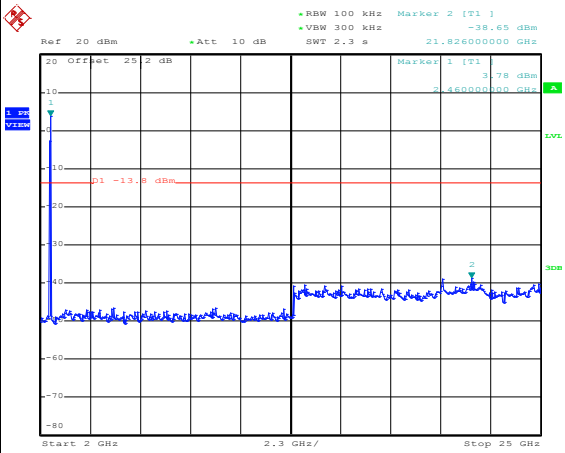
Test Mode :	802.11b	Test Channel :	06

100kHz PSD reference Level	
 Date: 2.JUN.2018 18:16:37	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
 Date: 2.JUN.2018 18:16:58	 Date: 2.JUN.2018 18:17:36

Test Mode :	802.11b	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 18:20:53	Date: 2.JUN.2018 18:21:20
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
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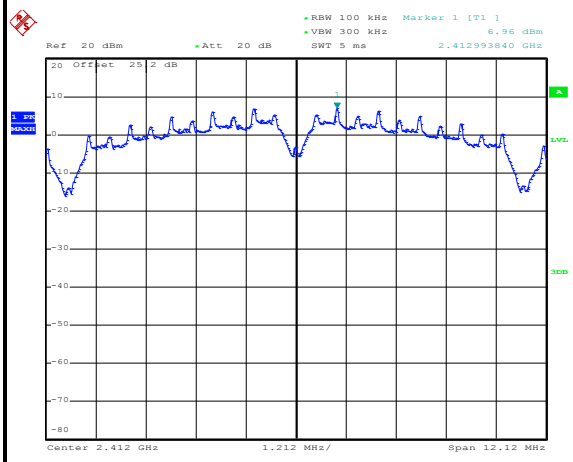
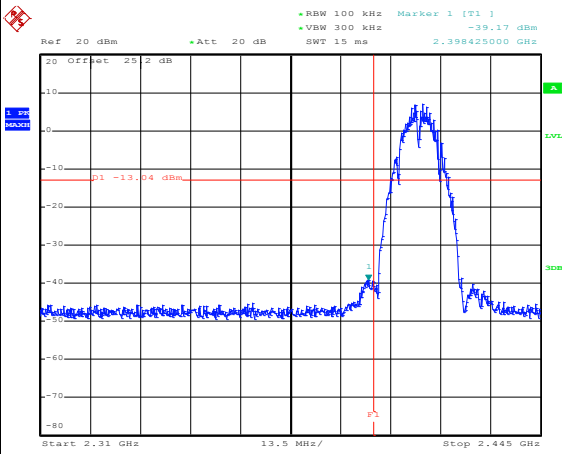
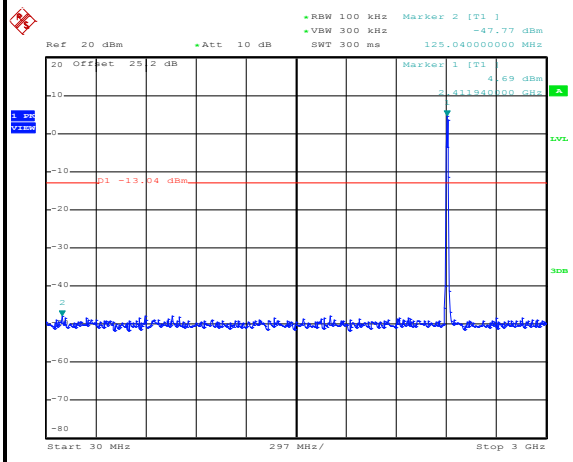
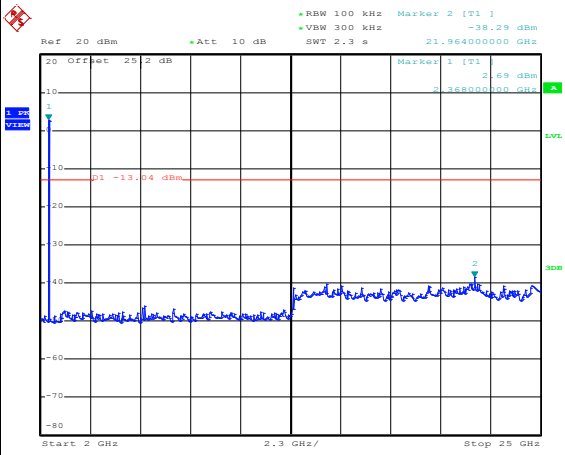
Number of TX = 1, Ant. 2 (Measured)

Test Mode :	802.11b	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 18:25:25	Date: 2.JUN.2018 18:27:21
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
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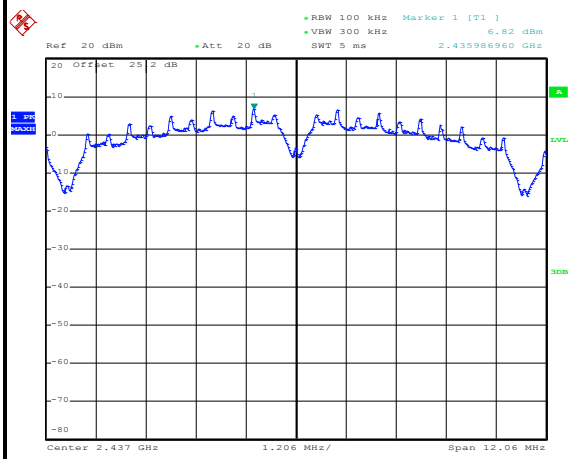
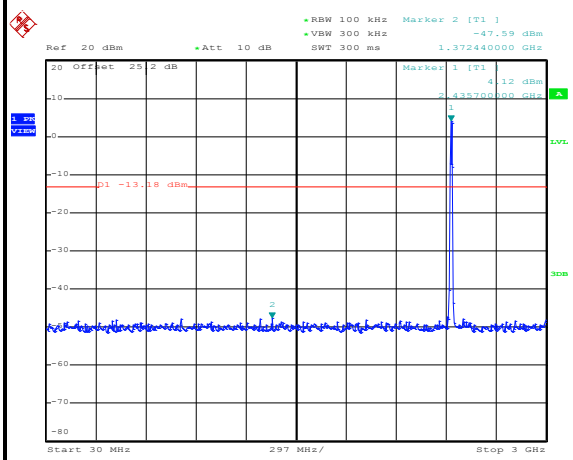
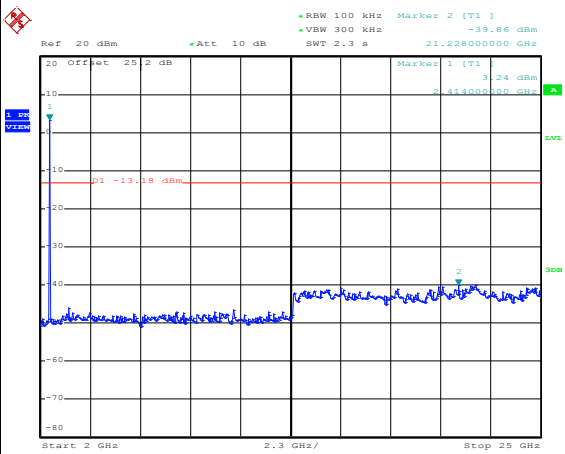
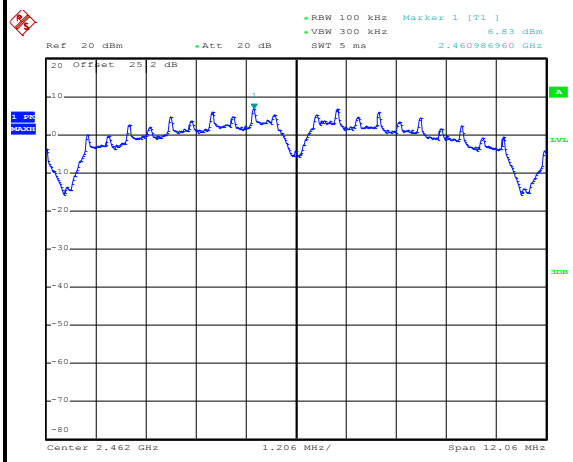
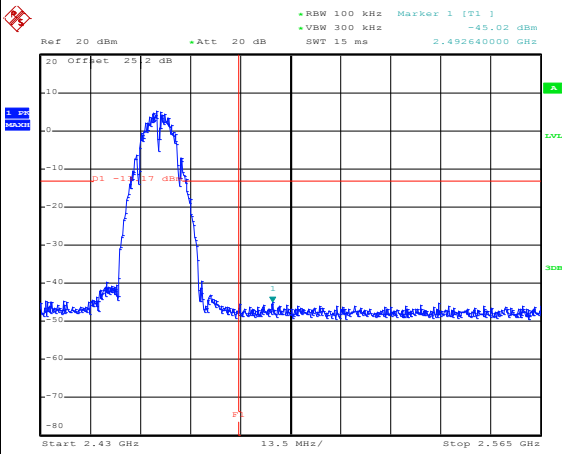
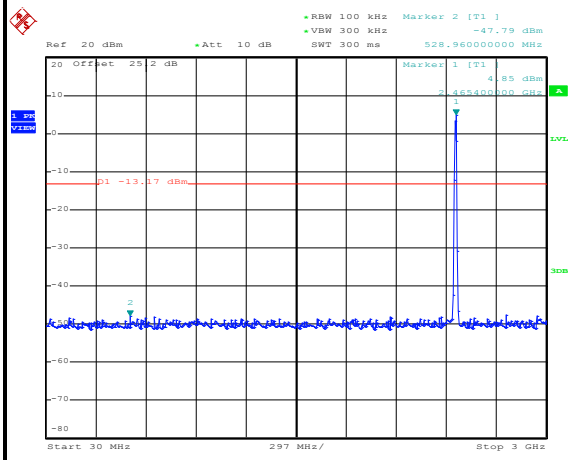
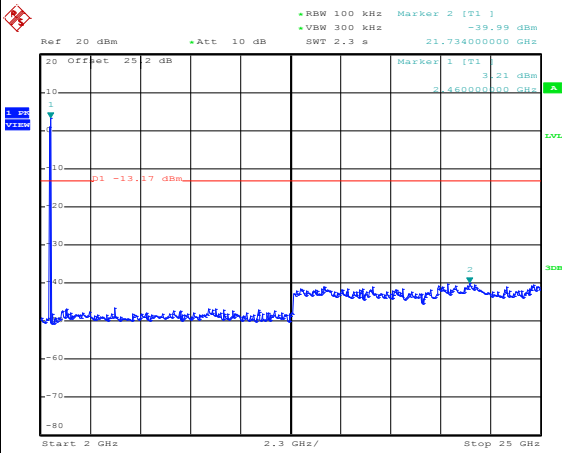
Test Mode :	802.11b	Test Channel :	06

100kHz PSD reference Level	
 Date: 2.JUN.2018 18:31:39	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
 Date: 2.JUN.2018 18:31:59	 Date: 2.JUN.2018 18:32:16

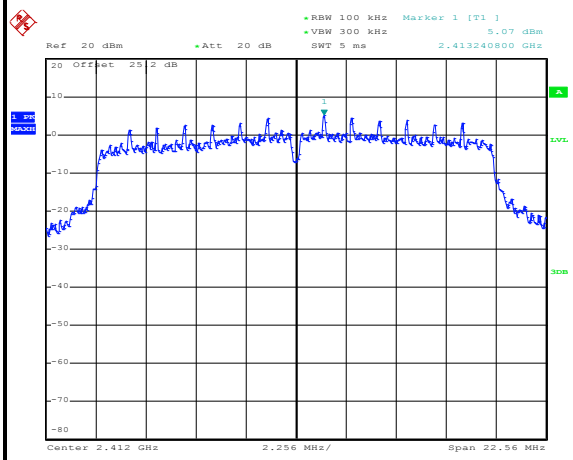
Test Mode :	802.11b	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 18:44:54	Date: 2.JUN.2018 18:45:33
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JUN.2018 18:45:58	Date: 2.JUN.2018 18:46:16

Number of TX = 2, Ant. 1 (Measured)

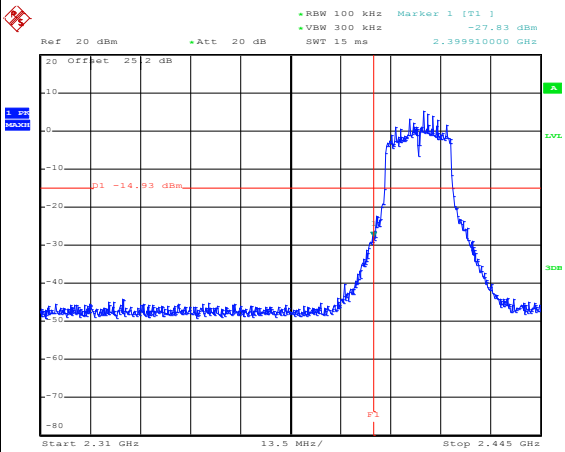
Test Mode :	802.11g	Test Channel :	01

100kHz PSD reference Level



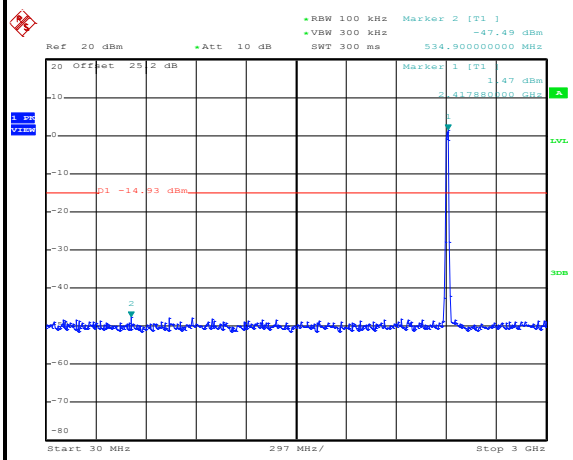
Date: 2.JUN.2018 19:07:53

Channel Plot



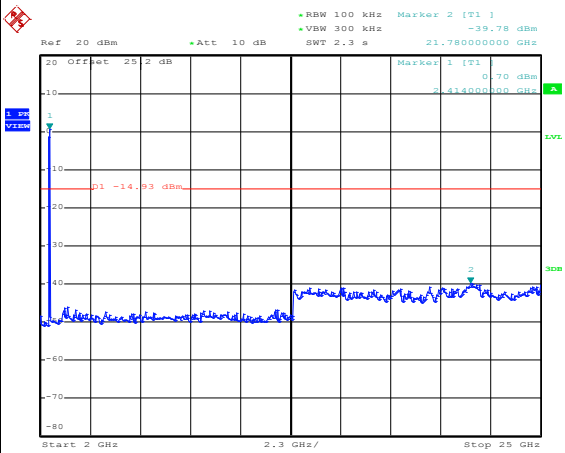
Date: 2.JUN.2018 19:08:09

Spurious Emission 30MHz~3GHz



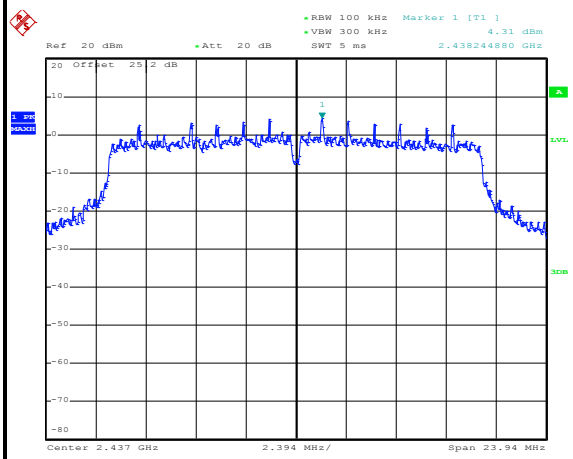
Date: 2.JUN.2018 19:08:30

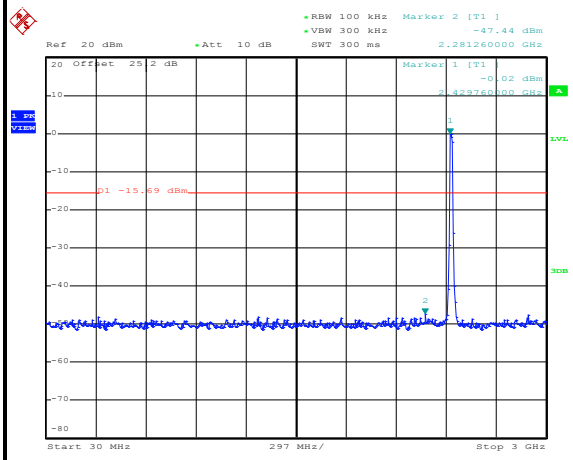
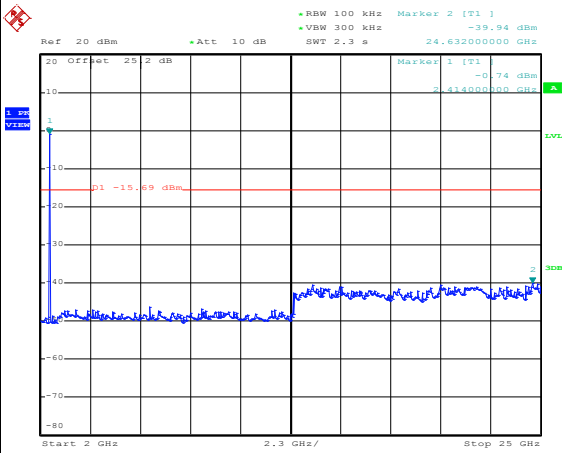
Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 19:08:50

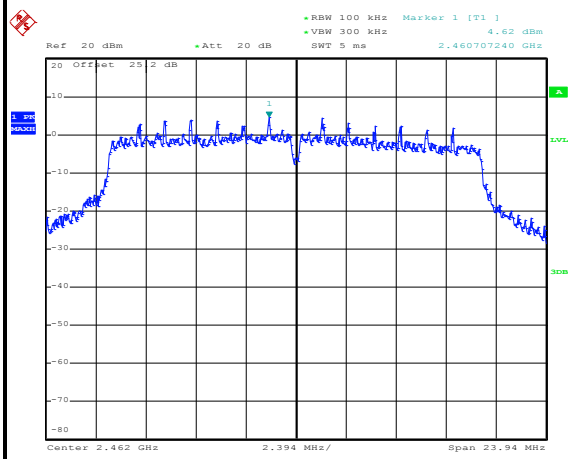
Test Mode :	802.11g	Test Channel :	06

100kHz PSD reference Level	
 Date: 2.JUN.2018 19:24:45	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
 Date: 2.JUN.2018 19:25:32	 Date: 2.JUN.2018 19:25:48

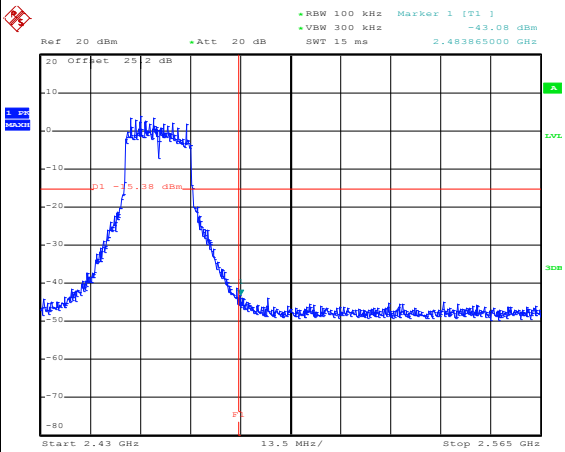
Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level



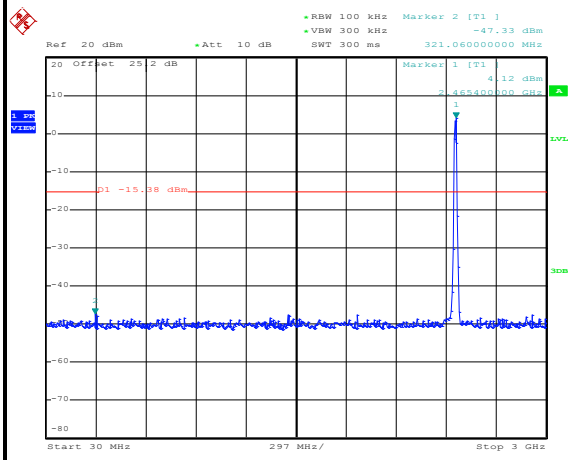
Date: 2.JUN.2018 19:29:27

Channel Plot



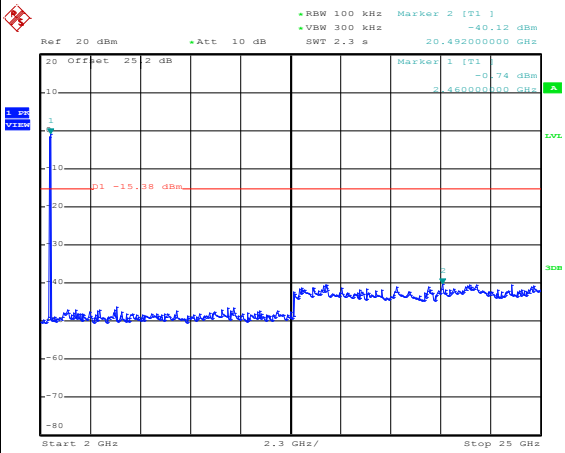
Date: 2.JUN.2018 19:29:44

Spurious Emission 30MHz~3GHz



Date: 2.JUN.2018 19:30:13

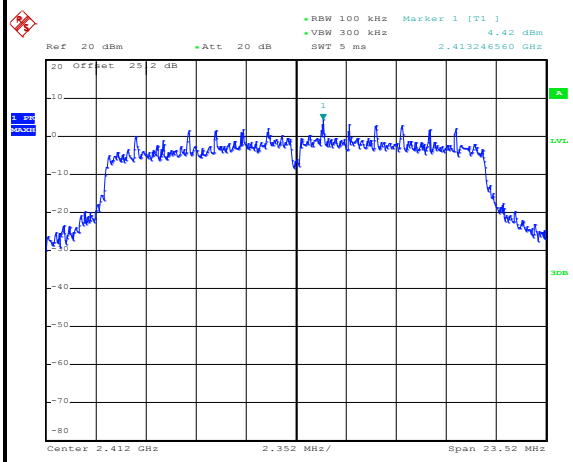
Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 19:30:35

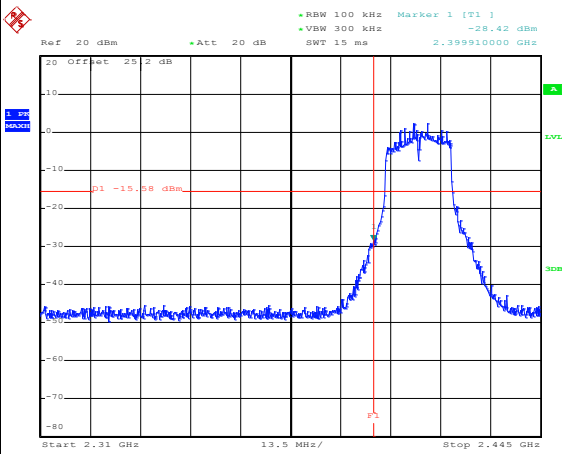
Test Mode :	802.11n HT20	Test Channel :	01

100kHz PSD reference Level



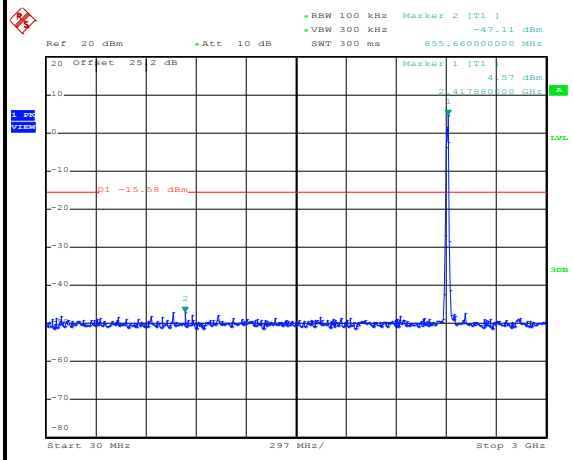
Date: 2.JUN.2018 19:52:13

Channel Plot



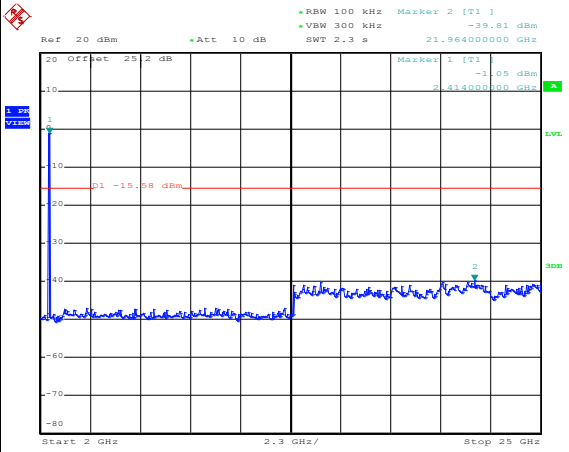
Date: 2.JUN.2018 19:52:28

Spurious Emission 30MHz~3GHz



Date: 2.JUN.2018 19:52:51

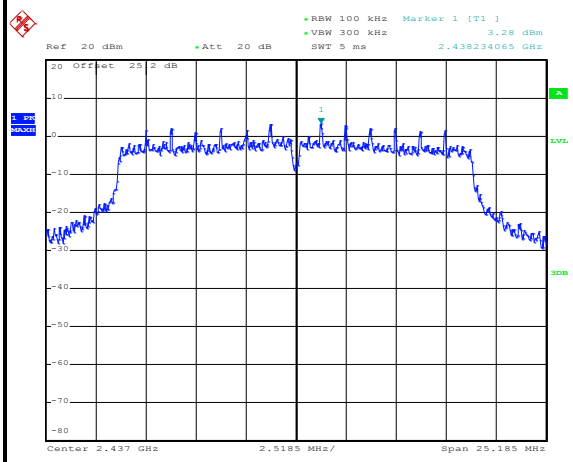
Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 19:53:04

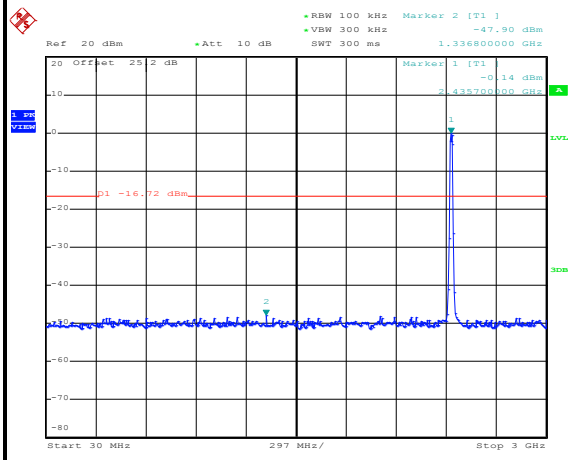
Test Mode :	802.11n HT20	Test Channel :	06

100kHz PSD reference Level



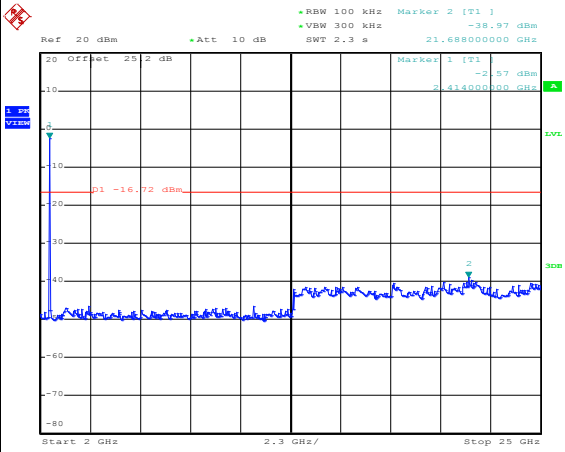
Date: 2.JUN.2018 20:00:15

Spurious Emission 30MHz~3GHz



Date: 2.JUN.2018 20:00:30

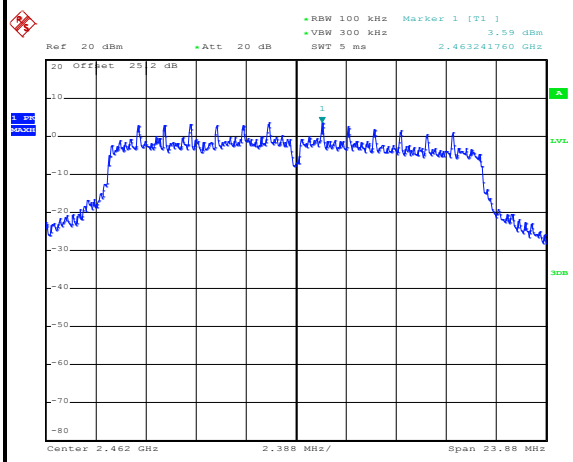
Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 20:00:43

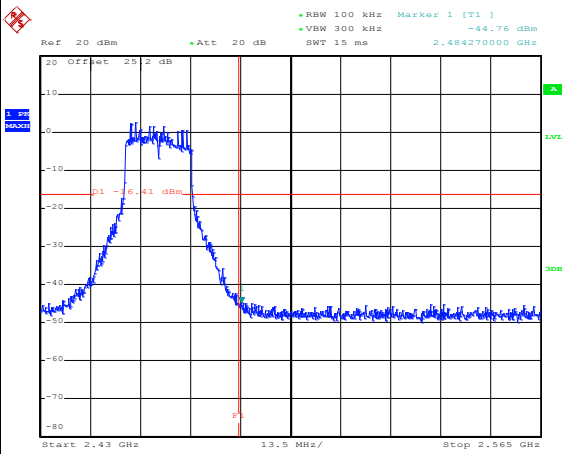
Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level



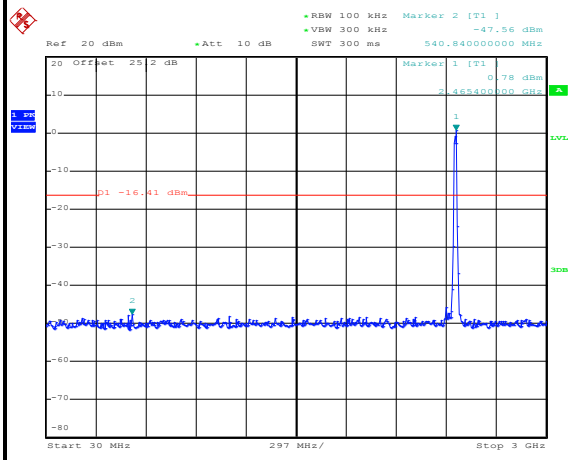
Date: 2.JUN.2018 20:07:02

Channel Plot



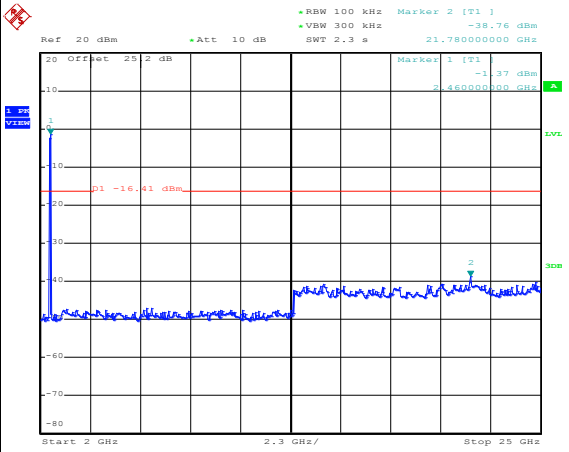
Date: 2.JUN.2018 20:07:17

Spurious Emission 30MHz~3GHz



Date: 2.JUN.2018 20:07:38

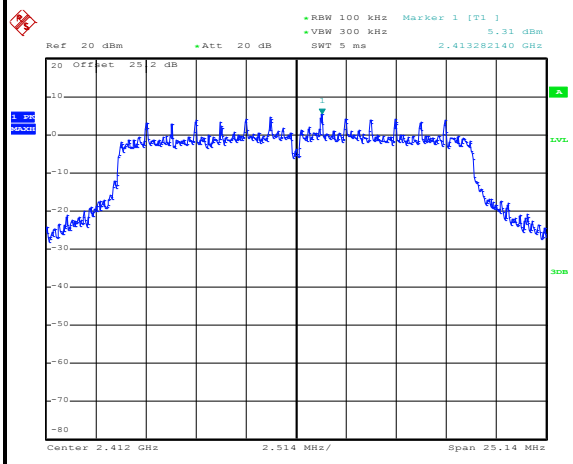
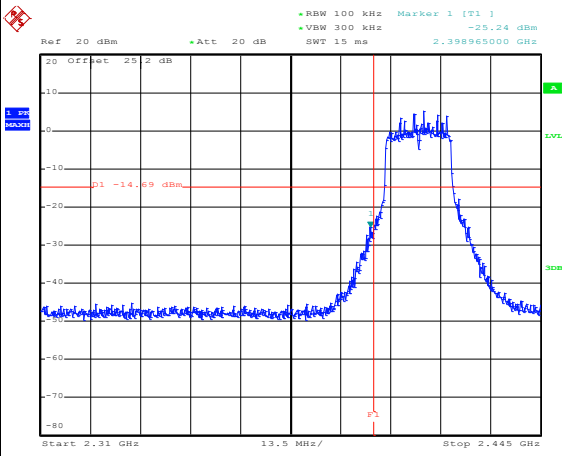
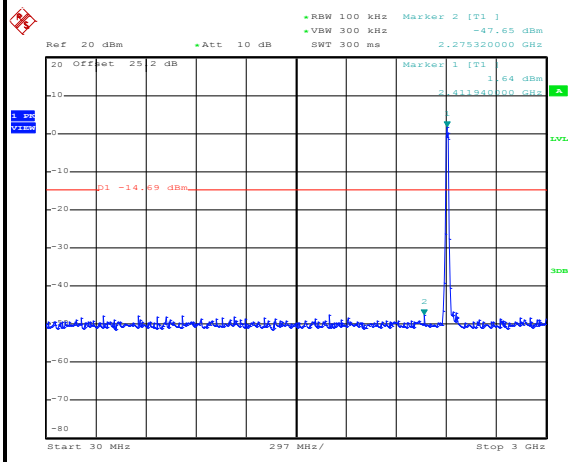
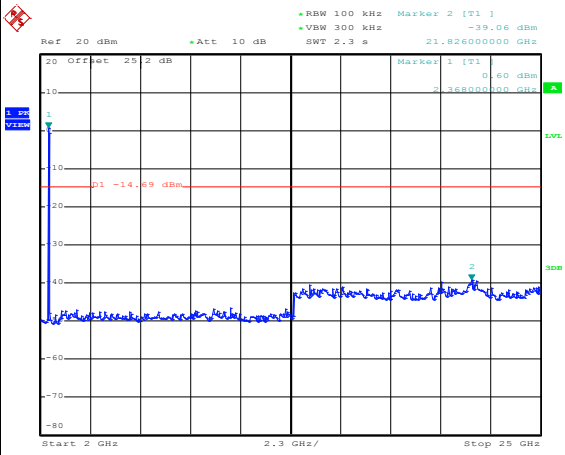
Spurious Emission 2GHz~25GHz



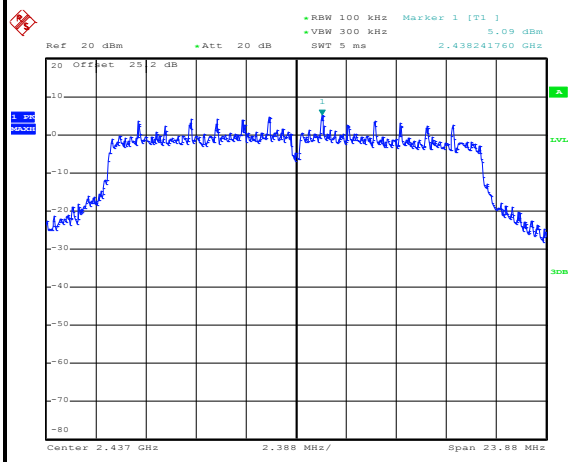
Date: 2.JUN.2018 20:08:00

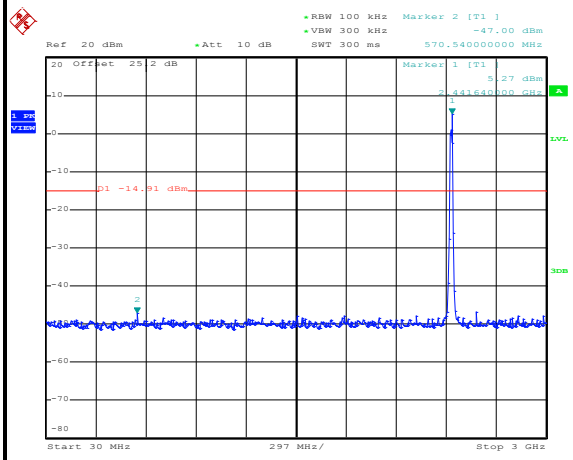
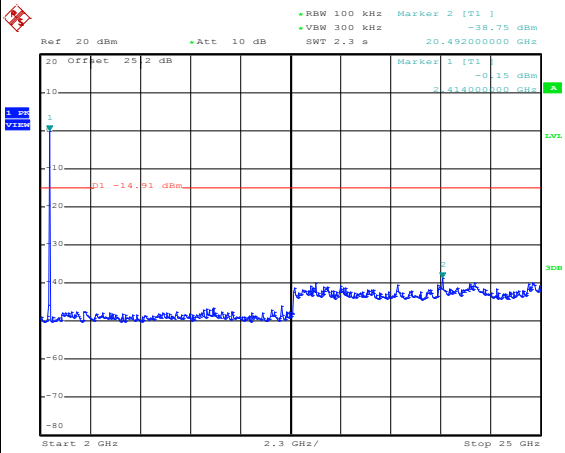
Number of TX = 2, Ant. 2 (Measured)

Test Mode :	802.11g	Test Channel :	01

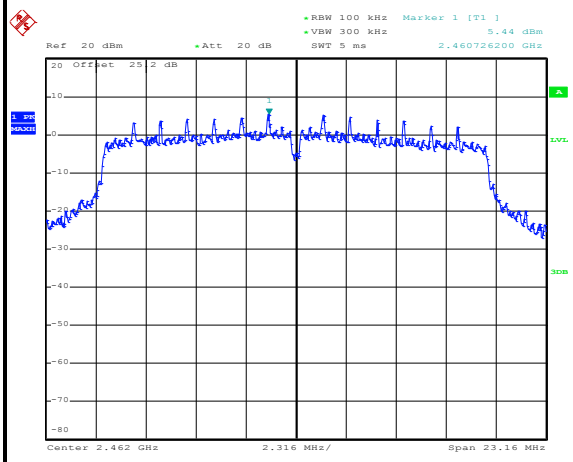
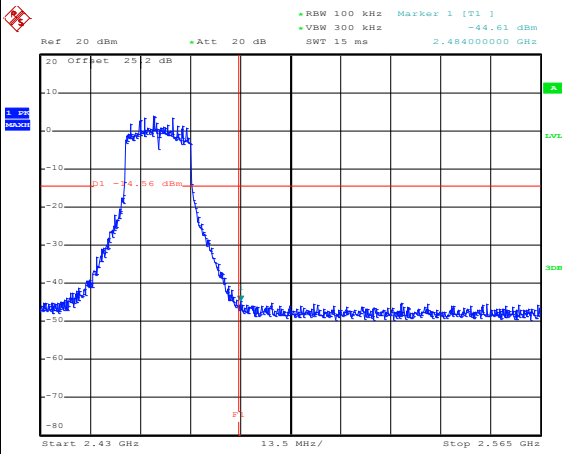
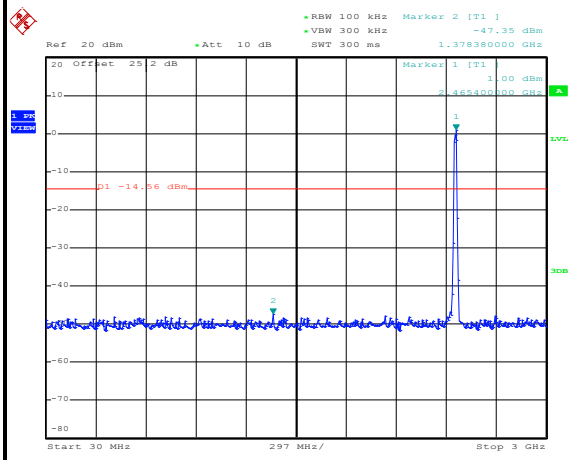
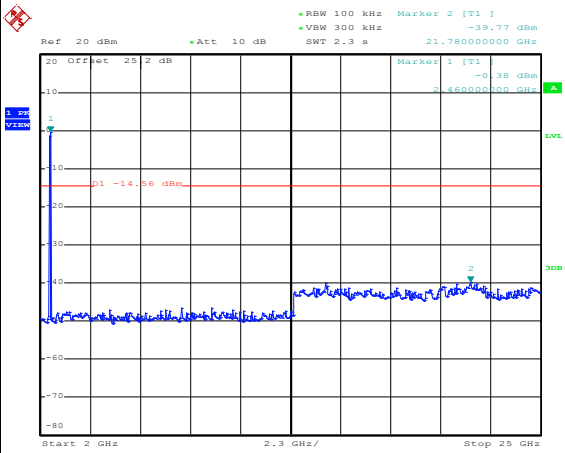
100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 19:13:46	Date: 2.JUN.2018 19:14:08
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JUN.2018 19:14:28	Date: 2.JUN.2018 19:14:44

Test Mode :	802.11g	Test Channel :	06

100kHz PSD reference Level	
 Date: 2.JUN.2018 19:20:06	

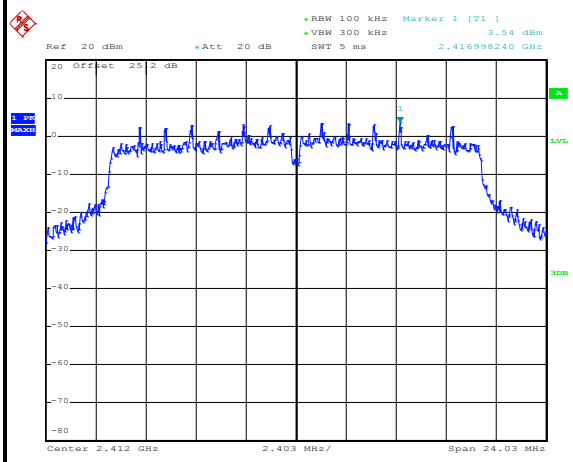
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
 Date: 2.JUN.2018 19:20:32	 Date: 2.JUN.2018 19:20:45

Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 19:35:45	Date: 2.JUN.2018 19:36:00
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JUN.2018 19:36:14	Date: 2.JUN.2018 19:36:27

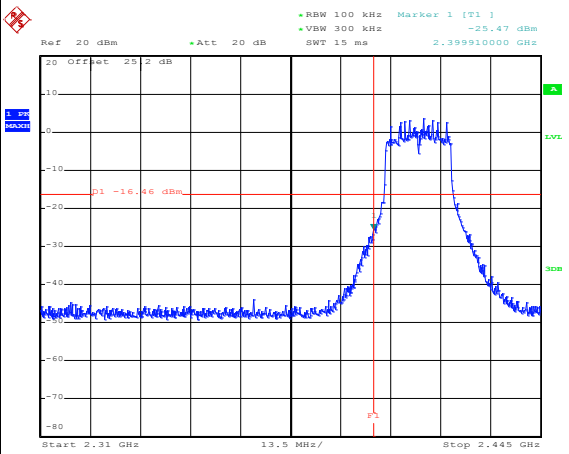
Test Mode :	802.11n HT20	Test Channel :	01

100kHz PSD reference Level



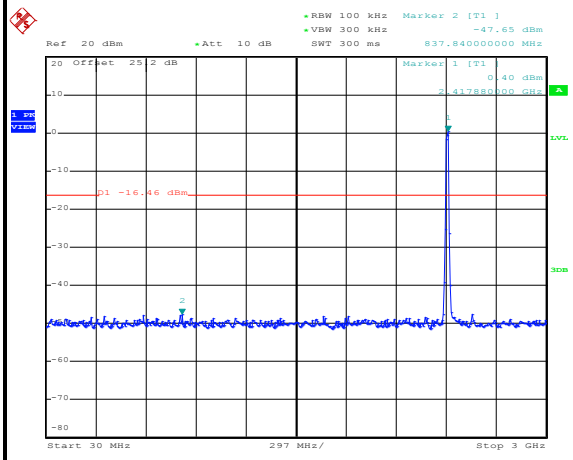
Date: 2.JUN.2018 21:02:47

Channel Plot



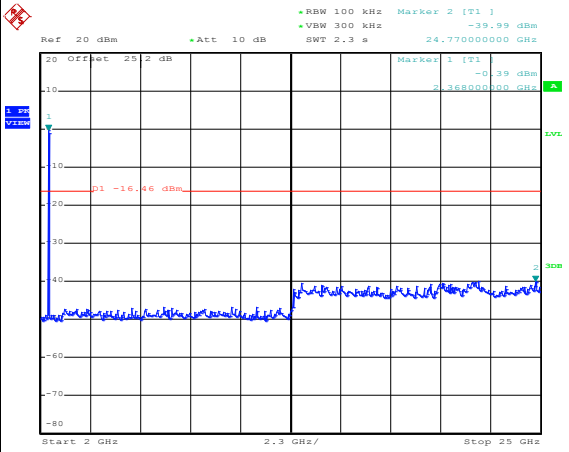
Date: 2.JUN.2018 21:03:03

Spurious Emission 30MHz~3GHz



Date: 2.JUN.2018 21:03:22

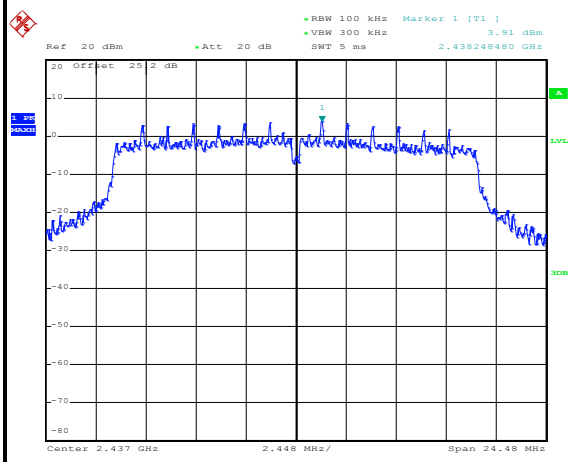
Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 21:03:35

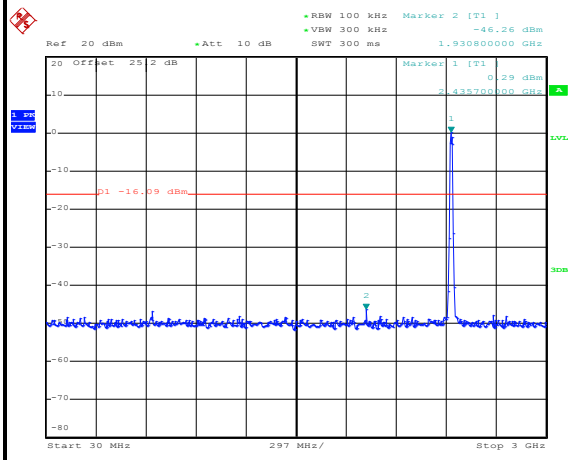
Test Mode :	802.11n HT20	Test Channel :	06

100kHz PSD reference Level



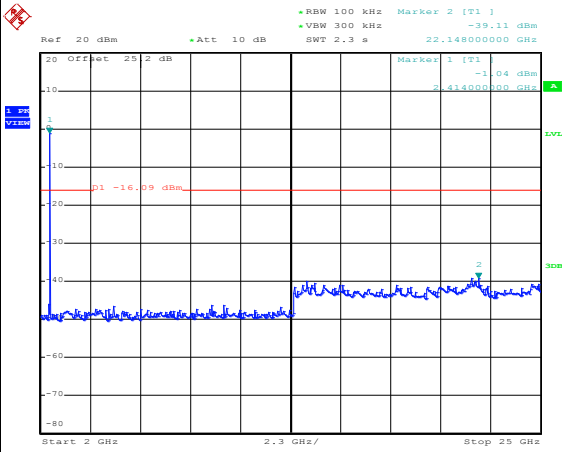
Date: 2.JUN.2018 20:02:52

Spurious Emission 30MHz~3GHz



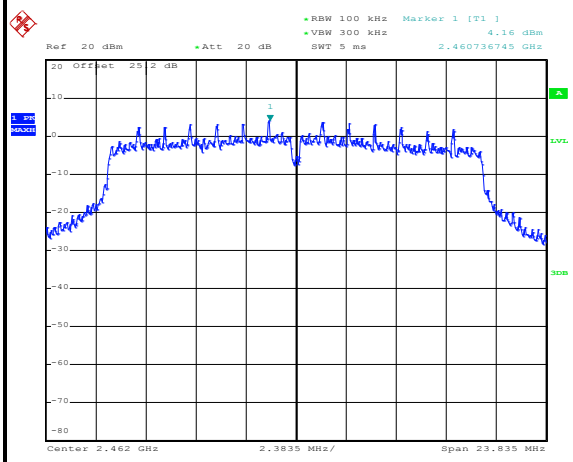
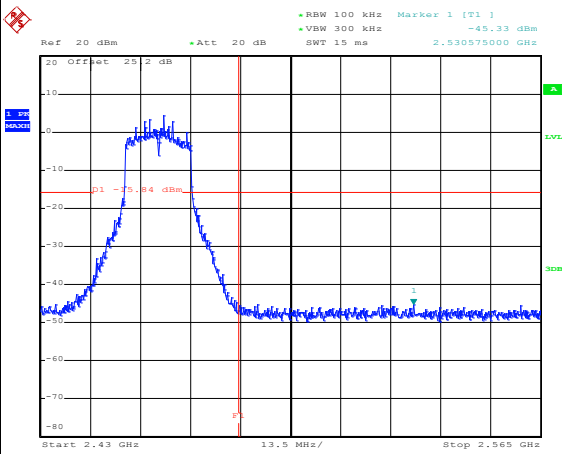
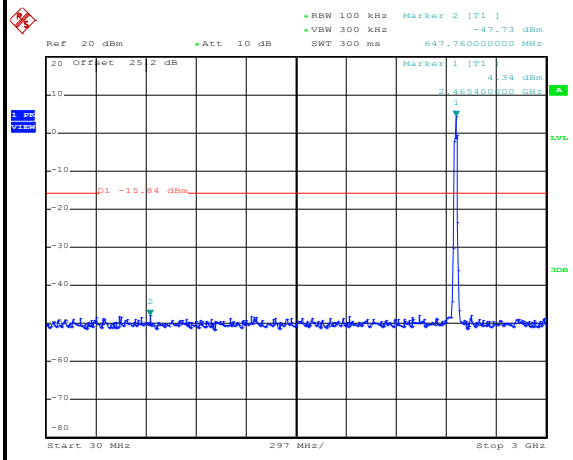
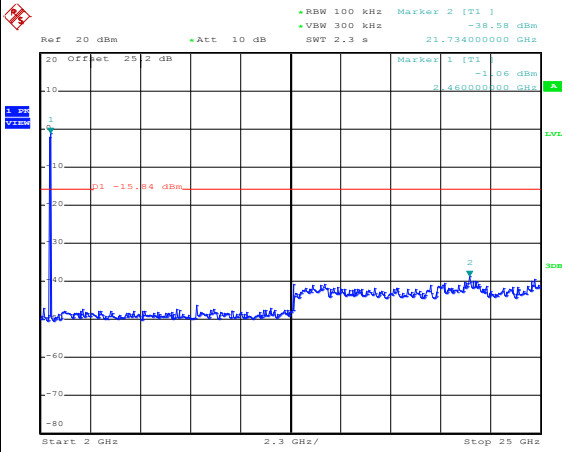
Date: 2.JUN.2018 20:03:13

Spurious Emission 2GHz~25GHz



Date: 2.JUN.2018 20:03:28

Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Date: 2.JUN.2018 20:10:28	Date: 2.JUN.2018 20:10:43
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JUN.2018 20:11:26	Date: 2.JUN.2018 20:11:46

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (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

3.5.2 Measuring Instruments

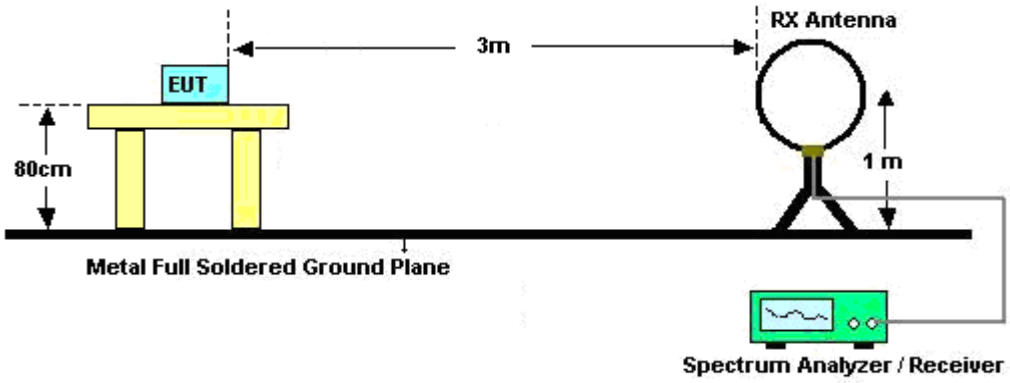
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

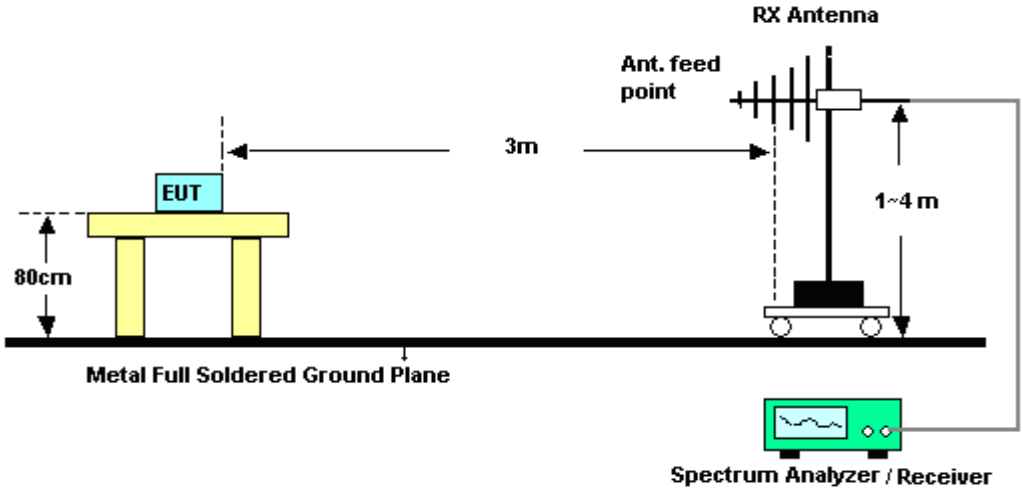
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. 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 average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

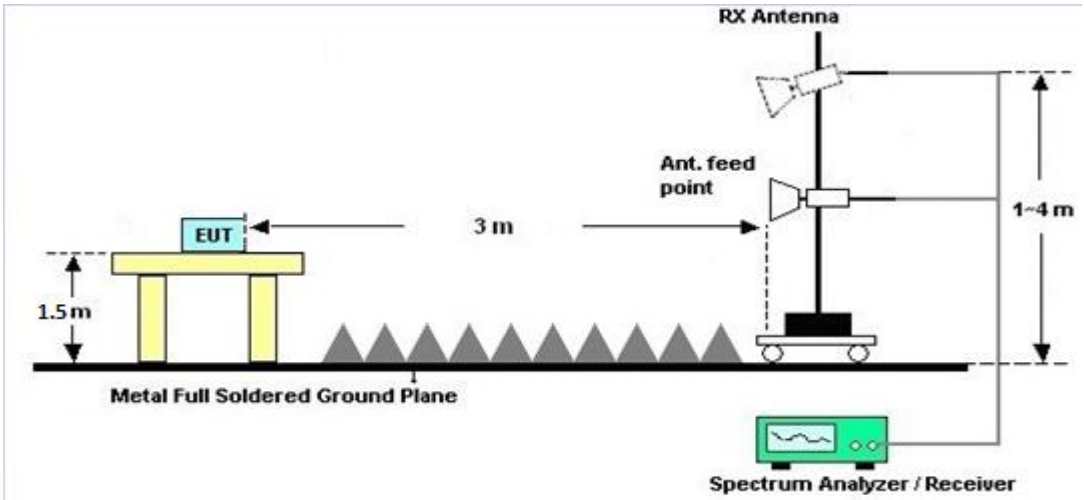
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

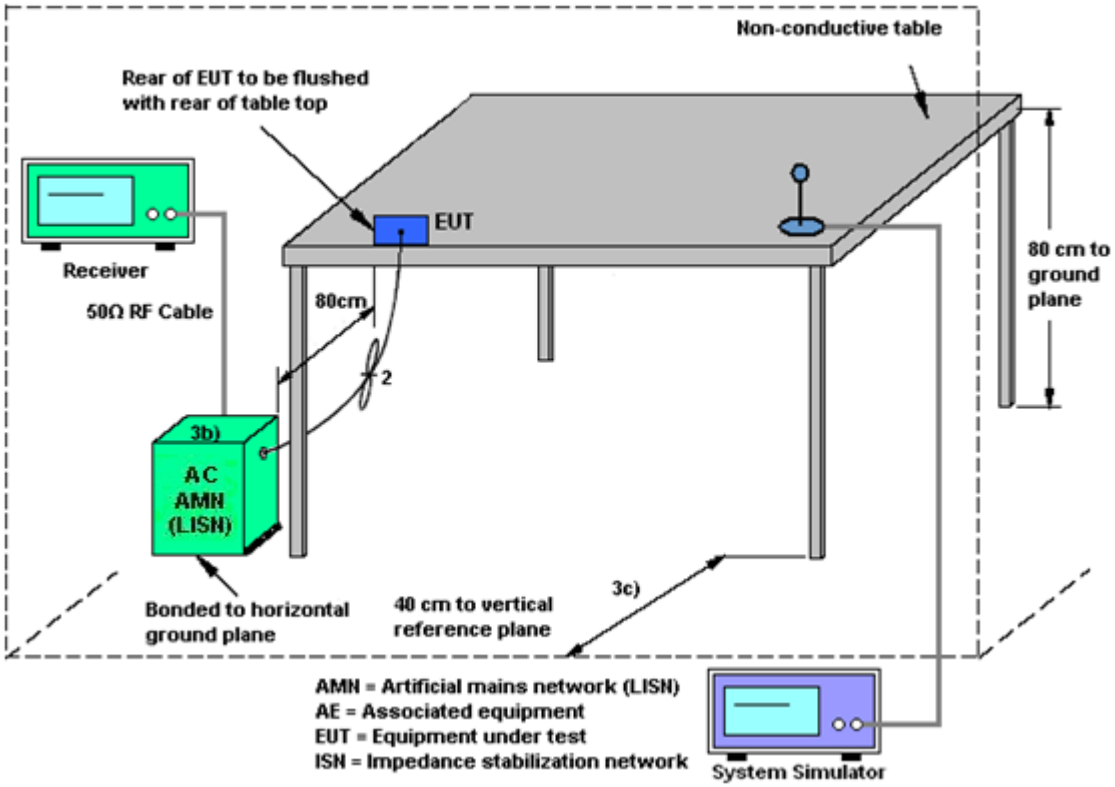
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	0.05	-4.45	0.05	1.10	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1240001	N/A	Sep. 07, 2017	May 23, 2018~ Jun. 02, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207349	300MHz~40GHz	Sep. 07, 2017	May 23, 2018~ Jun. 02, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 20, 2017	May 23, 2018~ Jun. 02, 2018	Jun. 19, 2018	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Jun. 01, 2018~ Jun. 05, 2018	Nov. 22, 2018	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N1D01N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Jun. 01, 2018~ Jun. 05, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jun. 15, 2017	Jun. 01, 2018~ Jun. 05, 2018	Jun. 14, 2018	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz- 40GHz	Nov. 10, 2017	Jun. 01, 2018~ Jun. 05, 2018	Nov. 09, 2018	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Jan. 19, 2018	Jun. 01, 2018~ Jun. 05, 2018	Jan. 18, 2019	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Feb. 02, 2018	Jun. 01, 2018~ Jun. 05, 2018	Feb. 01, 2019	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800054001	1GHz~18GHz	Apr. 16, 2018	Jun. 01, 2018~ Jun. 05, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 16, 2018	Jun. 01, 2018~ Jun. 05, 2018	Jan. 15, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 15, 2018	Jun. 01, 2018~ Jun. 05, 2018	Mar. 14, 2019	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	NCR	Jun. 01, 2018~ Jun. 05, 2018	NCR	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	NCR	Jun. 01, 2018~ Jun. 05, 2018	NCR	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	NCR	Jun. 01, 2018~ Jun. 05, 2018	NCR	Radiation (03CH13-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	NCR	Jun. 07, 2018	NCR	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	3.6GHz	Dec. 08, 2017	Jun. 07, 2018	Dec. 07, 2018	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 06, 2018	Jun. 07, 2018	Mar. 05, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Jun. 07, 2018	Nov. 29, 2018	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Jun. 07, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Jun. 07, 2018	Jan. 02, 2019	Conduction (CO05-HY)

NCR: No Calibration Required

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.4 dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.3 dB**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kai Liao/Shiang Wang/Luffy Lin	Temperature:	21~25	°C
Test Date:	2018/5/23 ~ 2018/06/02	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.90	14.00	8.04	8.08	0.50	Pass
11b	1Mbps	1	6	2437	14.15	13.90	8.08	8.04	0.50	Pass
11b	1Mbps	1	11	2462	14.10	13.80	7.56	8.04	0.50	Pass
11g	6Mbps	2	1	2412	18.50	18.80	15.04	16.76	0.50	Pass
11g	6Mbps	2	6	2437	18.75	18.70	15.96	15.92	0.50	Pass
11g	6Mbps	2	11	2462	18.70	18.50	15.96	15.44	0.50	Pass
HT20	MCS0	2	1	2412	18.45	18.80	15.68	16.02	0.50	Pass
HT20	MCS0	2	6	2437	18.75	18.75	16.79	16.32	0.50	Pass
HT20	MCS0	2	11	2462	18.75	18.60	15.92	15.89	0.50	Pass

Report Number : FR842002C

TEST RESULTS DATA
Peak Output Power

2.4GHz Band															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	17.36	17.88	-	30.00	30.00	0.05	-4.45	17.41	13.43	36.00	36.00	Pass
11b	1Mbps	1	6	2437	17.40	17.54	-	30.00	30.00	0.05	-4.45	17.45	13.09	36.00	36.00	Pass
11b	1Mbps	1	11	2462	17.44	17.81	-	30.00	30.00	0.05	-4.45	17.49	13.36	36.00	36.00	Pass
11g	6Mbps	1	1	2412	19.70	20.31	-	30.00	30.00	0.05	-4.45	19.75	15.86	36.00	36.00	Pass
11g	6Mbps	1	6	2437	19.47	20.12	-	30.00	30.00	0.05	-4.45	19.52	15.67	36.00	36.00	Pass
11g	6Mbps	1	11	2462	19.56	20.24	-	30.00	30.00	0.05	-4.45	19.61	15.79	36.00	36.00	Pass
HT20	MCS0	1	1	2412	18.62	19.28	-	30.00	30.00	0.05	-4.45	18.67	14.83	36.00	36.00	Pass
HT20	MCS0	1	6	2437	18.59	19.06	-	30.00	30.00	0.05	-4.45	18.64	14.61	36.00	36.00	Pass
HT20	MCS0	1	11	2462	18.63	19.20	-	30.00	30.00	0.05	-4.45	18.68	14.75	36.00	36.00	Pass
11g	6Mbps	2	1	2412	19.71	20.33	23.04	30.00		0.05		23.09		36.00		Pass
11g	6Mbps	2	6	2437	19.79	20.14	22.98	30.00		0.05		23.03		36.00		Pass
11g	6Mbps	2	11	2462	19.57	20.26	22.94	30.00		0.05		22.99		36.00		Pass
HT20	MCS0	2	1	2412	18.72	19.29	22.02	30.00		0.05		22.07		36.00		Pass
HT20	MCS0	2	6	2437	18.68	19.08	21.89	30.00		0.05		21.94		36.00		Pass
HT20	MCS0	2	11	2462	18.64	19.24	21.96	30.00		0.05		22.01		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.04	0.04	14.99	15.65	
11b	1Mbps	1	6	2437	0.04	0.04	15.08	15.55	
11b	1Mbps	1	11	2462	0.04	0.04	15.19	15.54	
11g	6Mbps	1	1	2412	0.08	0.08	14.88	15.63	
11g	6Mbps	1	6	2437	0.08	0.08	14.89	15.50	-
11g	6Mbps	1	11	2462	0.08	0.08	14.91	15.49	
HT20	MCS0	1	1	2412	0.09	0.13	13.74	14.51	
HT20	MCS0	1	6	2437	0.09	0.13	13.83	14.36	
HT20	MCS0	1	11	2462	0.09	0.13	13.82	14.33	
11g	6Mbps	2	1	2412	0.08	0.08	14.90	15.64	18.30
11g	6Mbps	2	6	2437	0.08	0.08	14.92	15.52	18.24
11g	6Mbps	2	11	2462	0.08	0.08	14.93	15.53	18.25
HT20	MCS0	2	1	2412	0.13	0.13	13.84	14.53	17.21
HT20	MCS0	2	6	2437	0.13	0.13	13.94	14.38	17.18
HT20	MCS0	2	11	2462	0.13	0.13	13.88	14.35	17.13

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Peak Power Spectral Density

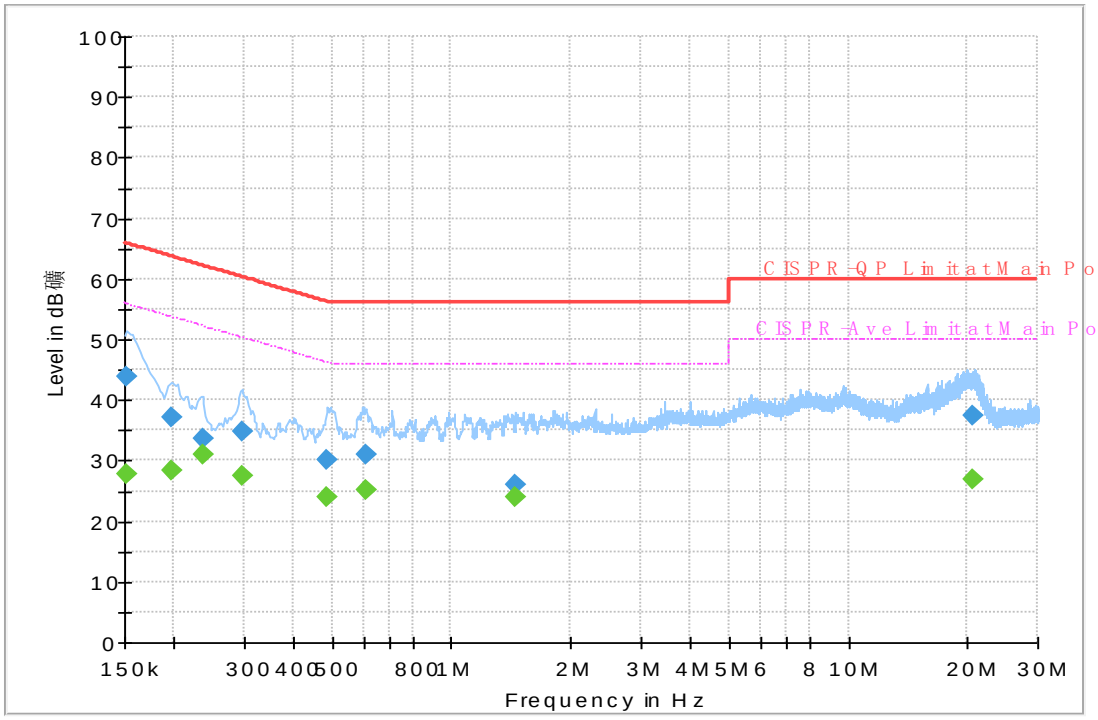
2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	5.87	4.84	-	0.05	-4.45	8.00	8.00	Pass
11b	1Mbps	1	6	2437	6.02	6.79	-	0.05	-4.45	8.00	8.00	Pass
11b	1Mbps	1	11	2462	6.22	6.81	-	0.05	-4.45	8.00	8.00	Pass
11g	6Mbps	2	1	2412	-11.28	-12.18	-8.27	1.10		8.00		Pass
11g	6Mbps	2	6	2437	-12.69	-12.23	-9.22	1.10		8.00		Pass
11g	6Mbps	2	11	2462	-12.08	-11.52	-8.51	1.10		8.00		Pass
HT20	MCS0	2	1	2412	-13.43	-12.39	-9.38	1.10		8.00		Pass
HT20	MCS0	2	6	2437	-13.39	-13.33	-10.32	1.10		8.00		Pass
HT20	MCS0	2	11	2462	-13.06	-12.92	-9.91	1.10		8.00		Pass

Measured power density (dBm) has offset with cable loss.

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Arthur Hsieh	Temperature :	21~25℃
		Relative Humidity :	51~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line

Full Spectrum

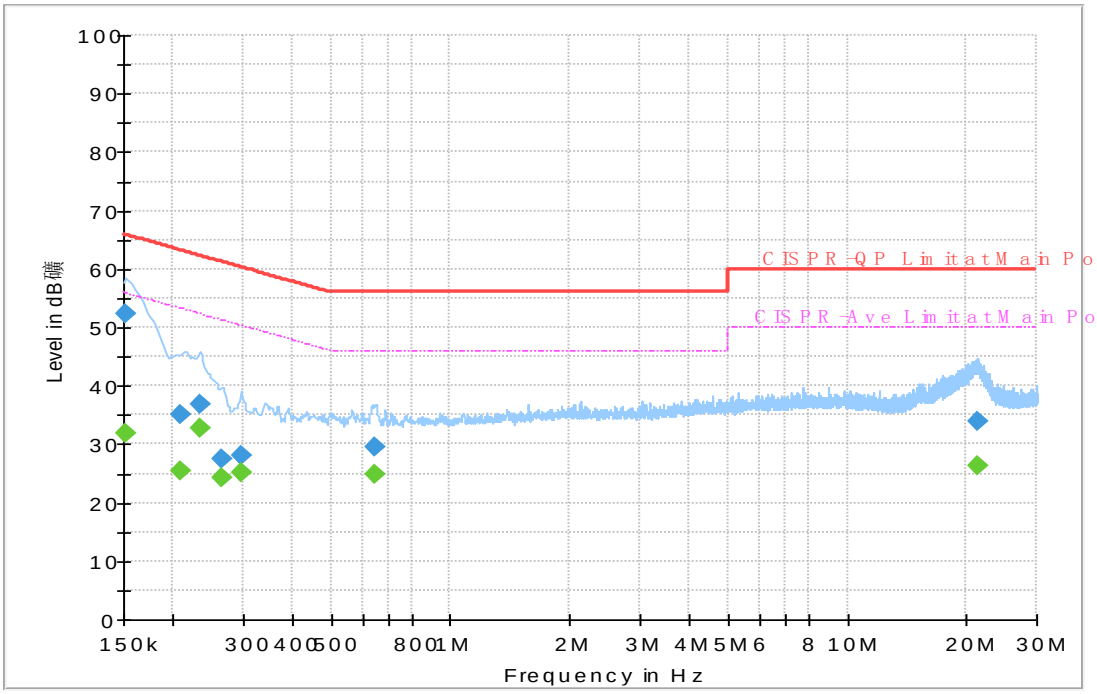


Final Result

Frequency (MHz)	Quasi-Peak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	27.74	55.88	28.14	L1	OFF	19.5
0.152250	43.83	---	65.88	22.05	L1	OFF	19.5
0.197250	---	28.34	53.73	25.39	L1	OFF	19.5
0.197250	37.23	---	63.73	26.50	L1	OFF	19.5
0.235500	---	30.92	52.25	21.33	L1	OFF	19.5
0.235500	33.64	---	62.25	28.61	L1	OFF	19.5
0.298500	---	27.52	50.28	22.76	L1	OFF	19.5
0.298500	34.92	---	60.28	25.36	L1	OFF	19.5
0.485250	---	23.87	46.25	22.38	L1	OFF	19.5
0.485250	30.25	---	56.25	26.00	L1	OFF	19.5
0.606750	---	25.08	46.00	20.92	L1	OFF	19.6
0.606750	30.96	---	56.00	25.04	L1	OFF	19.6
1.450500	---	23.91	46.00	22.09	L1	OFF	19.6
1.450500	26.05	---	56.00	29.95	L1	OFF	19.6
20.681250	---	26.92	50.00	23.08	L1	OFF	20.3
20.681250	37.34	---	60.00	22.66	L1	OFF	20.3

Test Engineer :	Arthur Hsieh	Temperature :	21~25℃
		Relative Humidity :	51~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral

Full Spectrum



Final Result

Frequency (MHz)	Quasi-Peak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	31.98	55.88	23.90	N	OFF	19.5
0.152250	52.40	---	65.88	13.48	N	OFF	19.5
0.208500	---	25.44	53.27	27.83	N	OFF	19.5
0.208500	35.21	---	63.27	28.06	N	OFF	19.5
0.233250	---	32.85	52.33	19.48	N	OFF	19.5
0.233250	36.89	---	62.33	25.44	N	OFF	19.5
0.264750	---	24.12	51.28	27.16	N	OFF	19.5
0.264750	27.63	---	61.28	33.65	N	OFF	19.5
0.296250	---	25.27	50.35	25.08	N	OFF	19.5
0.296250	28.11	---	60.35	32.24	N	OFF	19.5
0.642750	---	24.85	46.00	21.15	N	OFF	19.6
0.642750	29.50	---	56.00	26.50	N	OFF	19.6
21.295500	---	26.20	50.00	23.80	N	OFF	20.4
21.295500	33.98	---	60.00	26.02	N	OFF	20.4

Appendix C. Radiated Spurious Emission

Test Engineer :	Alex Jheng, Fu Chen, Wilson Wu	**Temperature :**	24.5~25°C
		Relative Humidity :	47~50%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2361.765	53.24	-20.76	74	40.89	26.79	15.47	29.91	102	55	P	H
		2390	42.16	-11.84	54	29.67	26.89	15.49	29.89	102	55	A	H
	*	2412	101.69	-	-	89.11	26.94	15.53	29.89	102	55	P	H
	*	2412	98.51	-	-	85.93	26.94	15.53	29.89	102	55	A	H
		2367.54	53.16	-20.84	74	40.8	26.79	15.47	29.9	305	78	P	V
		2390	42.02	-11.98	54	29.53	26.89	15.49	29.89	305	78	A	V
	*	2412	98.28	-	-	85.7	26.94	15.53	29.89	305	78	P	V
	*	2412	95.18	-	-	82.6	26.94	15.53	29.89	305	78	A	V
802.11b CH 06 2437MHz		2347.94	53.53	-20.47	74	41.26	26.73	15.45	29.91	102	55	P	H
		2388.82	42.1	-11.9	54	29.62	26.89	15.49	29.9	102	55	A	H
	*	2437	103.29	-	-	90.59	27.04	15.55	29.89	102	55	P	H
	*	2437	100.16	-	-	87.46	27.04	15.55	29.89	102	55	A	H
		2486.77	53.32	-20.68	74	40.44	27.15	15.61	29.88	102	55	P	H
		2484.04	42.48	-11.52	54	29.6	27.15	15.61	29.88	102	55	A	H
		2373	52.97	-21.03	74	40.56	26.84	15.47	29.9	303	93	P	V
		2387.28	42.01	-11.99	54	29.53	26.89	15.49	29.9	303	93	A	V
	*	2437	98.5	-	-	85.8	27.04	15.55	29.89	303	93	P	V
	*	2437	95.38	-	-	82.68	27.04	15.55	29.89	303	93	A	V
		2488.8	52.64	-21.36	74	39.71	27.2	15.61	29.88	303	93	P	V
		2492.44	42.4	-11.6	54	29.46	27.2	15.61	29.87	303	93	A	V

802.11b CH 11 2462MHz	*	2462	103.52	-	-	90.73	27.1	15.57	29.88	118	58	P	H
	*	2462	100.37	-	-	87.58	27.1	15.57	29.88	118	58	A	H
		2492.32	53.65	-20.35	74	40.71	27.2	15.61	29.87	118	58	P	H
		2487.84	43.13	-10.87	54	30.2	27.2	15.61	29.88	118	58	A	H
	*	2462	98.9	-	-	86.11	27.1	15.57	29.88	295	91	P	V
	*	2462	95.75	-	-	82.96	27.1	15.57	29.88	295	91	A	V
		2498.72	53.27	-20.73	74	40.33	27.2	15.61	29.87	295	91	P	V
		2487.36	42.57	-11.43	54	29.69	27.15	15.61	29.88	295	91	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	37.54	-36.46	74	56.28	31.56	8.27	58.57	100	0	P	H
		4824	36.92	-37.08	74	55.66	31.56	8.27	58.57	100	0	P	V
802.11b CH 06 2437MHz		4874	37.61	-36.39	74	56.04	31.63	8.49	58.55	100	0	P	H
		7311	43.34	-30.66	74	55.33	36.16	10.68	58.83	100	0	P	H
		4874	37.06	-36.94	74	55.49	31.63	8.49	58.55	100	0	P	V
		7311	42.29	-31.71	74	54.28	36.16	10.68	58.83	100	0	P	V
802.11b CH 11 2462MHz		4924	37.96	-36.04	74	56.15	31.7	8.64	58.53	100	0	P	H
		7386	43.55	-30.45	74	55.31	36.31	10.67	58.74	100	0	P	H
		4924	38.69	-35.31	74	56.88	31.7	8.64	58.53	100	0	P	V
		7386	42.88	-31.12	74	54.64	36.31	10.67	58.74	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.485	52.54	-21.46	74	40.06	26.89	15.49	29.9	400	308	P	H
		2389.695	41.98	-12.02	54	29.5	26.89	15.49	29.9	400	308	A	H
	*	2412	93.89	-	-	81.31	26.94	15.53	29.89	400	308	P	H
	*	2412	91.08	-	-	78.5	26.94	15.53	29.89	400	308	A	H
		2375.52	53.52	-20.48	74	41.09	26.84	15.49	29.9	317	16	P	V
		2389.59	42	-12	54	29.52	26.89	15.49	29.9	317	16	A	V
	*	2412	95.64	-	-	83.06	26.94	15.53	29.89	317	16	P	V
	*	2412	92.52	-	-	79.94	26.94	15.53	29.89	317	16	A	V
802.11b CH 06 2437MHz		2325.26	52.46	-21.54	74	40.26	26.68	15.43	29.91	393	303	P	H
		2389.38	41.94	-12.06	54	29.46	26.89	15.49	29.9	393	303	A	H
	*	2437	94.06	-	-	81.36	27.04	15.55	29.89	393	303	P	H
	*	2437	90.81	-	-	78.11	27.04	15.55	29.89	393	303	A	H
		2498.95	52.94	-21.06	74	40	27.2	15.61	29.87	393	303	P	H
		2499.37	42.37	-11.63	54	29.43	27.2	15.61	29.87	393	303	A	H
		2381.4	53.39	-20.61	74	40.96	26.84	15.49	29.9	310	25	P	V
		2388.82	42	-12	54	29.52	26.89	15.49	29.9	310	25	A	V
	*	2437	95.92	-	-	83.22	27.04	15.55	29.89	310	25	P	V
	*	2437	92.84	-	-	80.14	27.04	15.55	29.89	310	25	A	V
		2496.15	53.12	-20.88	74	40.18	27.2	15.61	29.87	310	25	P	V
		2483.5	42.38	-11.62	54	29.5	27.15	15.61	29.88	310	25	A	V

802.11b CH 11 2462MHz	*	2462	91.73	-	-	78.94	27.1	15.57	29.88	385	320	P	H
	*	2462	88.65	-	-	75.86	27.1	15.57	29.88	385	320	A	H
		2497.8	53.18	-20.82	74	40.24	27.2	15.61	29.87	385	320	P	H
		2488.84	42.37	-11.63	54	29.44	27.2	15.61	29.88	385	320	A	H
	*	2462	94.97	-	-	82.18	27.1	15.57	29.88	302	29	P	V
	*	2462	91.83	-	-	79.04	27.1	15.57	29.88	302	29	A	V
		2497.68	53.28	-20.72	74	40.34	27.2	15.61	29.87	302	29	P	V
		2487.32	42.54	-11.46	54	29.66	27.15	15.61	29.88	302	29	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	38.47	-35.53	74	57.21	31.56	8.27	58.57	100	0	P	H
		4824	37.95	-36.05	74	56.69	31.56	8.27	58.57	100	0	P	V
802.11b CH 06 2437MHz		4874	37.74	-36.26	74	56.17	31.63	8.49	58.55	100	0	P	H
		7311	44.08	-29.92	74	56.07	36.16	10.68	58.83	100	0	P	H
		4874	37.58	-36.42	74	56.01	31.63	8.49	58.55	100	0	P	V
		7311	43.43	-30.57	74	55.42	36.16	10.68	58.83	100	0	P	V
802.11b CH 11 2462MHz		4924	38.49	-35.51	74	56.68	31.7	8.64	58.53	100	0	P	H
		7386	43.11	-30.89	74	54.87	36.31	10.67	58.74	100	0	P	H
		4924	37.43	-36.57	74	55.62	31.7	8.64	58.53	100	0	P	V
		7386	43.76	-30.24	74	55.52	36.31	10.67	58.74	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		2389.695	54.24	-19.76	74	41.76	26.89	15.49	29.9	150	64	P	H
		2390	44.11	-9.89	54	31.62	26.89	15.49	29.89	150	64	A	H
	*	2412	106.09	-	-	93.51	26.94	15.53	29.89	150	64	P	H
	*	2412	97.93	-	-	85.35	26.94	15.53	29.89	150	64	A	H
		2390	54.06	-19.94	74	41.57	26.89	15.49	29.89	382	91	P	V
		2390	43.39	-10.61	54	30.9	26.89	15.49	29.89	382	91	A	V
	*	2412	103.76	-	-	91.18	26.94	15.53	29.89	382	91	P	V
	*	2412	95.94	-	-	83.36	26.94	15.53	29.89	382	91	A	V
802.11g CH 06 2437MHz		2384.2	54.07	-19.93	74	41.64	26.84	15.49	29.9	121	64	P	H
		2389.94	42.71	-11.29	54	30.22	26.89	15.49	29.89	121	64	A	H
	*	2437	105.97	-	-	93.27	27.04	15.55	29.89	121	64	P	H
	*	2437	98.04	-	-	85.34	27.04	15.55	29.89	121	64	A	H
		2487.96	55.16	-18.84	74	42.23	27.2	15.61	29.88	121	64	P	H
		2483.5	42.92	-11.08	54	30.04	27.15	15.61	29.88	121	64	A	H
		2380.14	53.74	-20.26	74	41.31	26.84	15.49	29.9	375	89	P	V
		2389.94	42.37	-11.63	54	29.88	26.89	15.49	29.89	375	89	A	V
	*	2437	105.17	-	-	92.47	27.04	15.55	29.89	375	89	P	V
	*	2437	97.32	-	-	84.62	27.04	15.55	29.89	375	89	A	V
		2491.88	53.63	-20.37	74	40.69	27.2	15.61	29.87	375	89	P	V
		2485.23	42.74	-11.26	54	29.86	27.15	15.61	29.88	375	89	A	V

802.11g CH 11 2462MHz	*	2462	106.14	-	-	93.35	27.1	15.57	29.88	112	63	P	H
	*	2462	98.45	-	-	85.66	27.1	15.57	29.88	112	63	A	H
		2484.28	59.11	-14.89	74	46.23	27.15	15.61	29.88	112	63	P	H
		2483.72	45.81	-8.19	54	32.93	27.15	15.61	29.88	112	63	A	H
	*	2462	103.86	-	-	91.07	27.1	15.57	29.88	370	90	P	V
	*	2462	96.22	-	-	83.43	27.1	15.57	29.88	370	90	A	V
		2483.6	56.83	-17.17	74	43.95	27.15	15.61	29.88	370	90	P	V
		2483.52	44.93	-9.07	54	32.05	27.15	15.61	29.88	370	90	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	37.56	-36.44	74	56.3	31.56	8.27	58.57	100	0	P	H
		4824	36.94	-37.06	74	55.68	31.56	8.27	58.57	100	0	P	V
802.11g CH 06 2437MHz		4874	36.87	-37.13	74	55.3	31.63	8.49	58.55	100	0	P	H
		7311	42.81	-31.19	74	54.8	36.16	10.68	58.83	100	0	P	H
		4874	37.38	-36.62	74	55.81	31.63	8.49	58.55	100	0	P	V
		7311	42.23	-31.77	74	54.22	36.16	10.68	58.83	100	0	P	V
802.11g CH 11 2462MHz		4924	37.46	-36.54	74	55.65	31.7	8.64	58.53	100	0	P	H
		7386	43.16	-30.84	74	54.92	36.31	10.67	58.74	100	0	P	H
		4924	37.38	-36.62	74	55.57	31.7	8.64	58.53	100	0	P	V
		7386	42.86	-31.14	74	54.62	36.31	10.67	58.74	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g LF		30.54	22.68	-17.32	40	30.27	23.96	0.79	32.34	-	-	P	H
		76.71	19.06	-20.94	40	36.79	13.29	1.28	32.3	-	-	P	H
		130.44	21.89	-21.61	43.5	35.15	17.56	1.46	32.28	-	-	P	H
		745.2	29.89	-16.11	46	30.82	27.93	3.23	32.09	-	-	P	H
		846.7	31.75	-14.25	46	31.01	29.01	3.49	31.76	-	-	P	H
		957.3	33.99	-12.01	46	30.26	31.01	3.71	30.99	100	0	P	H
		39.45	27.37	-12.63	40	39.02	19.71	0.97	32.33	100	0	P	V
		59.16	26.44	-13.56	40	45.54	12.15	1.06	32.31	-	-	P	V
		78.06	22.24	-17.76	40	39.75	13.51	1.28	32.3	-	-	P	V
		694.8	28.85	-17.15	46	31.4	26.48	3.14	32.17	-	-	P	V
		796.3	30.4	-15.6	46	30.88	28.11	3.41	32	-	-	P	V
		897.1	33.22	-12.78	46	32.17	29.02	3.55	31.52	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

2.4GHz 2400~2483.5MHz

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

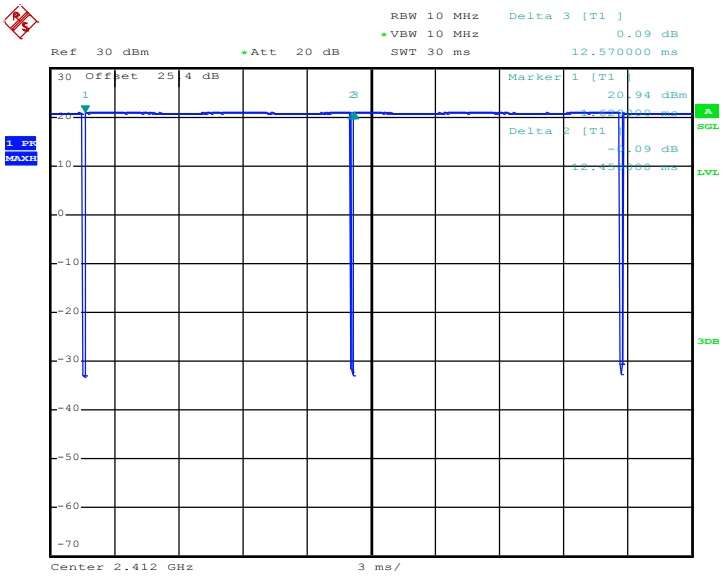
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

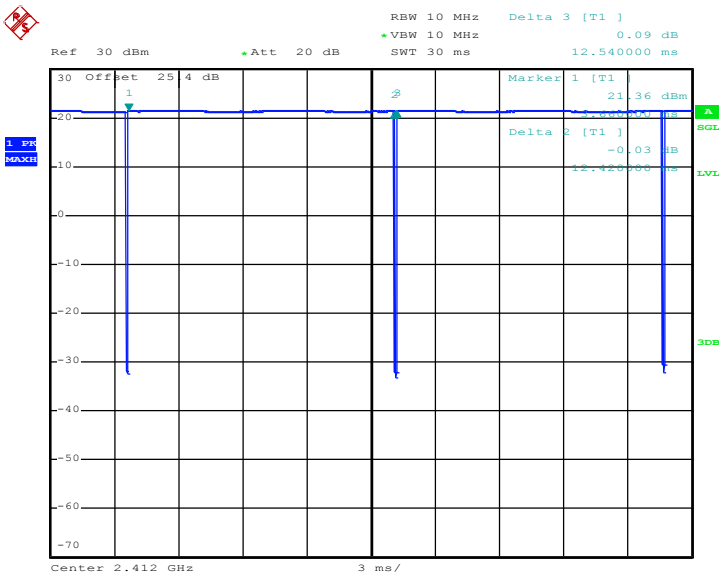
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b Ant1	99.05	-	-	10Hz
802.11b Ant2	99.04	-	-	10Hz
802.11g ANT1+2	98.10	-	-	10Hz

802.11b Ant 1



802.11b Ant 2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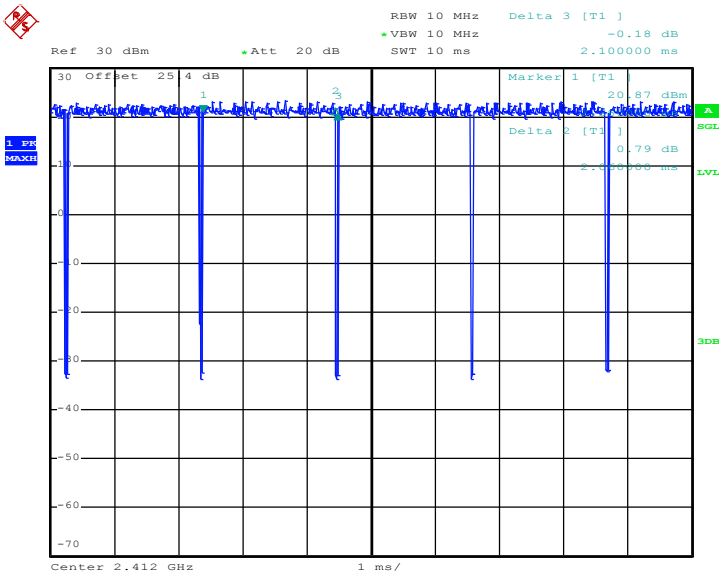
VBW 10 MHz
SWT 30 ms
Delta 3 [T1]
0.09 dB
12.540000 ms
Ref 30 dBm
Att 20 dB
Offset 25.4 dB
Marker 1 [T1]
21.36 dBm
Delta 2 [T1]
-0.03 dB
12.420700 ms
1 PK MAXH
A
SGL
LVL
3DB
Center 2.412 GHz
3 ms/

802.11g


RBW 10 MHz
VBW 10 MHz
SWT 10 ms
Delta 3 [T1]
-0.18 dB
2.100000 ms
Ref 30 dBm
Att 20 dB
30 Offset 25.4 dB
Marker 1 [T1]
20.87 dBm
Delta 2 [T1]
0.79 dB
2.100000 ms
Center 2.412 GHz
1 ms/