



FCC RF Test Report

APPLICANT : Pod Trackers Pty Ltd
EQUIPMENT : Pod 3 GPS Tracker
BRAND NAME : Pod Trackers
MODEL NAME : POD-003
MARKETING NAME : Pod 3 GPS Tracker
FCC ID : 2AD83POD-3-1
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Aug. 20, 2018 and testing was completed on Oct. 28, 2018. We, Sporton International (Shenzhen) 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 (Shenzhen) Inc., the test report shall not be reproduced except in full.

Eric Shih



Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.

**1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City
Guangdong Province 518055 China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR882005B	Rev. 01	Initial issue of report	Nov. 20, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	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 7.16 dB at 640.130 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Required	-
3.6	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-
Note: Not required means after assessing, test items are not necessary to carry out.					

1 General Description

1.1 Applicant

Pod Trackers Pty Ltd

Lvl 9,61 Lavender St Milsons Point NSW 2061 Australia

1.2 Manufacturer

Kaifa Technology Co., Ltd.

7006 Caitian Rd., Futian Distric, Shenzhen, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Pod 3 GPS Tracker
Brand Name	Pod Trackers
Model Name	POD-003
Marketing Name	Pod 3 GPS Tracker
FCC ID	2AD83POD-3-1
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/GNSS WLAN 11b/g/n HT20 Bluetooth LE
HW Version	V3.1.0.0
SW Version	V3.3.83
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 14.15 dBm (0.0260 W) 802.11g : 18.83 dBm (0.0764 W) 802.11n HT20 : 19.35 dBm (0.0861 W)
99% Occupied Bandwidth	802.11b : 11.39MHz 802.11g : 21.48MHz 802.11n HT20 : 21.18MHz
Antenna Type / Gain	LA.02 Antenna type with gain -0.23 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)



1.5 Modification of EUT

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

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-SZ	CN5018	337463

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH04-SZ	CN5019	577730

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 558074 D01 Meas. Guidance v05
- ♦ 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

- a. 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: radiation 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 (Y plane) were recorded in this report.

2.1 Carrier Frequency and Channel

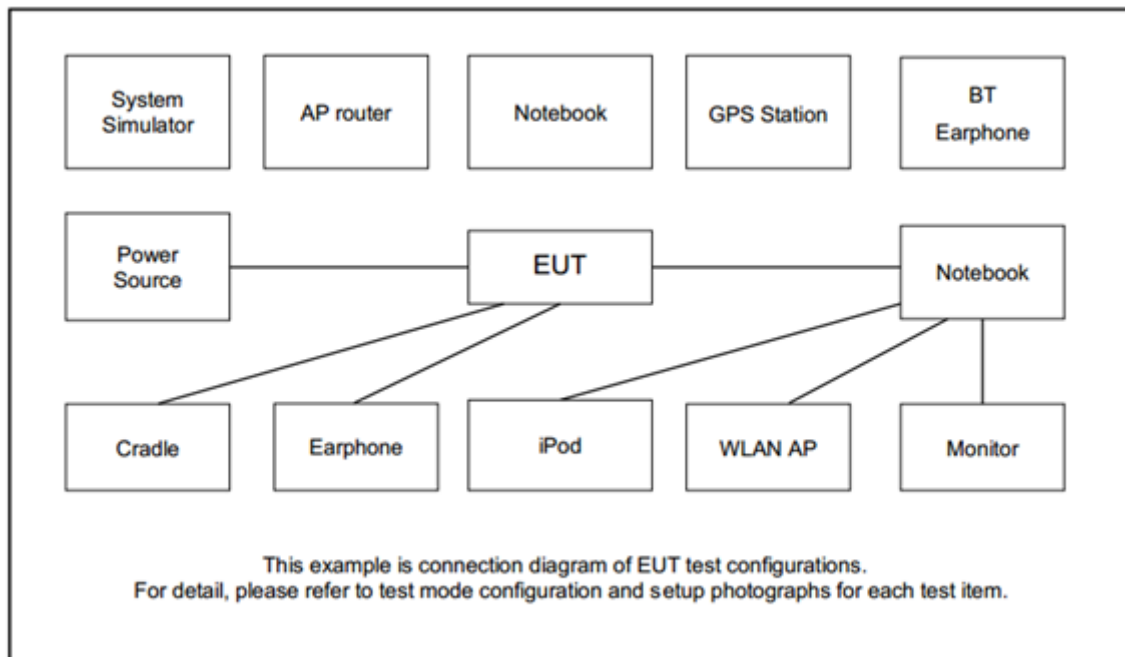
Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

The RF test items, an engineering test program was installed in PC which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.5 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 4.2 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

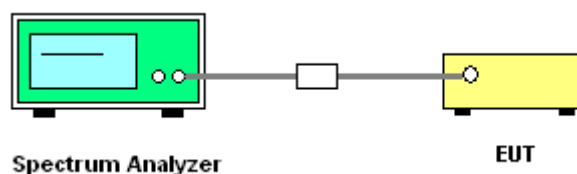
3.1.2 Measuring Instruments

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 v05.
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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

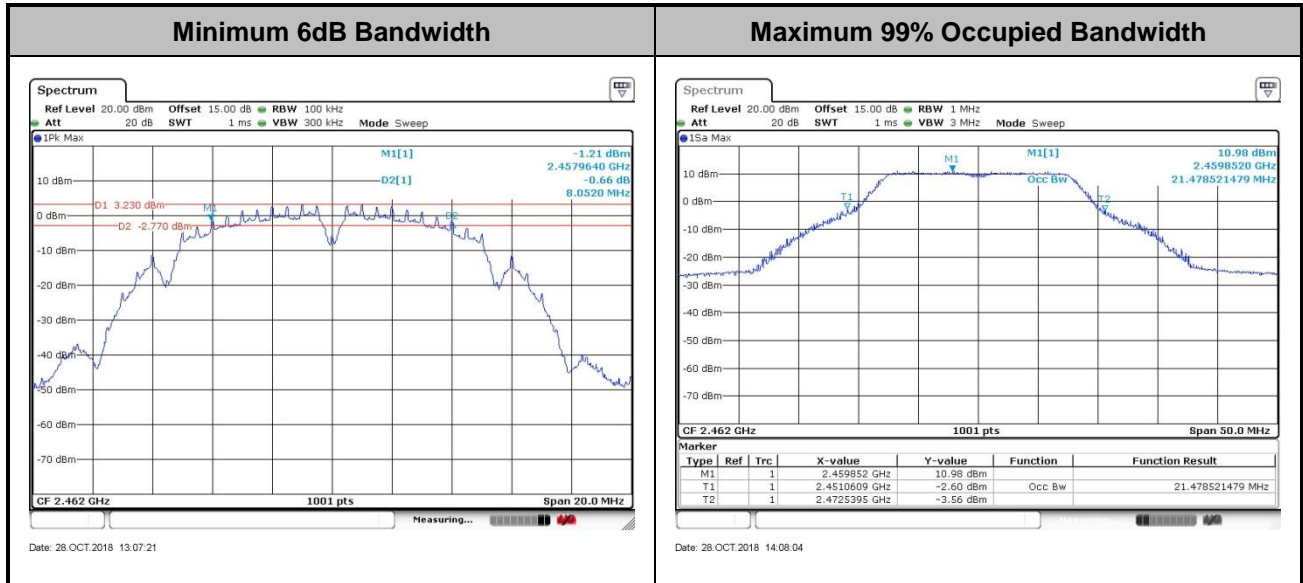
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of 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.

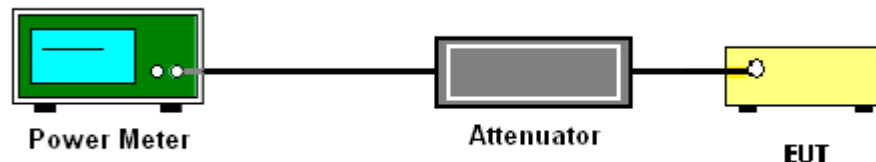
3.2.2 Measuring Instruments

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 v05 section 9.1.3 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.

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.

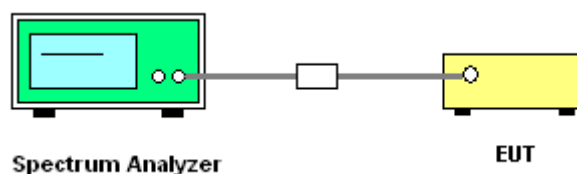
3.3.2 Measuring Instruments

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 v05
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.

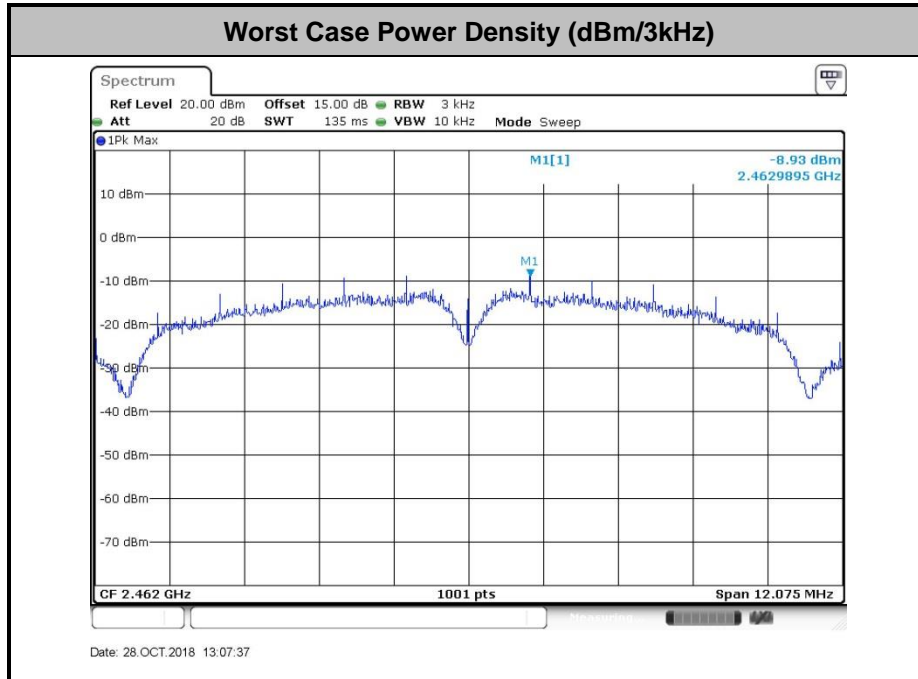
3.3.4 Test Setup





3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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.

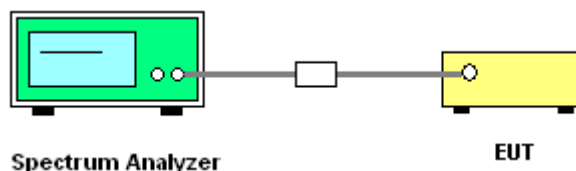
3.4.2 Measuring Instruments

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 v05.
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 per 15.247(d).
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



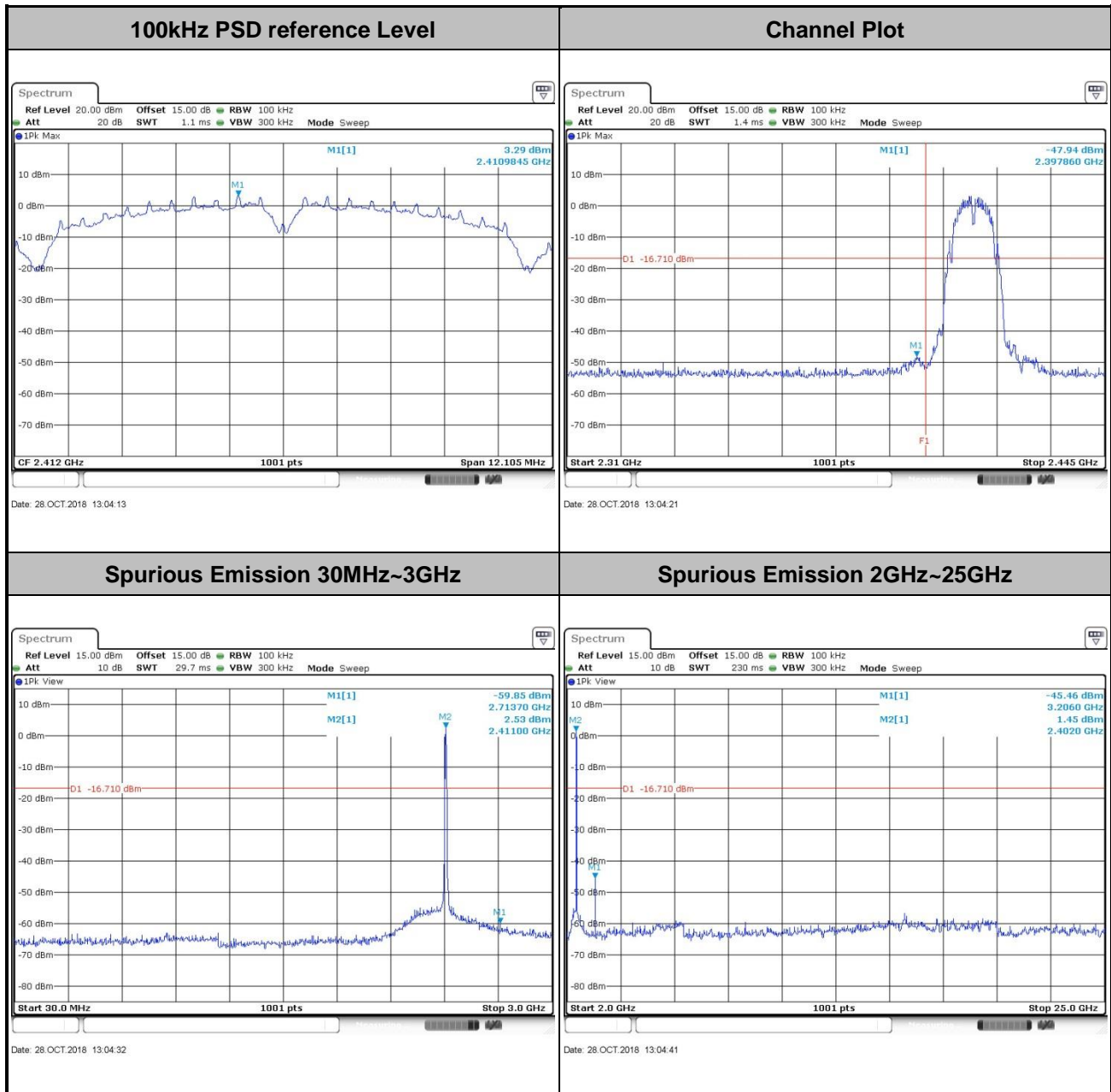


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Wilson Chen	Temperature :	24~26°C
		Relative Humidity :	50~53%

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

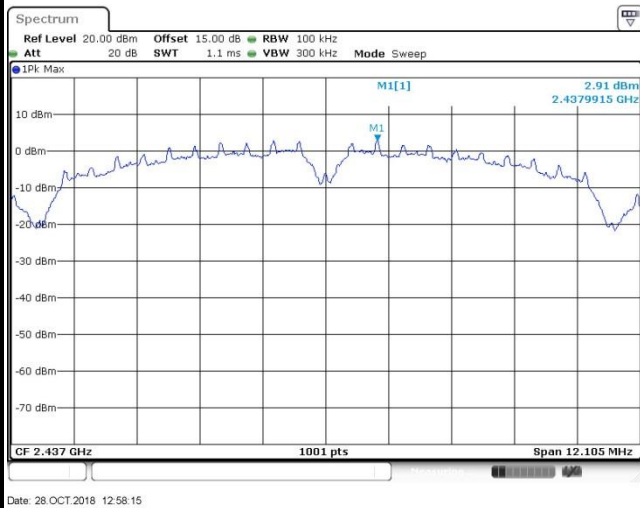
Test Mode :	802.11b	Test Channel :	01
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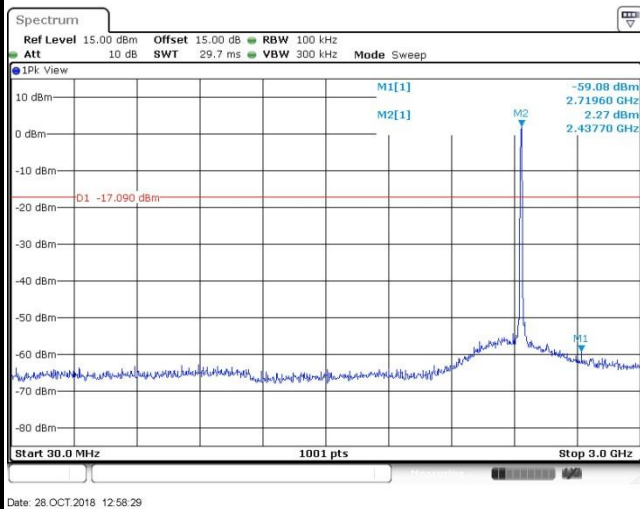
Test Mode :	802.11b	Test Channel :	06
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100kHz PSD reference Level

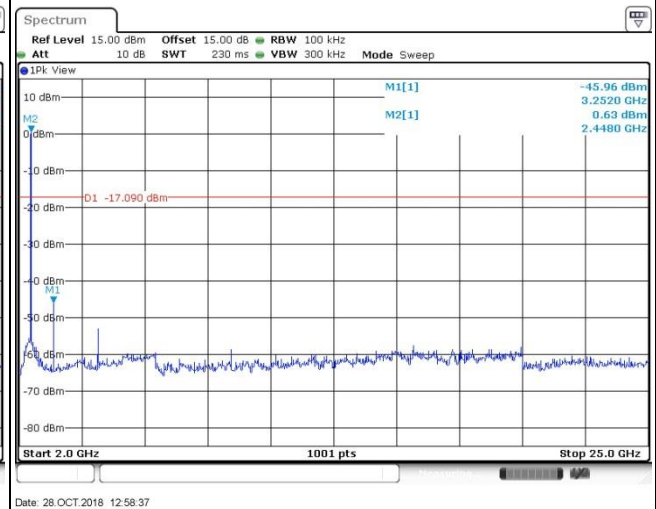


Channel Plot

Spurious Emission 30MHz~3GHz

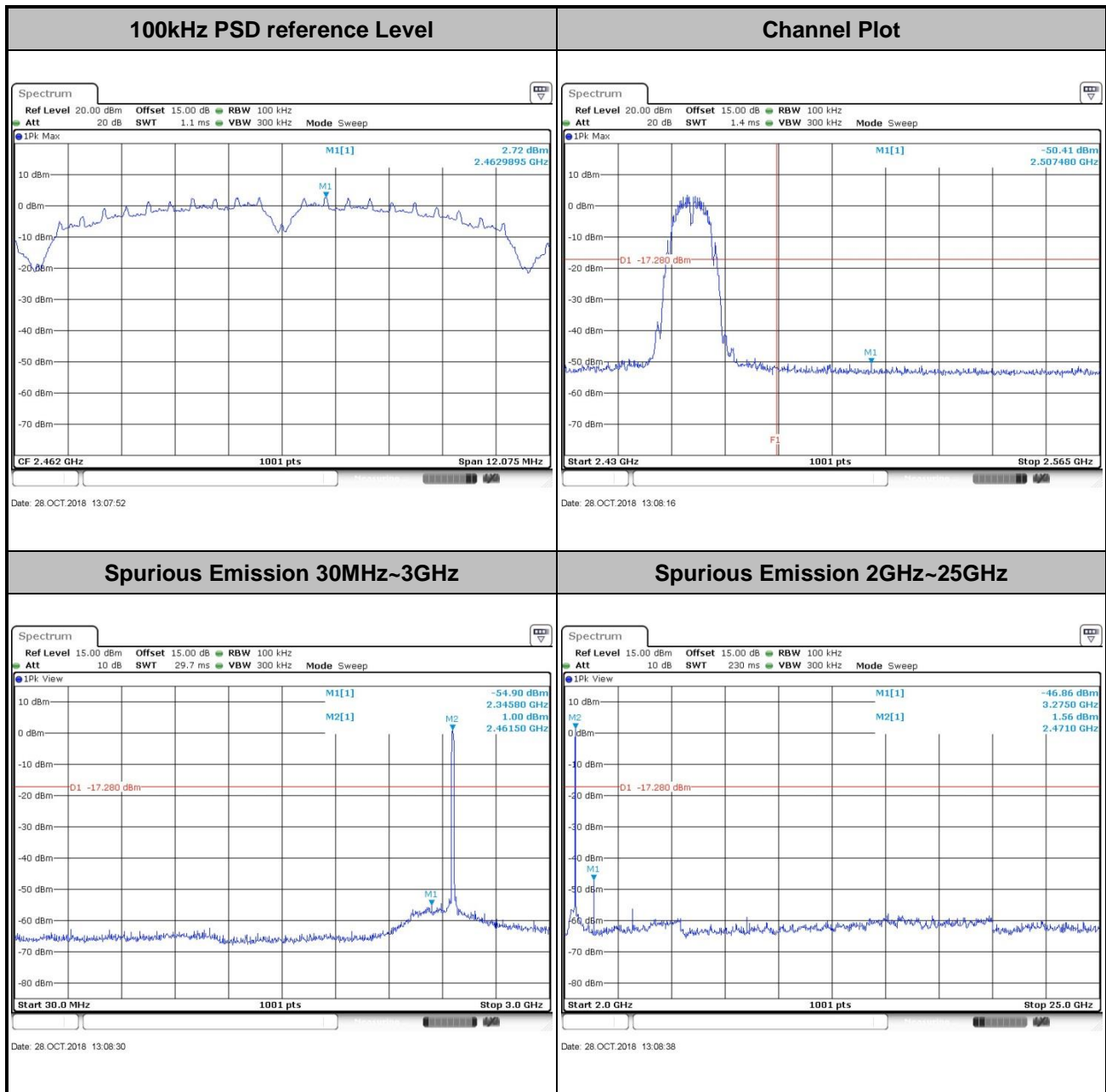


Spurious Emission 2GHz~25GHz





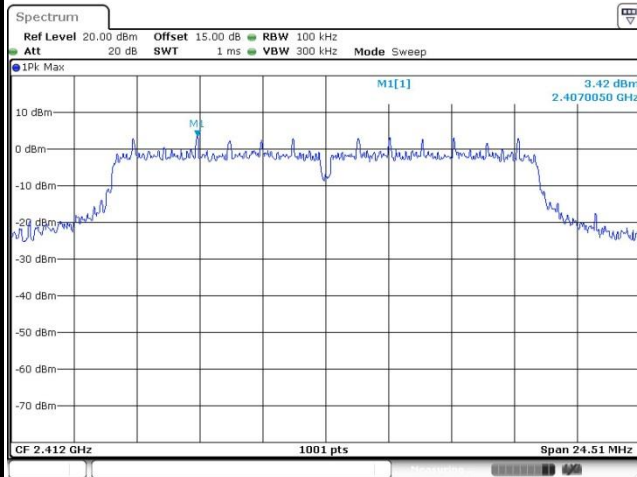
Test Mode :	802.11b	Test Channel :	11
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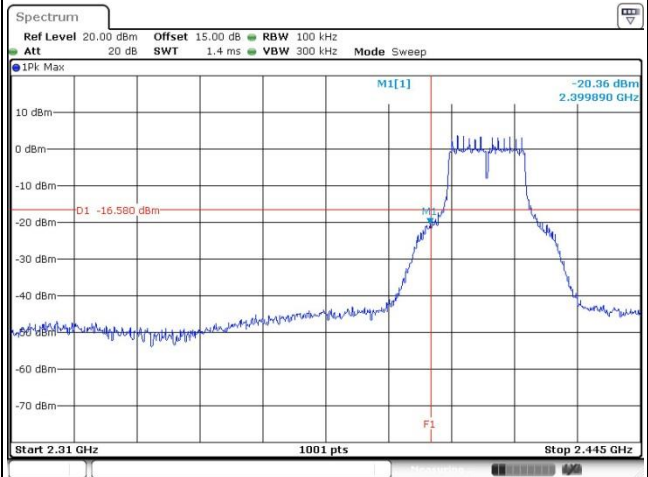


Test Mode :	802.11g	Test Channel :	01
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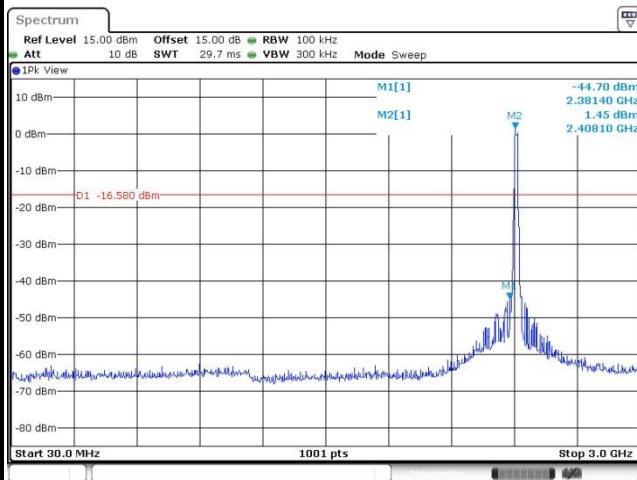
100kHz PSD reference Level



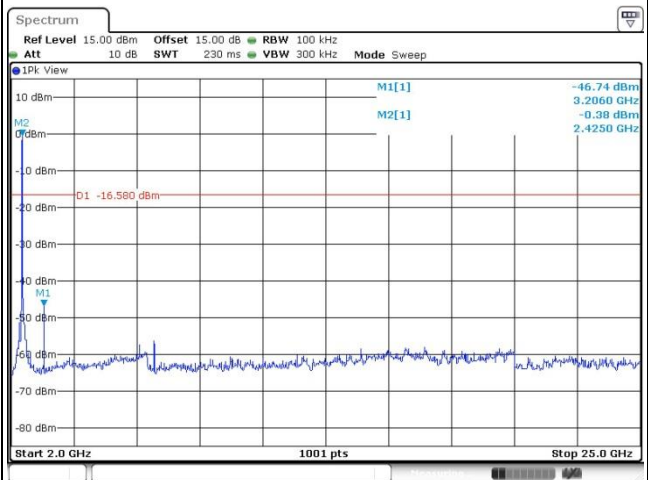
Channel Plot



Spurious Emission 30MHz~3GHz



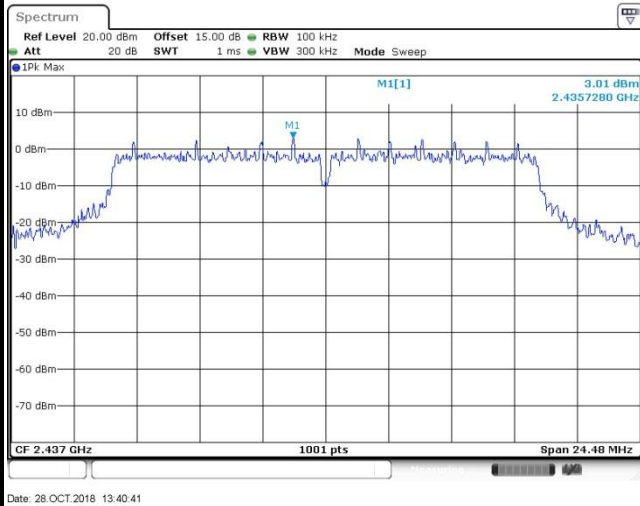
Spurious Emission 2GHz~25GHz





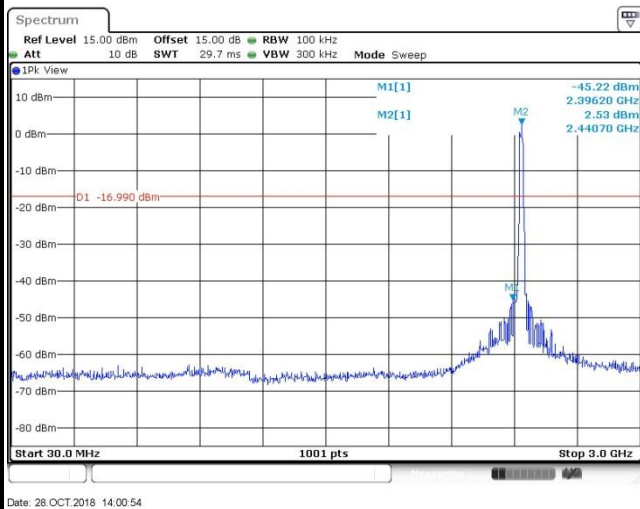
Test Mode :	802.11g	Test Channel :	06
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100kHz PSD reference Level

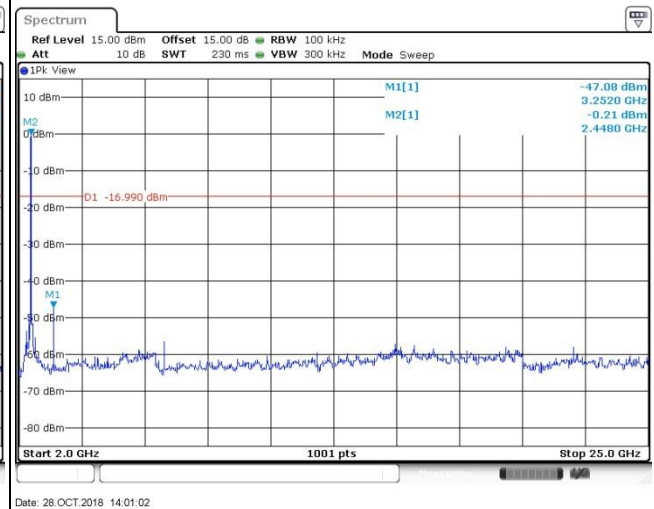


Channel Plot

Spurious Emission 30MHz~3GHz



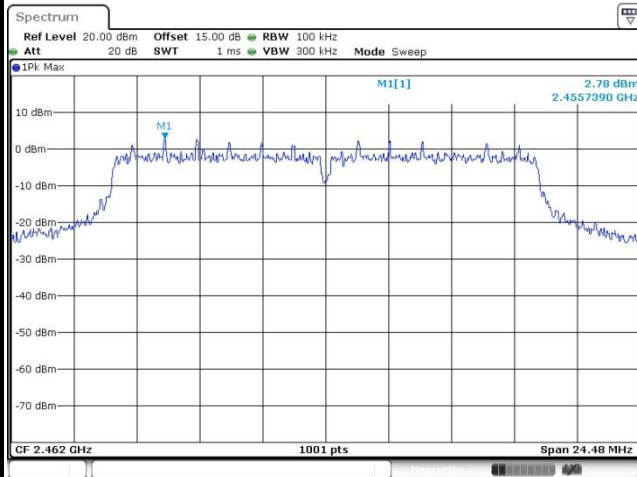
Spurious Emission 2GHz~25GHz



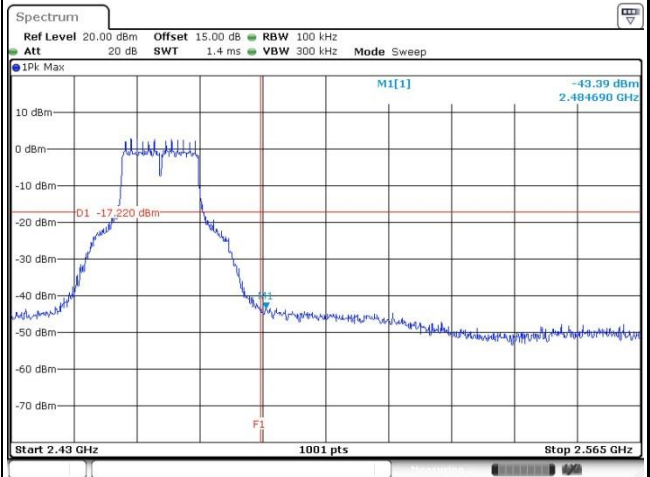


Test Mode :	802.11g	Test Channel :	11
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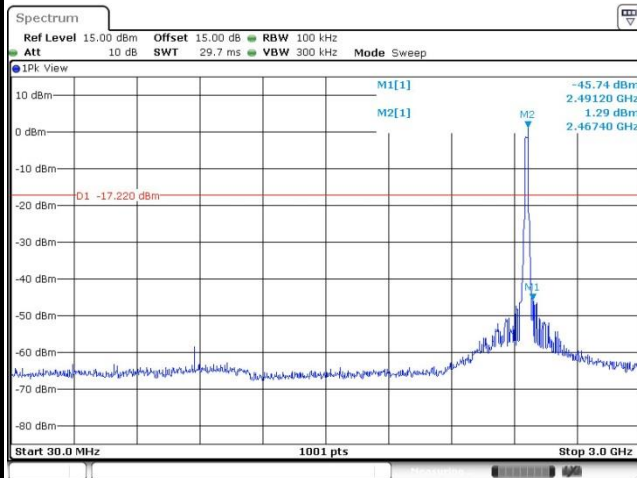
100kHz PSD reference Level



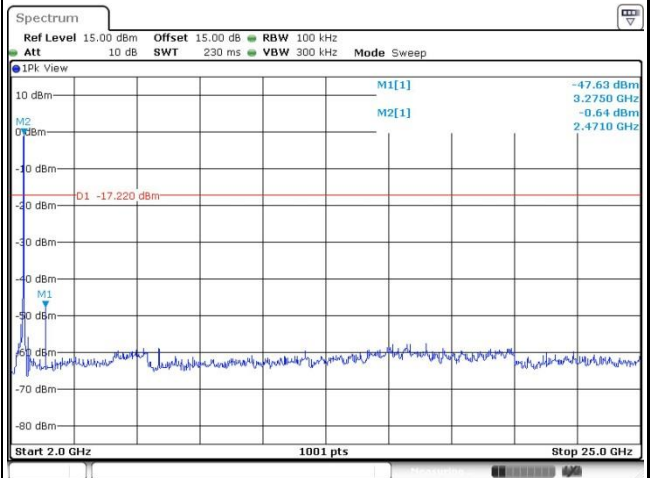
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

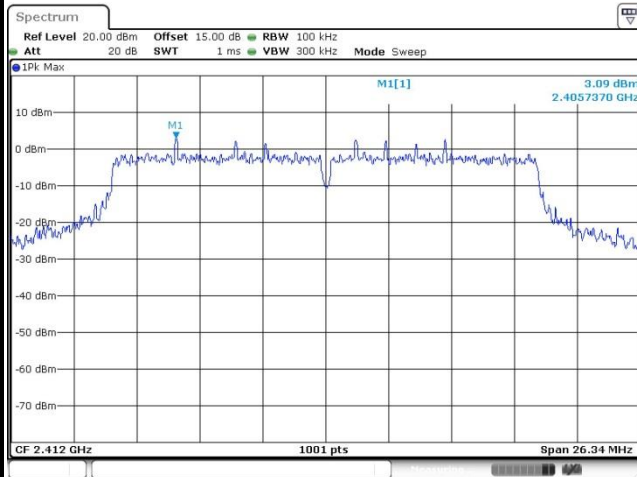




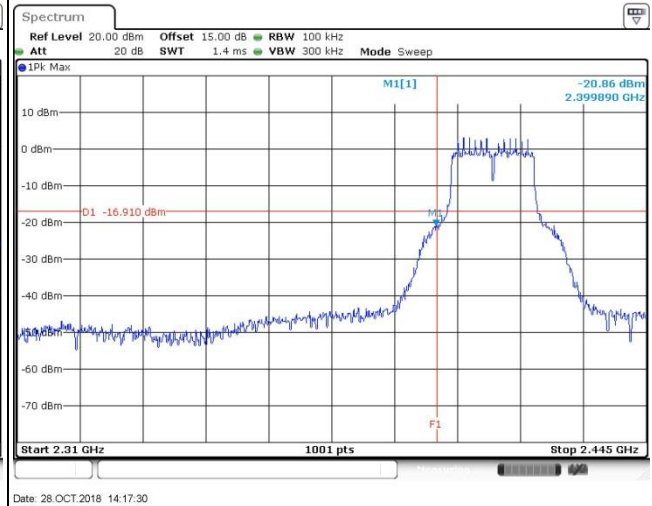
Test Mode : 802.11n HT20

Test Channel : 01

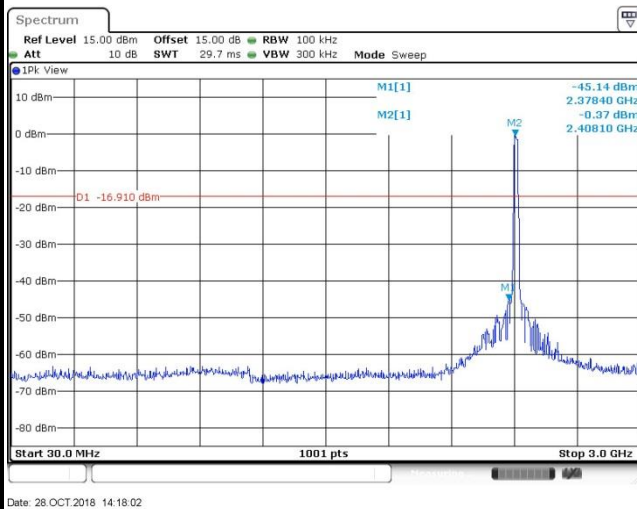
100kHz PSD reference Level



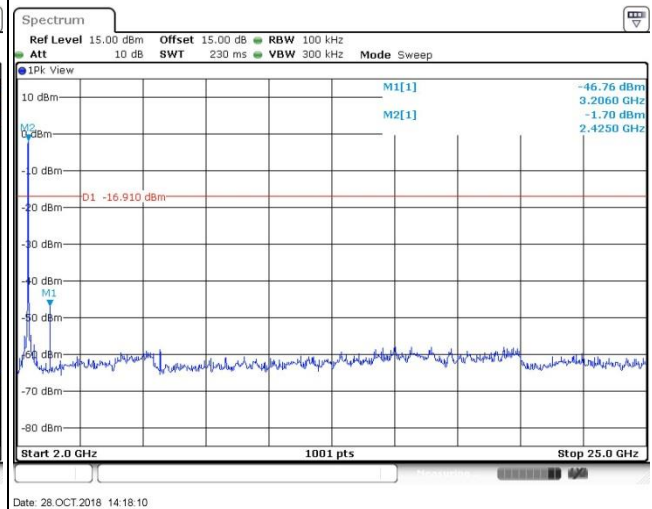
Channel Plot



Spurious Emission 30MHz~3GHz



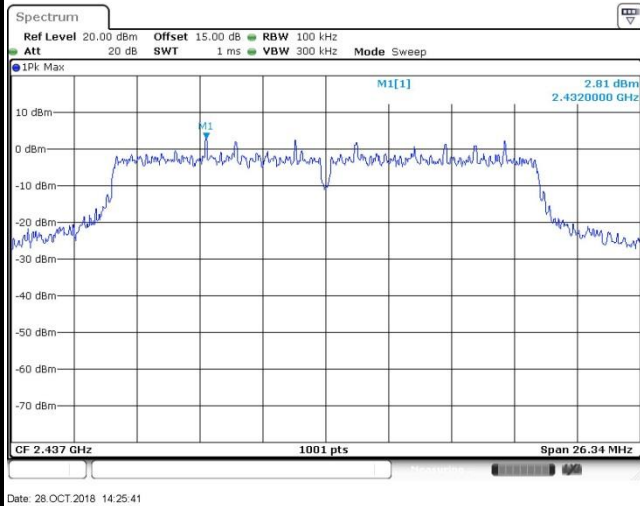
Spurious Emission 2GHz~25GHz





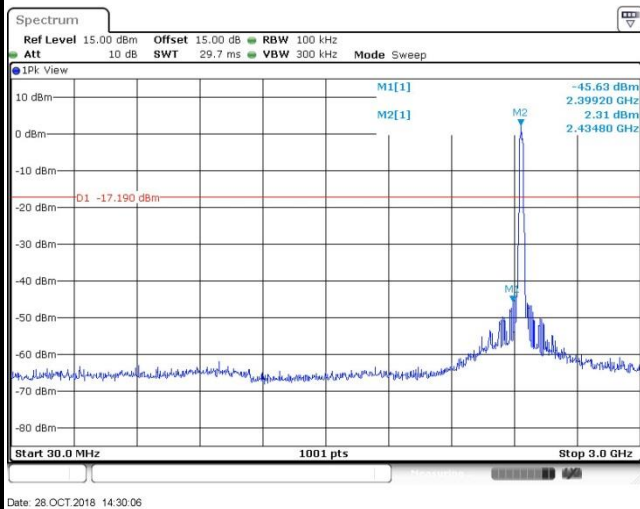
Test Mode :	802.11n HT20	Test Channel :	06
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100kHz PSD reference Level

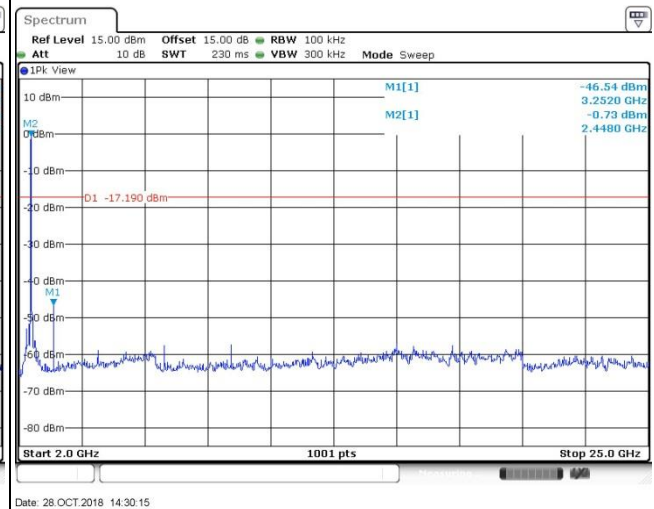


Channel Plot

Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

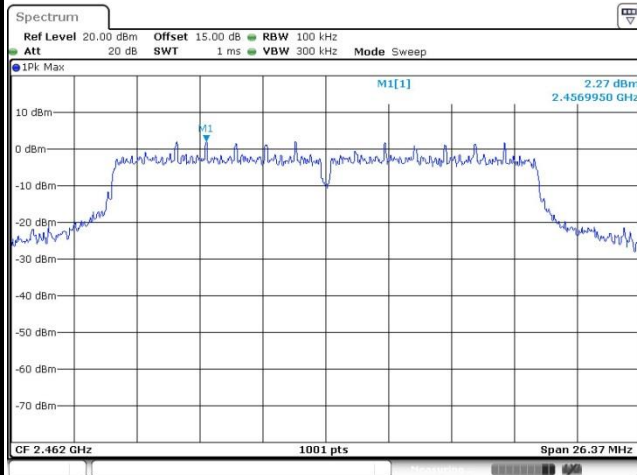




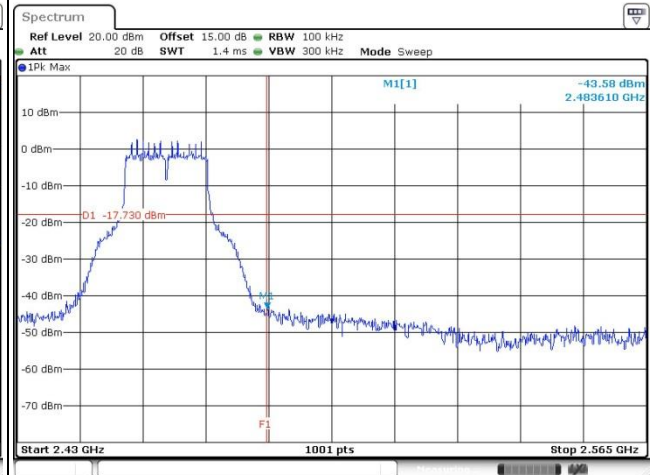
Test Mode : 802.11n HT20

Test Channel : 11

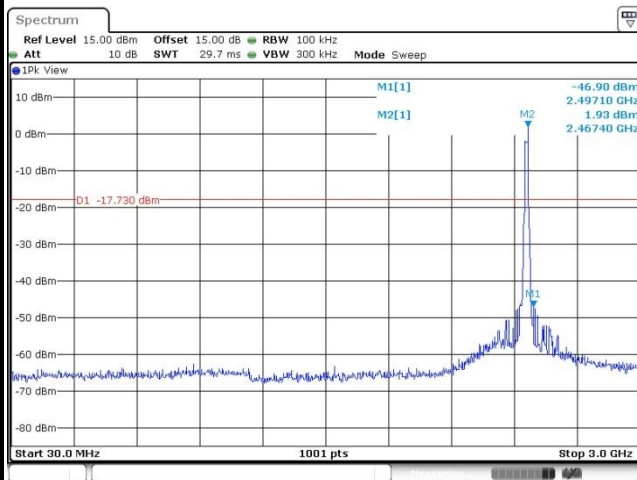
100kHz PSD reference Level



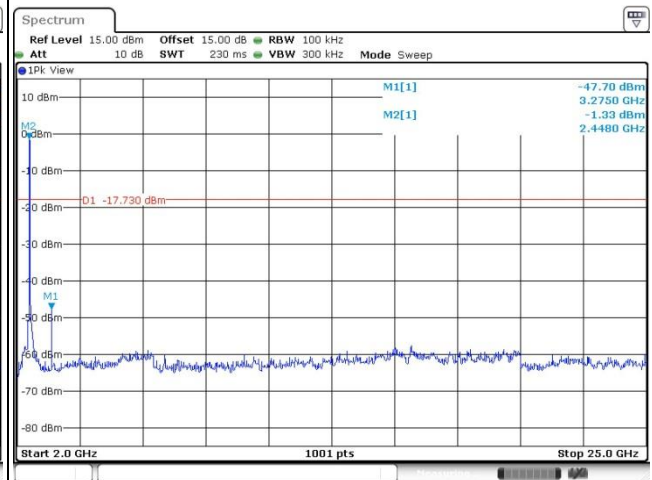
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



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

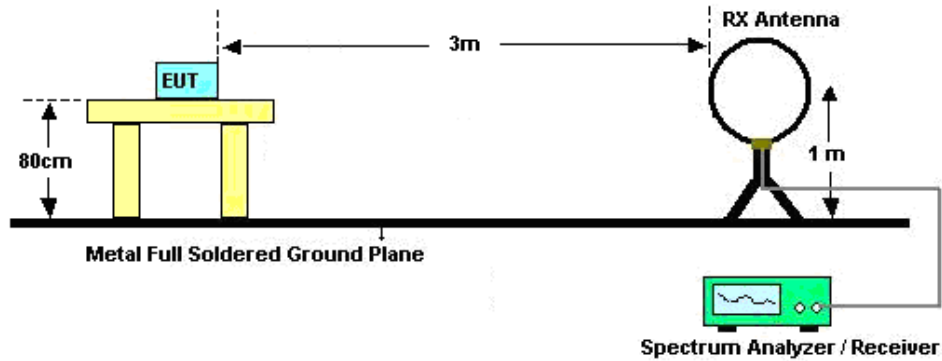
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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 \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

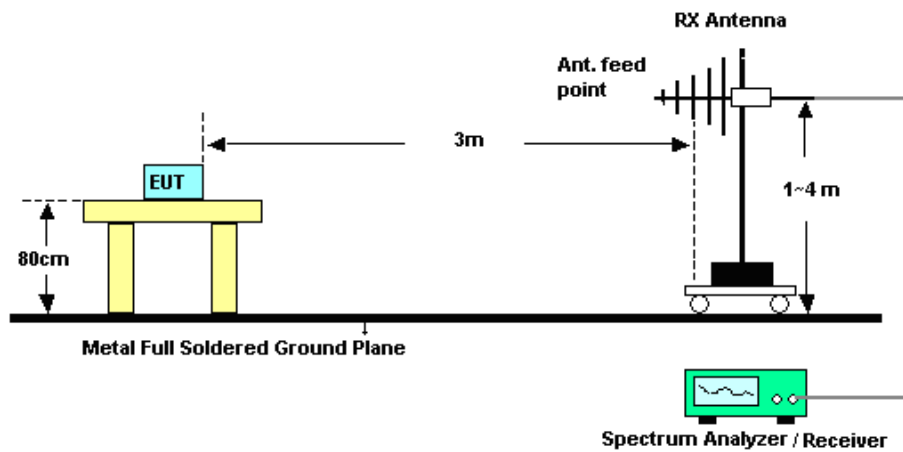
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

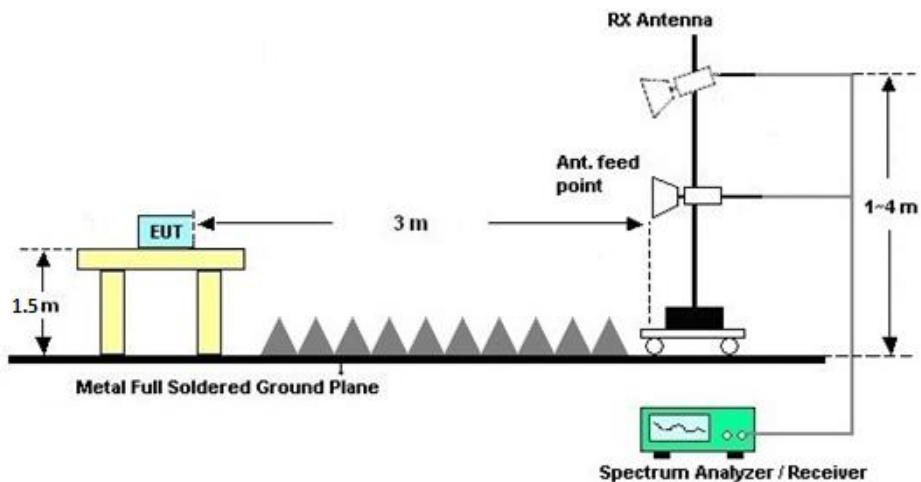
For radiated emissions below 30MHz



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.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.5.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.



3.6 Antenna Requirements

3.6.1 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. 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.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	Oct. 28, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Oct. 28, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Oct. 28, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	Sep. 14, 2018~ Oct. 21, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	Sep. 14, 2018~ Oct. 21, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	Sep. 14, 2018~ Oct. 21, 2018	May 13, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug. 28, 2018	Sep. 14, 2018~ Oct. 21, 2018	Aug. 27, 2019	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Sep. 14, 2018~ Oct. 21, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Apr. 20, 2018	Sep. 14, 2018~ Oct. 21, 2018	Apr. 19, 2019	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2017	Sep. 14, 2018~ Oct. 17, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2018	Oct. 18, 2018~ Oct. 21, 2018	Oct. 17, 2019	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1989346	1GHz~18GHz	Jul. 30, 2018	Sep. 14, 2018~ Oct. 21, 2018	Jul. 29, 2019	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 26, 2018	Sep. 14, 2018~ Oct. 21, 2018	Jul. 25, 2019	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 19, 2018	Sep. 14, 2018~ Oct. 21, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Sep. 14, 2018~ Oct. 21, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Sep. 14, 2018~ Oct. 21, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Sep. 14, 2018~ Oct. 21, 2018	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1 dB
--	--------

Appendix A. Conducted Test Results

Test Engineer:	Wilson Chen	Temperature:	24~26	°C
Test Date:	2018/10/28	Relative Humidity:	50~53	%

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
11b	1Mbps	1	1	2412	11.39	8.07	0.50	Pass
11b	1Mbps	1	6	2437	11.39	8.07	0.50	Pass
11b	1Mbps	1	11	2462	11.34	8.05	0.50	Pass
11g	6Mbps	1	1	2412	20.23	16.34	0.50	Pass
11g	6Mbps	1	6	2437	19.93	16.32	0.50	Pass
11g	6Mbps	1	11	2462	21.48	16.32	0.50	Pass
HT20	MCS0	1	1	2412	20.98	17.56	0.50	Pass
HT20	MCS0	1	6	2437	20.88	17.56	0.50	Pass
HT20	MCS0	1	11	2462	21.18	17.58	0.50	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.00	10.54
11b	1Mbps	1	6	2437	0.00	10.51
11b	1Mbps	1	11	2462	0.00	10.03
11g	6Mbps	1	1	2412	0.11	10.02
11g	6Mbps	1	6	2437	0.11	10.17
11g	6Mbps	1	11	2462	0.11	9.98
HT20	MCS0	1	1	2412	0.11	10.27
HT20	MCS0	1	6	2437	0.11	9.99
HT20	MCS0	1	11	2462	0.11	9.80

TEST RESULTS DATA
Peak Power Table

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
11b	1Mbps	1	1	2412	14.15	30.00	-0.23	13.92	36.00	Pass
11b	1Mbps	1	6	2437	13.93	30.00	-0.23	13.70	36.00	Pass
11b	1Mbps	1	11	2462	13.39	30.00	-0.23	13.16	36.00	Pass
11g	6Mbps	1	1	2412	17.18	30.00	-0.23	16.95	36.00	Pass
11g	6Mbps	1	6	2437	18.83	30.00	-0.23	18.60	36.00	Pass
11g	6Mbps	1	11	2462	18.66	30.00	-0.23	18.43	36.00	Pass
HT20	MCS0	1	1	2412	19.35	30.00	-0.23	19.12	36.00	Pass
HT20	MCS0	1	6	2437	19.32	30.00	-0.23	19.09	36.00	Pass
HT20	MCS0	1	11	2462	18.73	30.00	-0.23	18.50	36.00	Pass

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-10.00	-0.23	8.00	Pass
11b	1Mbps	1	6	2437	-9.00	-0.23	8.00	Pass
11b	1Mbps	1	11	2462	-8.93	-0.23	8.00	Pass
11g	6Mbps	1	1	2412	-11.31	-0.23	8.00	Pass
11g	6Mbps	1	6	2437	-11.83	-0.23	8.00	Pass
11g	6Mbps	1	11	2462	-10.81	-0.23	8.00	Pass
HT20	MCS0	1	1	2412	-11.27	-0.23	8.00	Pass
HT20	MCS0	1	6	2437	-10.44	-0.23	8.00	Pass
HT20	MCS0	1	11	2462	-10.65	-0.23	8.00	Pass



Appendix B. Radiated Spurious Emission

Test Engineer :	Fuquan Wu	Temperature :	22~25°C
		Relative Humidity :	48~52%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2379.195	47.95	-26.05	74	48.79	27.72	4.72	33.28	116	163	P	H
		2390	37.03	-16.97	54	37.81	27.7	4.78	33.26	116	163	A	H
	*	2412	88.48	-	-	89.27	27.69	4.78	33.26	116	163	P	H
	*	2412	85.24	-	-	86.03	27.69	4.78	33.26	116	163	A	H
		2377.515	48.86	-25.14	74	49.7	27.72	4.72	33.28	179	22	P	V
		2389.8	38.26	-15.74	54	39.04	27.7	4.78	33.26	179	22	A	V
	*	2412	94.77	-	-	95.56	27.69	4.78	33.26	179	22	P	V
	*	2412	91.53	-	-	92.32	27.69	4.78	33.26	179	22	A	V
802.11b CH 06 2437MHz		2380.7	47.67	-26.33	74	48.51	27.72	4.72	33.28	120	182	P	H
		2389.8	37.08	-16.92	54	37.86	27.7	4.78	33.26	120	182	A	H
	*	2437	87.63	-	-	88.39	27.66	4.82	33.24	120	182	P	H
	*	2437	84.06	-	-	84.82	27.66	4.82	33.24	120	182	A	H
		2491.6	48.97	-25.03	74	49.73	27.61	4.85	33.22	120	182	P	H
		2484.67	37.69	-16.31	54	38.43	27.63	4.85	33.22	120	182	A	H
		2384.9	49.47	-24.53	74	50.25	27.72	4.78	33.28	145	53	P	V
		2389.94	38.79	-15.21	54	39.57	27.7	4.78	33.26	145	53	A	V
	*	2437	94.77	-	-	95.53	27.66	4.82	33.24	145	53	P	V
	*	2437	91.25	-	-	92.01	27.66	4.82	33.24	145	53	A	V
		2483.62	50.68	-23.32	74	51.42	27.63	4.85	33.22	145	53	P	V
		2484.39	40.12	-13.88	54	40.86	27.63	4.85	33.22	145	53	A	V



802.11b CH 11 2462MHz	*	2462	88.51	-	-	89.28	27.64	4.82	33.23	112	208	P	H
	*	2462	85.22	-	-	85.99	27.64	4.82	33.23	112	208	A	H
		2492.36	48.11	-25.89	74	48.85	27.61	4.85	33.2	112	208	P	H
		2494.68	37.8	-16.2	54	38.54	27.61	4.85	33.2	112	208	A	H
	*	2462	96.41	-	-	97.18	27.64	4.82	33.23	107	61	P	V
	*	2462	93.07	-	-	93.84	27.64	4.82	33.23	107	61	A	V
		2495.32	51.28	-22.72	74	52.02	27.61	4.85	33.2	107	61	P	V
		2484.04	40.85	-13.15	54	41.59	27.63	4.85	33.22	107	61	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.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		4824	45.8	-28.2	74	66.83	31.76	5.55	58.34	141	214	P	H
		4824	43.36	-30.64	74	64.39	31.76	5.55	58.34	158	320	P	V
802.11b CH 06 2437MHz		4874	41.15	-32.85	74	61.95	31.88	5.65	58.33	122	136	P	H
		7311	44.67	-29.33	74	59.93	36.88	7.26	59.4	112	298	P	H
		4874	41.76	-32.24	74	62.56	31.88	5.65	58.33	233	102	P	V
		7311	44.51	-29.49	74	59.77	36.88	7.26	59.4	185	32	P	V
802.11b CH 11 2462MHz		4924	42.38	-31.62	74	62.85	32	5.86	58.33	102	203	P	H
		7386	44.49	-29.51	74	59.52	37.21	7.2	59.44	172	214	P	H
		4924	45.98	-28.02	74	66.45	32	5.86	58.33	150	271	P	V
		7386	44.77	-29.23	74	59.8	37.21	7.2	59.44	195	226	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 Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		2389.065	49.81	-24.19	74	50.61	27.7	4.78	33.28	109	20	P	H
		2389.17	38.95	-15.05	54	39.75	27.7	4.78	33.28	109	20	A	H
	*	2412	87.77	-	-	88.56	27.69	4.78	33.26	109	20	P	H
	*	2412	80.05	-	-	80.84	27.69	4.78	33.26	109	20	P	H
		2389.065	56.77	-17.23	74	57.57	27.7	4.78	33.28	128	46	P	V
		2389.485	42.2	-11.8	54	43	27.7	4.78	33.28	128	46	A	V
	*	2412	95.96	-	-	96.75	27.69	4.78	33.26	128	46	P	V
	*	2412	88.54	-	-	89.33	27.69	4.78	33.26	128	46	A	V
802.11g CH 06 2437MHz		2379.58	47.53	-26.47	74	48.37	27.72	4.72	33.28	115	159	P	H
		2388.12	38.2	-15.8	54	39	27.7	4.78	33.28	115	159	A	H
	*	2437	87.16	-	-	87.92	27.66	4.82	33.24	115	159	P	H
	*	2437	79.6	-	-	80.36	27.66	4.82	33.24	115	159	A	H
		2492.09	48.5	-25.5	74	49.24	27.61	4.85	33.2	115	159	P	H
		2483.5	38.22	-15.78	54	38.96	27.63	4.85	33.22	115	159	A	H
		2389.8	52.48	-21.52	74	53.26	27.7	4.78	33.26	125	43	P	V
		2387.84	39.08	-14.92	54	39.88	27.7	4.78	33.28	125	43	A	V
	*	2437	96.26	-	-	97.02	27.66	4.82	33.24	125	43	P	V
	*	2437	88.83	-	-	89.59	27.66	4.82	33.24	125	43	A	V
		2485.02	55.59	-18.41	74	56.33	27.63	4.85	33.22	125	43	P	V
		2484.25	40.99	-13.01	54	41.73	27.63	4.85	33.22	125	43	A	V



802.11g CH 11 2462MHz	*	2462	88.68	-	-	89.45	27.64	4.82	33.23	100	0	P	H
	*	2462	80.99	-	-	81.76	27.64	4.82	33.23	100	0	A	H
		2495.76	53.3	-20.7	74	54.04	27.61	4.85	33.2	100	0	P	H
		2491.04	39.81	-14.19	54	40.57	27.61	4.85	33.22	100	0	A	H
	*	2462	96.48	-	-	97.25	27.64	4.82	33.23	123	223	P	V
	*	2462	89.08	-	-	89.85	27.64	4.82	33.23	123	223	A	V
		2483.68	59.14	-14.86	74	59.88	27.63	4.85	33.22	123	223	P	V
		2483.6	44.37	-9.63	54	45.11	27.63	4.85	33.22	123	223	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.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		4824	40.06	-33.94	74	61.09	31.76	5.55	58.34	141	214	P	H
		4824	40.41	-33.59	74	61.44	31.76	5.55	58.34	141	214	P	V
802.11g CH 06 2437MHz		4874	39.71	-34.29	74	60.51	31.88	5.65	58.33	122	136	P	H
		7311	43.55	-30.45	74	58.81	36.88	7.26	59.4	112	298	P	H
		4874	38.11	-35.89	74	58.91	31.88	5.65	58.33	233	102	P	V
		7311	42.55	-31.45	74	57.81	36.88	7.26	59.4	185	32	P	V
802.11g CH 11 2462MHz		4924	39.51	-34.49	74	59.98	32	5.86	58.33	102	203	P	H
		7386	45.48	-28.52	74	60.51	37.21	7.2	59.44	172	214	P	H
		4924	41.49	-32.51	74	61.96	32	5.86	58.33	150	271	P	V
		7386	44.78	-29.22	74	59.81	37.21	7.2	59.44	195	226	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 802.11n HT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		2388.54	49.5	-24.5	74	50.3	27.7	4.78	33.28	100	183	P	H
		2389.17	38.36	-15.64	54	39.16	27.7	4.78	33.28	100	183	A	H
	*	2412	86.74	-	-	87.53	27.69	4.78	33.26	100	183	P	H
	*	2412	79.14	-	-	79.93	27.69	4.78	33.26	100	183	A	H
		2389.905	55.86	-18.14	74	56.64	27.7	4.78	33.26	186	82	P	V
		2389.695	41.22	-12.78	54	42.02	27.7	4.78	33.28	186	82	A	V
	*	2412	95.73	-	-	96.52	27.69	4.78	33.26	186	82	P	V
	*	2412	87.53	-	-	88.32	27.69	4.78	33.26	186	82	A	V
802.11n HT20 CH 06 2437MHz		2371.88	47.94	-26.06	74	48.78	27.72	4.72	33.28	120	55	P	H
		2377.76	38.31	-15.69	54	39.15	27.72	4.72	33.28	120	55	A	H
	*	2437	89.19	-	-	89.95	27.66	4.82	33.24	120	55	P	H
	*	2437	81.69	-	-	82.45	27.66	4.82	33.24	120	55	A	H
		2495.38	50.9	-23.1	74	51.64	27.61	4.85	33.2	120	55	P	H
		2486.7	38.99	-15.01	54	39.73	27.63	4.85	33.22	120	55	A	H
		2389.94	53.49	-20.51	74	54.27	27.7	4.78	33.26	125	83	P	V
		2387.98	40.18	-13.82	54	40.98	27.7	4.78	33.28	125	83	A	V
	*	2437	96.24	-	-	97	27.66	4.82	33.24	125	83	P	V
	*	2437	88.79	-	-	89.55	27.66	4.82	33.24	125	83	A	V
		2483.5	54.64	-19.36	74	55.38	27.63	4.85	33.22	125	83	P	V
		2483.97	40.7	-13.3	54	41.44	27.63	4.85	33.22	125	83	A	V



802.11n HT20 CH 11 2462MHz	*	2462	88.71	-	-	89.48	27.64	4.82	33.23	123	39	P	H
	*	2462	81.34	-	-	82.11	27.64	4.82	33.23	123	39	A	H
		2485.48	51.64	-22.36	74	52.38	27.63	4.85	33.22	123	39	P	H
		2486.12	39.06	-14.94	54	39.8	27.63	4.85	33.22	123	39	A	H
	*	2462	95.42	-	-	96.19	27.64	4.82	33.23	123	81	P	V
	*	2462	87.81	-	-	88.58	27.64	4.82	33.23	123	81	A	V
		2483.84	56.8	-17.2	74	57.54	27.63	4.85	33.22	123	81	P	V
		2485.36	41.85	-12.15	54	42.59	27.63	4.85	33.22	123	81	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 802.11n HT20 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		4824	34.83	-39.17	74	55.86	31.76	5.55	58.34	141	214	P	H
		4824	35.14	-38.86	74	56.17	31.76	5.55	58.34	141	214	P	V
802.11n HT20 CH 06 2437MHz		4874	35.64	-38.36	74	56.44	31.88	5.65	58.33	122	136	P	H
		7311	43.68	-30.32	74	58.94	36.88	7.26	59.4	112	298	P	H
		4874	36.34	-37.66	74	57.14	31.88	5.65	58.33	233	102	P	V
		7311	43.36	-30.64	74	58.62	36.88	7.26	59.4	185	32	P	V
802.11n HT20 CH 11 2462MHz		4924	36.26	-37.74	74	56.73	32	5.86	58.33	102	203	P	H
		7386	43.98	-30.02	74	59.01	37.21	7.2	59.44	172	214	P	H
		4924	36.64	-37.36	74	57.11	32	5.86	58.33	150	271	P	V
		7386	44.69	-29.31	74	59.72	37.21	7.2	59.44	195	226	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11g LF		30	21.85	-18.15	40	28.77	24.8	0.25	31.97	-	-	P	H
		138.64	17.28	-26.22	43.5	30.13	17.5	1.23	31.58	-	-	P	H
		320.03	26.37	-19.63	46	35.75	19.89	1.95	31.22	-	-	P	H
		480.08	26.53	-19.47	46	31.92	23.48	2.38	31.25	-	-	P	H
		800.18	31.85	-14.15	46	31.35	28.5	3.16	31.16	100	122	P	H
		912.7	30.79	-15.21	46	29.38	29.2	3.41	31.2	-	-	P	H
		35.82	22.49	-17.51	40	32.12	21.98	0.37	31.98	-	-	P	V
		159.98	18.41	-25.09	43.5	32.21	16.4	1.3	31.5	-	-	P	V
		320.03	21.48	-24.52	46	30.86	19.89	1.95	31.22	-	-	P	V
		480.08	28.89	-17.11	46	34.28	23.48	2.38	31.25	-	-	P	V
		640.13	38.84	-7.16	46	41.12	26.16	2.8	31.24	175	246	P	V
		800.18	34.36	-11.64	46	33.86	28.5	3.16	31.16	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



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	Peak or Average
H/V	Horizontal or Vertical



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

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
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. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable 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) + Cable 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)

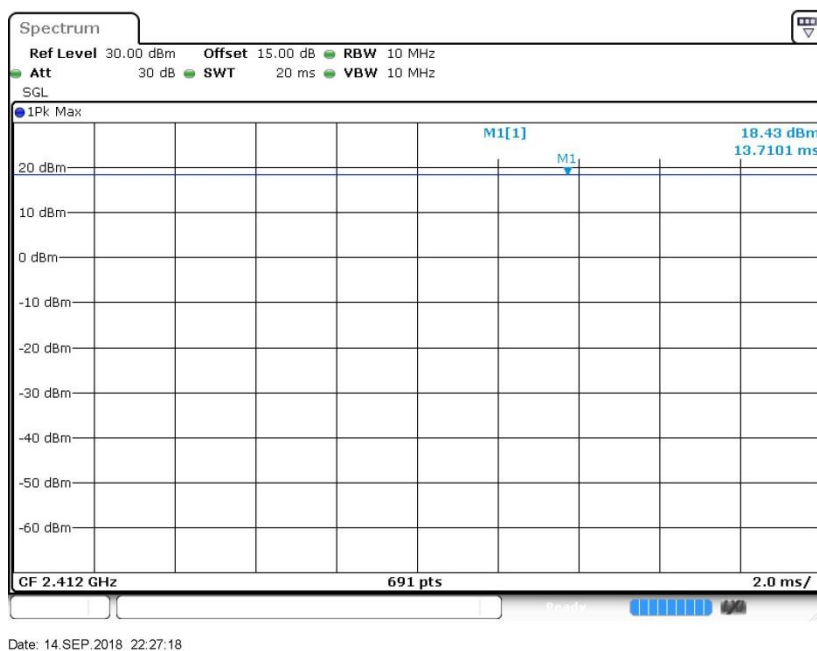
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

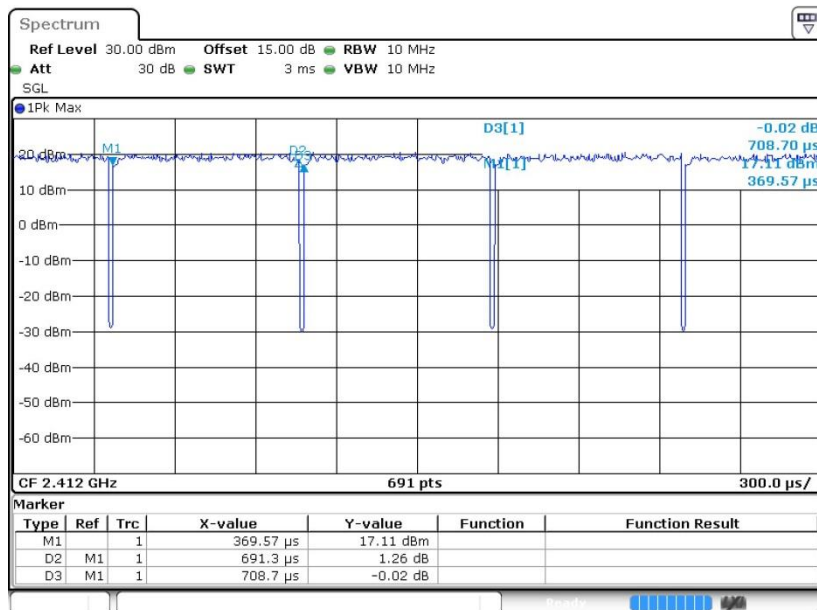
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	97.54	0.69	1.45	3kHz
2.4GHz 802.11n HT20	97.41	0.65	1.53	3kHz

802.11b



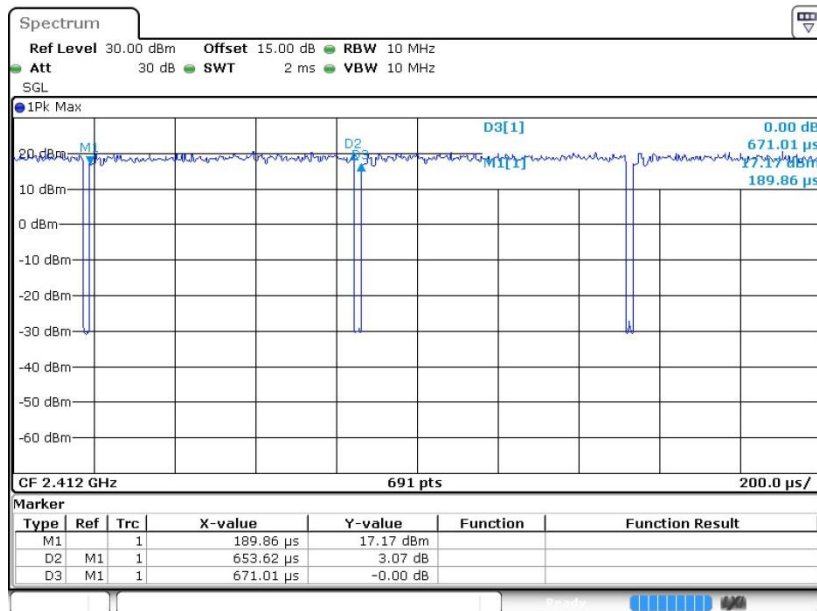


802.11g



Date: 14.SEP.2018 22:31:29

802.11n HT20



Date: 14.SEP.2018 22:36:38