FCC RADIO TEST REPORT

FCC ID	:	**P4Q-N564A**
Equipment	:	**Tablet**
Brand Name	:	**MiTAC, Mio, NAVMAN, MAGELLAN**
Model name	:	**N564A**
Applicant	:	**MiTAC Digital Technology Corporation** **No.200, Wen Hua 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)**
Manufacturer	:	**MITAC Computer (Kunshan) Co,. Ltd.** **No. 269, 2nd Avenue, District A, Conprehensive Free Trade Zone, 300 Kunshan, China**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Apr. 11, 2018 and testing was started from Apr. 18, 2018 and completed on May 06, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Jones Tsai

Approved by: Jones Tsai

SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report **3**
Summary of Test Result **4**
1 General Description **5**
1.1 Product Feature of Equipment Under Test 5
1.2 Modification of EUT 5
1.3 Testing Location 6
1.4 Applicable Standards 6
2 Test Configuration of Equipment Under Test **7**
2.1 Carrier Frequency and Channel 7
2.2 Test Mode 7
2.3 Connection Diagram of Test System 8
2.4 Support Unit used in test configuration and system 8
2.5 EUT Operation Test Setup 8
3 Test Result **9**
3.1 Maximum Conducted Output Power Measurement 9
3.2 Unwanted Emissions Measurement 10
3.3 AC Conducted Emission Measurement 15
3.4 Antenna Requirements 17
4 List of Measuring Equipment **18**
5 Uncertainty of Evaluation **20**
Appendix A. Conducted Test Results
Appendix B. AC Conducted Emission Test Result
Appendix C. Radiated Spurious Emission
Appendix D. Radiated Spurious Emission Plots
Appendix E. Duty Cycle Plots
Appendix F. Setup Photographs

History of this test report

Report No.	Version	Description	Issued Date
FR722135-10F	01	Initial issue of report	May 21, 2018
FR722135-10F	02	Revise the report type to variant report	May 29, 2018
FR722135-10F	03	Add FCC ID of the referenced report in the remark of summary of test result	May 31, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.403 (i)	6dB & 26dB Bandwidth	Not Required	-
-	2.1049	99% Occupied Bandwidth	Not Required	-
3.1	15.407 (a)	Maximum Conducted Output Power	Pass	-
-	15.407 (a)	Power Spectral Density	Not Required	-
3.2	15.407(b)	Unwanted Emissions	Pass	Under limit 2.93 dB at 11490.000 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 9.27 dB at 0.562 MHz
-	15.407 (c)	Automatically Discontinue Transmission	Not Required	-
3.4	15.203 & 15.407 (a)	Antenna Requirement	Pass	-

Remark:

1. Not required means after assessing, test items are not necessary to carry out.
2. T This is a variant report. All the test cases were performed on original report which can be referred to Sporton Report Number FR722135-07F (FCC ID: P4Q-N564B).

Reviewed by: Joseph Lin

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n, NFC, and GNSS

Product Specification subjective to this standard	
Sample 1	EUT with SKU 1
Sample 2	EUT with SKU 2
Sample 3	EUT with SKU 3
Integrated WLAN Module	Brand Name: Qualcomm Model Name: WCN3660B
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS/GLONASS: PATCH Antenna NFC: Loop Antenna

Remark: All test items were performed with Sample 3.

<Sample Information>

SKU	SKU 1	SKU 2	SKU3
Model name	N564B	N564B	N564A
WLAN	Support(2.4G + 5G)	Support(2.4G + 5G)	Support(2.4G + 5G)
WWAN	Support	Support	Not Support
RFID(13.56MHz)	Support	Not Support	Support
RAM	2G	2G	2G
Storage	16G	16G	16G
Camera	Support	Support	Support

1.2 Modification of EUT

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

1.3 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan 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, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH12-HY

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

1.4 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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: conduction emission (150 kHz to 30 MHz), 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 (X plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	-	-	165	5825

Note: The above Frequency and Channel in "*" were 802.11n HT40.

2.2 Test Mode

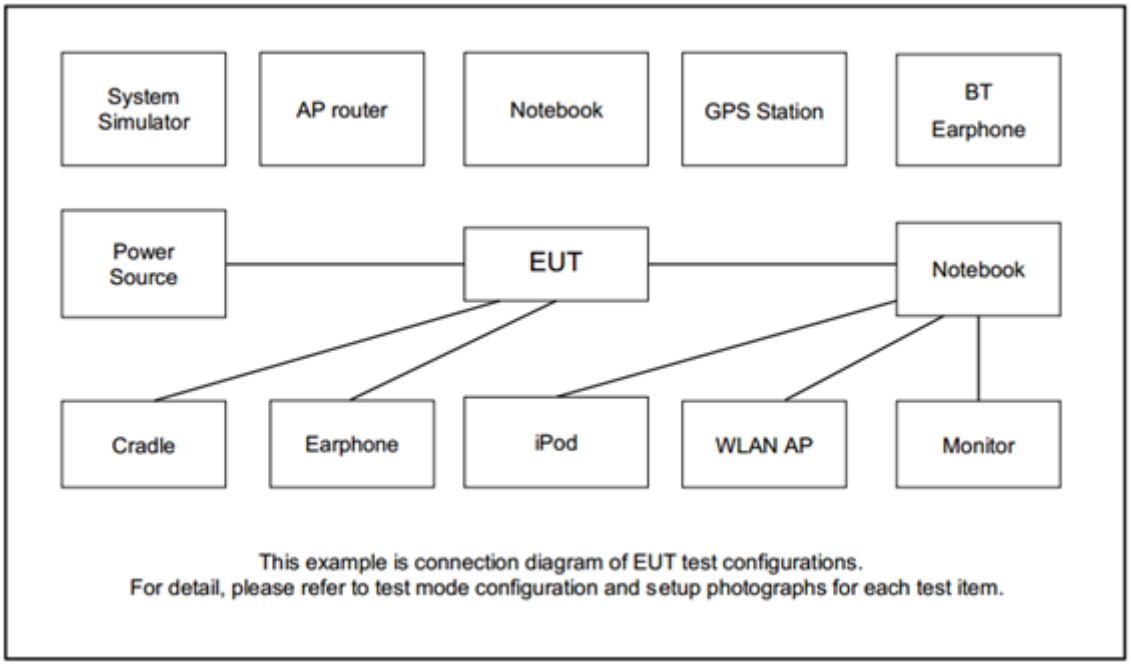
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	**6 Mbps**
802.11n HT20	**MCS0**
802.11n HT40	**MCS0**

Test Cases	
AC Conducted Emission	Mode 1: Bluetooth Link + WLAN (2.4GHz) Link + GLONASS Rx + Cradle 1 + Earphone + USB Cable (Charging from AC Adapter) + USB Flash Drive (Link)

Ch. #		Band IV：5725-5850 MHz		
		802.11a	**802.11n HT20**	**802.11n HT40**
L	**Low**	149	149	-
M	**Middle**	-	-	-
H	**High**	-	-	159

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.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0m	N/A
5.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	USB Flash Drive	Kingston	DataTraveler	N/A	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT” was installed in Notebook 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.

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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

3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

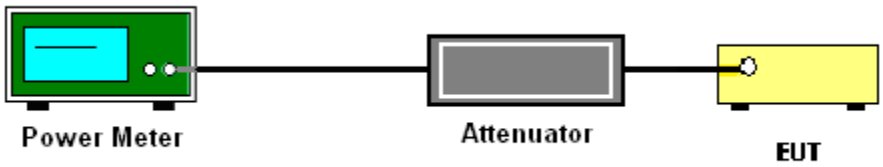
3.1.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.2 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.2.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

(3) KDB789033 D02 v02r01 G)2)c)

(i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.3

(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.[4]

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

   Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

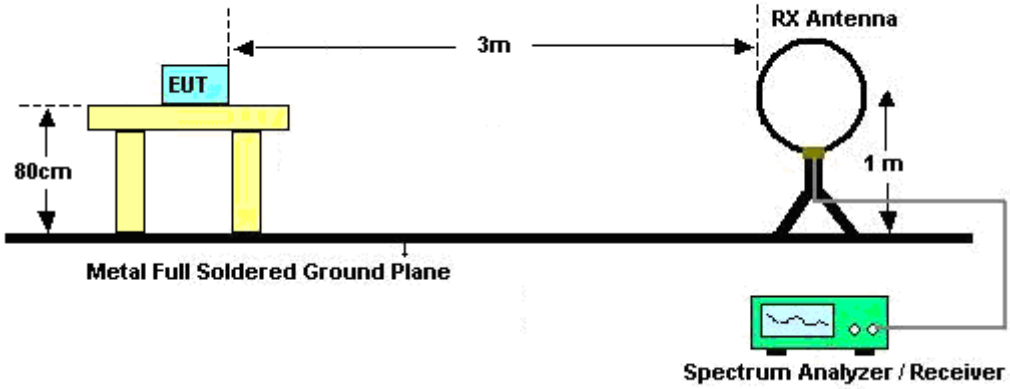
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- RBW = 1 MHz
- 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.

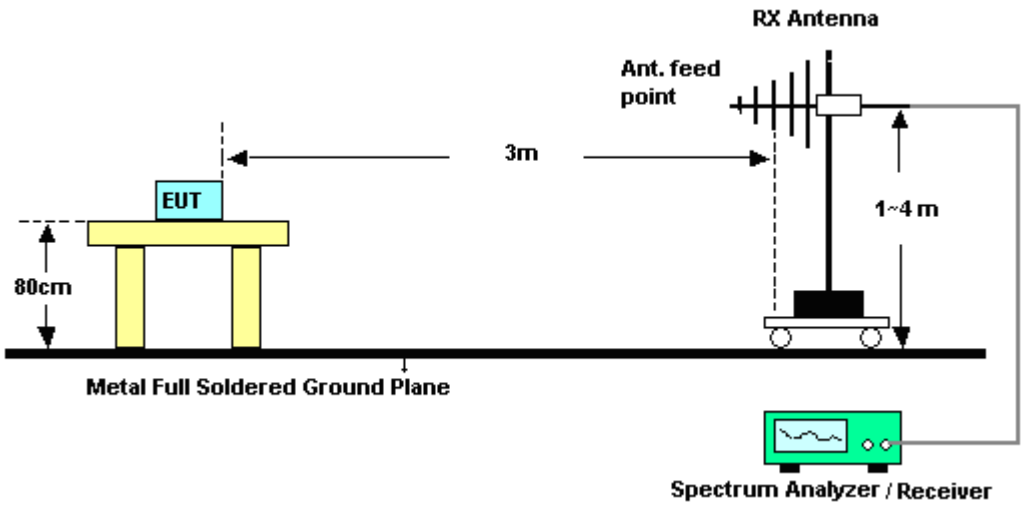
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

3.2.4 Test Setup

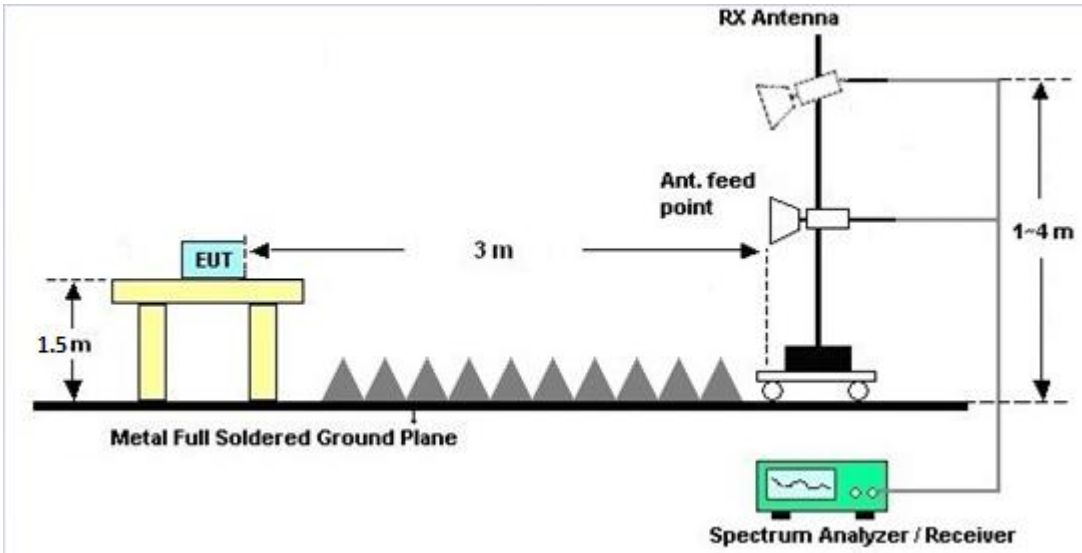
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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.

3.2.6 Test Result of Radiated Band Edges

Please refer to Appendix C and D.

3.2.7 Duty Cycle

Please refer to Appendix E.

3.2.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.3 AC Conducted Emission Measurement

3.3.1 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.

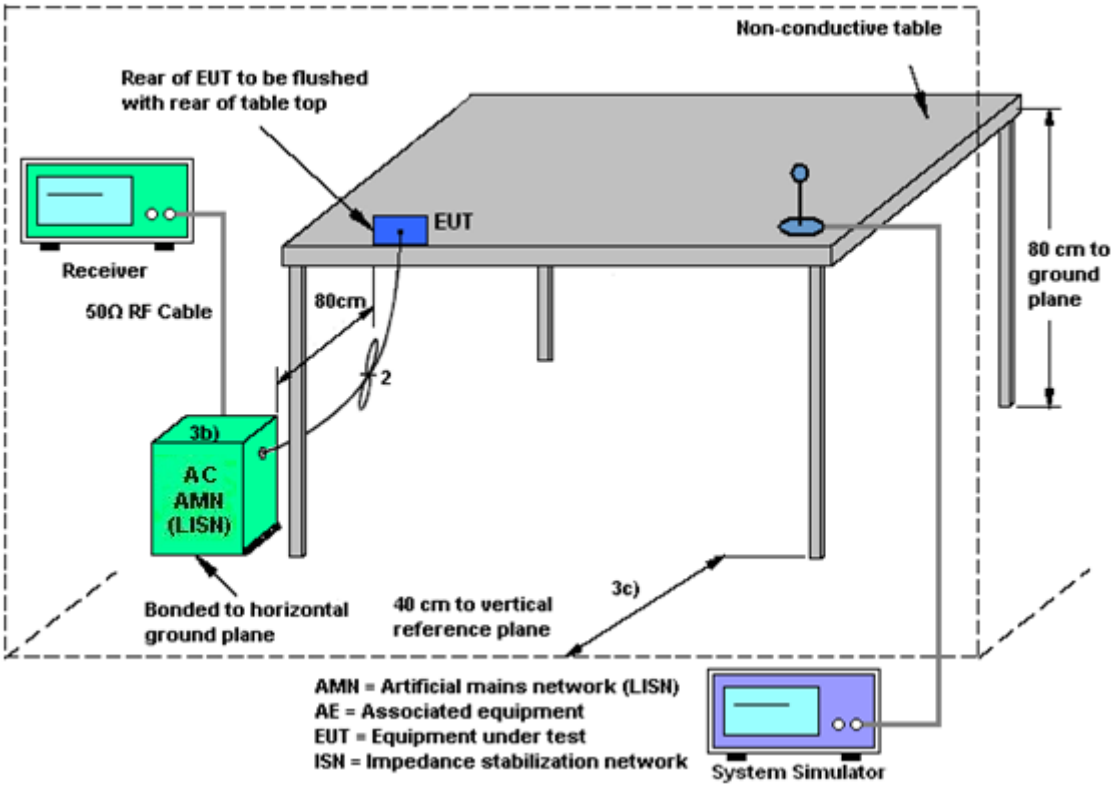
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room 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 with Maximum Hold Mode.

3.3.4 Test Setup



3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.4 Antenna Requirements

3.4.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 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
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 26, 2017	Apr. 18, 2018~ Apr. 19, 2018	Sep. 25, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 26, 2017	Apr. 18, 2018~ Apr. 19, 2018	Sep. 25, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 13, 2017	Apr. 18, 2018~ Apr. 19, 2018	Nov. 12, 2018	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1300484	N/A	Mar. 01, 2018	Apr. 18, 2018~ Apr. 19, 2018	Feb. 28, 2019	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 19, 2018	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	3.6GHz	Dec. 08, 2017	Apr. 19, 2018	Dec. 07, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Apr. 19, 2018	Nov. 29, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 08, 2017	Apr. 19, 2018	Dec. 07, 2018	Conduction (CO05-HY)
Test Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Apr. 19, 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Apr. 19, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Apr. 19, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	May 02, 2018~ May 06, 2018	Nov. 22, 2018	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N0602	30MHz~1GHz	Oct. 14, 2017	May 02, 2018~ May 06, 2018	Oct. 13, 2018	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Oct. 20, 2017	May 02, 2018~ May 06, 2018	Oct. 19, 2018	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz ~ 40GHz	Nov. 27, 2017	May 02, 2018~ May 06, 2018	Nov. 26, 2018	Radiation (03CH12-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Jan. 19, 2018	May 02, 2018~ May 06, 2018	Jan. 18, 2020	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY53270148	1GHz~26.5GHz	Jan. 15, 2018	May 02, 2018~ May 06, 2018	Jan. 14, 2019	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303K	1710001800054002	1GHz~18GHz	Apr. 17, 2018	May 02, 2018~ May 06, 2018	Apr. 16, 2019	Radiation (03CH12-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 18, 2017	May 02, 2018~ May 06, 2018	Jul. 17, 2018	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 25, 2017	May 02, 2018~ May 06, 2018	Dec. 24, 2018	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Oct. 31, 2017	May 02, 2018~ May 06, 2018	Oct. 30, 2018	Radiation (03CH12-HY)
Test Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	May 02, 2018~ May 06, 2018	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	May 02, 2018~ May 06, 2018	N/A	Radiation (03CH12-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	May 02, 2018~ May 06, 2018	N/A	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12SS	SN2	1.2G Low Pass	Mar. 23, 2018	May 02, 2018~ May 06, 2018	Mar. 22, 2019	Radiation (03CH12-HY)
Filter	Woken	WHKX8-5272.5-6750-18000-40ST	SN2	6.75G High pass	Mar. 21, 2018	May 02, 2018~ May 06, 2018	Mar. 20, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30M-18G	Mar. 14, 2018	May 02, 2018~ May 06, 2018	Mar. 13, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY15539/4	30M-18G	Mar. 14, 2018	May 02, 2018~ May 06, 2018	Mar. 13, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36979/4	30M-18G	Mar. 14, 2018	May 02, 2018~ May 06, 2018	Mar. 13, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 17, 2017	May 02, 2018~ May 06, 2018	Oct. 16, 2018	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 17, 2017	May 02, 2018~ May 06, 2018	Oct. 16, 2018	Radiation (03CH12-HY)

5 Uncertainty of Evaluation

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.7

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Eason Huang	Temperature:	21~25	°C
Test Date:	2018/4/18~2018/04/19	Relative Humidity:	51~54	%

Report Number : FR722135-10F

TEST RESULTS DATA
Average Power Table

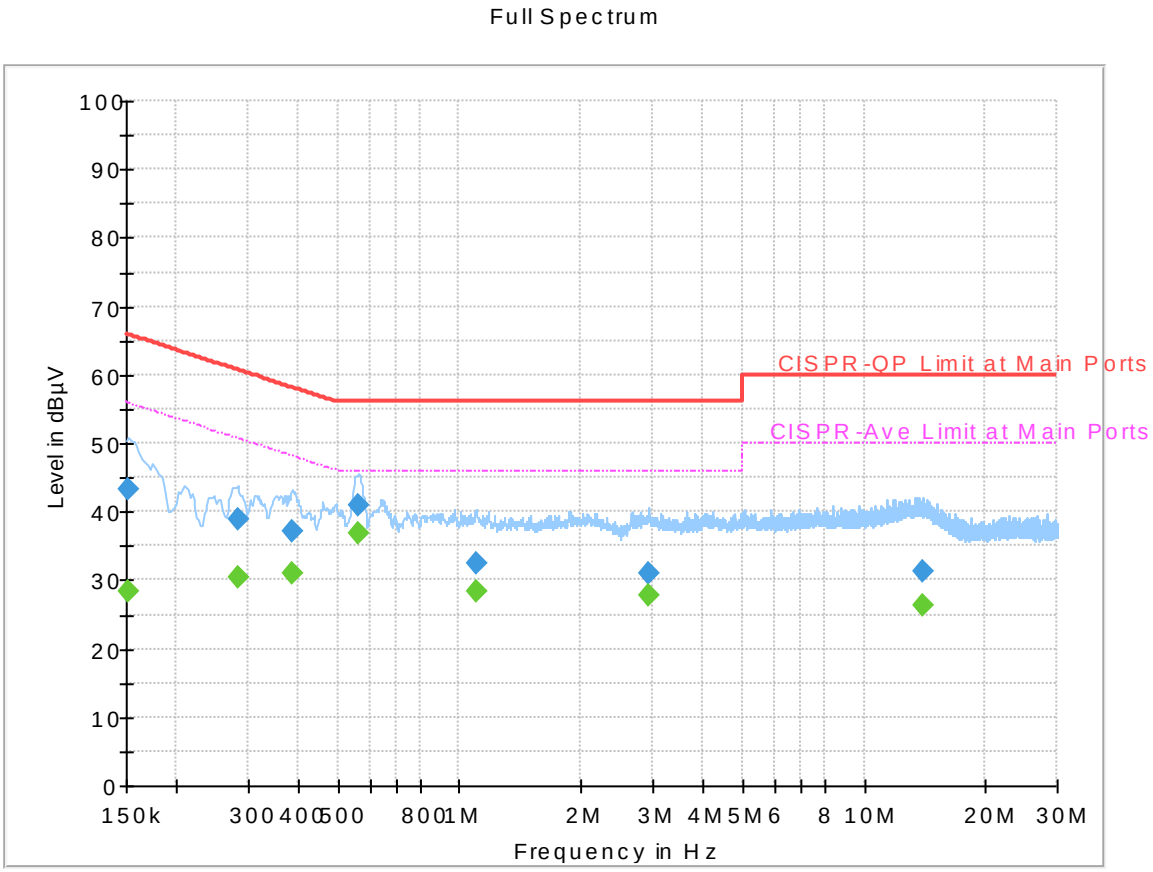
Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	-	Pass/Fail
					Ant 1	Ant 1	Ant 1	Ant 1		
11a	6Mbps	1	149	5745	0.62	10.78	30.00	3.04		Pass
11a	6Mbps	1	157	5785	0.62	10.96	30.00	3.04		Pass
11a	6Mbps	1	165	5825	0.62	11.12	30.00	3.04		Pass
HT20	MCS0	1	149	5745	0.66	10.75	30.00	3.04		Pass
HT20	MCS0	1	157	5785	0.66	10.58	30.00	3.04		Pass
HT20	MCS0	1	165	5825	0.66	11.01	30.00	3.04		Pass
HT40	MCS0	1	151	5755	0.70	11.19	30.00	3.04		Pass
HT40	MCS0	1	159	5795	0.70	10.91	30.00	3.04		Pass

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Shareef Yu	**Temperature :**	23~24℃
		Relative Humidity :	58~62%

EUT Information

Report NO :	722135-10
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line



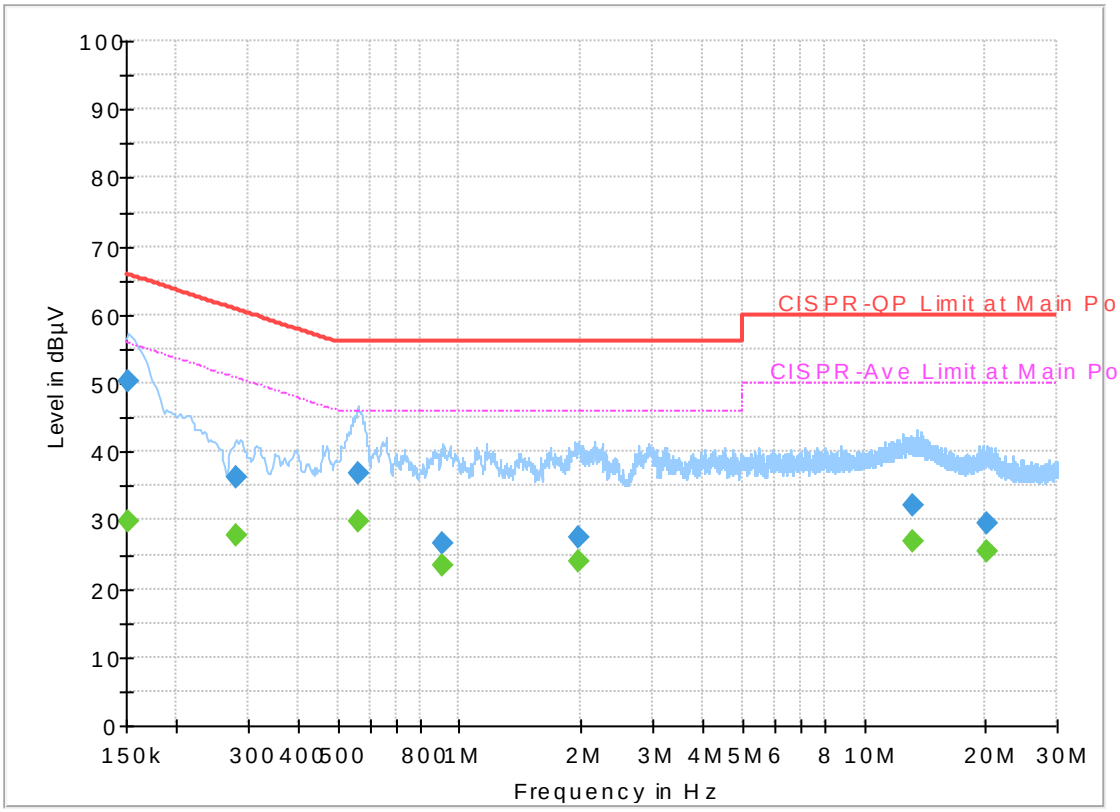
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	28.39	55.88	27.49	L1	OFF	19.5
0.152250	43.23	---	65.88	22.65	L1	OFF	19.5
0.282750	---	30.37	50.74	20.37	L1	OFF	19.5
0.282750	38.77	---	60.74	21.97	L1	OFF	19.5
0.386250	---	30.98	48.14	17.16	L1	OFF	19.5
0.386250	37.24	---	58.14	20.90	L1	OFF	19.5
0.561750	---	36.73	46.00	9.27	L1	OFF	19.5
0.561750	40.85	---	56.00	15.15	L1	OFF	19.5
1.101750	---	28.43	46.00	17.57	L1	OFF	19.5
1.101750	32.52	---	56.00	23.48	L1	OFF	19.5
2.944500	---	27.84	46.00	18.16	L1	OFF	19.6
2.944500	31.06	---	56.00	24.94	L1	OFF	19.6
13.983000	---	26.22	50.00	23.78	L1	OFF	19.7
13.983000	31.15	---	60.00	28.85	L1	OFF	19.7

EUT Information

Report NO :	722135-10
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	29.93	55.88	25.95	N	OFF	19.5
0.152250	50.34	---	65.88	15.54	N	OFF	19.5
0.280500	---	27.78	50.80	23.02	N	OFF	19.5
0.280500	36.24	---	60.80	24.56	N	OFF	19.5
0.559500	---	29.68	46.00	16.32	N	OFF	19.5
0.559500	36.85	---	56.00	19.15	N	OFF	19.5
0.912750	---	23.30	46.00	22.70	N	OFF	19.5
0.912750	26.73	---	56.00	29.27	N	OFF	19.5
1.965750	---	23.98	46.00	22.02	N	OFF	19.6
1.965750	27.43	---	56.00	28.57	N	OFF	19.6
13.276500	---	26.93	50.00	23.07	N	OFF	19.8
13.276500	32.07	---	60.00	27.93	N	OFF	19.8
20.040000	---	25.50	50.00	24.50	N	OFF	19.9
20.040000	29.46	---	60.00	30.54	N	OFF	19.9

Appendix C. Radiated Spurious Emission

Test Engineer :	Karl Hou, Nick Yu, and Peter Liao	Temperature :	23~25°C
		Relative Humidity :	56~61%

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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)
802.11a CH 149 5745MHz		5643.8	52.39	-15.81	68.2	45.07	32.19	6.35	31.22	101	256	P	H
		5693	56.34	-43.7	100.04	48.96	32.27	6.36	31.25	101	256	P	H
		5718.2	70.38	-39.92	110.3	62.96	32.31	6.37	31.26	101	256	P	H
		5724.4	84.24	-36.59	120.83	76.82	32.31	6.37	31.26	101	256	P	H
	*	5745	111.12	-	-	103.68	32.34	6.37	31.27	101	256	P	H
	*	5745	99.63	-	-	92.19	32.34	6.37	31.27	101	256	A	H
													H
													H
		5646.8	50.44	-17.76	68.2	43.12	32.19	6.35	31.22	223	5	P	V
		5691.6	53.52	-45.49	99.01	46.14	32.27	6.36	31.25	223	5	P	V
		5717.2	67.83	-42.19	110.02	60.44	32.29	6.36	31.26	223	5	P	V
		5724.8	77.84	-43.9	121.74	70.42	32.31	6.37	31.26	223	5	P	V
	*	5745	108.25	-	-	100.81	32.34	6.37	31.27	223	5	P	V
	*	5745	97.59	-	-	90.15	32.34	6.37	31.27	223	5	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11a (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)
802.11a CH 149 5745MHz		11490	58.26	-15.74	74	69.42	40.11	10.33	61.6	387	342	P	H
		11490	44.45	-9.55	54	55.61	40.11	10.33	61.6	387	342	A	H
		17235	47.55	-20.65	68.2	49.06	41.54	12.73	55.78	100	0	P	H
													H
		11490	67.96	-6.04	74	79.12	40.11	10.33	61.6	100	198	P	V
		11490	51.07	-2.93	54	62.23	40.11	10.33	61.6	100	198	A	V
		17235	48.32	-19.88	68.2	49.83	41.54	12.73	55.78	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 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)
		5604	52.29	-15.91	68.2	45.02	32.14	6.34	31.21	118	256	P	H
		5690.8	57.54	-40.88	98.42	50.16	32.27	6.36	31.25	118	256	P	H
		5720	73.47	-37.33	110.8	66.05	32.31	6.37	31.26	118	256	P	H
		5724.6	82.34	-38.95	121.29	74.92	32.31	6.37	31.26	118	256	P	H
	*	5745	111.04	-	-	103.6	32.34	6.37	31.27	118	256	P	H
	*	5745	99.79	-	-	92.35	32.34	6.37	31.27	118	256	A	H
802.11n													H
HT20													H
CH 149		5621.8	50.66	-17.54	68.2	43.36	32.17	6.34	31.21	255	8	P	V
5745MHz		5693.2	56.45	-43.74	100.19	49.07	32.27	6.36	31.25	255	8	P	V
		5720	69.14	-41.66	110.8	61.72	32.31	6.37	31.26	255	8	P	V
		5722.8	79.55	-37.63	117.18	72.13	32.31	6.37	31.26	255	8	P	V
	*	5745	108.41	-	-	100.97	32.34	6.37	31.27	255	8	P	V
	*	5745	97.09	-	-	89.65	32.34	6.37	31.27	255	8	A	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

WIFI 802.11n HT20 (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)
802.11n HT20 CH 149 5745MHz		11490	59.23	-14.77	74	70.39	40.11	10.33	61.6	397	343	P	H
		11490	44.51	-9.49	54	55.67	40.11	10.33	61.6	397	343	A	H
		17235	48.05	-20.15	68.2	49.56	41.54	12.73	55.78	100	0	P	H
													H
		11490	68.49	-5.51	74	79.65	40.11	10.33	61.6	100	196	P	V
		11490	50.87	-3.13	54	62.03	40.11	10.33	61.6	100	196	A	V
		17235	47.98	-20.22	68.2	49.49	41.54	12.73	55.78	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 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)
802.11n HT40 CH 159 5795MHz		5638.4	52.53	-15.67	68.2	45.21	32.19	6.35	31.22	108	258	P	H
		5692.2	53.95	-45.5	99.45	46.57	32.27	6.36	31.25	108	258	P	H
		5713	57.05	-51.79	108.84	49.66	32.29	6.36	31.26	108	258	P	H
		5723.2	59.84	-58.26	118.1	52.42	32.31	6.37	31.26	108	258	P	H
	*	5795	107.55	-	-	100.05	32.41	6.38	31.29	108	258	P	H
	*	5795	96.8	-	-	89.3	32.41	6.38	31.29	108	258	A	H
		5850.6	66.76	-54.07	120.83	59.18	32.48	6.42	31.32	108	258	P	H
		5855.2	59.81	-50.93	110.74	52.2	32.51	6.42	31.32	108	258	P	H
		5878.8	53.65	-48.73	102.38	46.02	32.53	6.43	31.33	108	258	P	H
		5931.4	49.41	-18.79	68.2	41.69	32.6	6.47	31.35	108	258	P	H
													H
													H
		5612	50.2	-18	68.2	42.93	32.14	6.34	31.21	255	8	P	V
		5690.8	53.49	-44.93	98.42	46.11	32.27	6.36	31.25	255	8	P	V
		5718.8	57.21	-53.25	110.46	49.79	32.31	6.37	31.26	255	8	P	V
		5722.4	55.05	-61.22	116.27	47.63	32.31	6.37	31.26	255	8	P	V
	*	5795	105.43	-	-	97.93	32.41	6.38	31.29	255	8	P	V
	*	5795	94.15	-	-	86.65	32.41	6.38	31.29	255	8	A	V
		5850.8	60.76	-59.62	120.38	53.18	32.48	6.42	31.32	255	8	P	V
		5859	59.34	-50.34	109.68	51.74	32.51	6.42	31.33	255	8	P	V
		5885	51.52	-46.25	97.77	43.89	32.53	6.44	31.34	255	8	P	V
		5939.2	49.68	-18.52	68.2	41.94	32.63	6.48	31.37	255	8	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

WIFI 802.11n HT40 (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)
802.11n HT40 CH 159 5795MHz		11590	56.48	-17.52	74	68.01	39.89	10.38	61.8	400	357	P	H
		11590	41.94	-12.06	54	53.47	39.89	10.38	61.8	400	357	A	H
		17385	48.47	-19.73	68.2	49	42.08	12.84	55.45	100	0	P	H
													H
		11590	65.88	-8.12	74	77.41	39.89	10.38	61.8	100	198	P	V
		11590	50.21	-3.79	54	61.74	39.89	10.38	61.8	100	198	A	V
		17385	49.46	-18.74	68.2	49.99	42.08	12.84	55.45	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

5GHz WIFI 802.11a (LF @ 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)
5GHz 802.11a LF		30	25.38	-14.62	40	28.92	26.2	0.44	30.18	100	0	P	H
		100.2	24.64	-18.86	43.5	38.02	16.2	0.85	30.43	-	-	P	H
		255.72	24.06	-21.94	46	33.41	19.4	1.47	30.22	-	-	P	H
		497.4	30.49	-15.51	46	34.08	24.34	1.86	29.79	-	-	P	H
		800.5	30.95	-15.05	46	29.72	28.1	2.42	29.29	-	-	P	H
		969.9	33.5	-20.5	54	29.68	30.02	2.74	28.94	-	-	P	H
													H
													H
													H
													H
													H
													H
		72.12	31.09	-8.91	40	47.97	12.84	0.73	30.45	-	-	P	V
		89.67	37.55	-5.95	43.5	52.27	14.9	0.82	30.44	100	0	P	V
		116.4	30.97	-12.53	43.5	42.91	17.55	0.92	30.41	-	-	P	V
		188.22	24.17	-19.33	43.5	37.73	15.48	1.29	30.33	-	-	P	V
		689.9	29.25	-16.75	46	30.06	26.49	2.23	29.53	-	-	P	V
		986	33.2	-20.8	54	29.38	29.95	2.76	28.89	-	-	P	V
													V
													V
													V
													V
													V
													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	**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. Radiated Spurious Emission Plots

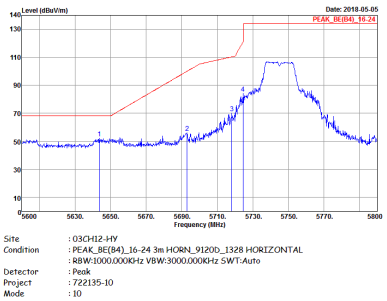
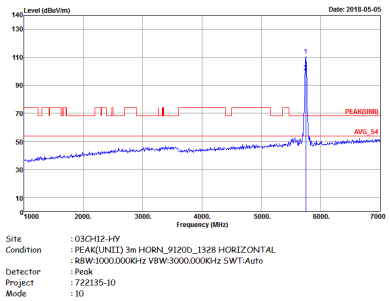
Test Engineer :	Karl Hou, Nick Yu, and Peter Liao	**Temperature :**	23~25°C
		Relative Humidity :	56~61%

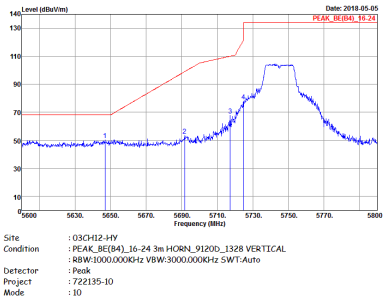
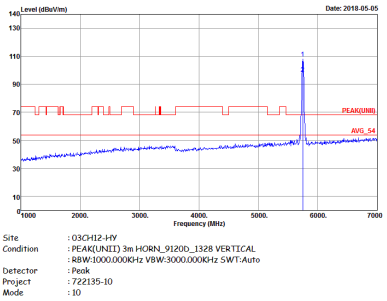
Note symbol

-L	**Low channel location**
-R	**High channel location**

Band 4 - 5725~5850MHz

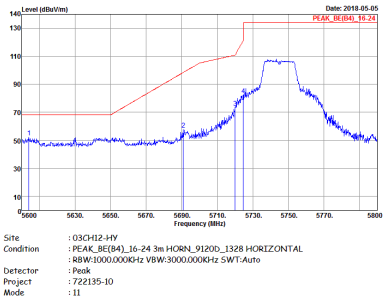
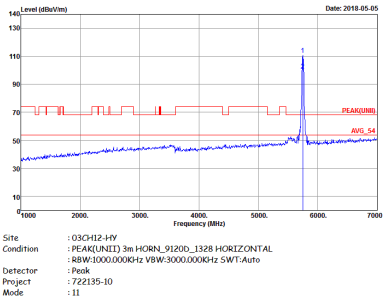
WIFI 802.11a (Band Edge @ 3m)

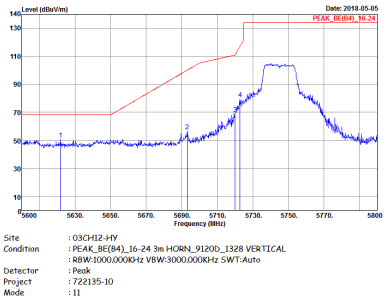
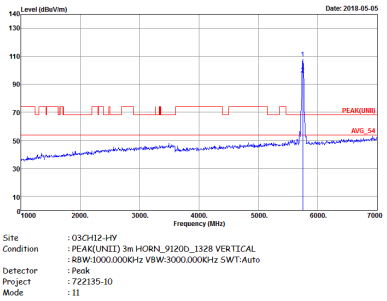
WIFI	**Band 4 5725~5850MHz Band Edge @ 3m**	
ANT	**802.11a CH149 5745MHz**	
1	**Horizontal**	**Fundamental**
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Vertical	Fundamental
Peak		

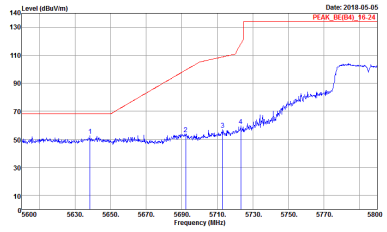
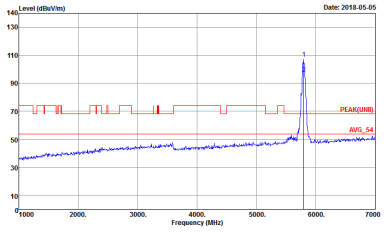
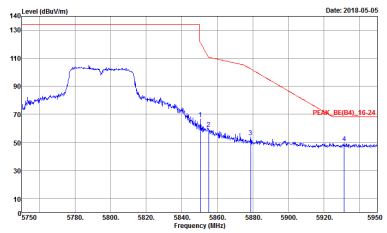
Band 4 5725~5850MHz

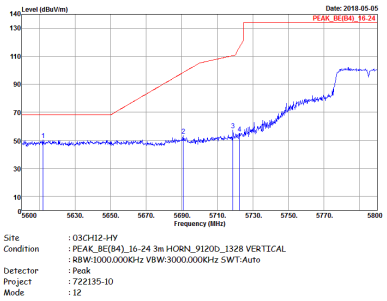
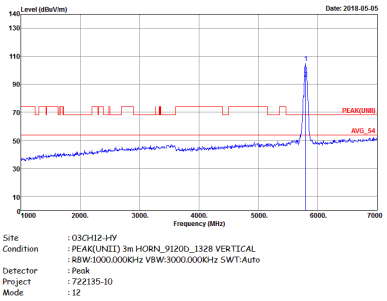
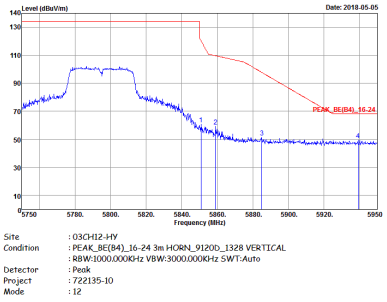
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Vertical	Fundamental
Peak		

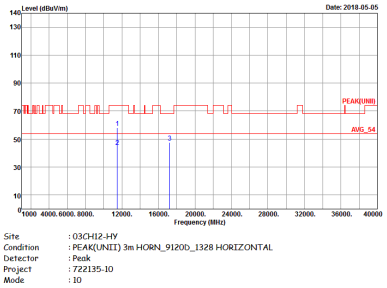
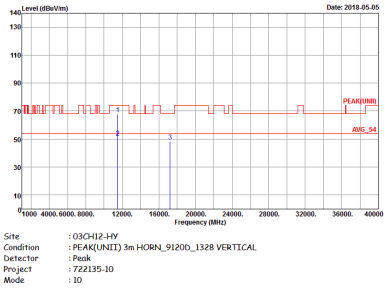
Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 722135-10 Mode : 12	 Site : 03CH12-HY Condition : PEAK(UNII) 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 722135-10 Mode : 12
Peak	 Site : 03CH12-HY Condition : PEAK_BE(B4)_16-24 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 722135-10 Mode : 12	Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

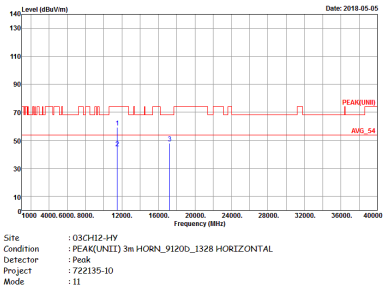
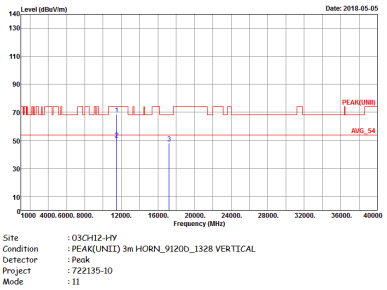
Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

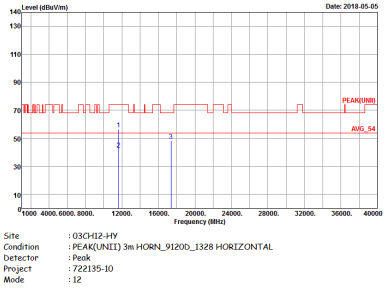
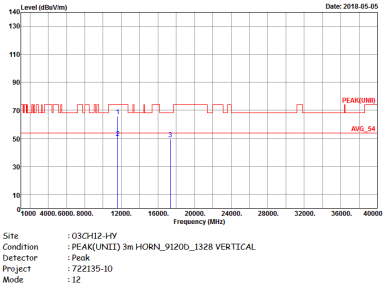
Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT20 CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

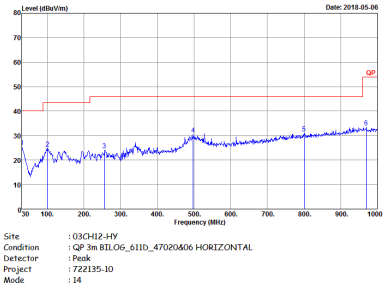
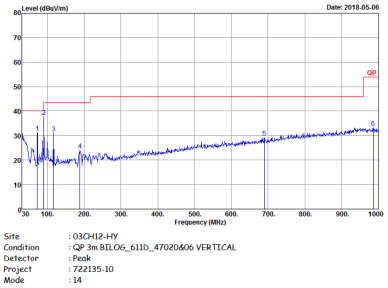
Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

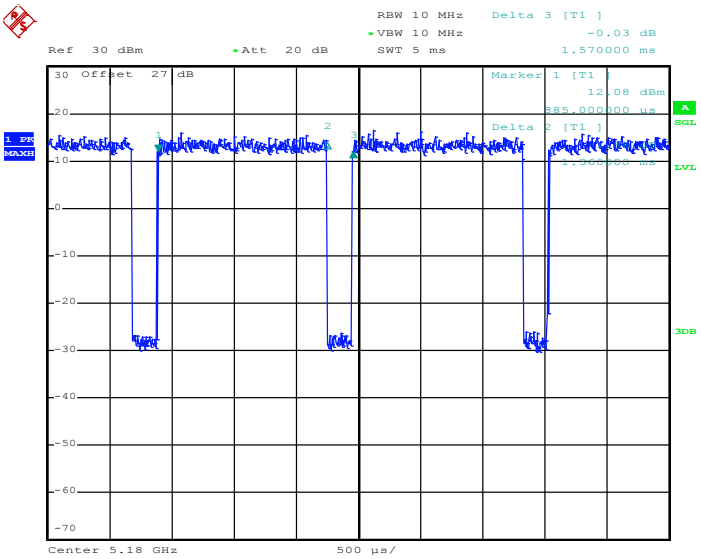
5GHz WIFI 802.11a (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

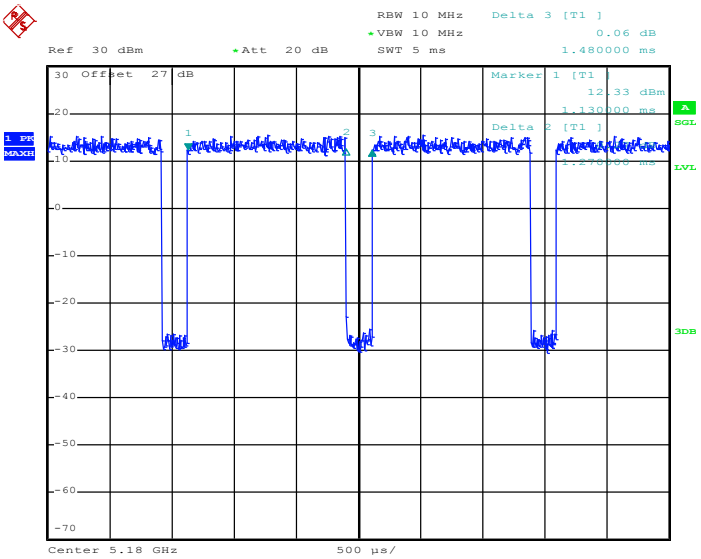
Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor (dB)
802.11a	86.62	1360.00	0.74	1kHz	0.62
5GHz 802.11n HT20	85.81	1270.00	0.79	1kHz	0.66
5GHz 802.11n HT40	85.14	1260.00	0.79	1kHz	0.70

802.11a



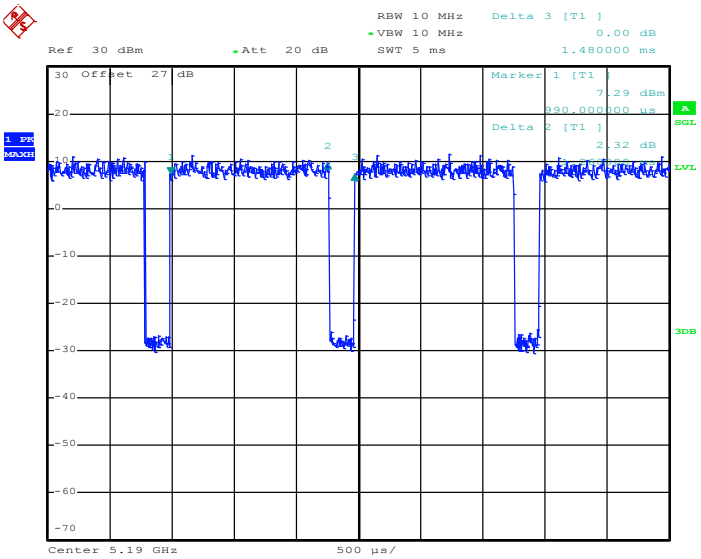
Date: 18.APR.2018 17:20:53

802.11n HT20



Date: 18.APR.2018 17:19:38

802.11n HT40



Date: 18.APR.2018 17:18:15