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 C §15.247**

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.)

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History of this test report

Report No.	Version	Description	Issued Date
FR722135-10C	01	Initial issue of report	May 21, 2018
FR722135-10C	02	Revise the report type to variant report	May 29, 2018
FR722135-10C	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
-	15.247(a)(2)	6dB Bandwidth	Not Required	-
-	2.1049	99% Occupied Bandwidth	Not Required	-
3.1	15.247(b)	Power Output Measurement	Pass	-
-	15.247(e)	Power Spectral Density	Not Required	-
-	15.247(d)	Conducted Band Edges	Not Required	-
		Conducted Spurious Emission	Not Required	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 2.33 dB at 2389.905 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 11.32 dB at 0.566 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Remark:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report. All the test cases were performed on original report which can be referred to Sporton Report Number FR722135-07C (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 C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- 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 (Y 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)
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		

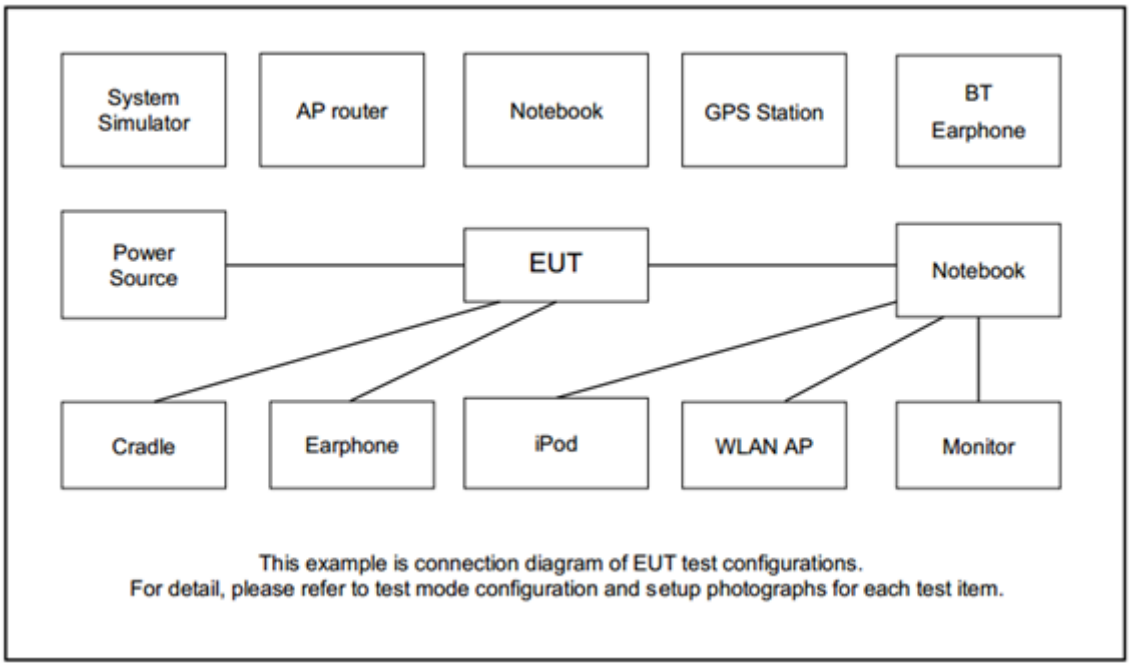
2.2 Test Mode

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**

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)

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 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the 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.

3.1.2 Measuring Instruments

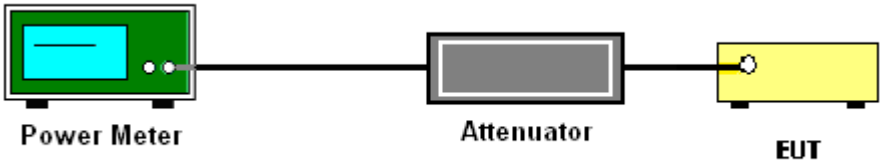
See list of measuring equipment of this test report.

3.1.3 Test Procedures

The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.2.3.2 Method AVGPM-G.

1. 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.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power (Reporting Only)

Please refer to Appendix A.

3.1.6 Test Result of Average output Power

Please refer to Appendix A.

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 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

3.2.2 Measuring Instruments

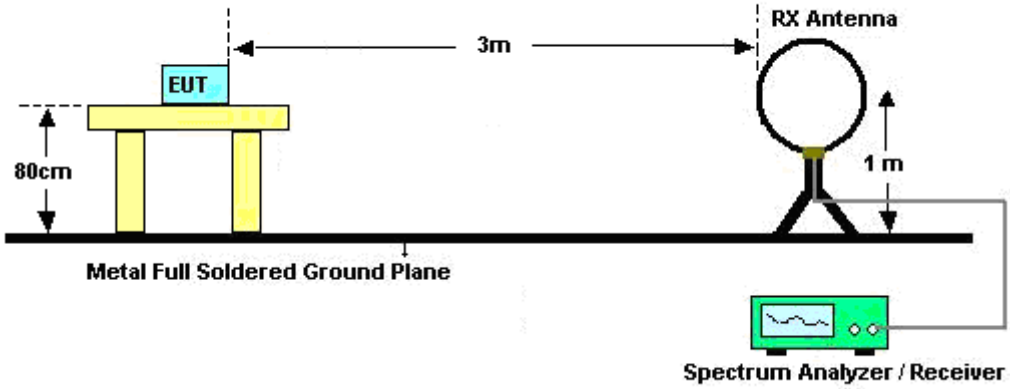
See list of measuring equipment of this test report.

3.2.3 Test Procedures

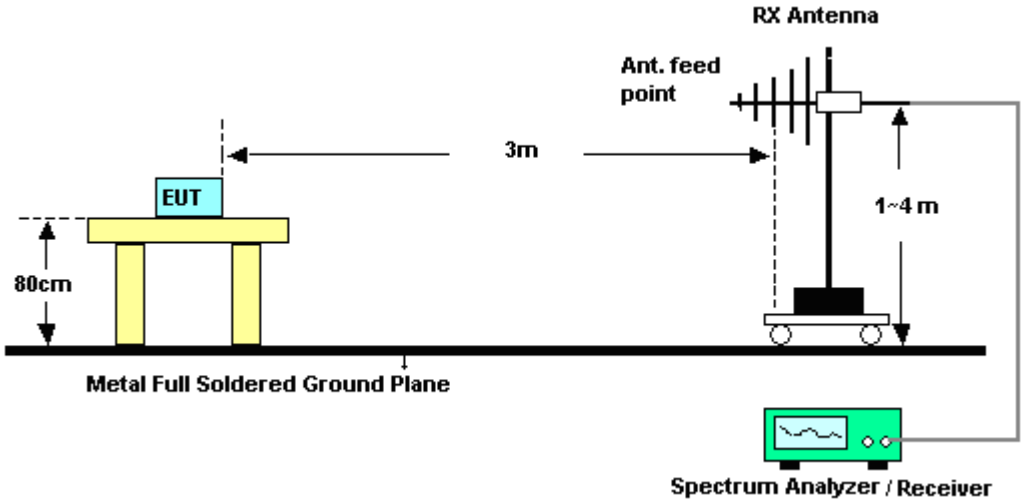
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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.

3.2.4 Test Setup

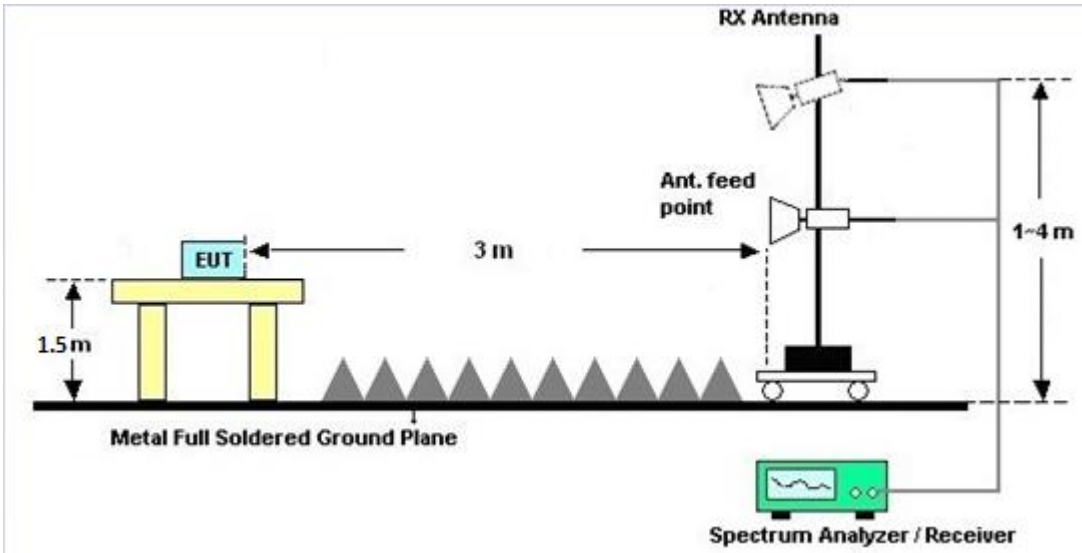
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated 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.

3.2.6 Test Result of Radiated Spurious at 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 Radiated Spurious 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.

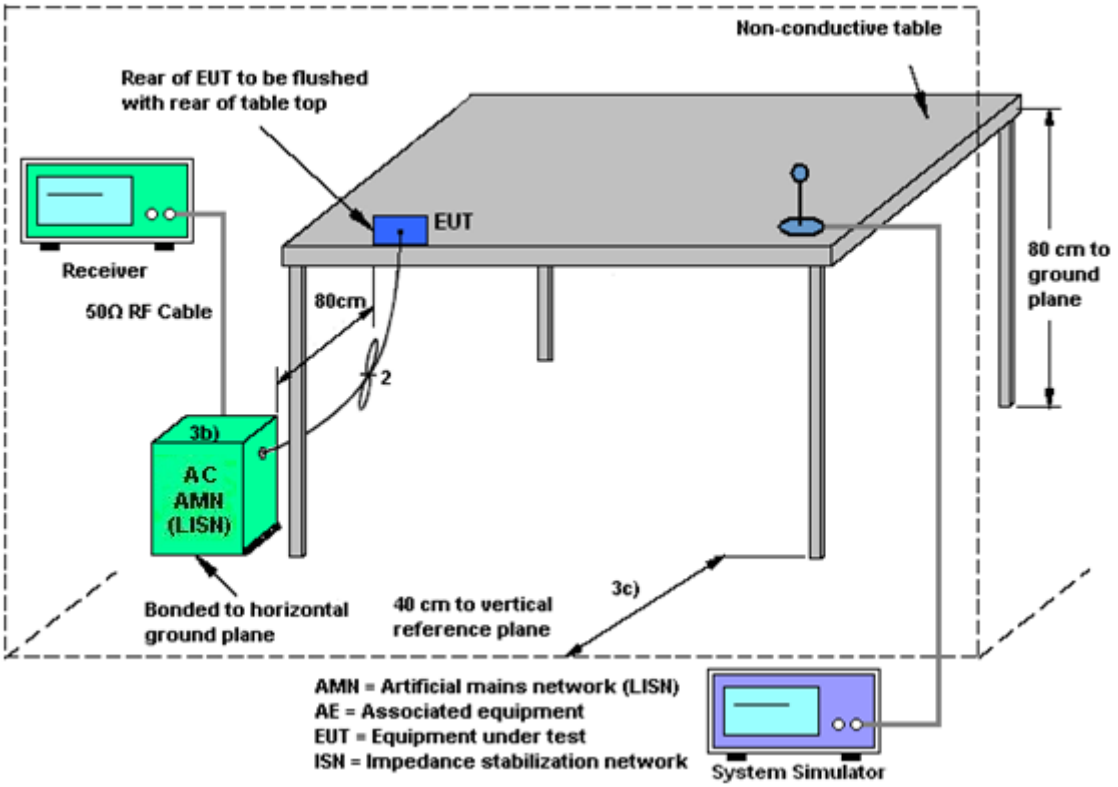
3.3.2 Measuring Instruments

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, 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.

3.3.4 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 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.

3.4.2 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	Sep. 25, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 26, 2017	Apr. 18, 2018	Sep. 25, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 13, 2017	Apr. 18, 2018	Nov. 12, 2018	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1300484	N/A	Mar. 01, 2018	Apr. 18, 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)
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)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	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
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	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3 GHz Highpass	Mar. 23, 2018	May 02, 2018~ May 06, 2018	Mar. 22, 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)

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	Relative Humidity:	51~54	%

Report Number : FR722135-10C

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 1	Ant 1	Ant 1	Ant 1	
11b	1Mbps	1	1	2412	18.01	30.00	-6.60	11.41	36.00	Pass
11b	1Mbps	1	6	2437	18.02	30.00	-6.60	11.42	36.00	Pass
11b	1Mbps	1	11	2462	18.12	30.00	-6.60	11.52	36.00	Pass
11g	6Mbps	1	1	2412	22.10	30.00	-6.60	15.50	36.00	Pass
11g	6Mbps	1	6	2437	21.89	30.00	-6.60	15.29	36.00	Pass
11g	6Mbps	1	11	2462	20.56	30.00	-6.60	13.96	36.00	Pass
HT20	MCS0	1	1	2412	21.50	30.00	-6.60	14.90	36.00	Pass
HT20	MCS0	1	6	2437	21.61	30.00	-6.60	15.01	36.00	Pass
HT20	MCS0	1	11	2462	20.32	30.00	-6.60	13.72	36.00	Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
					Ant 1	Ant 1
11b	1Mbps	1	1	2412	0.10	15.25
11b	1Mbps	1	6	2437	0.10	15.24
11b	1Mbps	1	11	2462	0.10	15.37
11g	6Mbps	1	1	2412	0.58	15.20
11g	6Mbps	1	6	2437	0.58	15.54
11g	6Mbps	1	11	2462	0.58	13.81
HT20	MCS0	1	1	2412	0.62	14.22
HT20	MCS0	1	6	2437	0.62	15.99
HT20	MCS0	1	11	2462	0.62	13.34

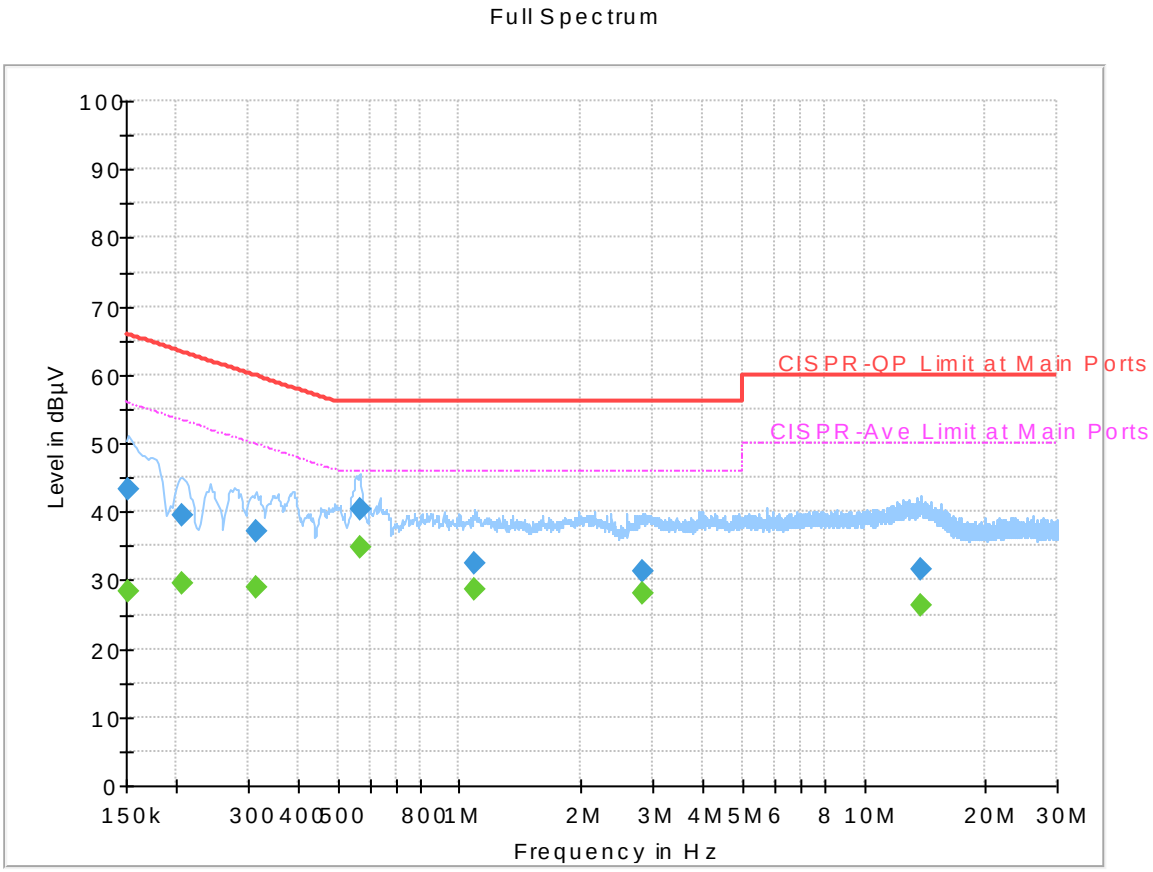
Note: Measured power (dBm) has offset with cable loss.

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

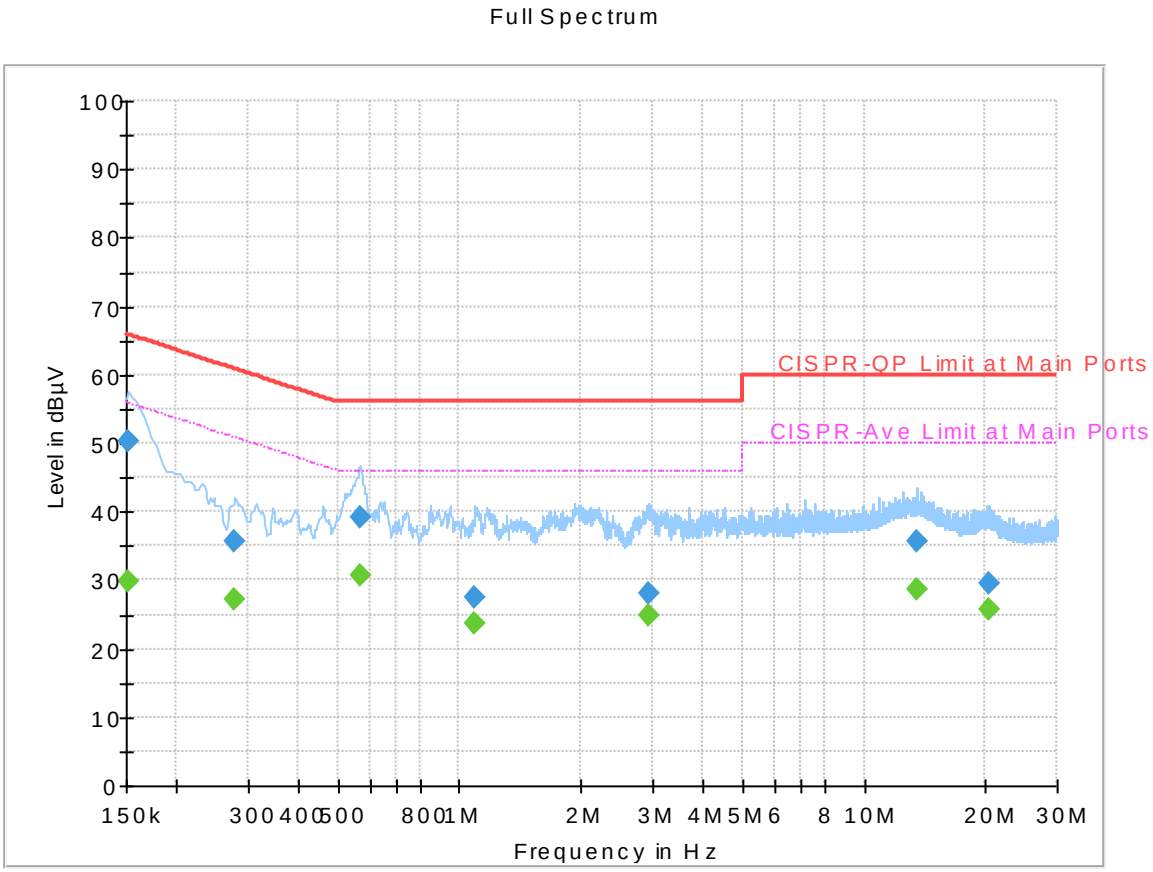


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	28.23	55.88	27.65	L1	OFF	19.5
0.152250	43.23	---	65.88	22.65	L1	OFF	19.5
0.206250	---	29.49	53.36	23.87	L1	OFF	19.5
0.206250	39.49	---	63.36	23.87	L1	OFF	19.5
0.314250	---	28.90	49.86	20.96	L1	OFF	19.5
0.314250	37.01	---	59.86	22.85	L1	OFF	19.5
0.566250	---	34.68	46.00	11.32	L1	OFF	19.5
0.566250	40.28	---	56.00	15.72	L1	OFF	19.5
1.092750	---	28.55	46.00	17.45	L1	OFF	19.5
1.092750	32.60	---	56.00	23.40	L1	OFF	19.5
2.847750	---	28.00	46.00	18.00	L1	OFF	19.6
2.847750	31.18	---	56.00	24.82	L1	OFF	19.6
13.857000	---	26.27	50.00	23.73	L1	OFF	19.7
13.857000	31.46	---	60.00	28.54	L1	OFF	19.7

EUT Information

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



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	29.83	55.88	26.05	N	OFF	19.5
0.152250	50.32	---	65.88	15.56	N	OFF	19.5
0.278250	---	27.18	50.87	23.69	N	OFF	19.5
0.278250	35.56	---	60.87	25.31	N	OFF	19.5
0.566250	---	30.83	46.00	15.17	N	OFF	19.5
0.566250	39.08	---	56.00	16.92	N	OFF	19.5
1.095000	---	23.71	46.00	22.29	N	OFF	19.5
1.095000	27.42	---	56.00	28.58	N	OFF	19.5
2.935500	---	24.80	46.00	21.20	N	OFF	19.6
2.935500	28.04	---	56.00	27.96	N	OFF	19.6
13.560000	---	28.73	50.00	21.27	N	OFF	19.8
13.560000	35.65	---	60.00	24.35	N	OFF	19.8
20.316750	---	25.59	50.00	24.41	N	OFF	19.9
20.316750	29.66	---	60.00	30.34	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%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (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)
802.11b CH 11 2462MHz	*	2462	102.57	-	-	92.7	27.32	14.11	31.56	108	124	P	H
	*	2462	98.2	-	-	88.33	27.32	14.11	31.56	108	124	A	H
		2487.28	54.09	-19.91	74	44.15	27.36	14.14	31.56	108	124	P	H
		2487.52	42.84	-11.16	54	32.86	27.4	14.14	31.56	108	124	A	H
													H
													H
	*	2462	103.86	-	-	93.99	27.32	14.11	31.56	198	88	P	V
	*	2462	99.29	-	-	89.42	27.32	14.11	31.56	198	88	A	V
		2488.92	54.69	-19.31	74	44.71	27.4	14.14	31.56	198	88	P	V
		2487.68	43.04	-10.96	54	33.06	27.4	14.14	31.56	198	88	A	V
													V
													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 11 2462MHz		4924	40.52	-33.48	74	58.76	31.56	6.73	56.53	100	0	P	H
		7386	44.66	-29.34	74	56.46	36.33	8.01	56.14	100	0	P	H
													H
													H
		4924	40	-34	74	58.24	31.56	6.73	56.53	100	0	P	V
		7386	45.18	-28.82	74	56.98	36.33	8.01	56.14	100	0	P	V
													V
													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. 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)
802.11g CH 06 2437MHz		2373.84	59.71	-14.29	74	50.14	27.11	14.04	31.58	100	120	P	H
		2384.48	43.94	-10.06	54	34.35	27.11	14.06	31.58	100	120	A	H
	*	2437	102.92	-	-	93.11	27.28	14.1	31.57	100	120	P	H
	*	2437	92.97	-	-	83.16	27.28	14.1	31.57	100	120	A	H
		2485.37	66.33	-7.67	74	56.39	27.36	14.14	31.56	100	120	P	H
		2489.22	44.51	-9.49	54	34.53	27.4	14.14	31.56	100	120	A	H
		2369.78	59.39	-14.61	74	49.82	27.11	14.04	31.58	183	89	P	V
		2384.9	44.38	-9.62	54	34.79	27.11	14.06	31.58	183	89	A	V
	*	2437	103.84	-	-	94.03	27.28	14.1	31.57	183	89	P	V
	*	2437	93.82	-	-	84.01	27.28	14.1	31.57	183	89	A	V
		2485.93	71.25	-2.75	74	61.31	27.36	14.14	31.56	183	89	P	V
		2489.22	45.17	-8.83	54	35.19	27.4	14.14	31.56	183	89	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	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 06 2437MHz		4874	38.94	-35.06	74	57.3	31.46	6.73	56.55	100	0	P	H
		7311	43.12	-30.88	74	55.17	36.11	8.07	56.23	100	0	P	H
													H
													H
		4874	38.75	-35.25	74	57.11	31.46	6.73	56.55	100	0	P	V
		7311	43.75	-30.25	74	55.8	36.11	8.07	56.23	100	0	P	V
													V
													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. 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 01 2412MHz		2389.8	66.21	-7.79	74	56.57	27.15	14.06	31.57	101	121	P	H
		2389.38	49.21	-4.79	54	39.58	27.15	14.06	31.58	101	121	A	H
	*	2412	100.3	-	-	90.6	27.19	14.08	31.57	101	121	P	H
	*	2412	90.28	-	-	80.58	27.19	14.08	31.57	101	121	A	H
													H
													H
		2389.905	71.67	-2.33	74	62.03	27.15	14.06	31.57	207	89	P	V
		2390	50.18	-3.82	54	40.54	27.15	14.06	31.57	207	89	A	V
	*	2412	101.83	-	-	92.13	27.19	14.08	31.57	207	89	P	V
	*	2412	91.89	-	-	82.19	27.19	14.08	31.57	207	89	A	V
													V
													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. 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 01 2412MHz		4824	38.72	-35.28	74	57.23	31.36	6.7	56.57	100	0	P	H
													H
													H
													H
		4824	39.23	-34.77	74	57.74	31.36	6.7	56.57	100	0	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

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)
2.4GHz 802.11n HT20 LF		30	25.17	-14.83	40	28.71	26.2	0.44	30.18	-	-	P	H
		133.95	24.05	-19.45	43.5	35.39	18.04	1.01	30.39	-	-	P	H
		254.1	23.03	-22.97	46	32.61	19.2	1.44	30.22	-	-	P	H
		497.4	32.65	-13.35	46	36.24	24.34	1.86	29.79	100	0	P	H
		810.3	31.37	-14.63	46	30.01	28.22	2.42	29.28	-	-	P	H
		997.2	33.55	-20.45	54	29.73	29.91	2.77	28.86	-	-	P	H
													H
													H
													H
													H
													H
													H
		85.35	34.45	-5.55	40	49.67	14.4	0.82	30.44	100	0	P	V
		100.2	26.94	-16.56	43.5	40.32	16.2	0.85	30.43	-	-	P	V
		164.19	23.58	-19.92	43.5	36.06	16.7	1.18	30.36	-	-	P	V
		256.8	23.47	-22.53	46	32.72	19.5	1.47	30.22	-	-	P	V
		722.1	31.38	-14.62	46	31.47	27.1	2.28	29.47	-	-	P	V
		960.1	34.25	-19.75	54	30.4	30.06	2.75	28.96	-	-	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

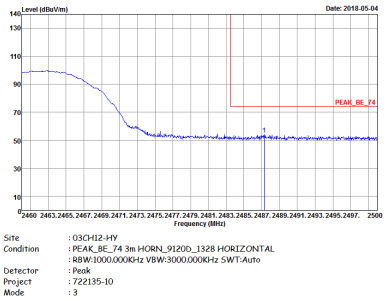
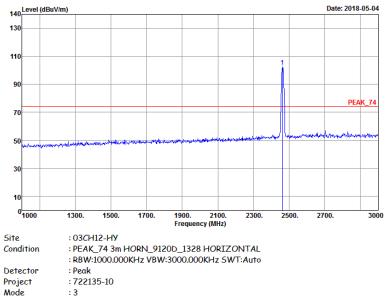
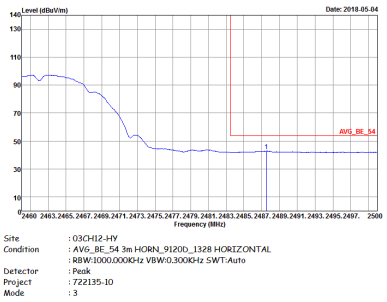
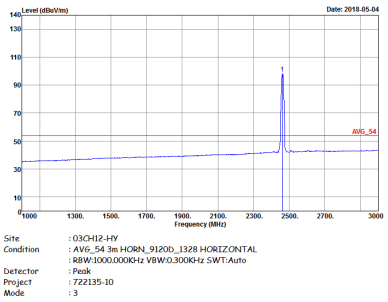
Test Engineer :	Karl Hou, Nick Yu, and Peter Liao	**Temperature :**	23~25°C
		Relative Humidity :	56~61%

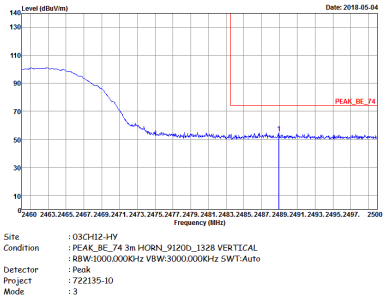
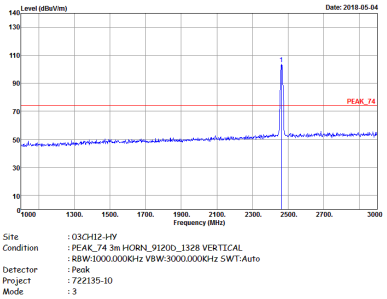
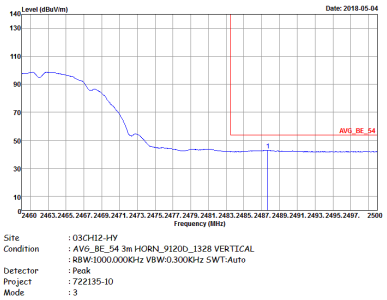
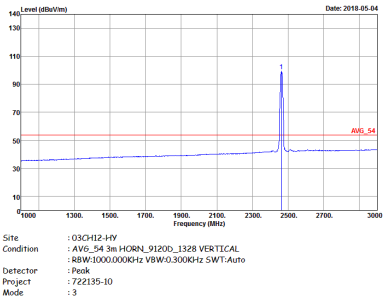
Note symbol

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

2.4GHz 2400~2483.5MHz

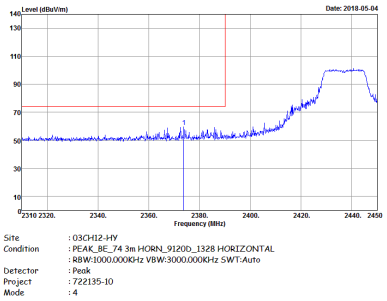
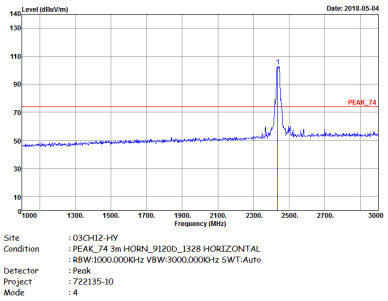
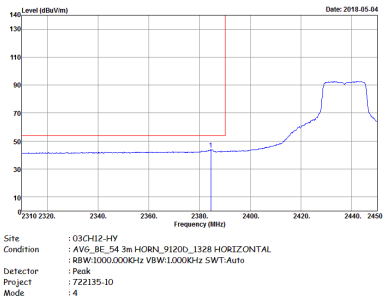
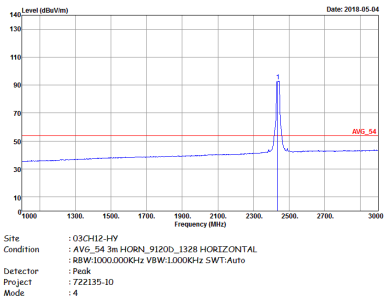
WIFI 802.11b (Band Edge @ 3m)

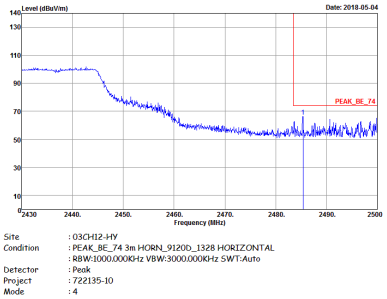
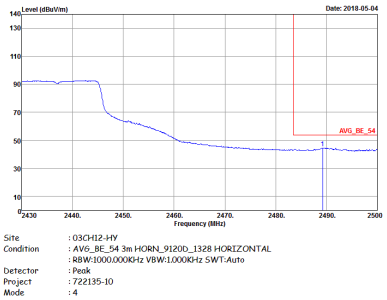
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

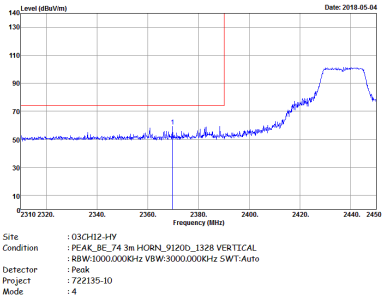
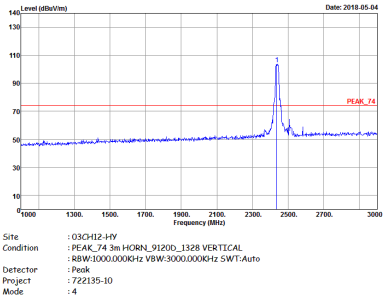
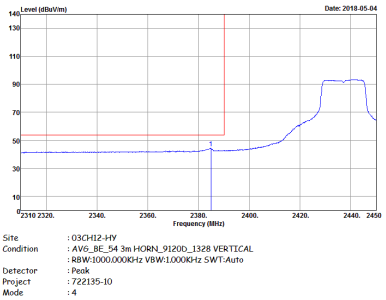
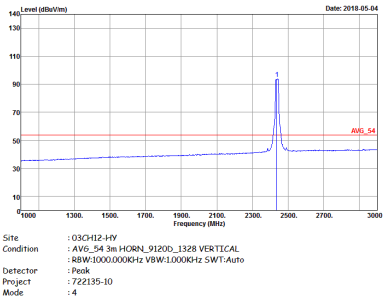
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

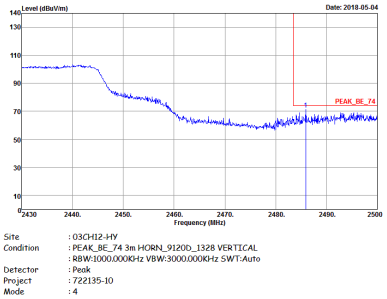
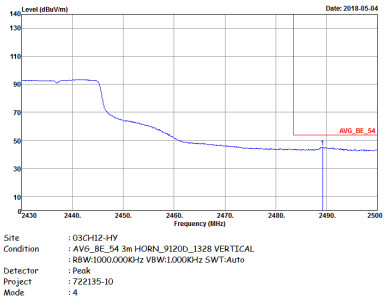
2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

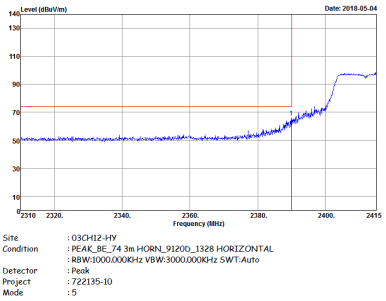
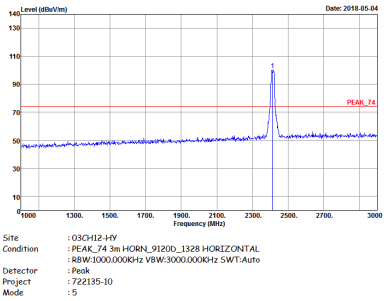
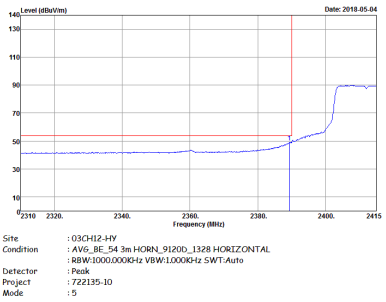
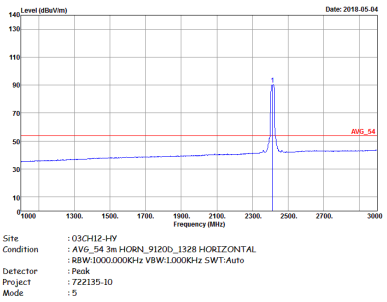
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

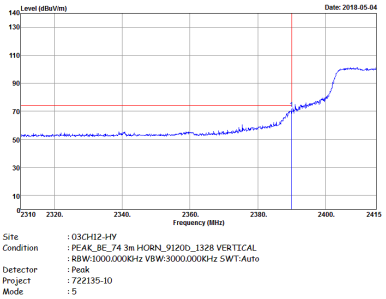
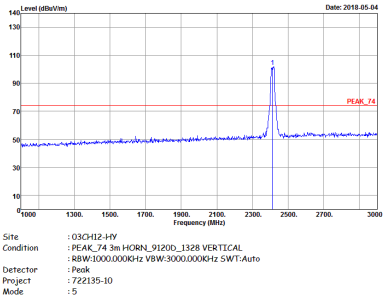
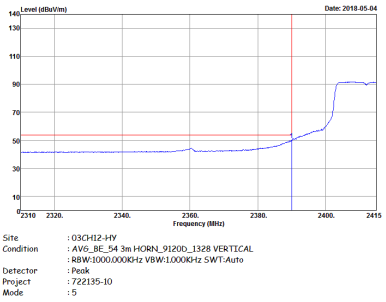
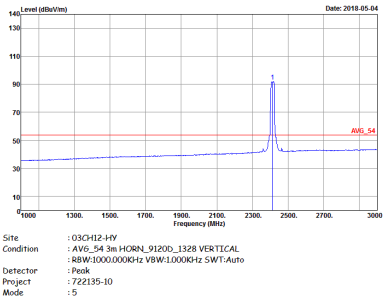
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Vertical	Fundamental
Peak		Left Blank
Avg.		Left Blank

2.4GHz 2400~2483.5MHz

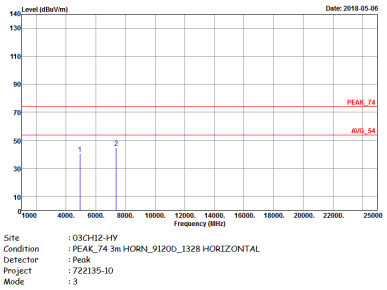
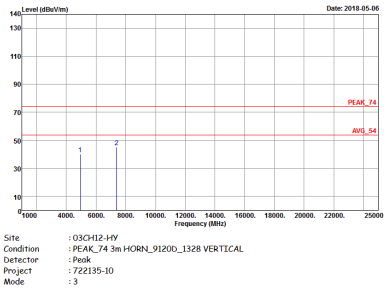
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

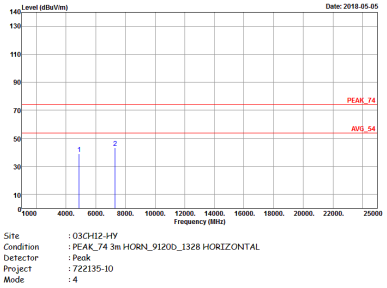
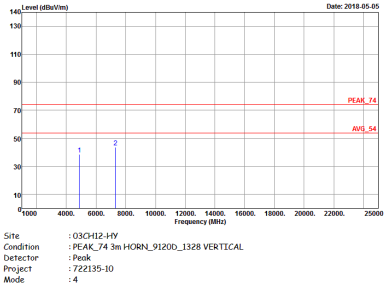
2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.		

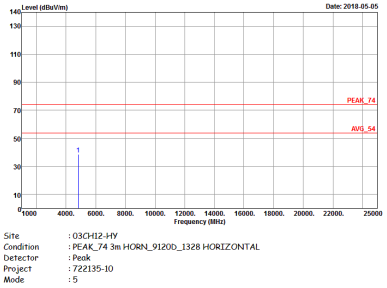
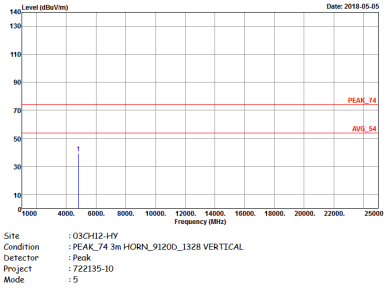
2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.		

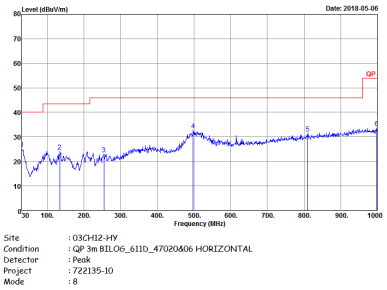
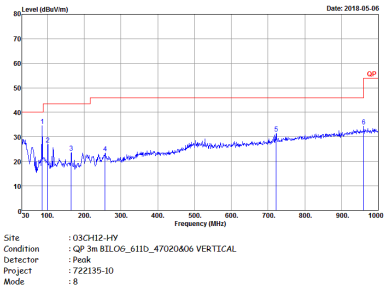
2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

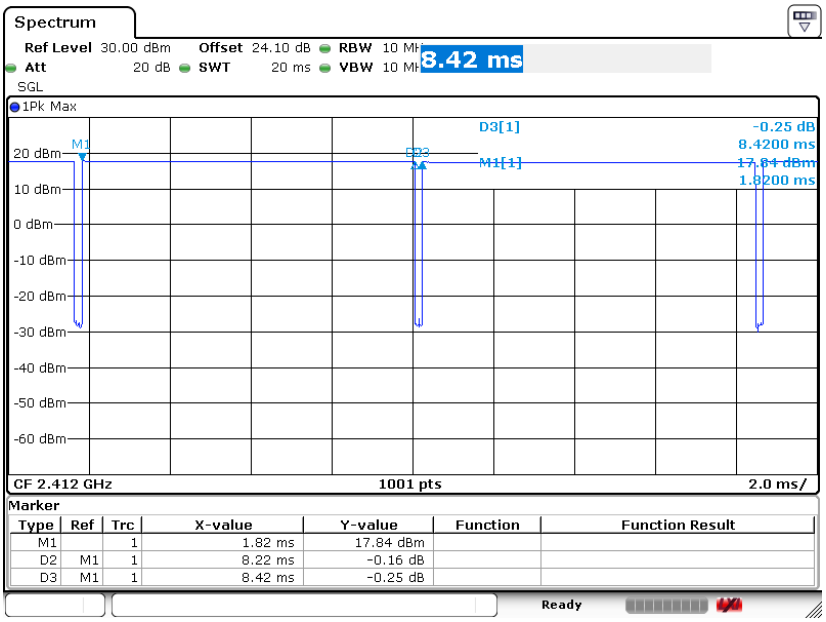
2.4GHz WIFI 802.11n HT20 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT20 LF	
1	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

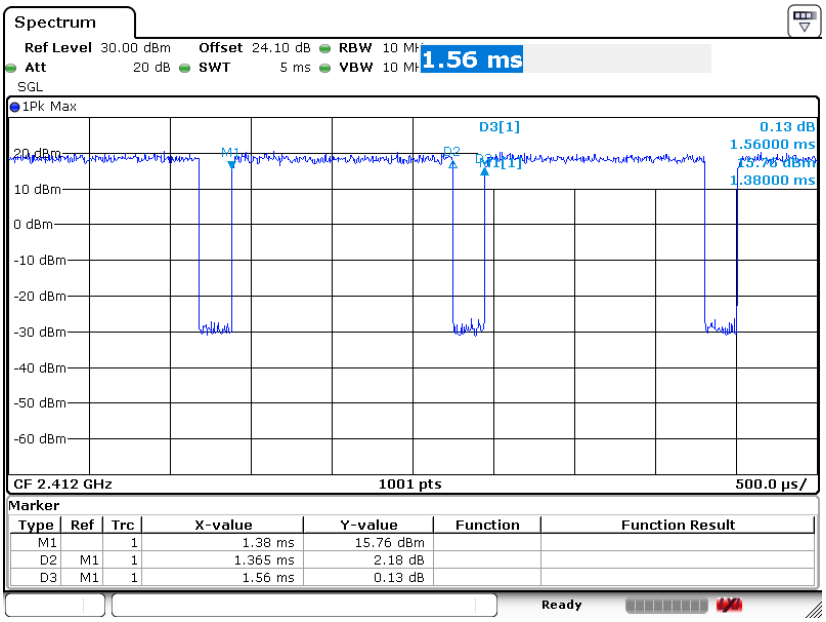
Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor (dB)
802.11b	97.62	8220.00	0.12	300Hz	0.10
802.11g	87.50	1365.00	0.73	1kHz	0.58
2.4GHz 802.11n HT20	86.73	1275.00	0.78	1kHz	0.62

802.11b



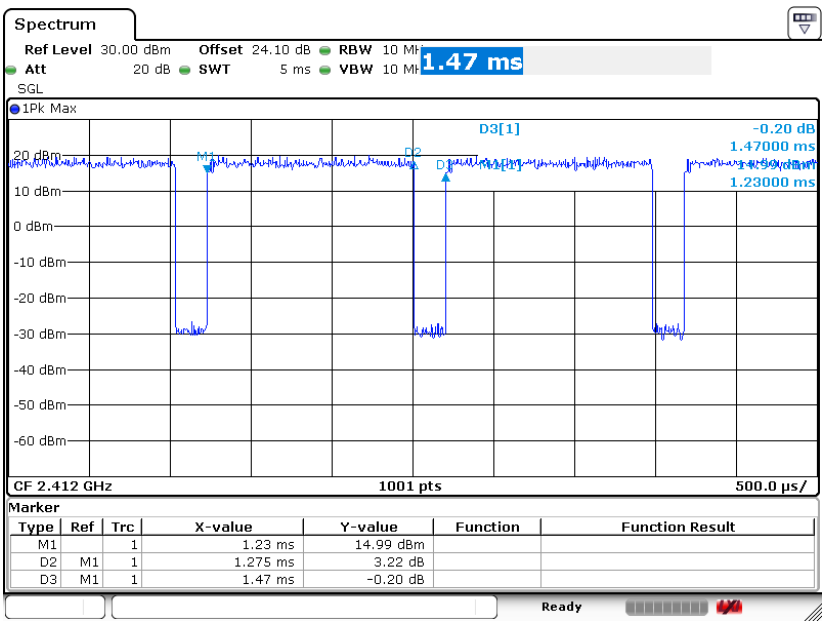
Date: 18.APR.2018 10:57:53

802.11g



Date: 18.APR.2018 11:15:29

802.11n HT20



Date: 18.APR.2018 11:35:13