FCC RF Test Report

FCC ID	:	**2AD9M-003A**
EQUIPMENT	:	**Smartphone**
BRAND NAME	:	**LEOMO**
MODEL NAME	:	**LEM-TS1**
MARKETING NAME	:	**LEOMO TYPE-S**
APPLICANT	:	**LEOMO, Inc. 7-22-17 Nishi Gotanda TOC Bldg. 7F Shinagawa-ku,Tokyo, 1410031, Japan**
MANUFACTURER	:	**LEOMO, Inc. 2000 Central Avenue, Suite 150, Boulder CO 80301, USA**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Apr. 24, 2019 and testing was completed on Jun. 12, 2019. We, Sporton International (Kunshan) 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.

This report contains data that were produced under subcontract by Laboratory SPORTON INTERNATIONAL INC.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR942441C	Rev. 01	Initial issue of report	Jun. 21, 2019
FR942441C	Rev. 02	Update the address of Appilicant.	Jul. 15, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 30dBc	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 4.05 dB at 2484.400 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.53 dB at 0.778 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-
Remark: Not required means after assessing, test items are not necessary to carry out.					

1 General Description

1.1 Applicant

LEOMO, Inc.
7-22-17 Nishi Gotanda TOC Bldg. 7F Shinagawa-ku,Tokyo, 1410031, Japan

1.2 Manufacturer

LEOMO, Inc.
2000 Central Avenue, Suite 150, Boulder CO 80301, USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smartphone
Brand Name	LEOMO
Model Name	LEM-TS1
FCC ID	2AD9M-003A
EUT supports Radios application	GSM/WCDMA/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR/EDR/LE/ANT+ NFC and GNSS
IMEI Code	Conducted : N/A Conduction : 355681100008836 Radiation : 355681100008745/355681100008700
HW Version	DVT
SW Version	000T_1_020
EUT Stage	Identical Prototype

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 (AV) Output Power to antenna	802.11b : 15.90 dBm (0.0389 W) 802.11g : 13.70 dBm (0.0234 W) 802.11n HT20 : 10.80 dBm (0.0120 W) 802.11n HT40 : 10.70 dBm (0.0117 W)
99% Occupied Bandwidth	802.11b : 13.50MHz 802.11g : 17.25MHz 802.11n HT20 : 18.10MHz 802.11n HT40 : 36.80MHz
Antenna Type / Gain	Loop Antenna with gain -1.57 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 INTERNATIONAL INC. is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and under the FCC-recognized accredited testing laboratories by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist. Taoyuan City Taiwan Tel: 886-3-327-3456 FAX: +886-3-327-0978		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	TH05-HY CO05-HY	TW1190	553509

Test data subcontracted: All test item of this report except Radiated Spurious Emission.

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH05-KS	CN1257	314309

1.7 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r01
- 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: 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)
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		

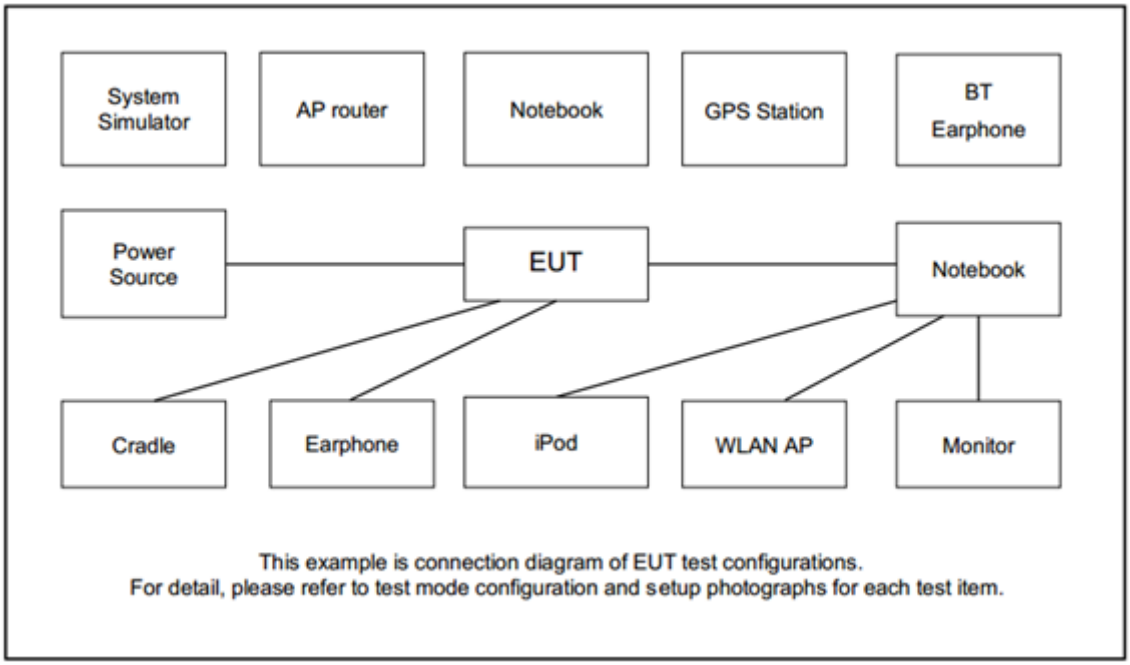
2.2 Test Mode

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
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :LTE Band 17 Idle + Bluetooth Link + WLAN (2.4G)Link + ANT+Link + Power Bank + USB Cable + Adapter
Remark: For Radiated Test Cases, The tests were performance with Adapter and USB Cable	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	BT Base Station	R&S	CBT	N/A	N/A	Unshielded,1.8m
3.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded,1.8m
4.	WLAN AP	ASUS	RT-AC1750	MSQ-RTAC66U B1	N/A	Unshielded,1.8m
5.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	Adapter	Nokia	AS-10WU	N/A	N/A	N/A
7.	Bluetooth Earphone	SonyErricsson	MW600	PY700A2029	N/A	N/A
8.	USB Cable	Nokia	N/A	N/A	Shielded, 1.0m	N/A
9.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
10.	ANT Plus	FIH	N/A	N/A	N/A	N/A
11.	Power Bank	LEOMO	LEM-PM1	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit/receive.

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 2 dB and 10dB attenuator.

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

= 2 + 10 = 12 (dB)

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.

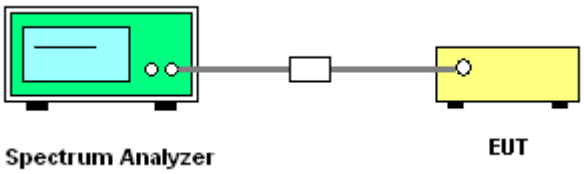
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

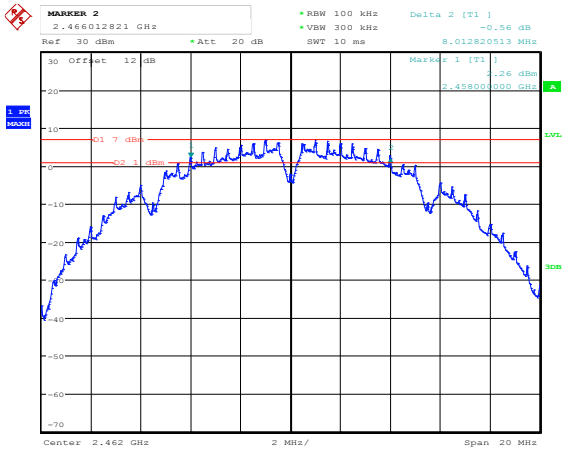
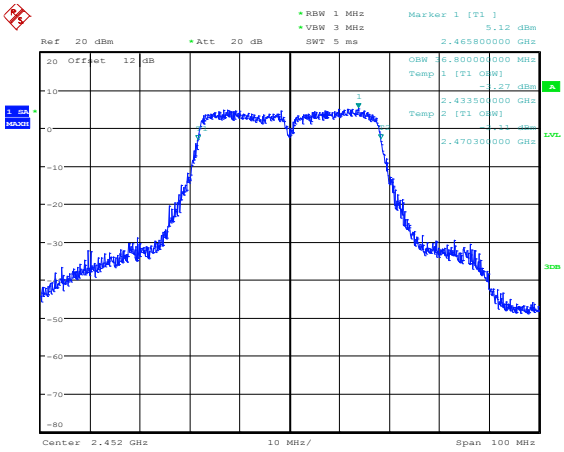
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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 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.

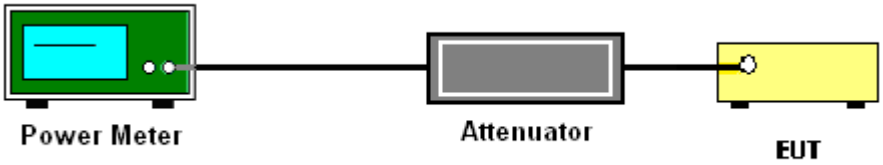
3.2.2 Measuring Instruments

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 ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.2 Method AVGPM-G 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 Average Output Power

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.

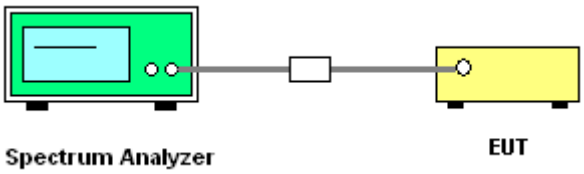
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
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.

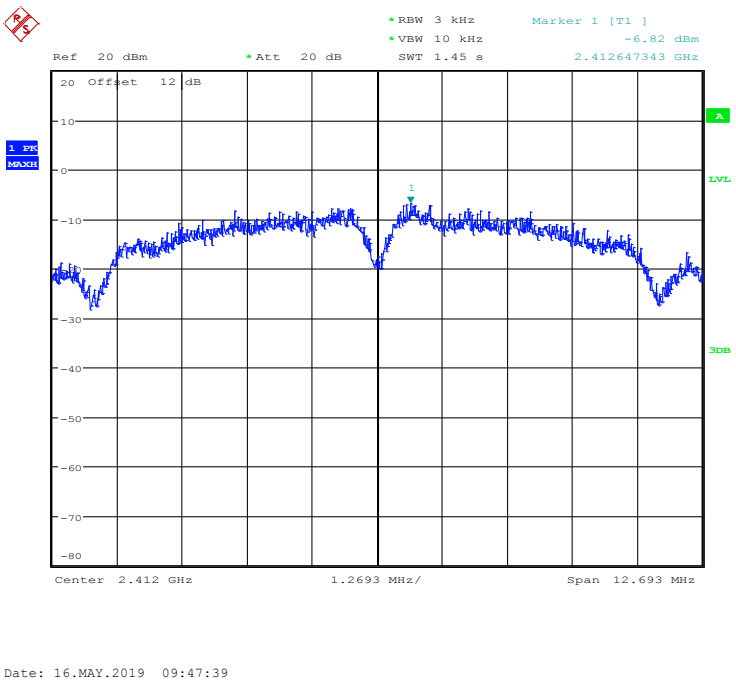
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



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.

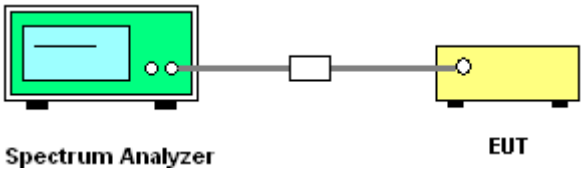
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.13
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

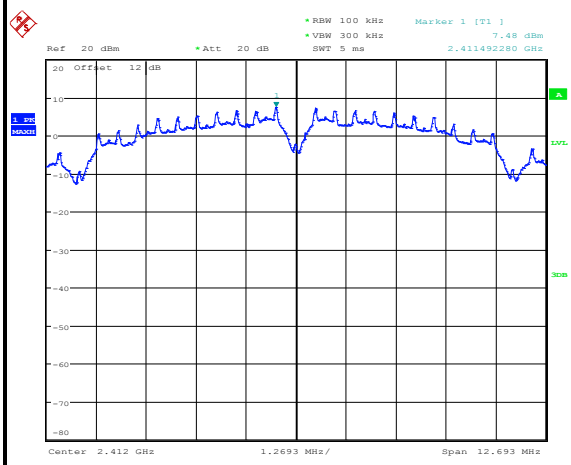


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Howard Lin	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

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

100kHz PSD reference Level



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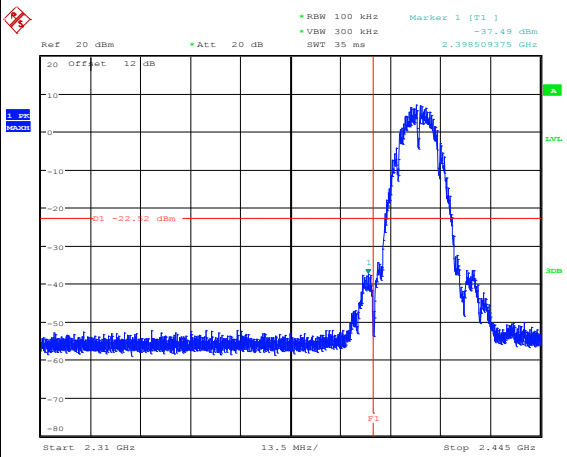
Channel Plot



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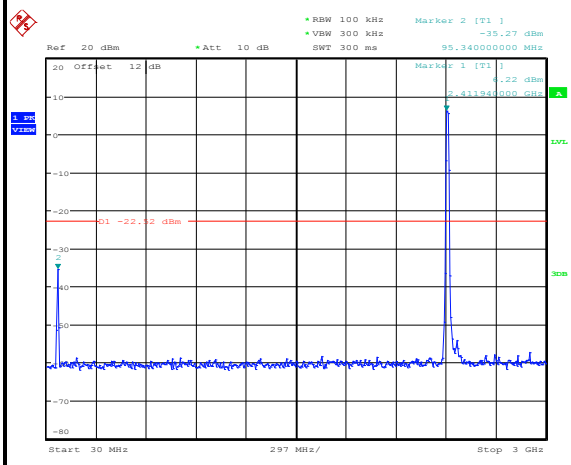
Spurious Emission 30MHz~3GHz



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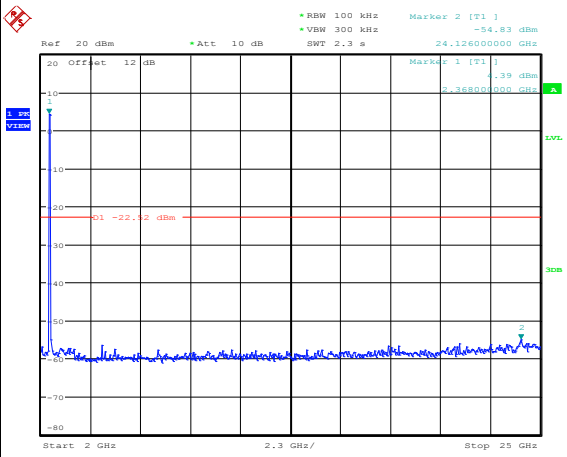
Spurious Emission 2GHz~25GHz



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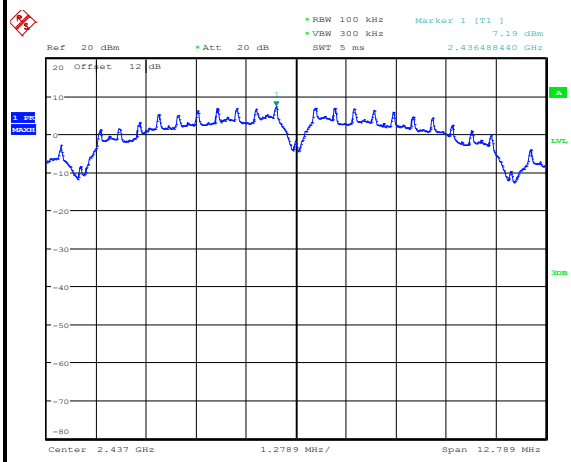
Test Mode :	802.11b	Test Channel :	06

100kHz PSD reference Level



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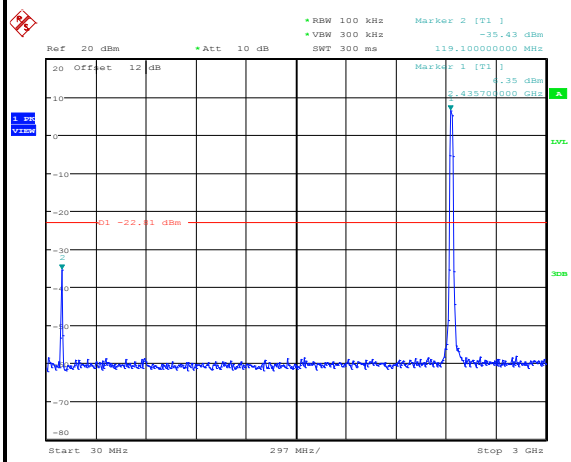
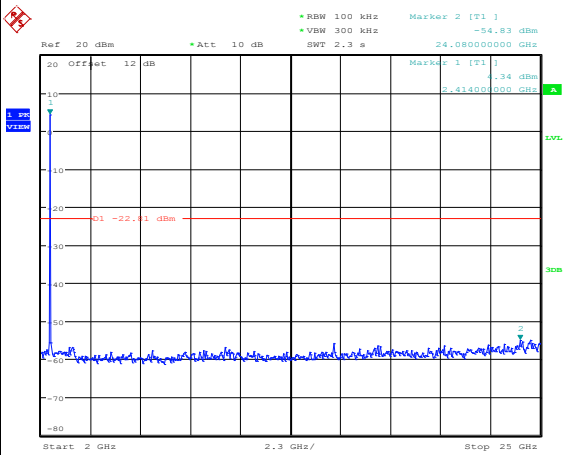
Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 09:58:49

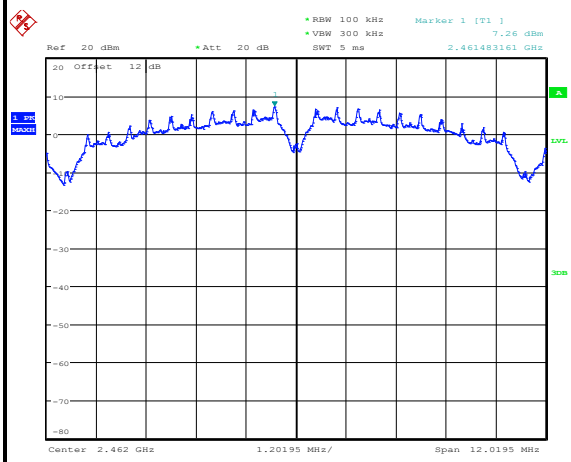
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 09:59:35

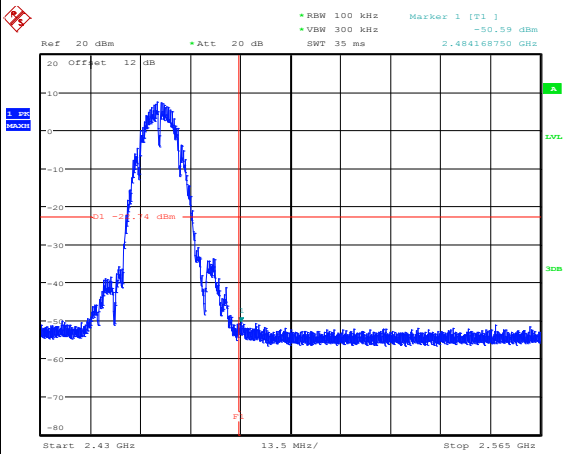
Test Mode :	802.11b	Test Channel :	11

100kHz PSD reference Level



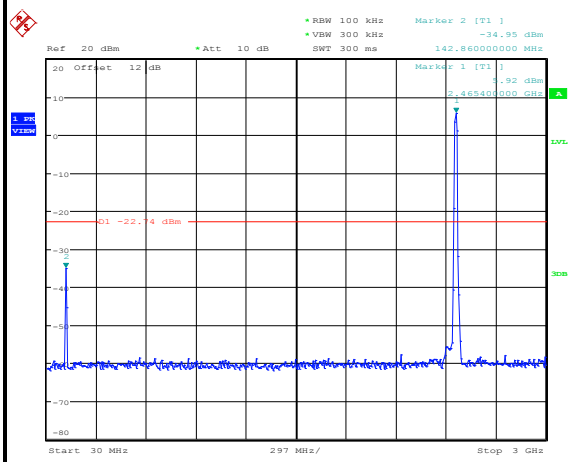
Date: 16.MAY.2019 10:09:25

Channel Plot



Date: 16.MAY.2019 10:10:47

Spurious Emission 30MHz~3GHz



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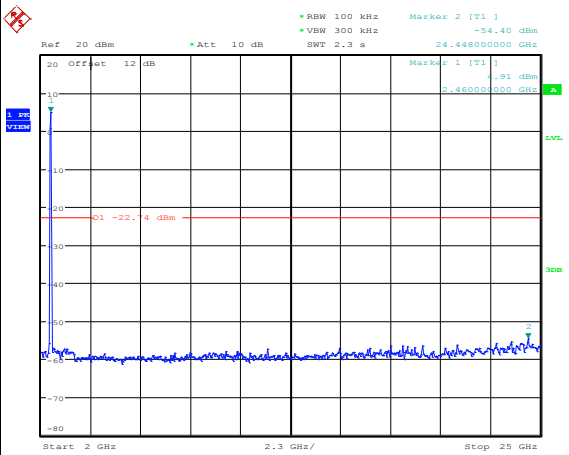
Spurious Emission 2GHz~25GHz



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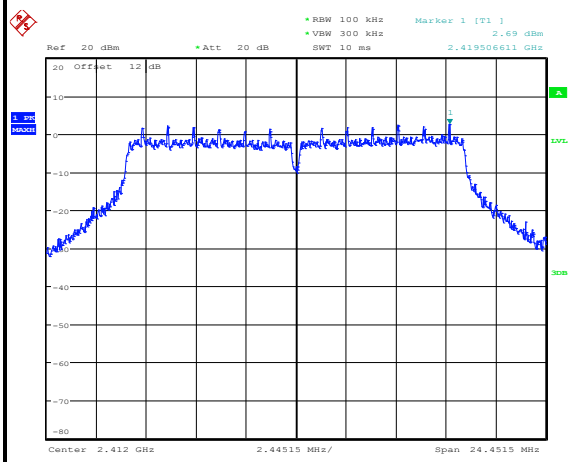
Test Mode :	802.11g	Test Channel :	01

100kHz PSD reference Level



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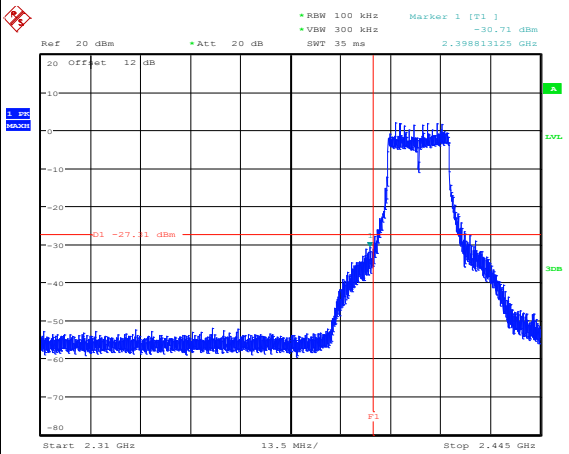
Channel Plot



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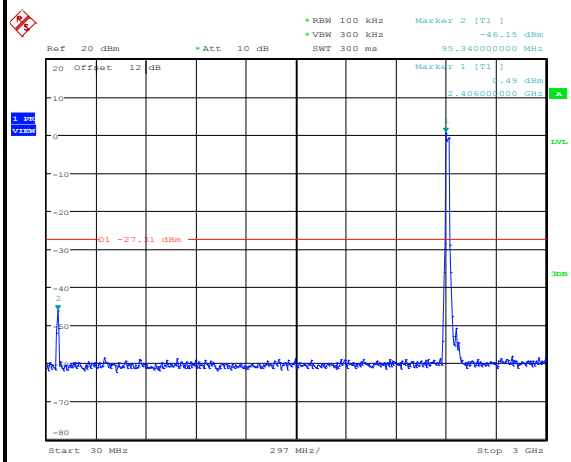
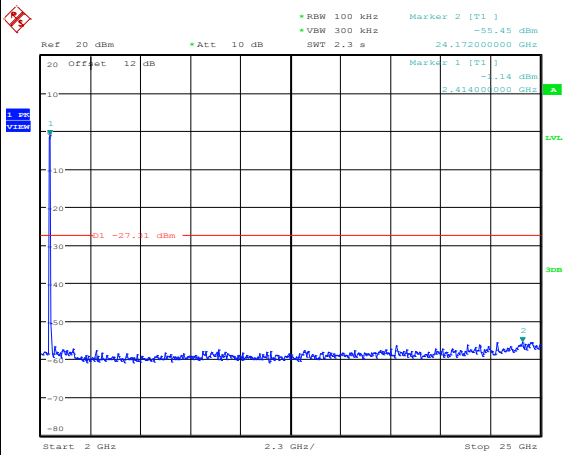
Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 10:21:49

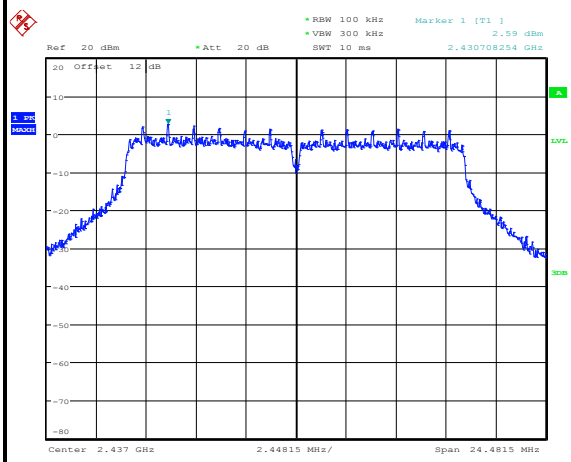
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 10:23:00

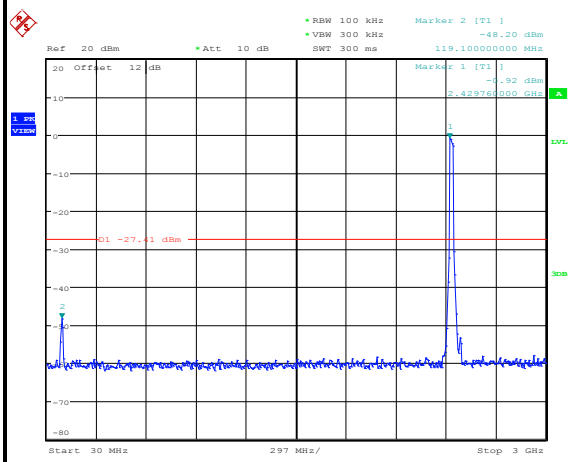
Test Mode :	802.11g	Test Channel :	06

100kHz PSD reference Level



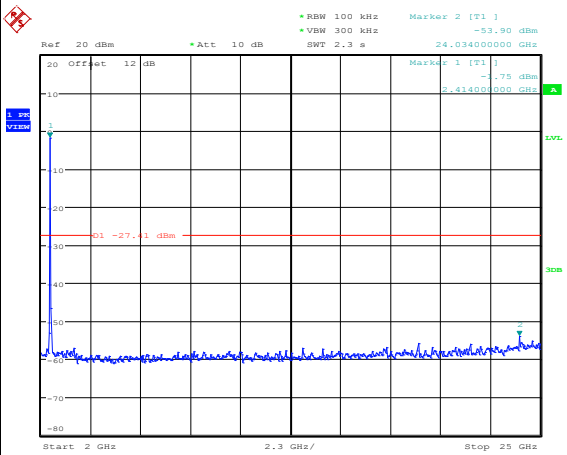
Date: 16.MAY.2019 10:27:27

Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 10:28:23

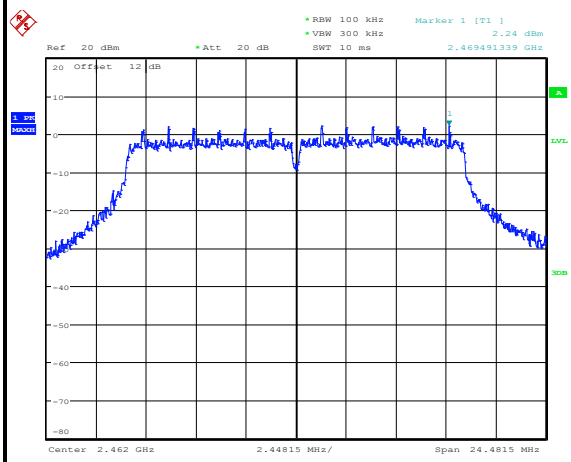
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 10:28:38

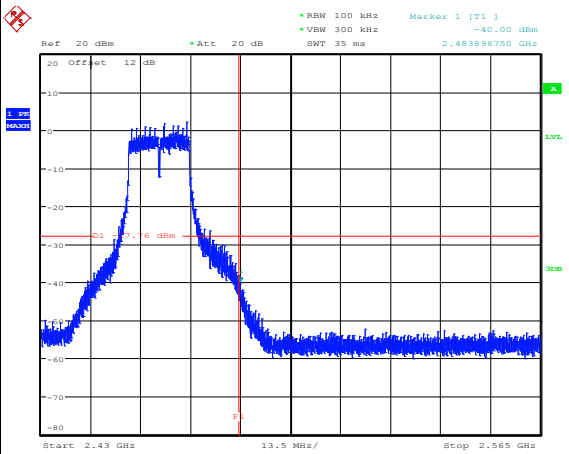
Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level



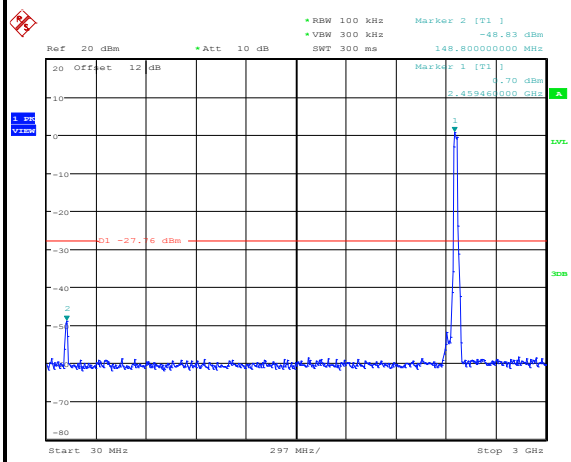
Date: 21.MAY.2019 18:31:03

Channel Plot



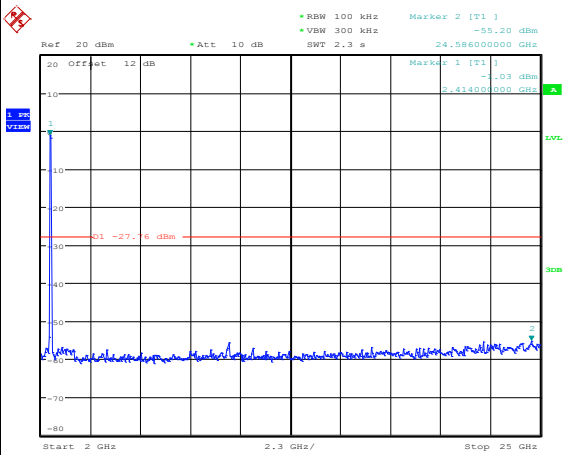
Date: 21.MAY.2019 18:32:04

Spurious Emission 30MHz~3GHz



Date: 21.MAY.2019 18:34:12

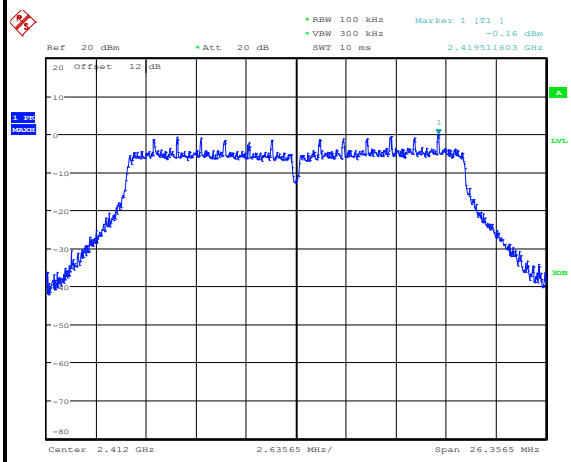
Spurious Emission 2GHz~25GHz



Date: 21.MAY.2019 18:34:34

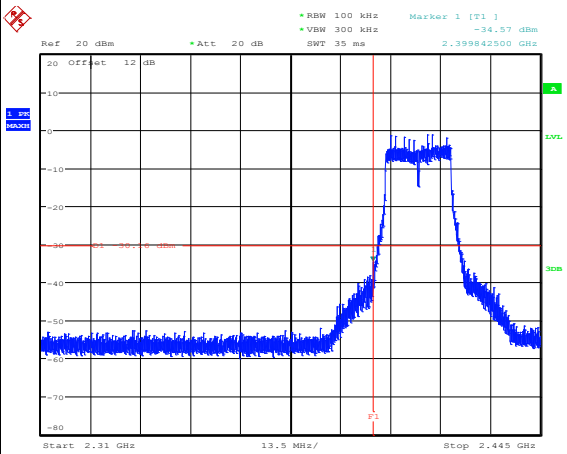
Test Mode :	802.11n HT20	Test Channel :	01

100kHz PSD reference Level



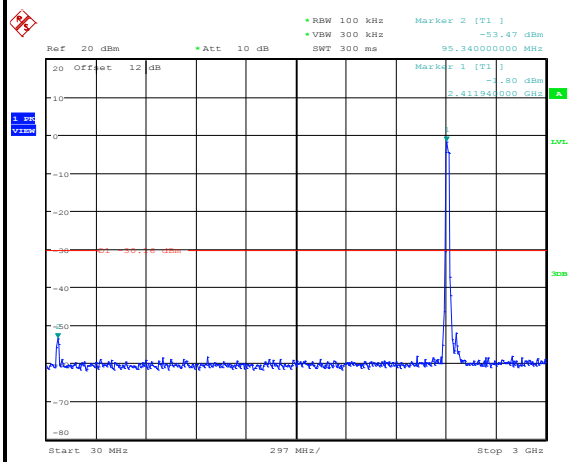
Date: 16.MAY.2019 10:38:42

Channel Plot



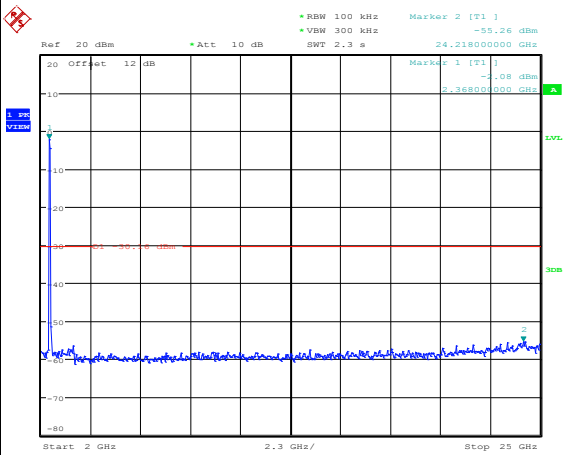
Date: 16.MAY.2019 10:39:44

Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 10:40:22

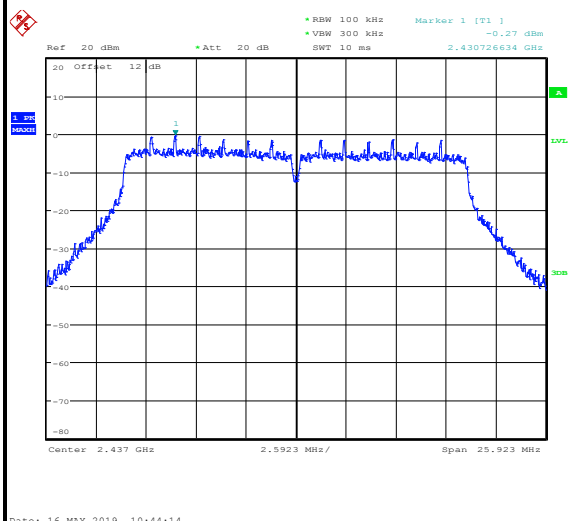
Spurious Emission 2GHz~25GHz



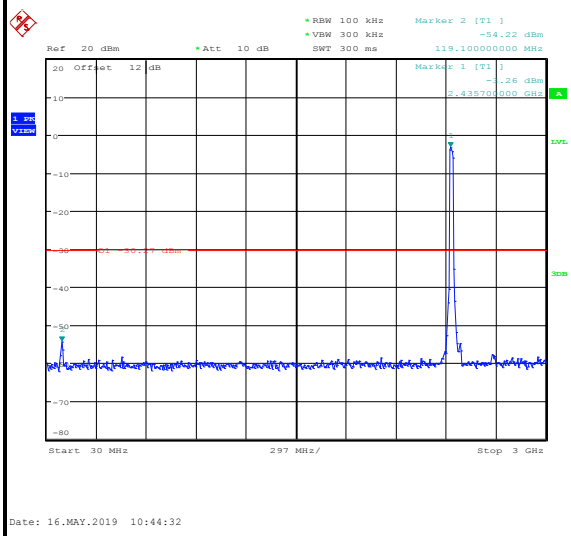
Date: 16.MAY.2019 10:40:47

Test Mode :	802.11n HT20	Test Channel :	06

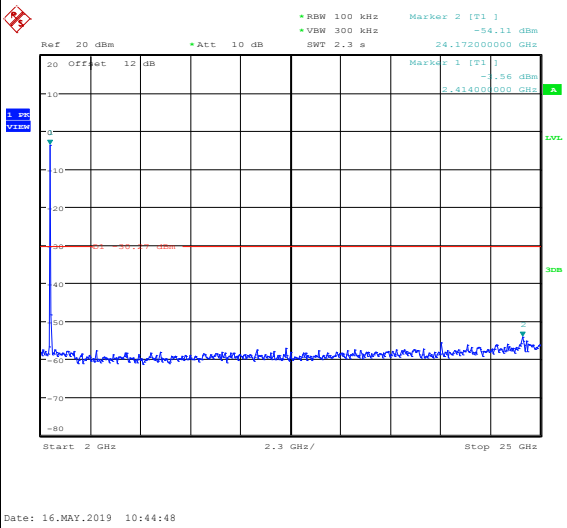
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

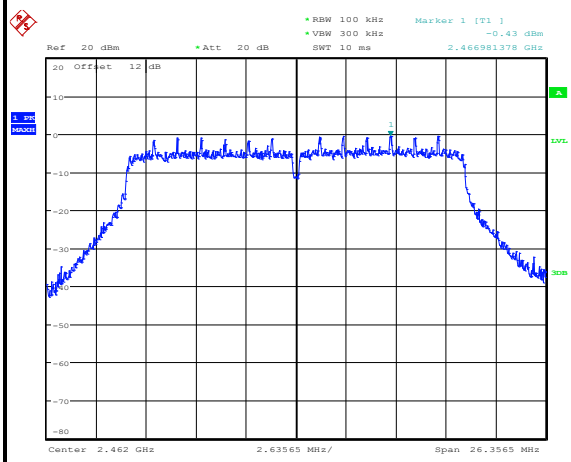


Spurious Emission 2GHz~25GHz



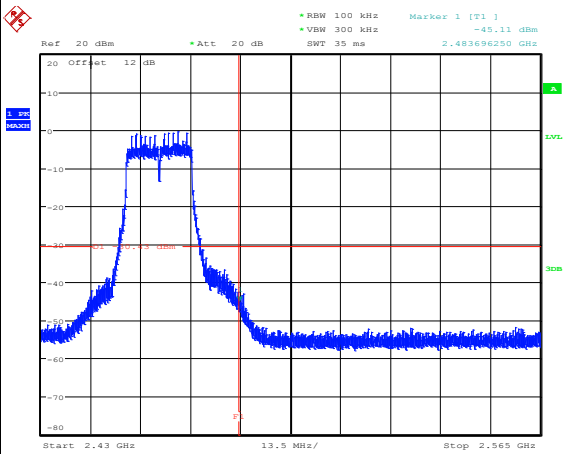
Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level



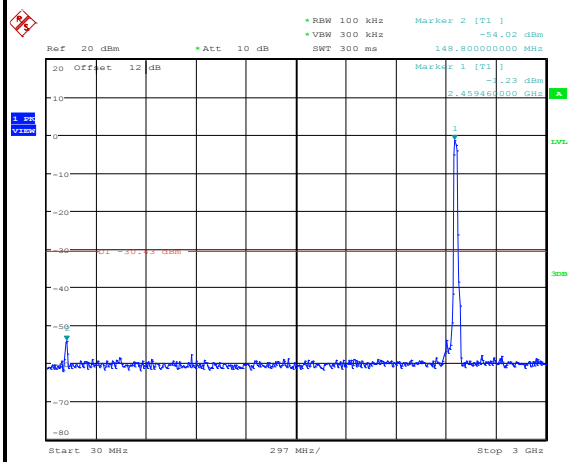
Date: 16.MAY.2019 10:59:05

Channel Plot



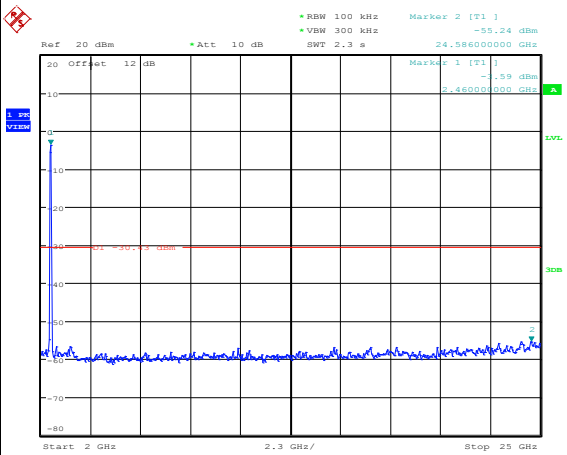
Date: 16.MAY.2019 10:59:33

Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 11:00:26

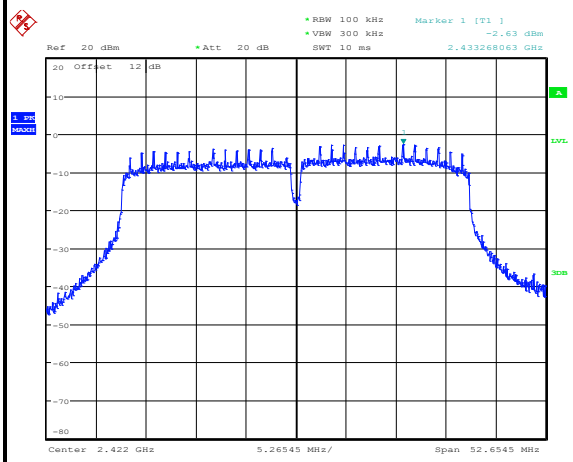
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 11:00:48

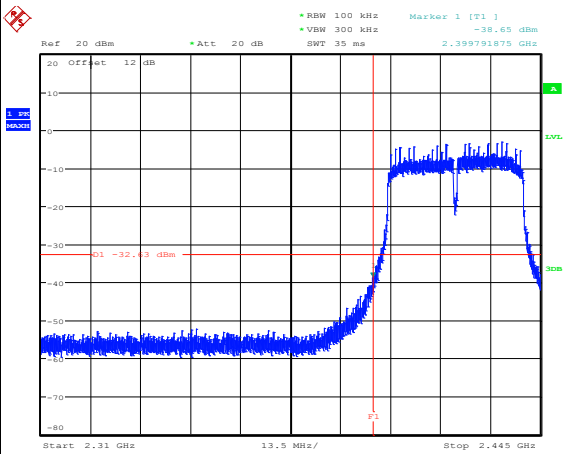
Test Mode :	802.11n HT40	Test Channel :	03

100kHz PSD reference Level



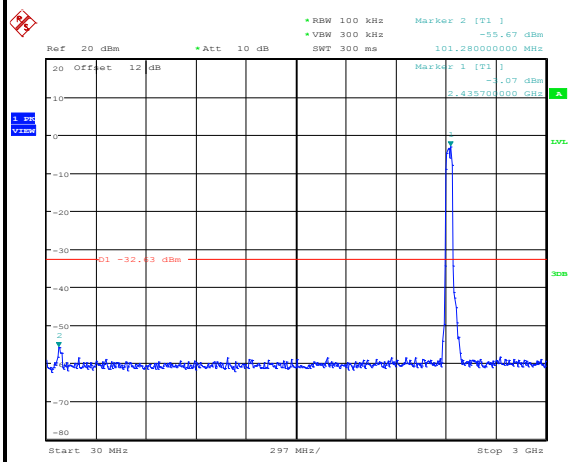
Date: 16.MAY.2019 11:10:56

Channel Plot



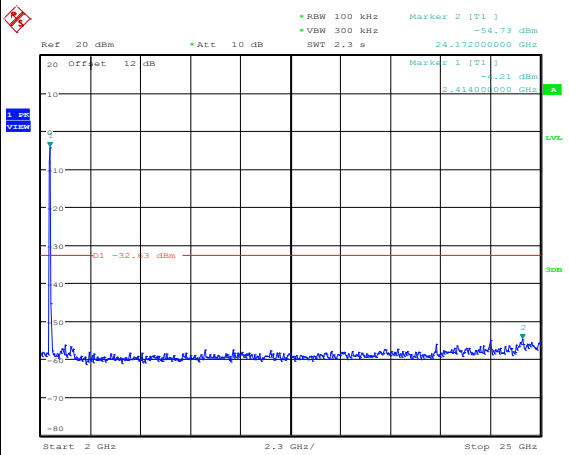
Date: 16.MAY.2019 11:11:12

Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 11:12:25

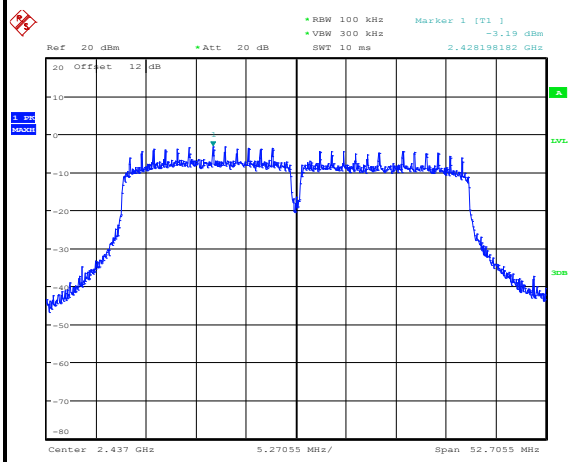
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 11:12:42

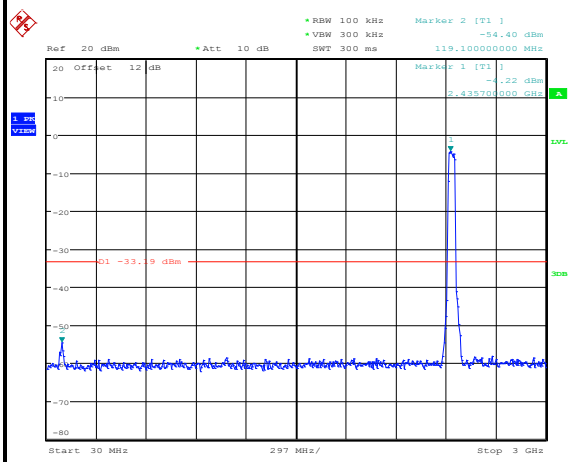
Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level



Date: 16.MAY.2019 11:16:49

Spurious Emission 30MHz~3GHz



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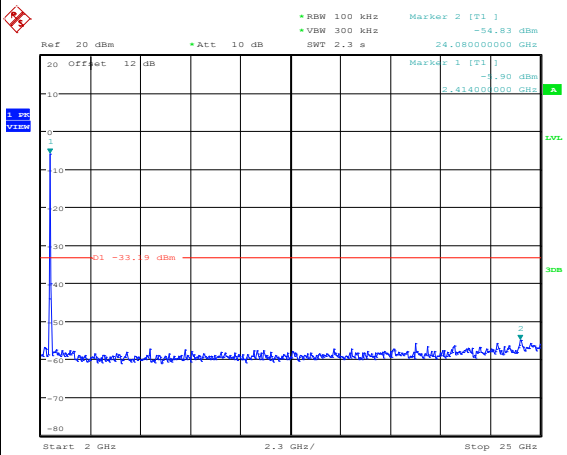
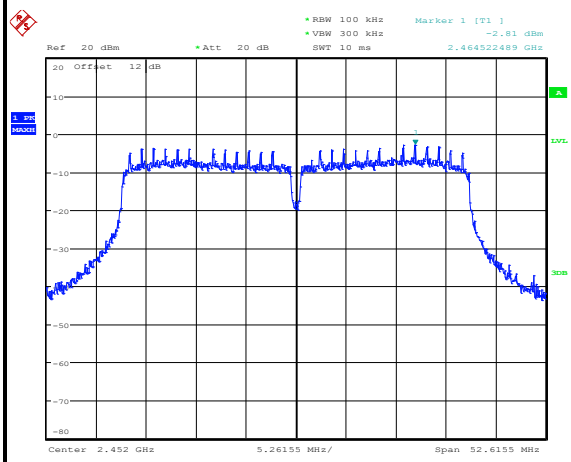
Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 11:17:29

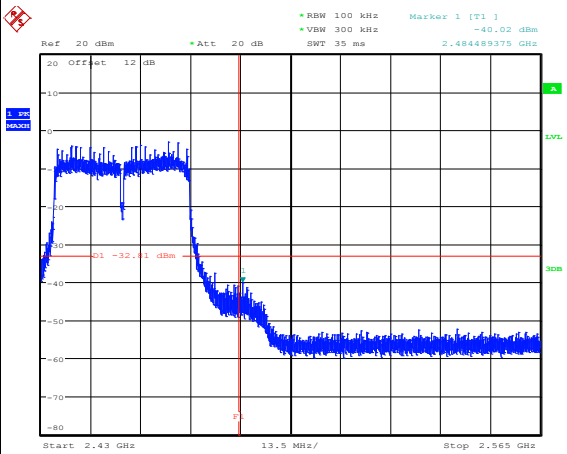
Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level



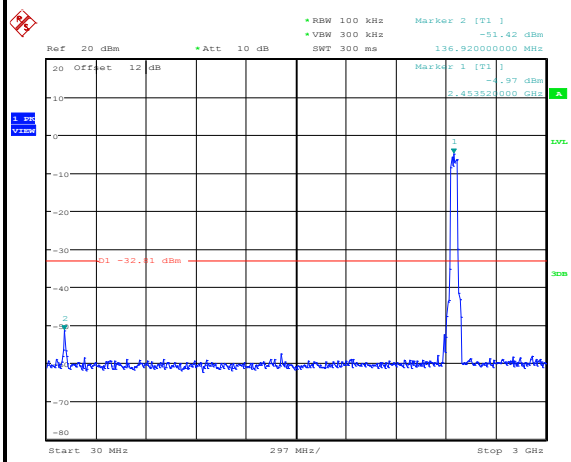
Date: 16.MAY.2019 11:21:57

Channel Plot



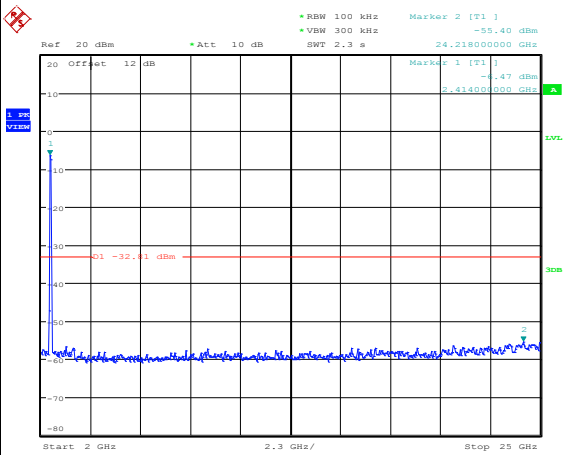
Date: 16.MAY.2019 11:22:09

Spurious Emission 30MHz~3GHz



Date: 16.MAY.2019 11:22:25

Spurious Emission 2GHz~25GHz



Date: 16.MAY.2019 11:22:40

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

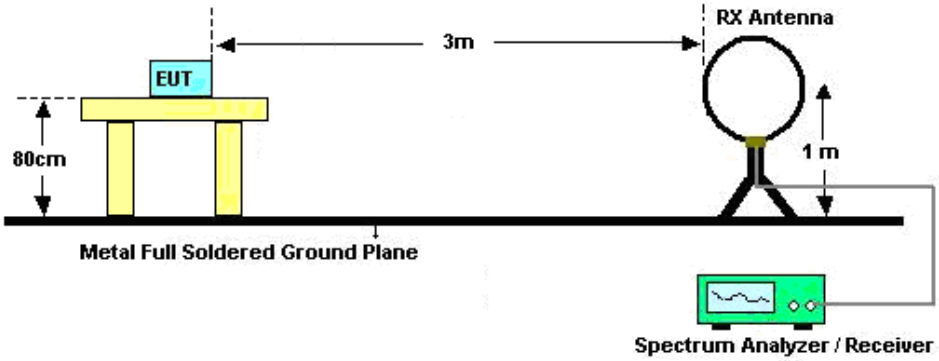
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

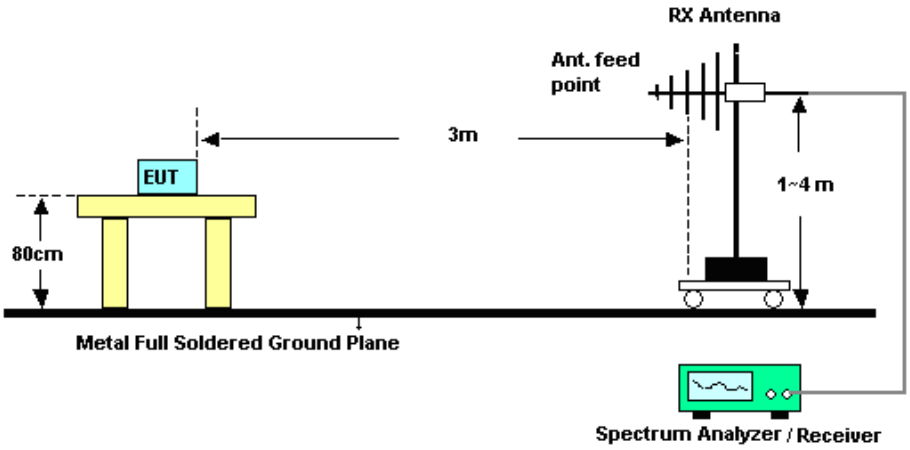
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

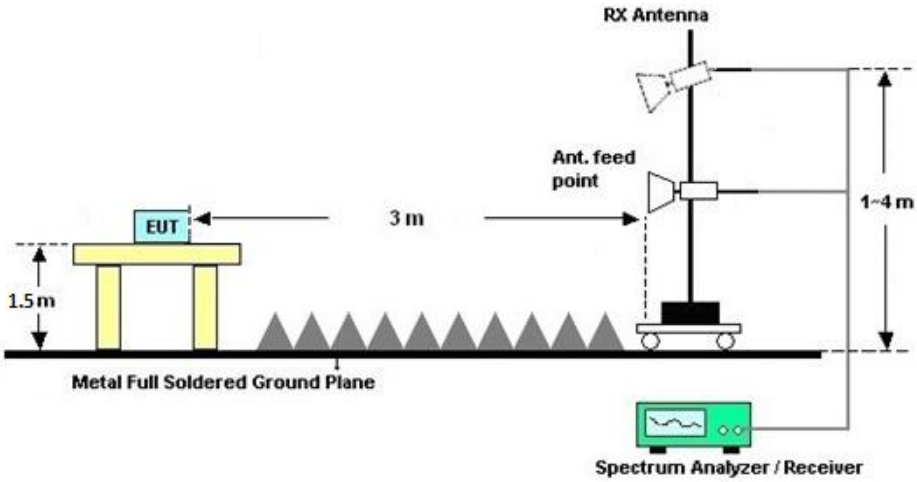
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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 C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

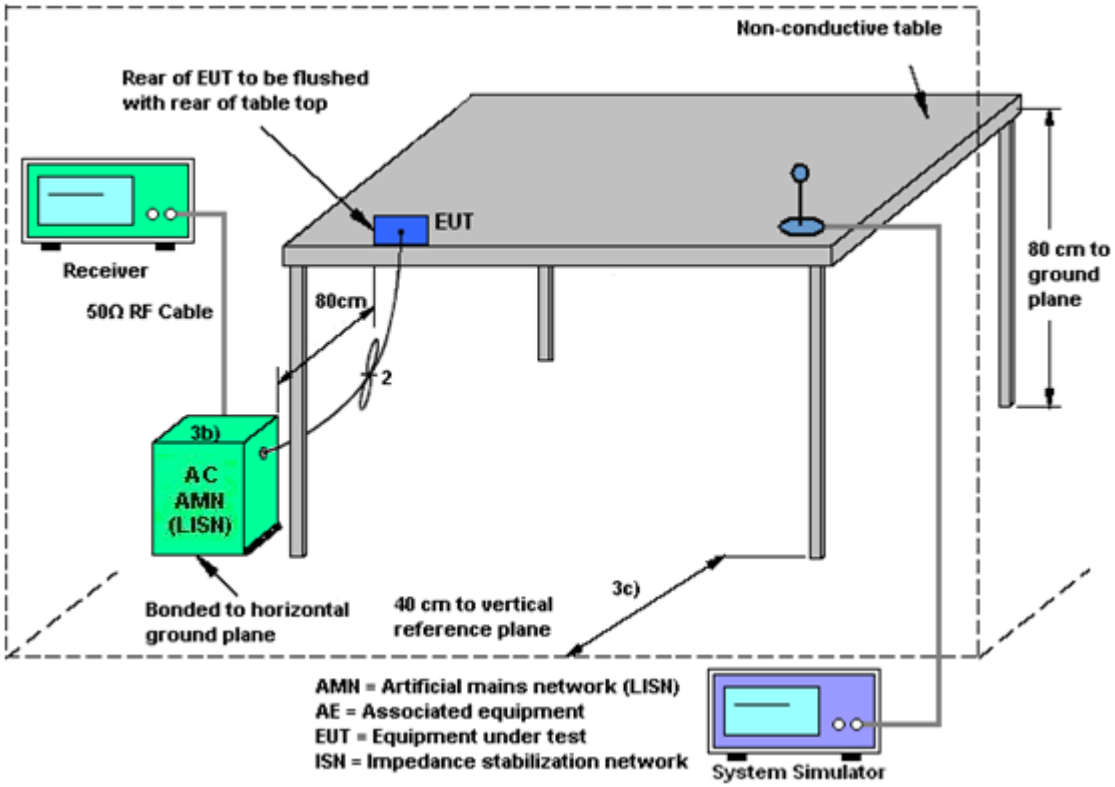
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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
Hygrometer	Testo	DTM-303A	TP157075	N/A	Nov. 05, 2018	May 16, 2019~ May 21, 2019	Nov. 04, 2019	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	13I00030S NO32	9kHz~6GHz	Dec. 03, 2018	May 16, 2019~ May 21, 2019	Dec. 02, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2018	May 16, 2019~ May 21, 2019	Nov. 20, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC120838 2	N/A	Mar. 27, 2019	May 16, 2019~ May 21, 2019	Mar. 26, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 02, 2018	May 16, 2019~ May 21, 2019	Oct. 01, 2019	Conducted (TH05-HY)
EMI Test Receiver	Keysight	N9038A	MY572901 51	3Hz~8.5GHz;M ax 30dBm	Jun. 25, 2018	Jun. 12, 2019	Jun. 24, 2019	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY553705 28	10Hz-44GHz	Oct. 09, 2018	Jun. 12, 2019	Oct. 08, 2019	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Jun. 12, 2019	Oct. 18, 2019	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 28, 2018	Jun. 12, 2019	Dec. 27, 2019	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Jun. 12, 2019	Jan. 26, 2020	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Jun. 12, 2019	Jan. 04, 2020	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Jun. 12, 2019	Aug. 05, 2019	Radiation (03CH05-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Jun. 12, 2019	Jan. 13, 2020	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Aug. 17, 2018	Jun. 12, 2019	Aug. 16, 2019	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY532703 16	500MHz~26.5G Hz	Dec. 22, 2018	Jun. 12, 2019	Dec. 21, 2019	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jun. 12, 2019	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 12, 2019	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 12, 2019	NCR	Radiation (03CH05-KS)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	NCR	May 28, 2019	NCR	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Nov. 12, 2018	May 28, 2019	Nov. 11, 2019	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 19, 2019	May 28, 2019	Mar. 18, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	May 28, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	May 28, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	NCR	May 28, 2019	NCR	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	May 28, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	May 28, 2019	Dec. 30, 2019	Conduction (CO05-HY)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Appendix A. Conducted Test Results

Report Number : FR942441C

Test Engineer:	Howard Lin	Temperature:	21~25	°C
Test Date:	2019/5/16~2019/5/21	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.50	-	8.46	-	0.50	Pass
11b	1Mbps	1	6	2437	13.50	-	8.53	-	0.50	Pass
11b	1Mbps	1	11	2462	13.30	-	8.01	-	0.50	Pass
11g	6Mbps	1	1	2412	17.20	-	16.30	-	0.50	Pass
11g	6Mbps	1	6	2437	17.25	-	16.32	-	0.50	Pass
11g	6Mbps	1	11	2462	17.10	-	16.32	-	0.50	Pass
HT20	MCS0	1	1	2412	18.10	-	17.57	-	0.50	Pass
HT20	MCS0	1	6	2437	18.05	-	17.28	-	0.50	Pass
HT20	MCS0	1	11	2462	18.05	-	17.57	-	0.50	Pass
HT40	MCS0	1	3	2422	36.50	-	35.10	-	0.50	Pass
HT40	MCS0	1	6	2437	36.50	-	35.14	-	0.50	Pass
HT40	MCS0	1	9	2452	36.80	-	35.08	-	0.50	Pass

Report Number : FR942441C

TEST RESULTS DATA
Average Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	15.70	-	-	30.00	-	-1.57	-	14.13	-	36.00	-	Pass
11b	1Mbps	1	6	2437	15.90	-		30.00	-	-1.57	-	14.33	-	36.00	-	Pass
11b	1Mbps	1	11	2462	15.70	-		30.00	-	-1.57	-	14.13	-	36.00	-	Pass
11g	6Mbps	1	1	2412	13.70	-		30.00	-	-1.57	-	12.13	-	36.00	-	Pass
11g	6Mbps	1	6	2437	13.60	-		30.00	-	-1.57	-	12.03	-	36.00	-	Pass
11g	6Mbps	1	11	2462	13.70	-		30.00	-	-1.57	-	12.13	-	36.00	-	Pass
HT20	MCS0	1	1	2412	10.80	-		30.00	-	-1.57	-	9.23	-	36.00	-	Pass
HT20	MCS0	1	6	2437	10.70	-		30.00	-	-1.57	-	9.13	-	36.00	-	Pass
HT20	MCS0	1	11	2462	10.80	-		30.00	-	-1.57	-	9.23	-	36.00	-	Pass
HT40	MCS0	1	3	2422	10.60	-		30.00	-	-1.57	-	9.03	-	36.00	-	Pass
HT40	MCS0	1	6	2437	10.60	-		30.00	-	-1.57	-	9.03	-	36.00	-	Pass
HT40	MCS0	1	9	2452	10.70	-		30.00	-	-1.57	-	9.13	-	36.00	-	Pass

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

Report Number : FR942441C

TEST RESULTS DATA
Peak Power Spectral Density

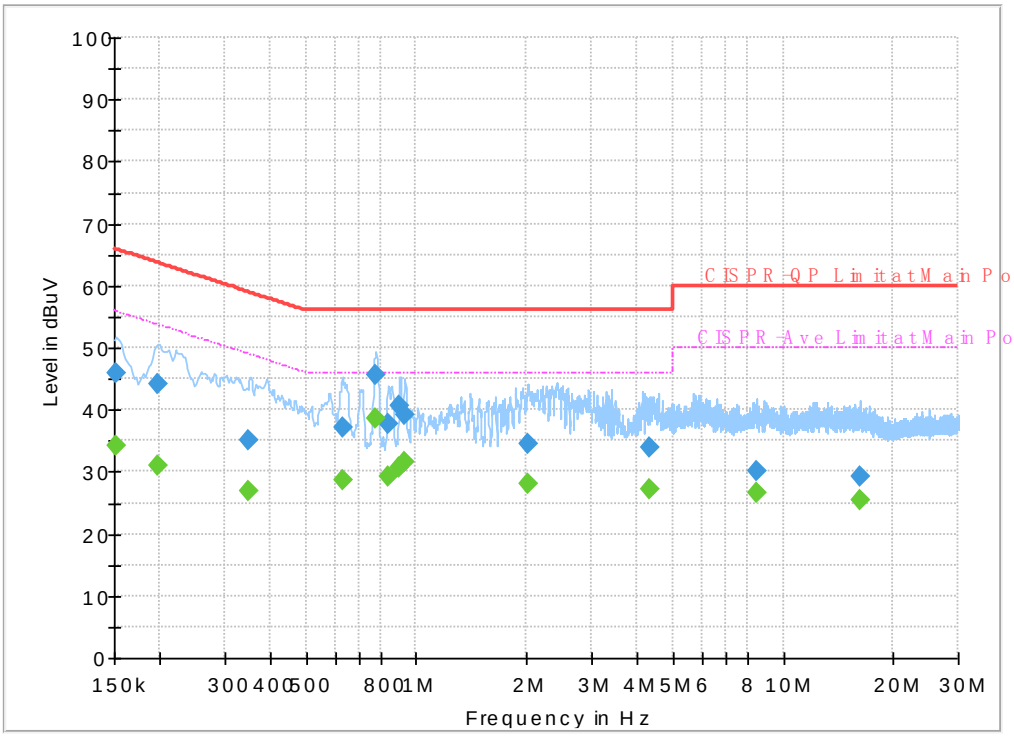
2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-6.82	-	-	-1.57	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-6.94	-	-	-1.57	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-6.87	-	-	-1.57	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-11.99	-	-	-1.57	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-12.19	-	-	-1.57	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-11.84	-	-	-1.57	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-14.38	-	-	-1.57	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-15.30	-	-	-1.57	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-15.68	-	-	-1.57	-	8.00	-	Pass
HT40	MCS0	1	3	2422	-17.43	-	-	-1.57	-	8.00	-	Pass
HT40	MCS0	1	6	2437	-17.93	-	-	-1.57	-	8.00	-	Pass
HT40	MCS0	1	9	2452	-18.02	-	-	-1.57	-	8.00	-	Pass

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

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Full Spectrum

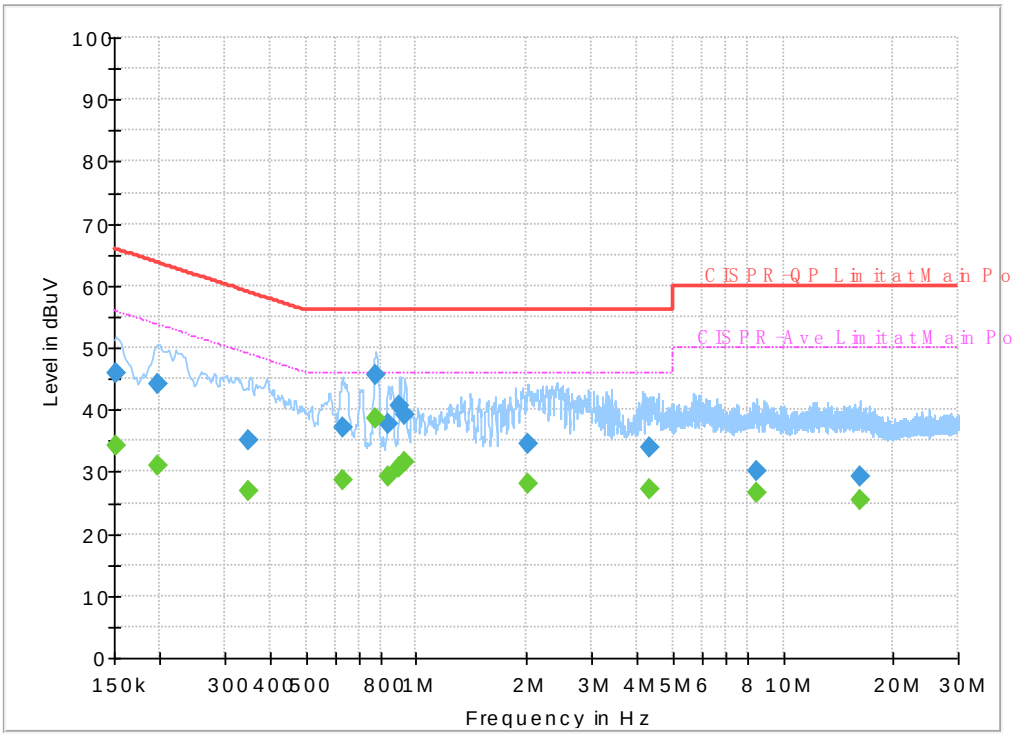


Final_Result

Frequency	QuasiPeak	Average	Limit	Margin	Line	Filter	Corr.
0.152250	---	34.09	55.88	21.79	L1	OFF	19.5
0.152250	46.01	---	65.88	19.87	L1	OFF	19.5
0.197250	---	30.95	53.73	22.78	L1	OFF	19.5
0.197250	44.22	---	63.73	19.51	L1	OFF	19.5
0.350250	---	27.04	48.96	21.92	L1	OFF	19.5
0.350250	35.22	---	58.96	23.74	L1	OFF	19.5
0.627000	---	28.76	46.00	17.24	L1	OFF	19.6
0.627000	37.19	---	56.00	18.81	L1	OFF	19.6
0.777750	---	38.47	46.00	7.53	L1	OFF	19.6
0.777750	45.69	---	56.00	10.31	L1	OFF	19.6
0.836250	---	29.23	46.00	16.77	L1	OFF	19.6
0.836250	37.68	---	56.00	18.32	L1	OFF	19.6

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Full Spectrum

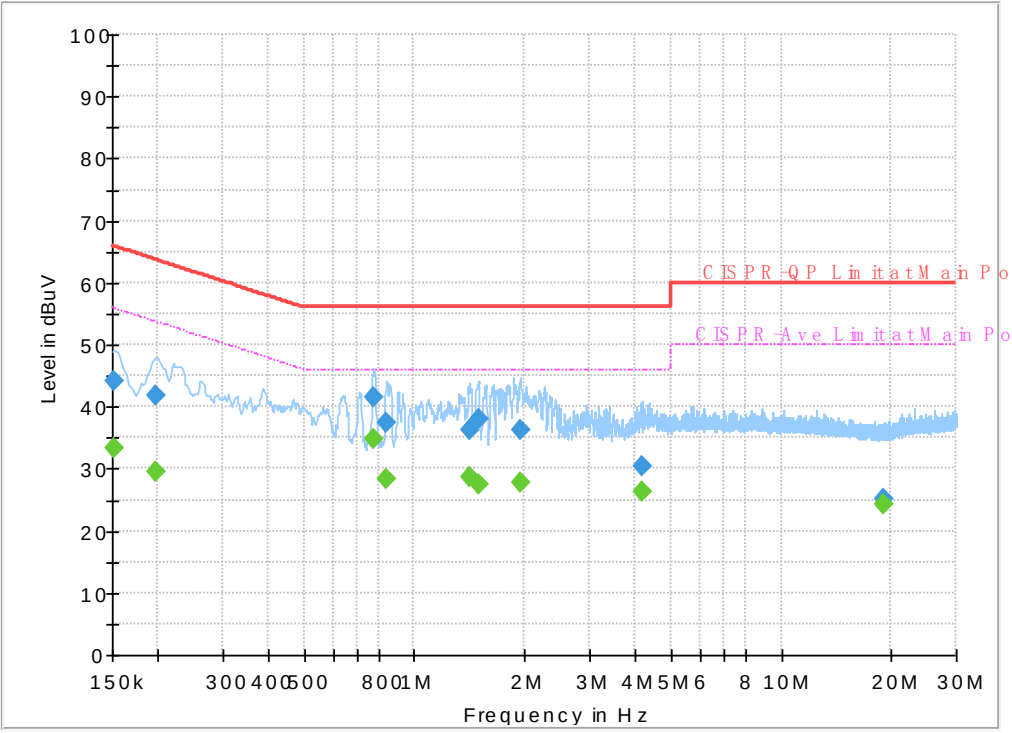


Final_Result

Frequency	QuasiPeak	Average	Limit	Margin	Line	Filter	Corr.
0.901500	---	30.75	46.00	15.25	L1	OFF	19.6
0.901500	40.75	---	56.00	15.25	L1	OFF	19.6
0.930750	---	31.71	46.00	14.29	L1	OFF	19.6
0.930750	39.16	---	56.00	16.84	L1	OFF	19.6
2.006250	---	27.94	46.00	18.06	L1	OFF	19.6
2.006250	34.61	---	56.00	21.39	L1	OFF	19.6
4.308000	---	27.22	46.00	18.78	L1	OFF	19.7
4.308000	33.83	---	56.00	22.17	L1	OFF	19.7
8.495250	---	26.68	50.00	23.32	L1	OFF	19.9
8.495250	30.14	---	60.00	29.86	L1	OFF	19.9
16.156500	---	25.37	50.00	24.63	L1	OFF	20.1
16.156500	29.15	---	60.00	30.85	L1	OFF	20.1

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Full Spectrum

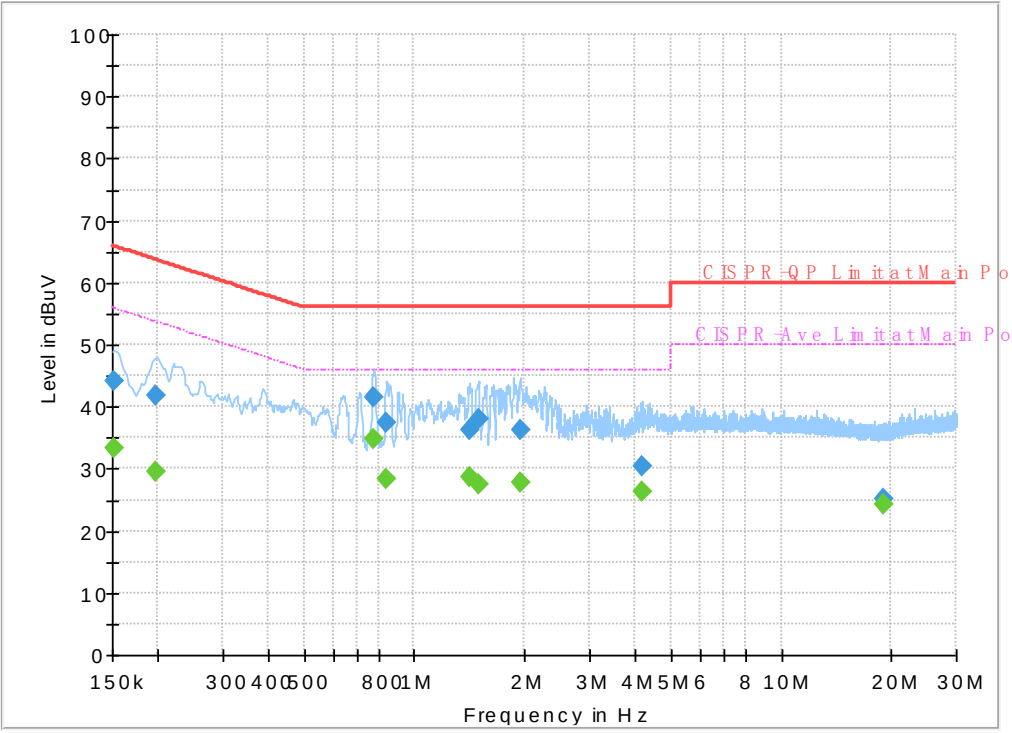


Final_Result

Frequency	QuasiPeak	Average	Limit	Margin	Line	Filter	Corr.
0.152250	---	33.41	55.88	22.47	N	OFF	19.5
0.152250	44.21	---	65.88	21.67	N	OFF	19.5
0.197250	---	29.62	53.73	24.11	N	OFF	19.5
0.197250	41.90	---	63.73	21.83	N	OFF	19.5
0.777750	---	34.66	46.00	11.34	N	OFF	19.6
0.777750	41.41	---	56.00	14.59	N	OFF	19.6
0.838500	---	28.22	46.00	17.78	N	OFF	19.6
0.838500	37.48	---	56.00	18.52	N	OFF	19.6
1.407750	---	28.60	46.00	17.40	N	OFF	19.6
1.407750	36.13	---	56.00	19.87	N	OFF	19.6
1.493250	---	27.54	46.00	18.46	N	OFF	19.6
1.493250	38.03	---	56.00	17.97	N	OFF	19.6

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	54~56%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Full Spectrum



Final_Result

Frequency	QuasiPeak	Average	Limit	Margin	Line	Filter	Corr.
1.938750	---	27.81	46.00	18.19	N	OFF	19.6
1.938750	36.32	---	56.00	19.68	N	OFF	19.6
4.195500	---	26.36	46.00	19.64	N	OFF	19.7
4.195500	30.36	---	56.00	25.64	N	OFF	19.7
18.957750	---	24.17	50.00	25.83	N	OFF	20.3
18.957750	25.07	---	60.00	34.93	N	OFF	20.3

Appendix C. Radiated Spurious Emission

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		2339.64	50.84	-23.16	74	51.24	31.16	5.38	36.94	109	115	P	H
		2389.95	40.26	-13.74	54	40.44	31.3	5.48	36.96	109	115	A	H
	*	2414	100.27	-	-	100.39	31.36	5.48	36.96	109	115	P	H
	*	2414	97.04	-	-	97.16	31.36	5.48	36.96	109	115	A	H
		2330.8	50.87	-23.13	74	51.3	31.12	5.38	36.93	100	63	P	V
		2389.43	39.85	-14.15	54	40.03	31.3	5.48	36.96	100	63	A	V
	*	2414	96.51	-	-	96.63	31.36	5.48	36.96	100	63	P	V
	*	2414	93.42	-	-	93.54	31.36	5.48	36.96	100	63	A	V
802.11b CH 11 2462MHz	*	2462	102.42	-	-	102.35	31.53	5.51	36.97	100	116	P	H
	*	2462	98.97	-	-	98.9	31.53	5.51	36.97	100	116	A	H
		2489.08	52.1	-21.9	74	51.88	31.64	5.55	36.97	100	116	P	H
		2484.22	41.58	-12.42	54	41.41	31.59	5.55	36.97	100	116	A	H
	*	2462	96.26	-	-	96.19	31.53	5.51	36.97	100	65	P	V
	*	2464	92.96	-	-	92.85	31.53	5.55	36.97	100	65	A	V
		2489.02	51.15	-22.85	74	50.93	31.64	5.55	36.97	100	65	P	V
		2484.22	40.42	-13.58	54	40.25	31.59	5.55	36.97	100	65	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	41.48	-12.52	54	60.61	34.89	8.1	62.12	100	0	P	H
		4824	40.08	-13.92	54	59.21	34.89	8.1	62.12	100	0	P	V
802.11b CH 06 2437MHz		4872	39.18	-14.82	54	58.28	34.92	8.09	62.11	100	0	P	H
		7311	42.22	-11.78	54	59.95	35.29	9.75	62.77	100	0	P	H
		4872	39.69	-14.31	54	58.79	34.92	8.09	62.11	100	0	P	V
		7311	41.41	-12.59	54	59.14	35.29	9.75	62.77	100	0	P	V
802.11b CH 11 2462MHz		4926	40.71	-13.29	54	59.79	34.95	8.06	62.09	100	0	P	H
		7386	42.87	-11.13	54	60.5	35.34	9.81	62.78	100	0	P	H
		4926	40.75	-13.25	54	59.83	34.95	8.06	62.09	100	0	P	V
		7386	41.99	-12.01	54	59.62	35.34	9.81	62.78	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI 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)
802.11g CH 01 2412MHz		2389.56	57.75	-16.25	74	57.93	31.3	5.48	36.96	111	114	P	H
		2389.95	44.93	-9.07	54	45.11	31.3	5.48	36.96	111	114	A	H
	*	2418	102.08	-	-	102.2	31.36	5.48	36.96	111	114	P	H
	*	2418	93.68	-	-	93.8	31.36	5.48	36.96	111	114	A	H
		2389.82	57.07	-16.93	74	57.25	31.3	5.48	36.96	100	60	P	V
		2389.95	42.75	-11.25	54	42.93	31.3	5.48	36.96	100	60	A	V
	*	2420	97.52	-	-	97.59	31.41	5.48	36.96	100	60	P	V
	*	2420	89.72	-	-	89.79	31.41	5.48	36.96	100	60	A	V
802.11g CH 11 2462MHz		2483.86	66.65	-7.35	74	66.48	31.59	5.55	36.97	100	115	P	H
	!	2483.5	50.57	-3.43	54	50.4	31.59	5.55	36.97	100	115	A	H
	*	2466	101.73	-	-	101.62	31.53	5.55	36.97	100	115	P	H
	*	2466	93.88	-	-	93.77	31.53	5.55	36.97	100	115	A	H
		2483.5	59.05	-14.95	74	58.88	31.59	5.55	36.97	100	126	P	V
		2483.5	43.78	-10.22	54	43.61	31.59	5.55	36.97	100	126	A	V
	*	2468	94.96	-	-	94.85	31.53	5.55	36.97	100	126	P	V
	*	2468	87.01	-	-	86.9	31.53	5.55	36.97	100	126	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	41.58	-12.42	54	60.71	34.89	8.1	62.12	100	0	P	H
		4824	40.39	-13.61	54	59.52	34.89	8.1	62.12	100	0	P	V
802.11g CH 06 2437MHz		4872	39.79	-14.21	54	58.89	34.92	8.09	62.11	100	0	P	H
		7311	40.12	-13.88	54	57.85	35.29	9.75	62.77	100	0	P	H
		4872	40.16	-13.84	54	59.26	34.92	8.09	62.11	100	0	P	V
		7311	41.34	-12.66	54	59.07	35.29	9.75	62.77	100	0	P	V
802.11g CH 11 2462MHz		4924	40.87	-13.13	54	59.95	34.95	8.06	62.09	100	0	P	H
		7386	41.79	-12.21	54	59.42	35.34	9.81	62.78	100	0	P	H
		4926	39.65	-14.35	54	58.73	34.95	8.06	62.09	100	0	P	V
		7386	40.59	-13.41	54	58.22	35.34	9.81	62.78	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n 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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz	*	2420	100.45	-	-	100.52	31.41	5.48	36.96	138	105	P	H
	*	2420	92.42	-	-	92.49	31.41	5.48	36.96	138	105	A	H
		2389.56	57.35	-16.65	74	57.53	31.3	5.48	36.96	138	105	P	H
		2389.95	43.12	-10.88	54	43.3	31.3	5.48	36.96	138	105	A	H
	*	2420	95.1	-	-	95.17	31.41	5.48	36.96	100	65	P	V
	*	2420	87.26	-	-	87.33	31.41	5.48	36.96	100	65	A	V
		2389.95	51.32	-22.68	74	51.5	31.3	5.48	36.96	100	65	P	V
		2389.82	41.24	-12.76	54	41.42	31.3	5.48	36.96	100	65	A	V
802.11n HT20 CH 11 2462MHz	*	2462	99	-	-	98.93	31.53	5.51	36.97	100	115	P	H
	*	2460	90.75	-	-	90.68	31.53	5.51	36.97	100	115	A	H
		2483.74	64.31	-9.69	74	64.14	31.59	5.55	36.97	100	115	P	H
		2483.5	46.97	-7.03	54	46.8	31.59	5.55	36.97	100	115	A	H
	*	2466	94.92	-	-	94.81	31.53	5.55	36.97	100	64	P	V
	*	2468	86.68	-	-	86.57	31.53	5.55	36.97	100	64	A	V
		2483.62	60.4	-13.6	74	60.23	31.59	5.55	36.97	100	64	P	V
		2483.74	44.8	-9.2	54	44.63	31.59	5.55	36.97	100	64	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. 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)
802.11n HT20 CH 01 2412MHz		4824	40.8	-13.2	54	59.93	34.89	8.1	62.12	100	0	P	H
		4824	40.57	-13.43	54	59.7	34.89	8.1	62.12	100	0	P	V
802.11n HT20 CH 06 2437MHz		4872	40.48	-13.52	54	59.58	34.92	8.09	62.11	100	0	P	H
		7311	40.46	-13.54	54	58.19	35.29	9.75	62.77	100	0	P	H
		4872	39.74	-14.26	54	58.84	34.92	8.09	62.11	100	0	P	V
		7311	40.81	-13.19	54	58.54	35.29	9.75	62.77	100	0	P	V
802.11n HT20 CH 11 2462MHz		4926	40.67	-13.33	54	59.75	34.95	8.06	62.09	100	0	P	H
		7386	40.62	-13.38	54	58.25	35.34	9.81	62.78	100	0	P	H
		4926	39.55	-14.45	54	58.63	34.95	8.06	62.09	100	0	P	V
		7386	40.3	-13.7	54	57.93	35.34	9.81	62.78	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n 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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.17	51.67	-22.33	74	51.85	31.3	5.48	36.96	120	116	P	H
		2389.69	41.49	-12.51	54	41.67	31.3	5.48	36.96	120	116	A	H
	*	2432	96.17	-	-	96.21	31.41	5.51	36.96	120	116	P	H
	*	2426	87.66	-	-	87.7	31.41	5.51	36.96	120	116	A	H
		2483.5	52.39	-21.61	74	52.22	31.59	5.55	36.97	120	116	P	H
		2483.92	41.85	-12.15	54	41.68	31.59	5.55	36.97	120	116	A	H
		2352.12	51.34	-22.66	74	51.65	31.21	5.43	36.95	106	64	P	V
		2389.69	40.59	-13.41	54	40.77	31.3	5.48	36.96	106	64	A	V
	*	2430	91.21	-	-	91.25	31.41	5.51	36.96	106	64	P	V
	*	2424	83.48	-	-	83.52	31.41	5.51	36.96	106	64	A	V
		2484.64	51.02	-22.98	74	50.85	31.59	5.55	36.97	106	64	P	V
		2484.82	41.01	-12.99	54	40.84	31.59	5.55	36.97	106	64	A	V
802.11n HT40 CH 09 2452MHz		2356.41	50.8	-23.2	74	51.11	31.21	5.43	36.95	100	114	P	H
		2389.69	40.68	-13.32	54	40.86	31.3	5.48	36.96	100	114	A	H
	*	2464	96.87	-	-	96.76	31.53	5.55	36.97	100	114	P	H
	*	2464	89.5	-	-	89.39	31.53	5.55	36.97	100	114	A	H
		2485	63.65	-10.35	74	63.48	31.59	5.55	36.97	100	114	P	H
		2484.4	49.95	-4.05	54	49.78	31.59	5.55	36.97	100	114	A	H
		2385.14	51.63	-22.37	74	51.85	31.25	5.48	36.95	100	63	P	V
		2389.56	40.33	-13.67	54	40.51	31.3	5.48	36.96	100	63	A	V
	*	2466	92.97	-	-	92.86	31.53	5.55	36.97	100	63	P	V
	*	2464	84.63	-	-	84.52	31.53	5.55	36.97	100	63	A	V
		2485.54	60.9	-13.1	74	60.73	31.59	5.55	36.97	100	63	P	V
		2484.34	46.41	-7.59	54	46.24	31.59	5.55	36.97	100	63	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 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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	40.94	-13.06	54	60.07	34.9	8.09	62.12	100	0	P	H
HT40		7266	40.51	-13.49	54	58.29	35.27	9.72	62.77	100	0	P	H
CH 03		4842	40.51	-13.49	54	59.64	34.9	8.09	62.12	100	0	P	V
2422MHz		7266	40.93	-13.07	54	58.71	35.27	9.72	62.77	100	0	P	V
802.11n		4872	39.71	-14.29	54	58.81	34.92	8.09	62.11	100	0	P	H
HT40		7311	40.61	-13.39	54	58.34	35.29	9.75	62.77	100	0	P	H
CH 06		4872	39.18	-14.82	54	58.28	34.92	8.09	62.11	100	0	P	V
2437MHz		7311	41.82	-12.18	54	59.55	35.29	9.75	62.77	100	0	P	V
802.11n		4902	39.44	-14.56	54	58.52	34.94	8.07	62.09	100	0	P	H
HT40		7356	41.13	-12.87	54	58.81	35.32	9.78	62.78	100	0	P	H
CH 09		4902	39.8	-14.2	54	58.88	34.94	8.07	62.09	100	0	P	V
2452MHz		7356	42.3	-11.7	54	59.98	35.32	9.78	62.78	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

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)
2.4GHz 802.11g LF		97.9	18.94	-24.56	43.5	33.33	16.4	1.14	31.93	-	-	P	H
		178.41	23.56	-19.94	43.5	38.17	15.77	1.54	31.92	-	-	P	H
		197.81	25.85	-17.65	43.5	40.78	15.34	1.63	31.9	100	0	P	H
		829.28	24.69	-21.31	46	27.01	26.29	3.32	31.93	-	-	P	H
		926.28	25.29	-20.71	46	26	27.01	3.5	31.22	-	-	P	H
		955.38	26.32	-27.68	54	26.44	27.26	3.55	30.93	-	-	P	H
		52.31	23.67	-16.33	40	41.71	13.06	0.84	31.94	-	-	P	V
		98.87	21.8	-21.7	43.5	35.98	16.6	1.15	31.93	-	-	P	V
		178.41	24.95	-18.55	43.5	39.56	15.77	1.54	31.92	-	-	P	V
		197.81	27.3	-16.2	43.5	42.23	15.34	1.63	31.9	100	0	P	V
		462.62	22.73	-23.27	46	29.76	22.77	2.43	32.23	-	-	P	V
		903	25.4	-20.6	46	26.55	26.82	3.46	31.43	-	-	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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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)

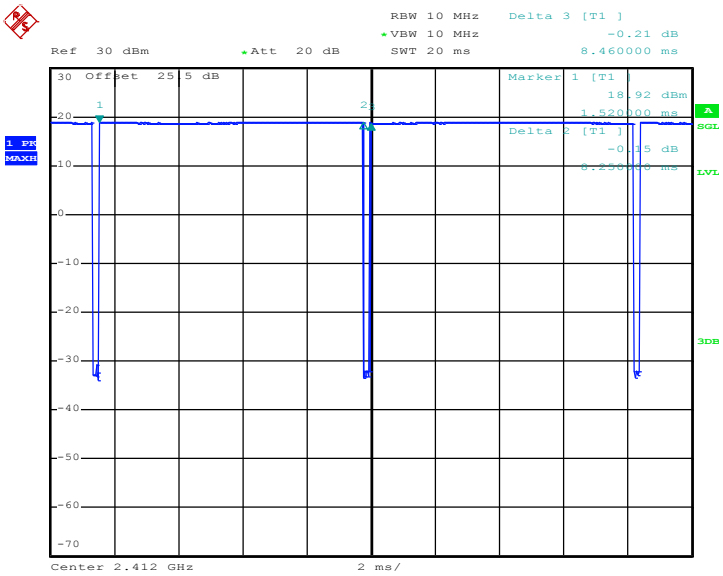
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.52	8.250	0.121	0.13kHz
802.11g	86.62	1.360	0.735	0.75kHz
802.11n HT20	86.53	1.285	0.778	0.82kHz
802.11n HT40	85.02	1.220	0.820	0.82kHz

802.11b



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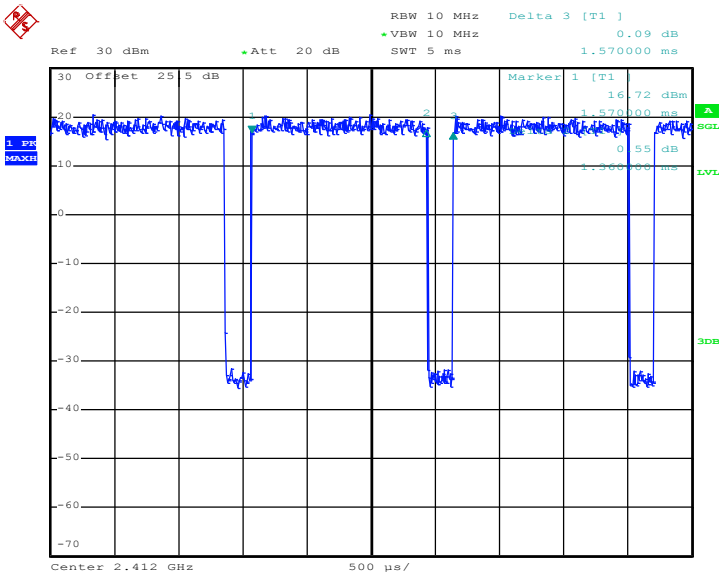
802.11g



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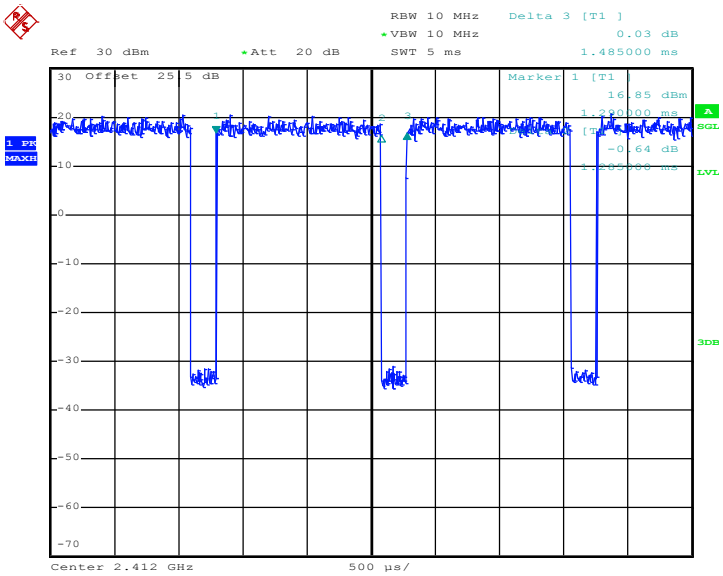
802.11n HT20



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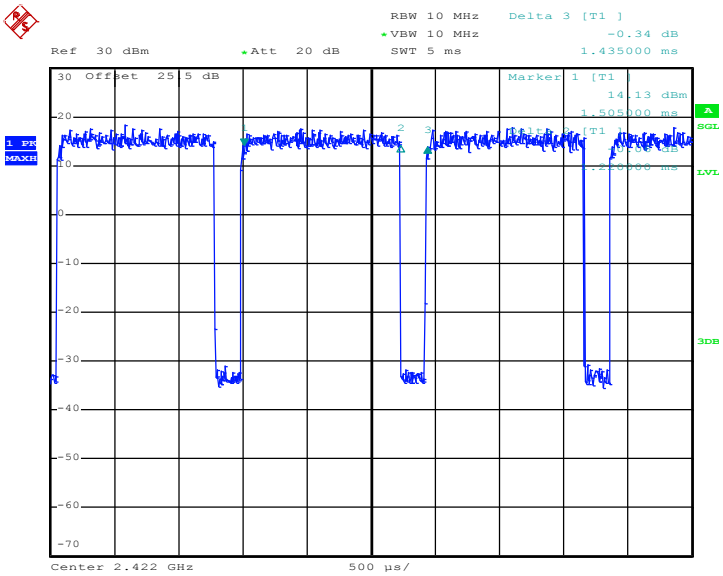
802.11n HT40



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