



FCC RF Test Report

APPLICANT : Huawei Technologies Co., Ltd.
EQUIPMENT : Smart Phone
BRAND NAME : HUAWEI
MODEL NAME : GLK-LX1U
FCC ID : QISGLK-LX1U
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Mar. 28, 2019 and testing was completed on Apr. 26, 2019. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Approved by: Eric Shih / Manager



Sporton International (Shenzhen) Inc.

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR932820C	Rev. 01	Initial issue of report	Apr. 30, 2019



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.30 dB at 2483.600 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.85 dB at 0.49 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2 Manufacturer

Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	HUAWEI
Model Name	GLK-LX1U
FCC ID	QISGLK-LX1U
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+(16QAM Uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver/GNSS
IMEI Code	Conducted: 867285040040254/867285040041500 Conduction: 867285040001637/867285040004151 Radiation: 867285040040809/867285040042052
HW Version	HL7SENEM
SW Version	9.1.0.102(C900E102R1P1)

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 19.13 dBm (0.0818 W) 802.11g : 23.47 dBm (0.2223 W) 802.11n HT20 : 21.84 dBm (0.1528 W) 802.11n HT40 : 23.60 dBm (0.2291 W)
Antenna Type / Gain	Internal Antenna with gain -0.50 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 (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.
	TH01-KS	630927

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	CO01-SZ	CN5018	337463



Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH01-SZ	CN5019	577730

1.7 Specification of Accessory

AC Adapter 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 4	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 5	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 6	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 7	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 8	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 9	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 10	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 11	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 12	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		



AC Adapter 13	Manufacturer	Manufacturer: PHIHONG	SN	
	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
AC Adapter 14	Manufacturer	Manufacturer: Salcomp	SN	
	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
USB Cable 1	Manufacturer	Manufacturer: BYD	SN	
	Brand Name	Ningbo Broad Telecommunication Co., Ltd	Model Name	WA0020
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
USB Cable 2	Brand Name	Dongguan Mingji Electronics Technology Group Co.,Ltd	Model Name	203-1572-0
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
USB Cable 3	Brand Name	Freeport Resources Enterprises (Jiangxi) Co.,Ltd	Model Name	18-93C2CHO-001HF
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
USB Cable 4	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	CUDU01B-HC295-EH
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
USB Cable 5	Brand Name	LUXSHARE Precision Industry Co., Ltd.	Model Name	L99UC131-CS-H
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
USB Cable 6	Brand Name	HUIZHOU DEHONG TECHNOLOGY CO.,LTD.	Model Name	330-50507
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		
Earphone 1	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH06-DH
	Signal Line	<u>1.1</u> meter, non-shielded cable, with w/o ferrite core		
Earphone 2	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH05-DH
	Signal Line	<u>1.1</u> meter, non-shielded cable, with w/o ferrite core		
Earphone 3	Brand Name	Boluo County Quancheng Electronic Co., Ltd.	Model Name	1293-3283-3.5MM-322
	Signal Line	<u>1.1</u> meter, non-shielded cable, with w/o ferrite core		
Earphone 4	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528A02
	Signal Line	<u>1.1</u> meter, non-shielded cable, with w/o ferrite core		
Earphone 5	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528B00
	Signal Line	<u>1.1</u> meter, non-shielded cable, with w/o ferrite core		
Battery	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HB446486ECW
	Power Rating	<u>3.82</u> Vdc, <u>3900</u> mAh	Type	Li-ion, <u>Yes</u>



1.8 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 (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		

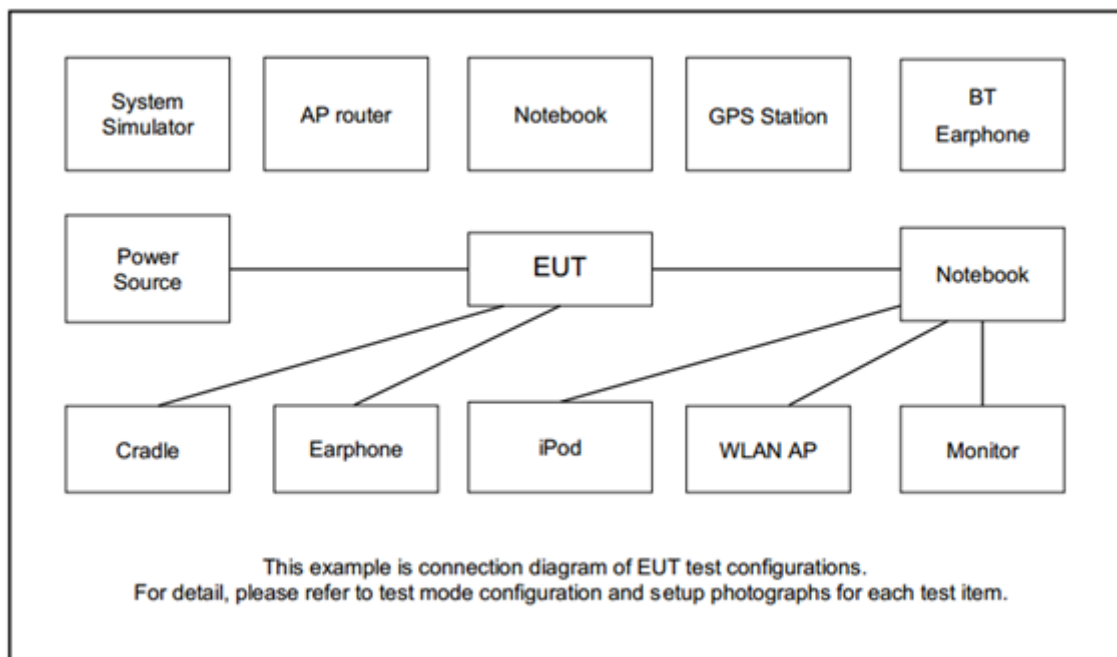
2.2 Test Mode

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
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :GSM1900 Idle + Bluetooth Link + WLAN Link + USB Cable 1(Charging from Adapter 1) + Earphone 1+ SIM 2
Remark: For Radiated Test Cases, The tests were performance with Adapter 1, Earphone 1 and USB Cable 1	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	BT Base Station	R&S	CBT	N/A	N/A	Unshielded,1.8m
3.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
5.	SD Card	N/A	MicroSD HC	FCC DoC	N/A	N/A



2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the 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 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

Offset = RF cable loss

Following shows an offset computation example with cable loss 4.5 dB

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} \\ &= 4.5 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

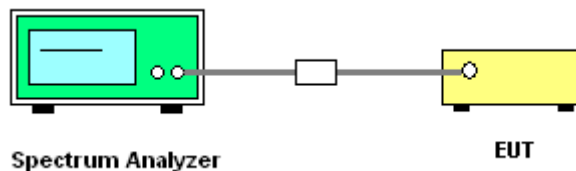
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

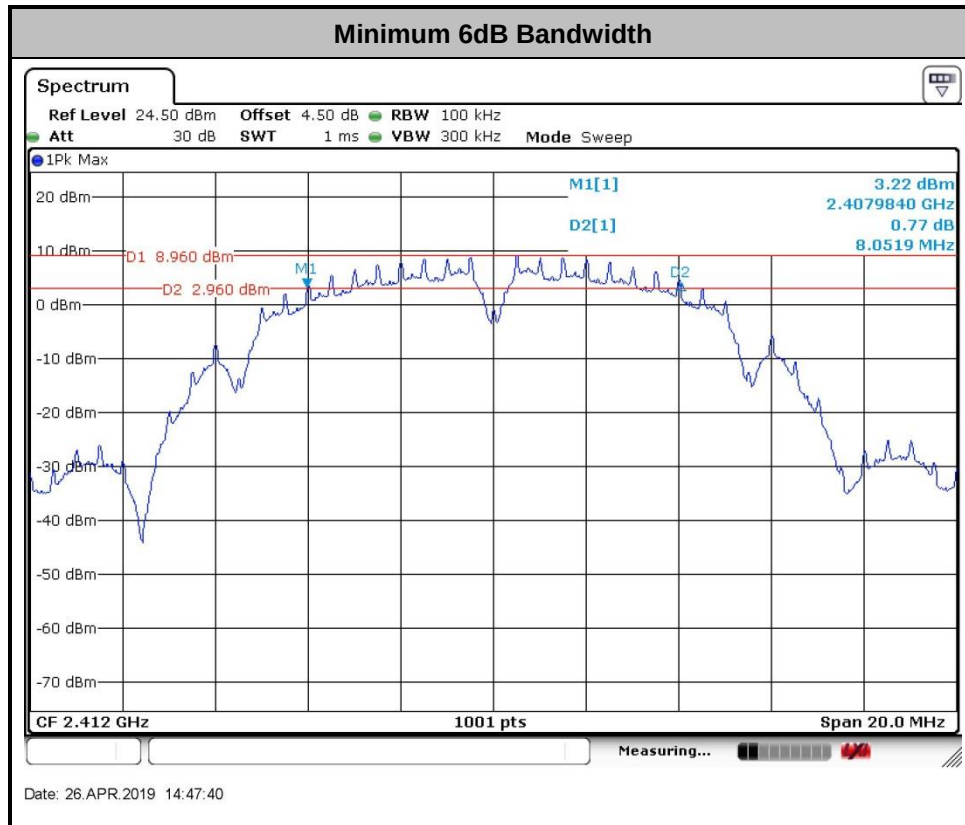
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement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

3.1.4 Test Setup



3.1.5 Test Result of 6dB Occupied Bandwidth

Please refer to Appendix A.



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

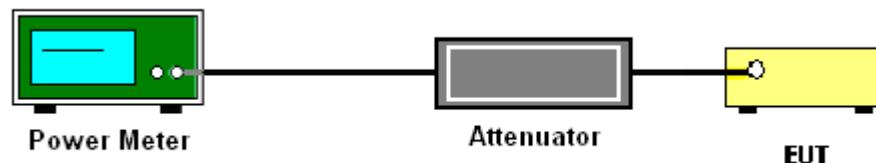
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

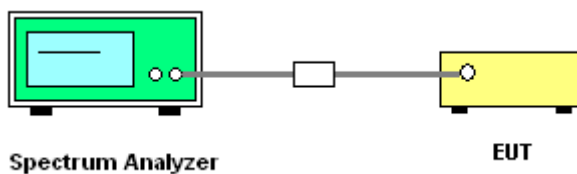
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

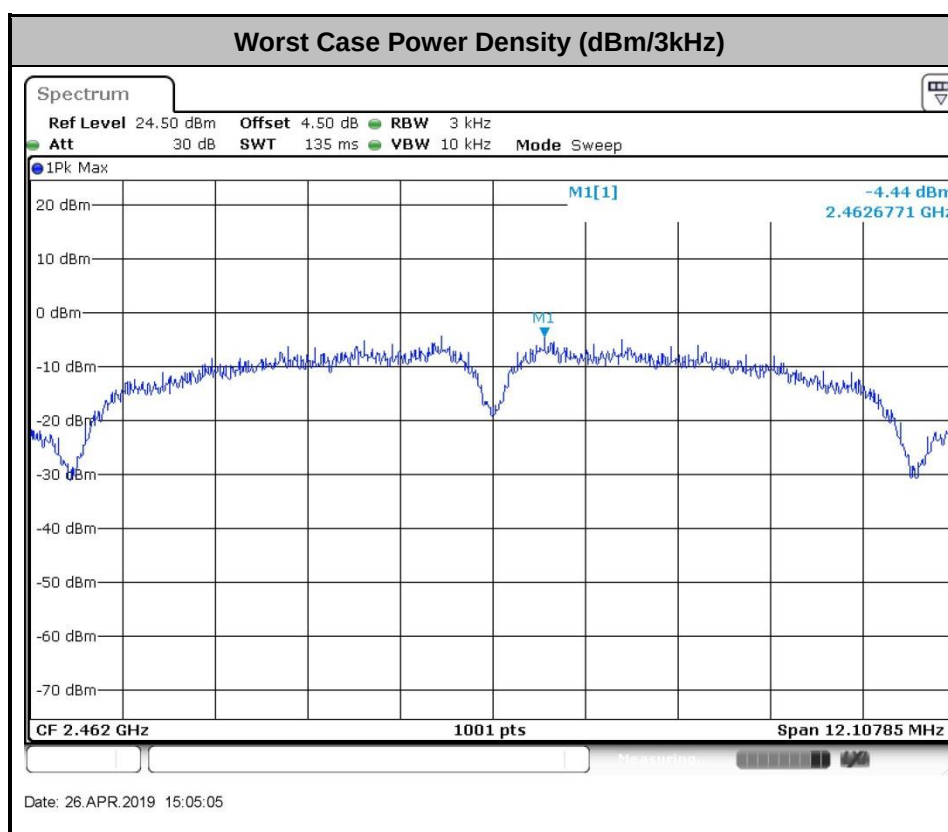
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the 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.



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.

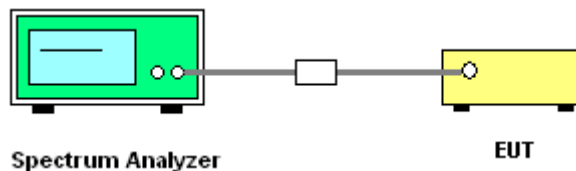
3.4.2 Measuring Instruments

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

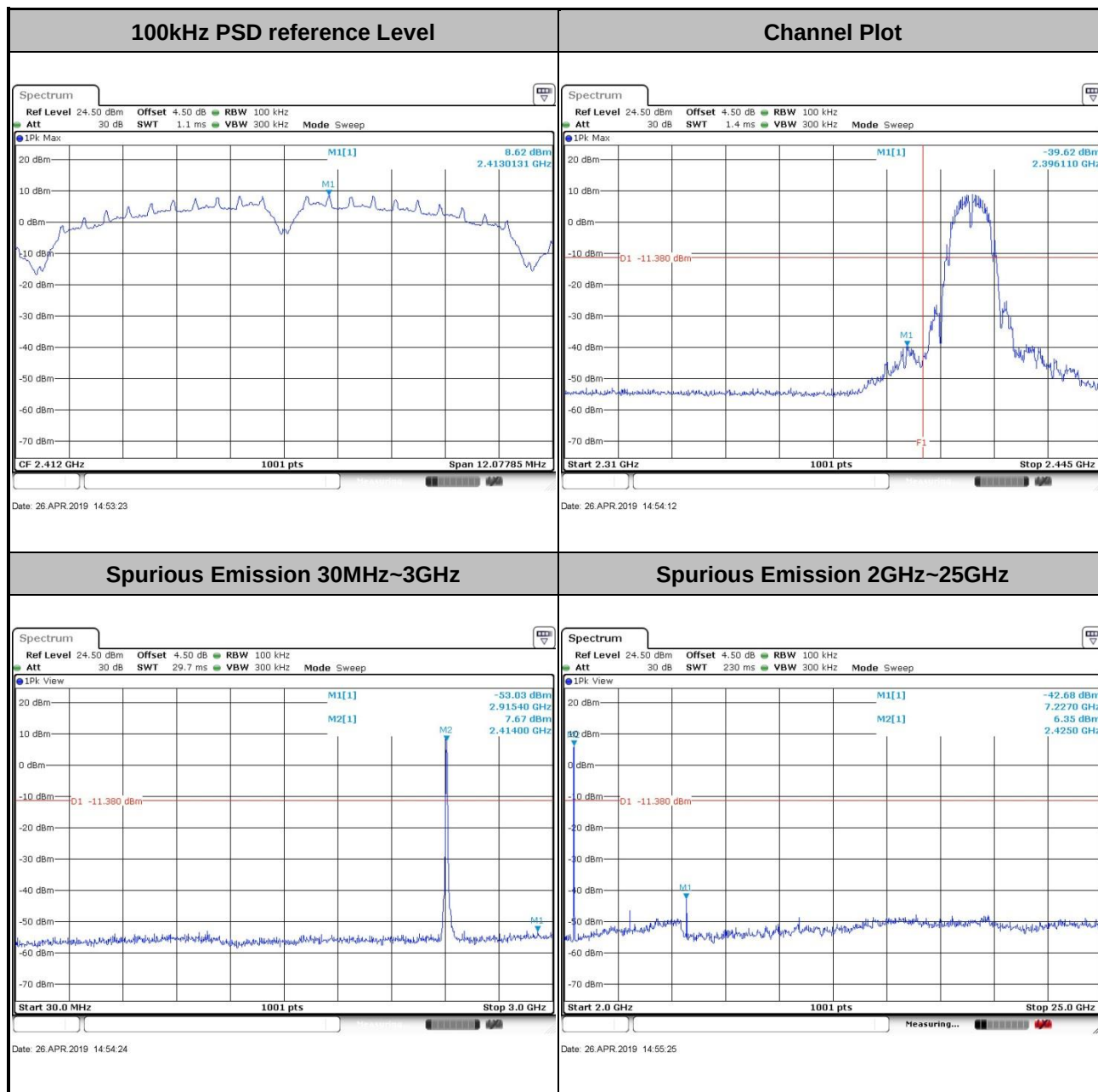




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	ASA Cheng	Temperature :	21~25°C
		Relative Humidity :	51~54%

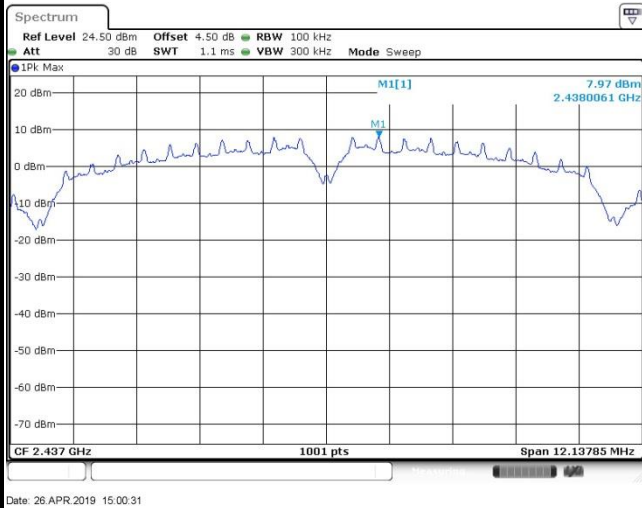
Test Mode :	802.11b	Test Channel :	01
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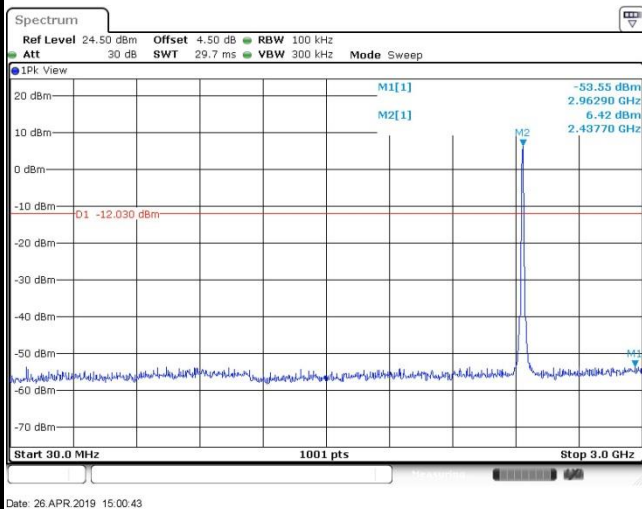


Test Mode :	802.11b	Test Channel :	06
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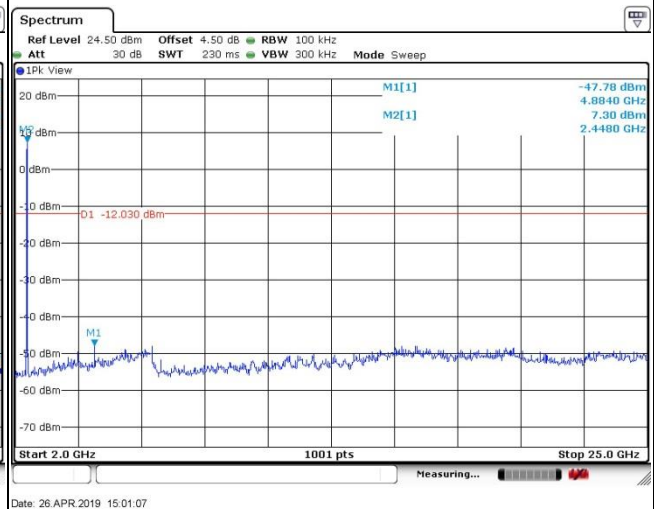
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

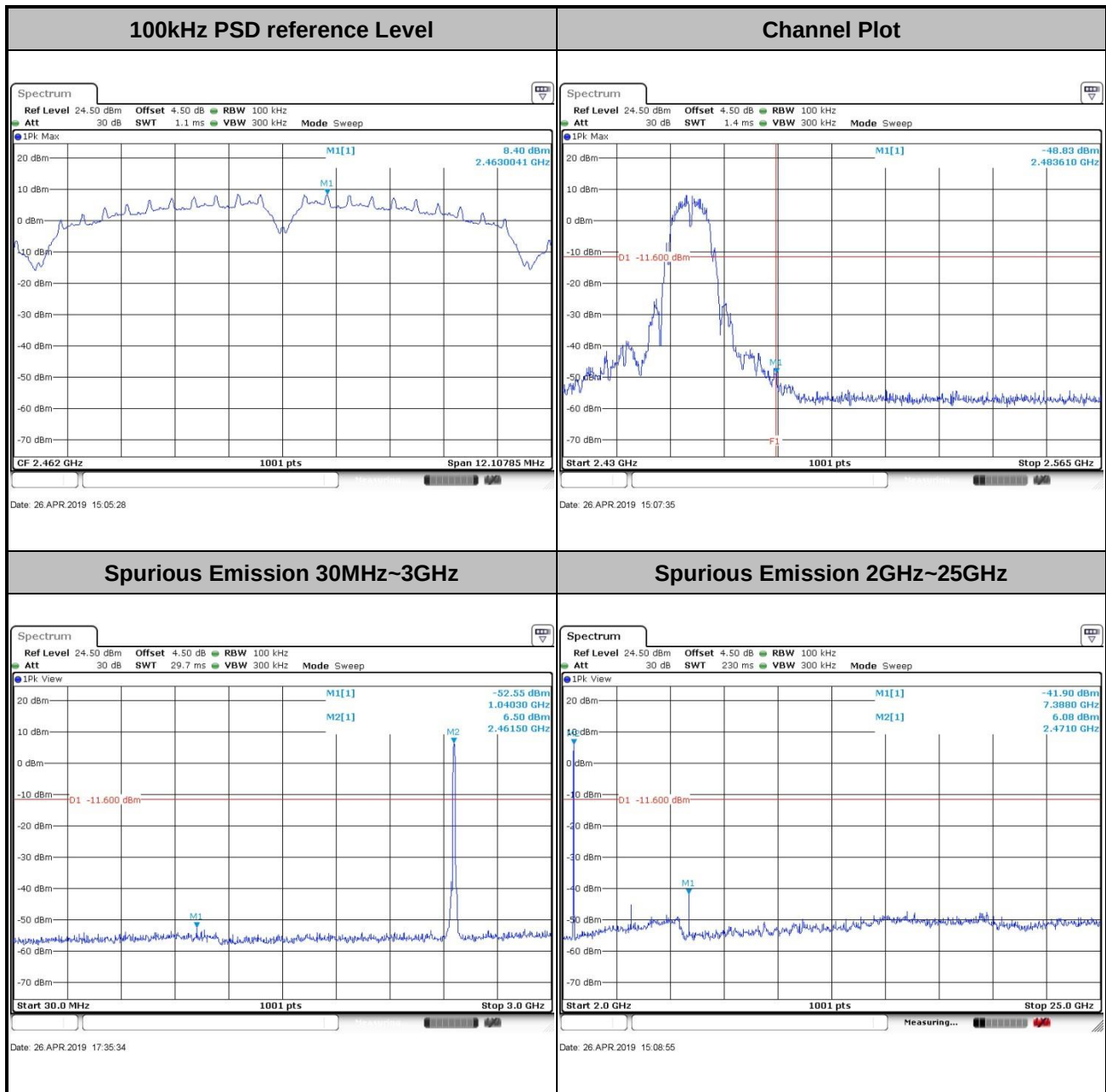


Spurious Emission 2GHz~25GHz





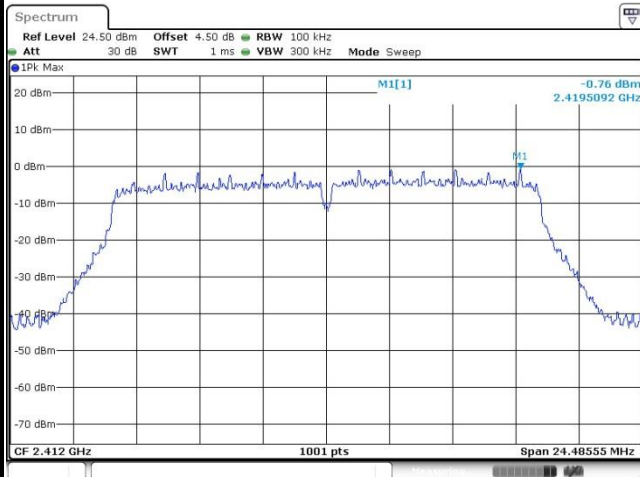
Test Mode :	802.11b	Test Channel :	11
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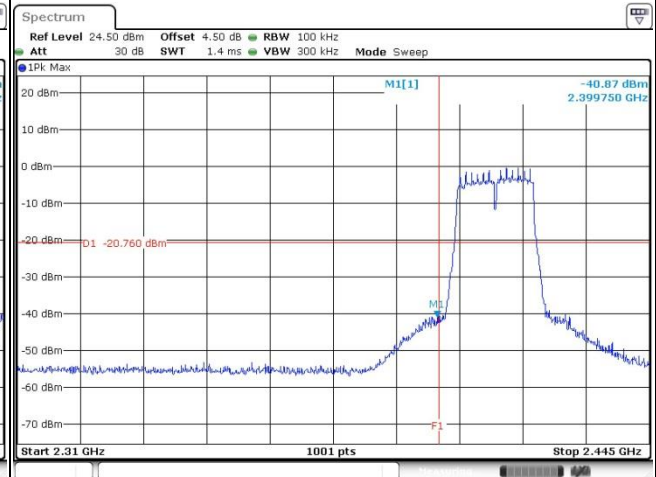


Test Mode :	802.11g	Test Channel :	01
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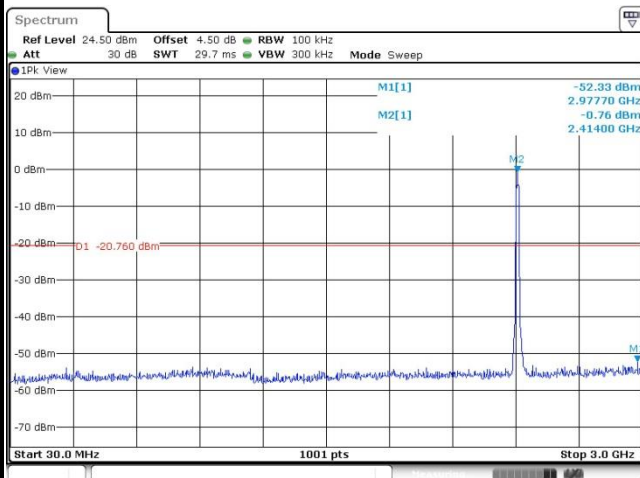
100kHz PSD reference Level



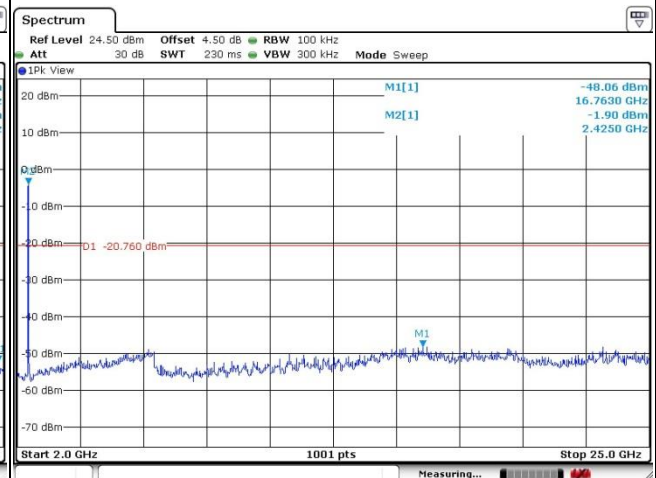
Channel Plot



Spurious Emission 30MHz~3GHz

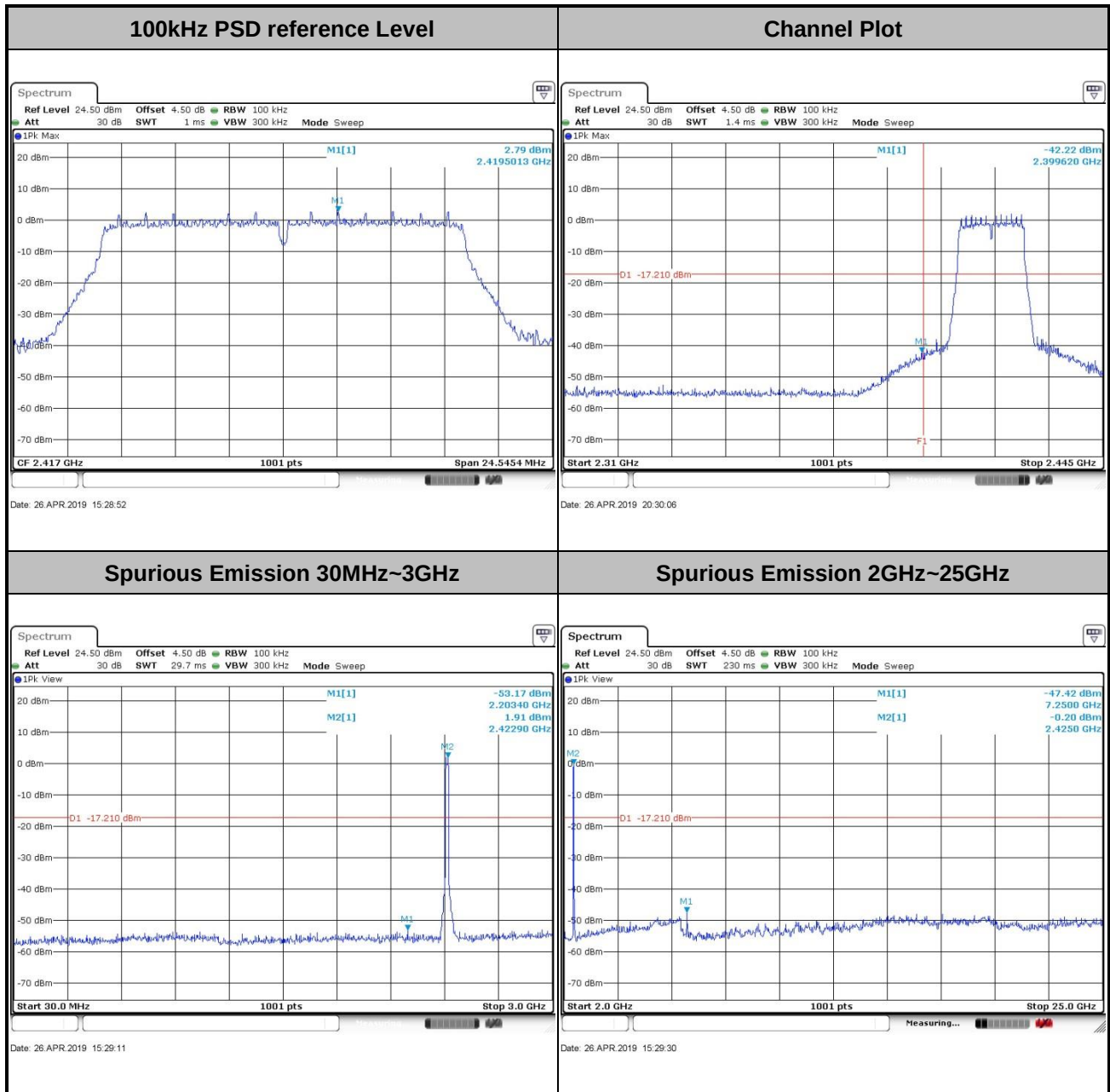


Spurious Emission 2GHz~25GHz





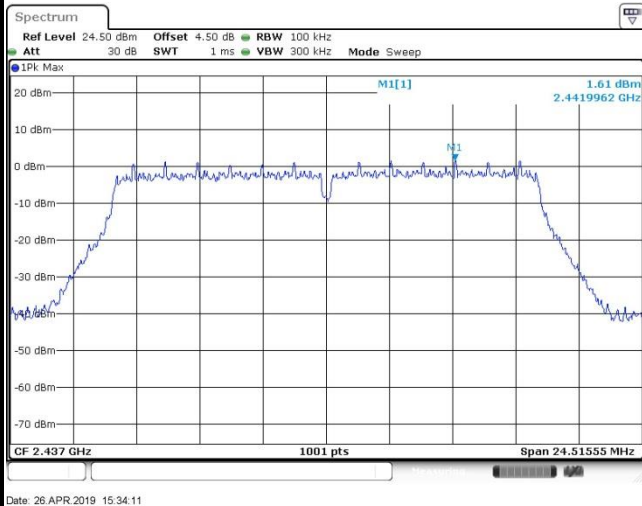
Test Mode :	802.11g	Test Channel :	02
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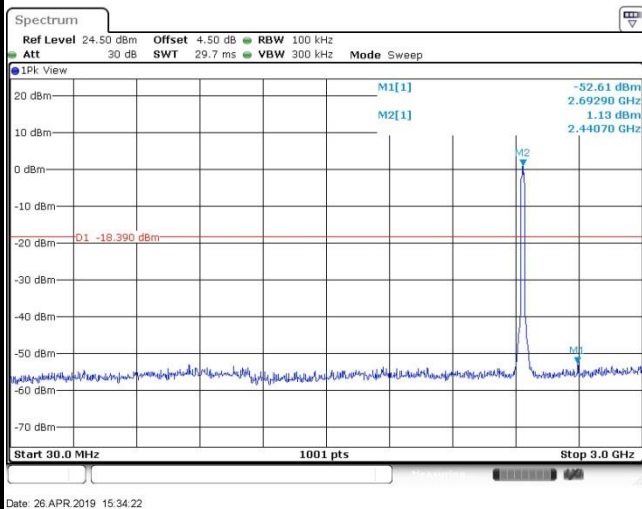


Test Mode :	802.11g	Test Channel :	06
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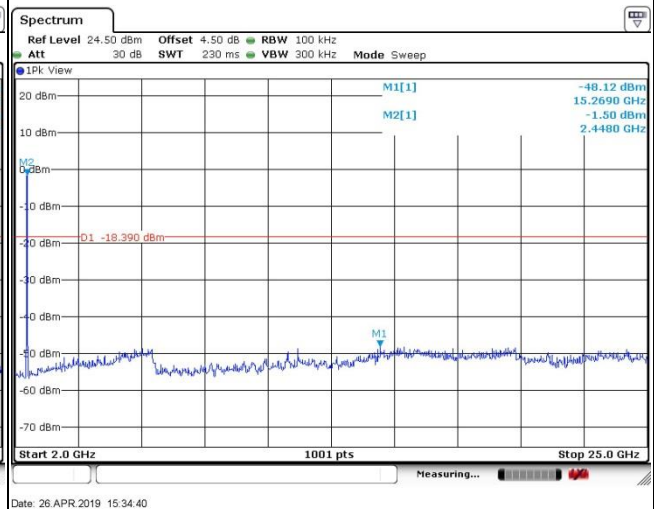
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

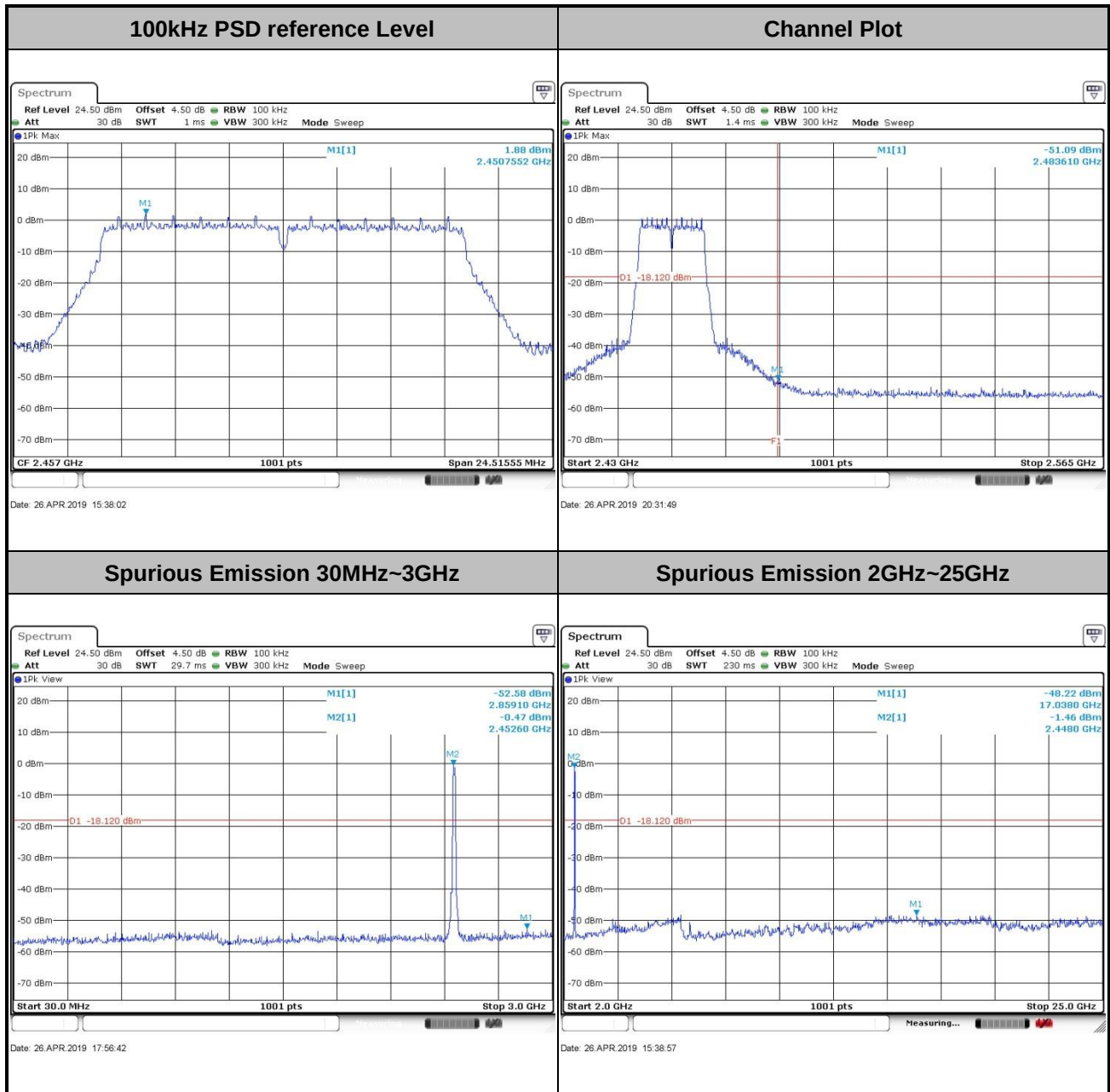


Spurious Emission 2GHz~25GHz



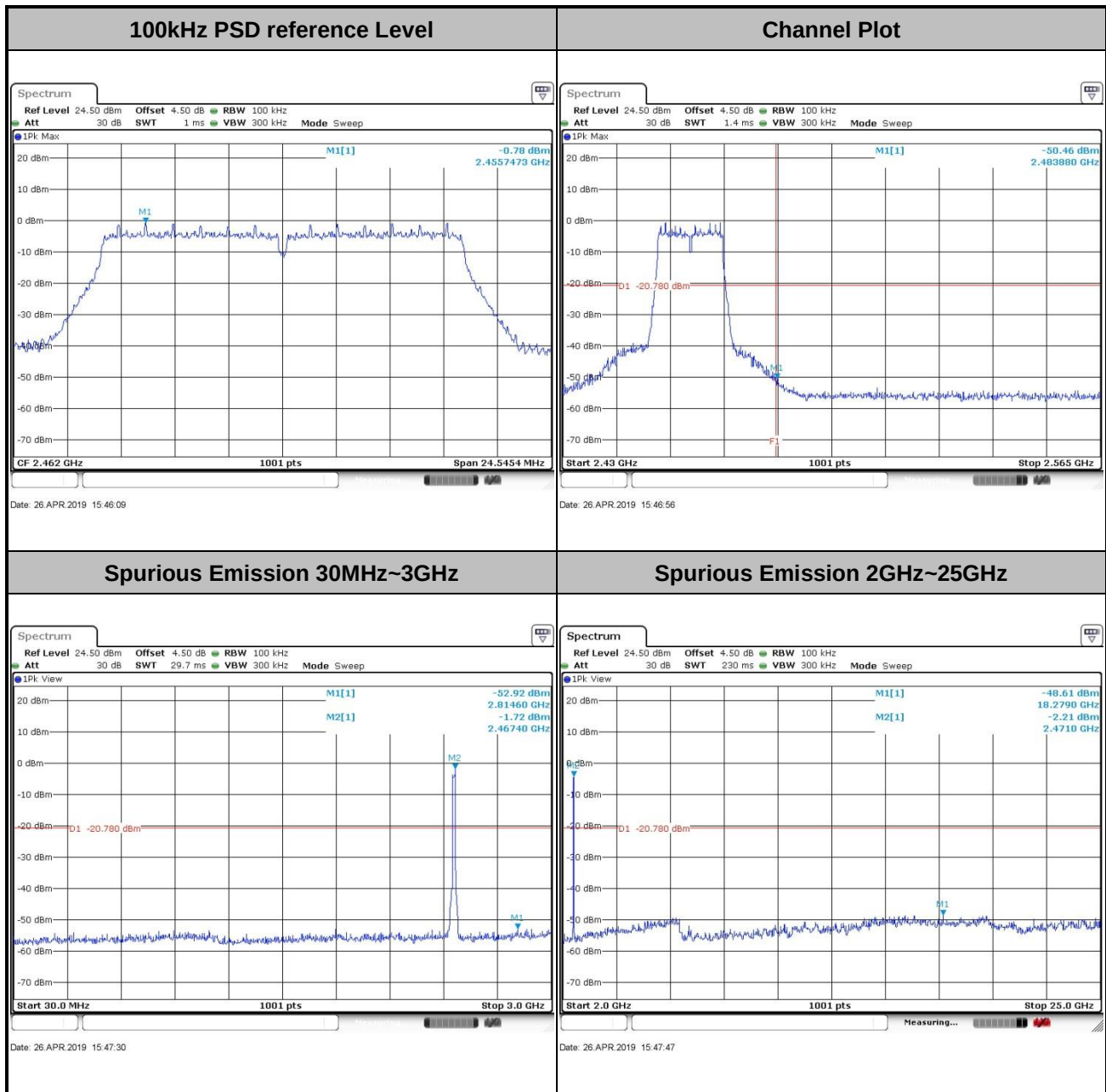


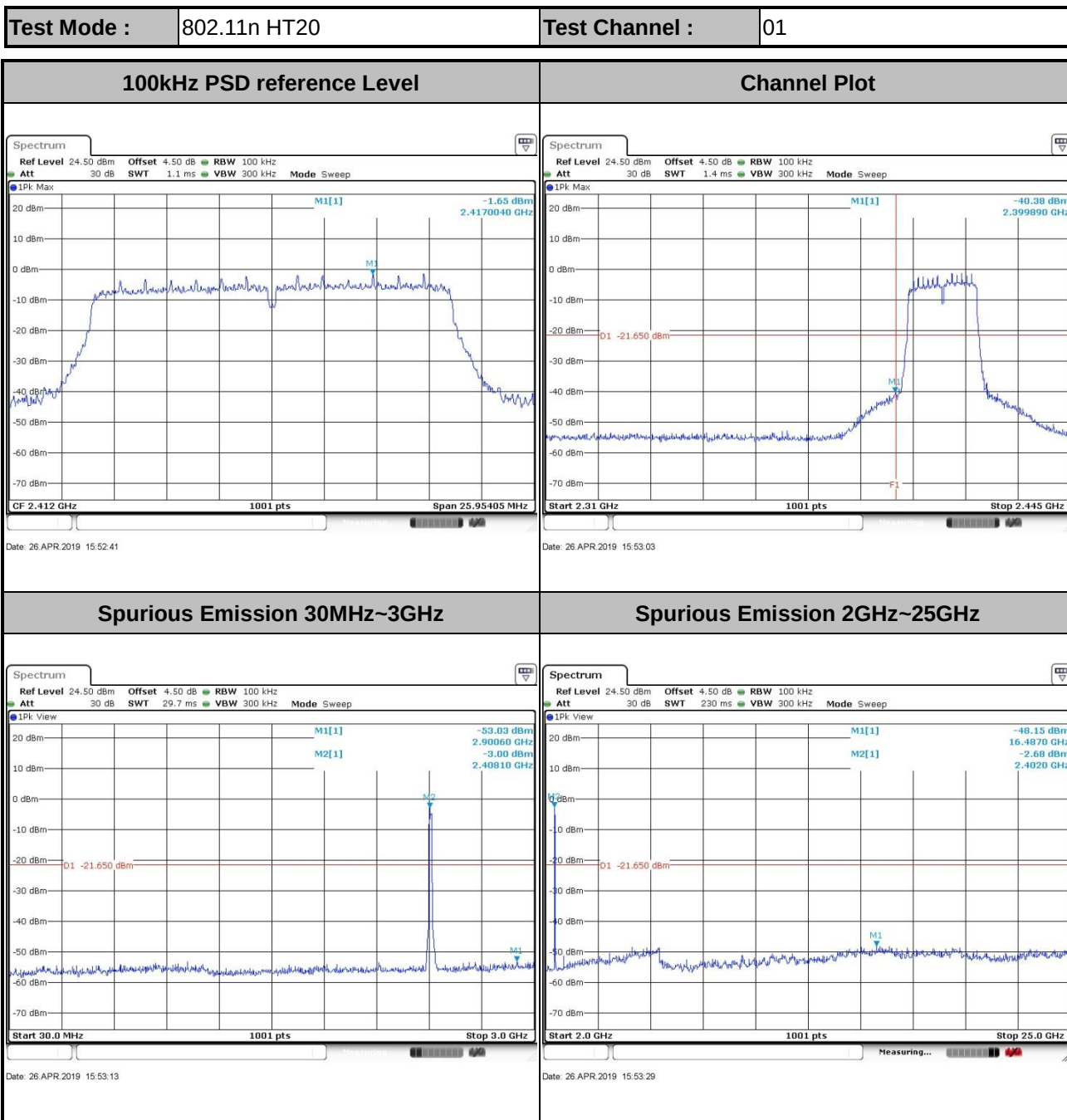
Test Mode :	802.11g	Test Channel :	10
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Test Mode :	802.11g	Test Channel :	11
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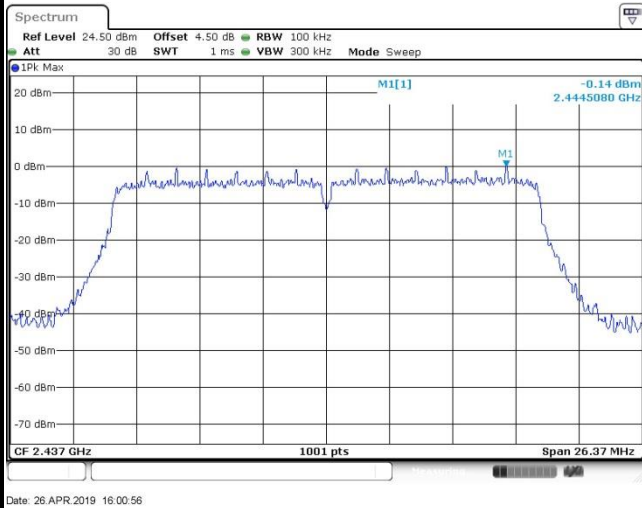




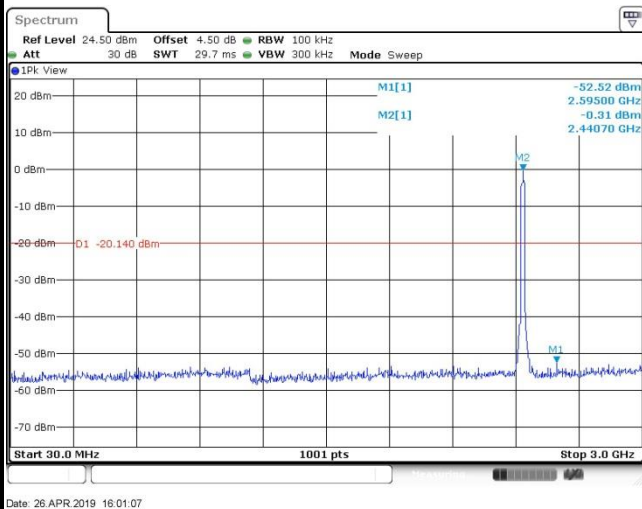
Test Mode : 802.11n HT20

Test Channel : 06

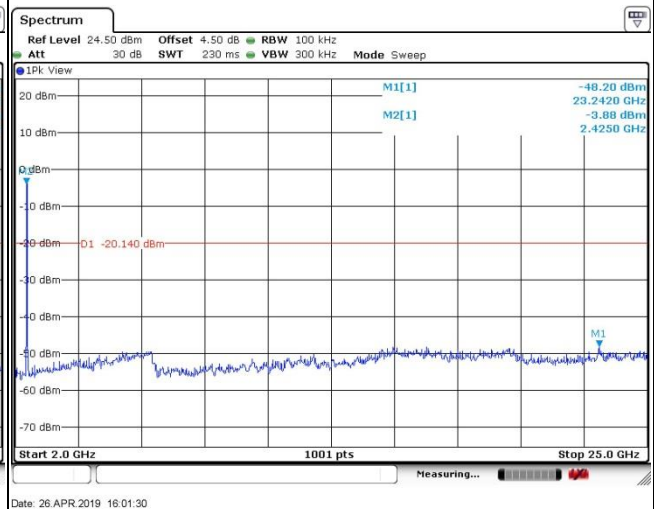
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

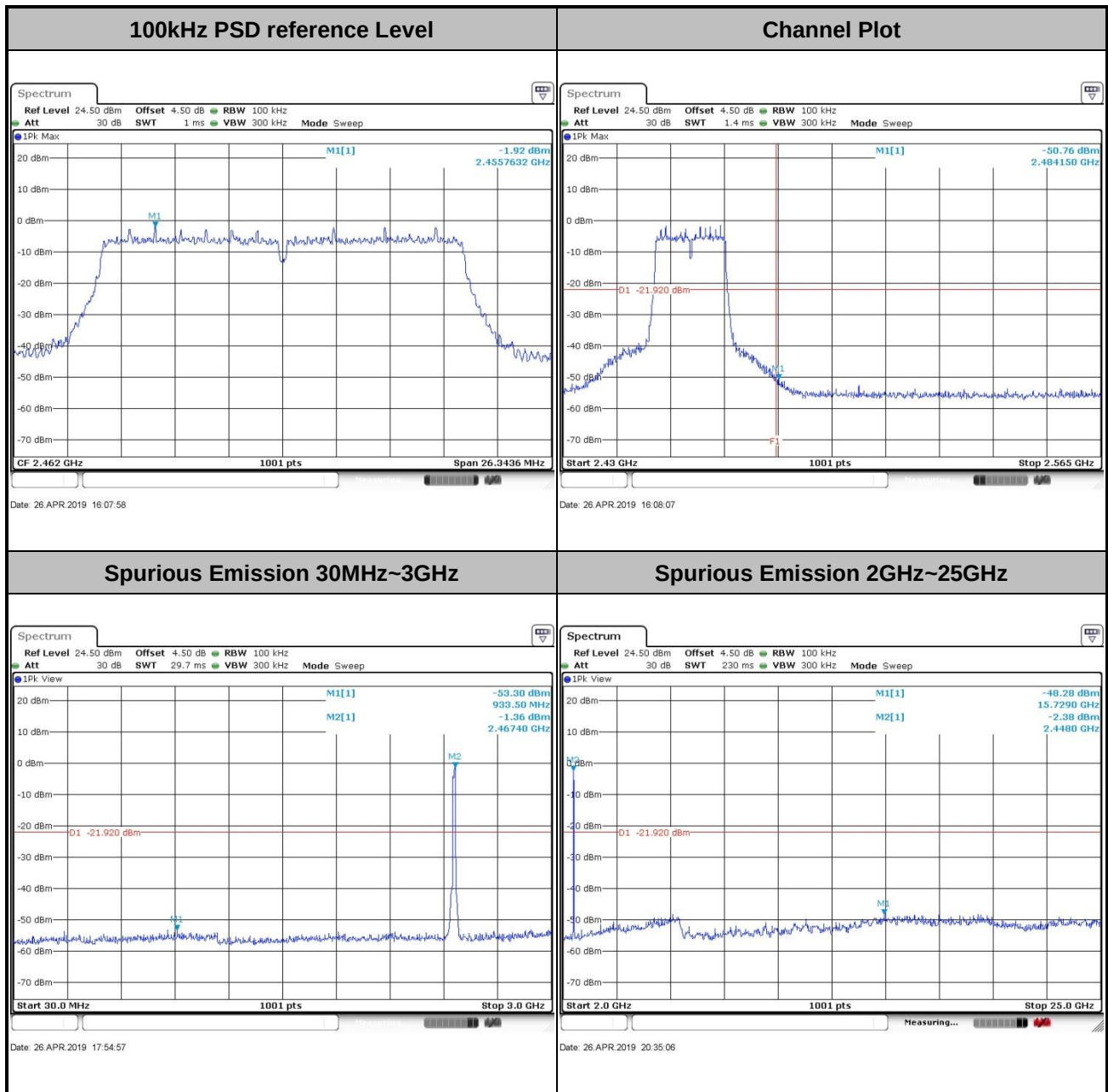


Spurious Emission 2GHz~25GHz



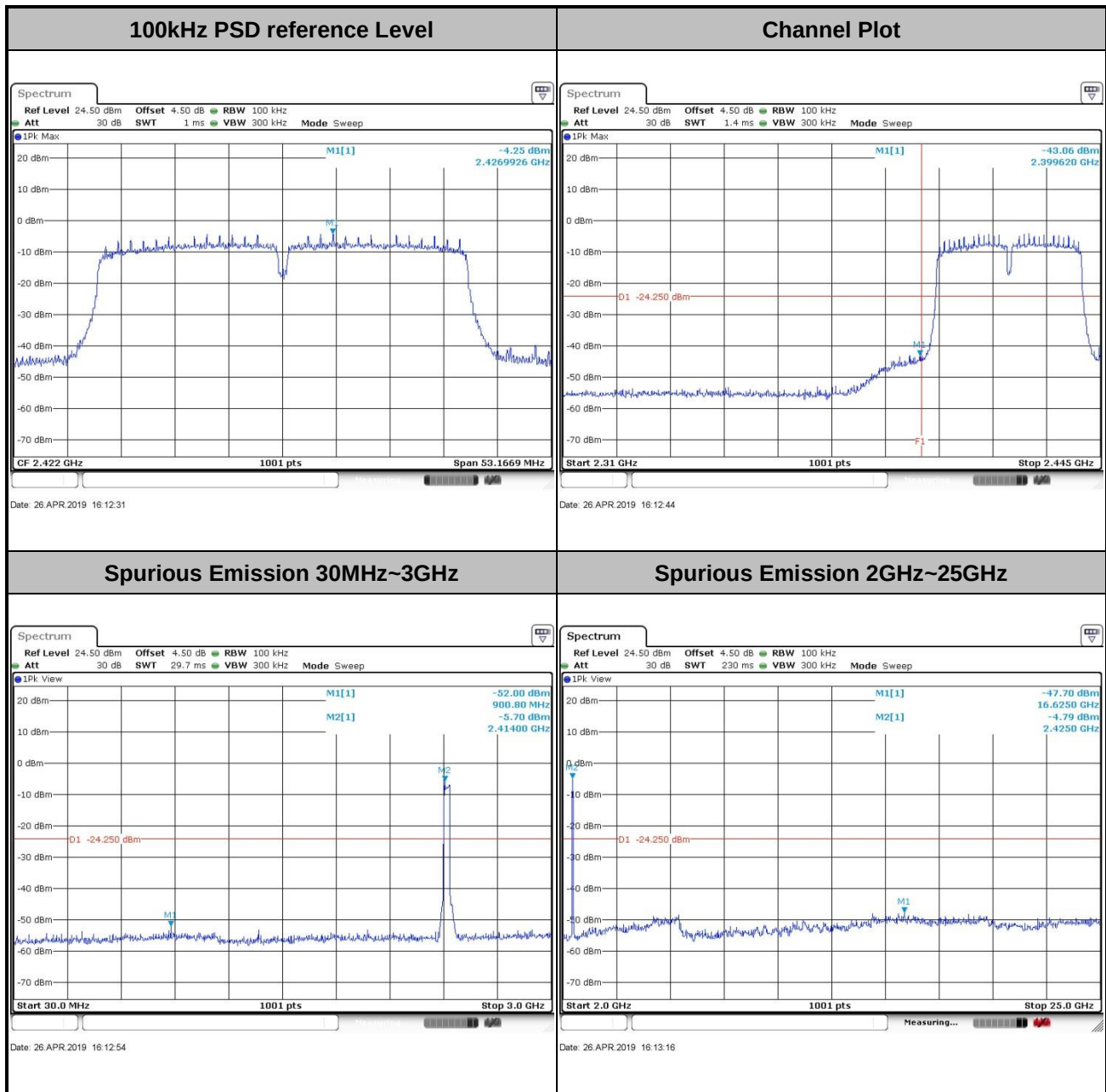


Test Mode :	802.11n HT20	Test Channel :	11
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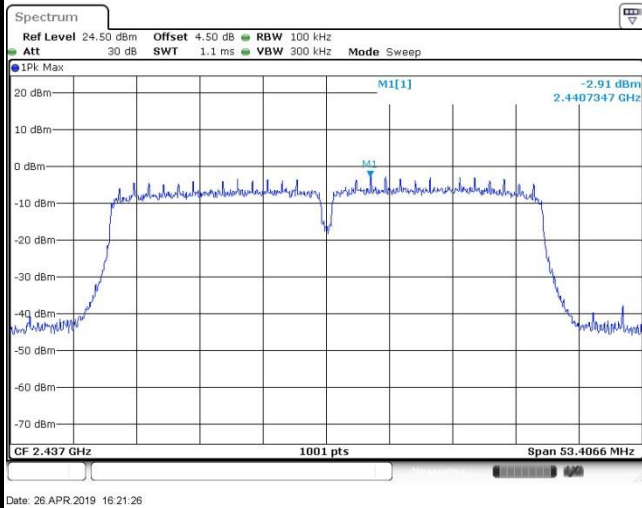
Test Mode :	802.11n HT40	Test Channel :	03
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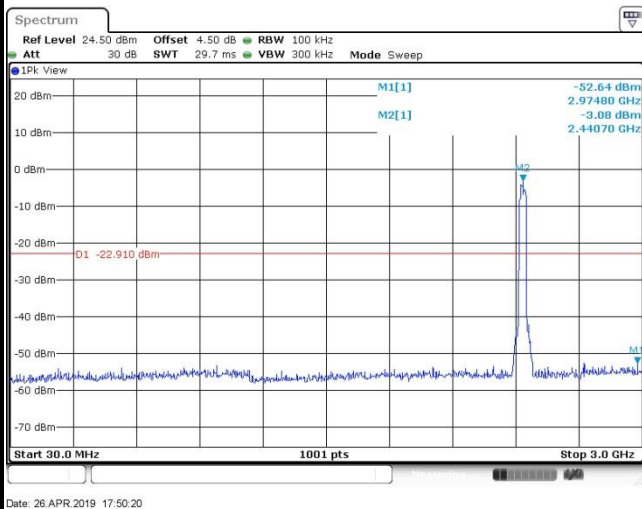


Test Mode :	802.11n HT40	Test Channel :	06
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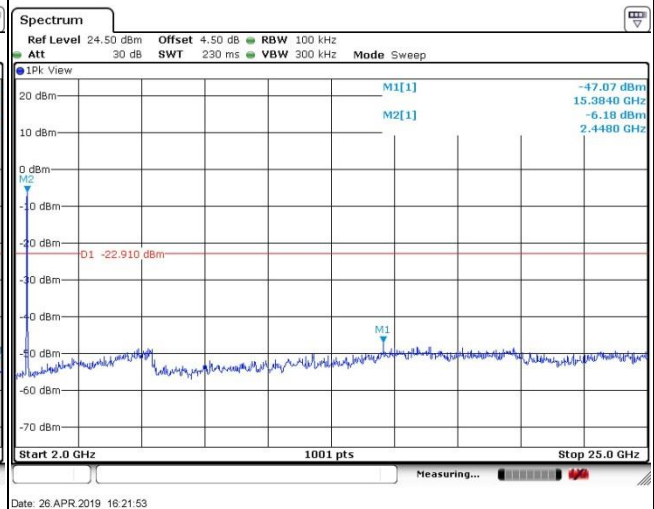
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

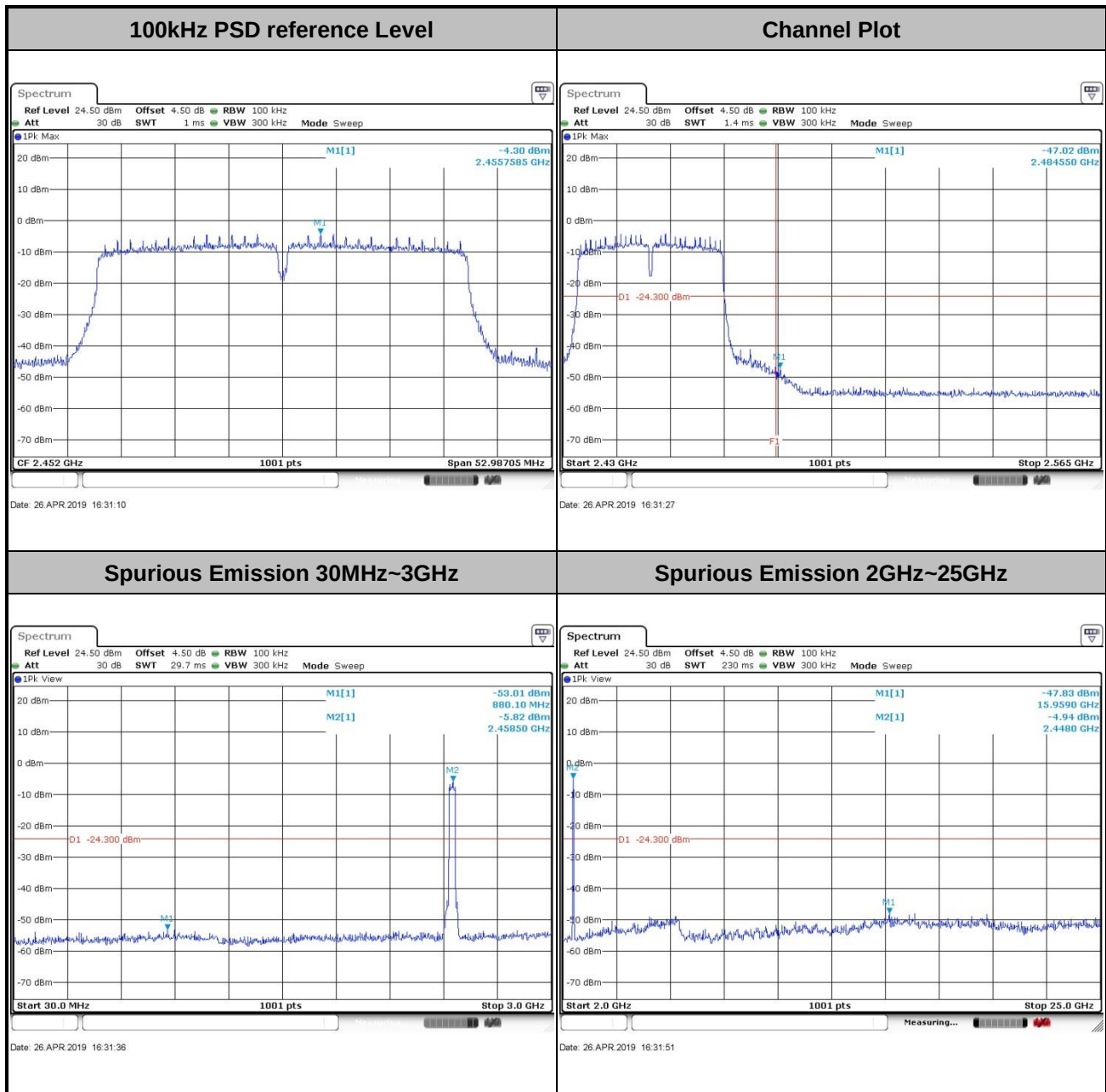


Spurious Emission 2GHz~25GHz





Test Mode :	802.11n HT40	Test Channel :	09
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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

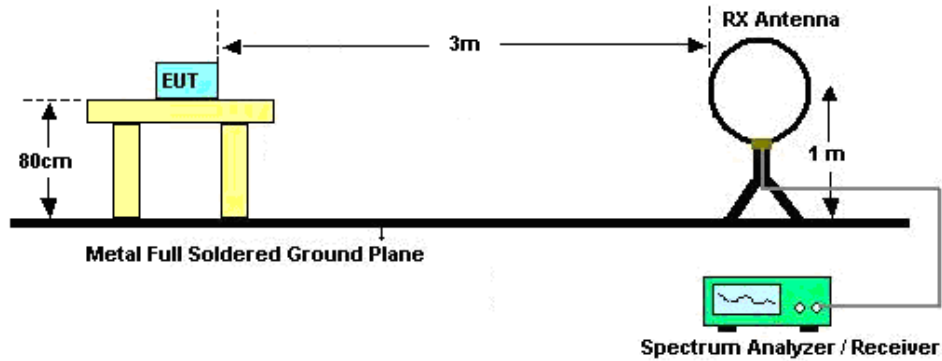
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

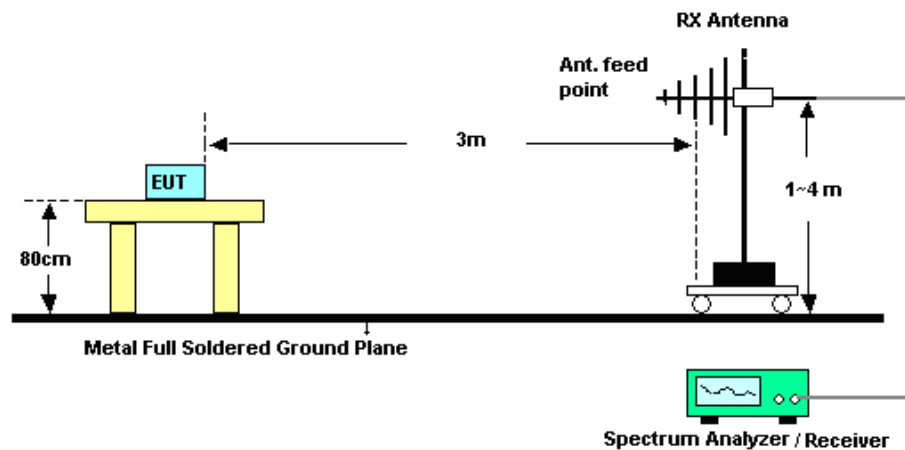
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

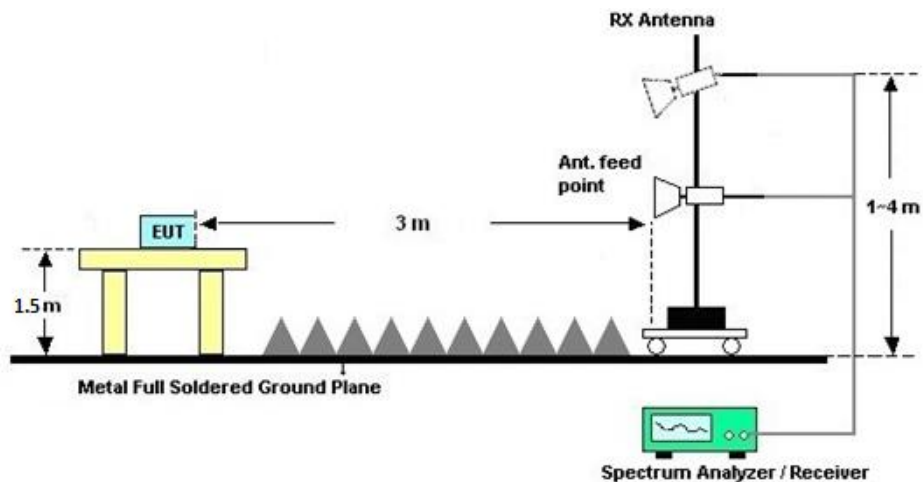
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





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

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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix 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 (dB μ V)	
	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.

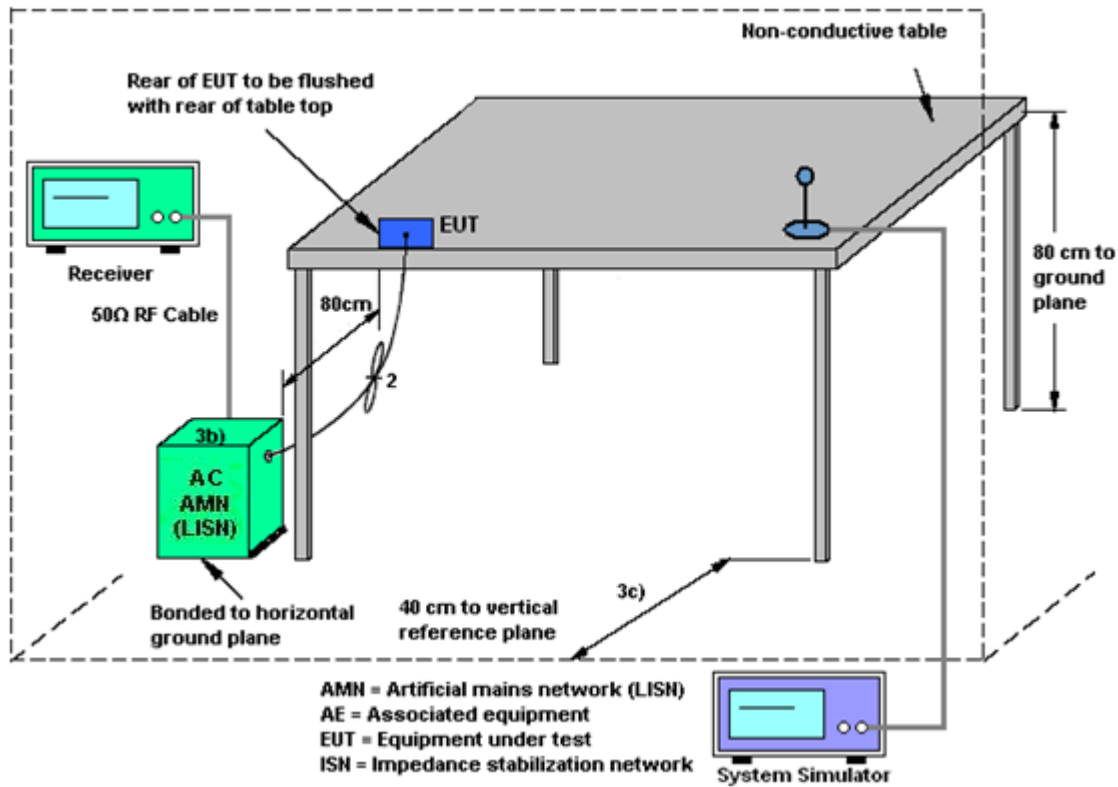
3.6.2 Measuring Instruments

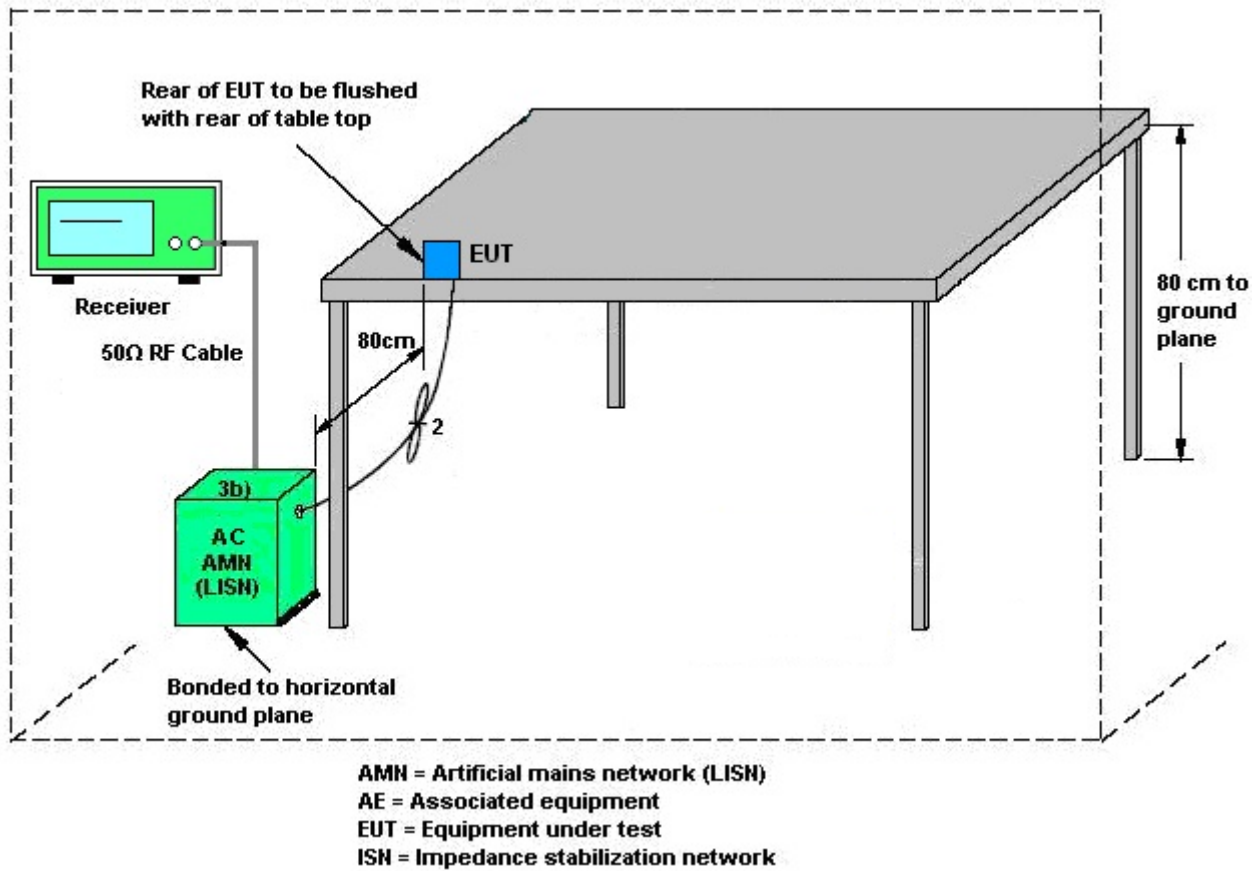
The measuring equipment is listed in the section 4 of this test report.

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
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Apr. 26, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Apr. 26, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Apr. 26, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Aug. 30, 2018	Apr. 24 2019	Aug. 29, 2019	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May. 29, 2018	Apr. 24 2019	May. 29, 2020	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jun. 05, 2018	Apr. 24 2019	Jun. 04, 2019	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	119436	1GHz~18GHz	Jun. 28, 2018	Apr. 24 2019	Jun. 27, 2019	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Mar. 30, 2019	Apr. 24 2019	Mar. 29, 2020	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 19, 2019	Apr. 24 2019	Apr. 18, 2020	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1707137	1GHz~18GHz	Oct. 19, 2018	Apr. 24 2019	Oct. 18, 2019	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270104	0.5GHz~26.5GHz	Dec. 22, 2018	Apr. 24 2019	Dec. 21, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 17, 2018	Apr. 24 2019	Jul. 16, 2019	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Apr. 24 2019	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Apr. 24 2019	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Apr. 24 2019	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 23, 2018	Apr. 20 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 18, 2018	Apr. 20 2019	Oct. 17, 2019	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 23, 2018	Apr. 20 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 18, 2018	Apr. 20 2019	Jul. 17, 2019	Conduction (CO01-SZ)

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% ($U = 2Uc(y)$)	2.6dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.3 dB
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Appendix A. Conducted Test Results

Report Number : FR932820C

Test Engineer:	ASA Cheng	Temperature:	21~25	°C
Test Date:	2019/04/26	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB Occupied Bandwidth

2.4GHz Band							
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
					Ant 1		
11b	1Mbps	1	1	2412	8.05	0.50	Pass
11b	1Mbps	1	6	2437	8.09	0.50	Pass
11b	1Mbps	1	11	2462	8.07	0.50	Pass
11g	6Mbps	1	1	2412	16.32	0.50	Pass
11g	6Mbps	1	2	2417	16.36	0.50	Pass
11g	6Mbps	1	6	2437	16.34	0.50	Pass
11g	6Mbps	1	10	2457	16.34	0.50	Pass
11g	6Mbps	1	11	2462	16.36	0.50	Pass
HT20	MCS0	1	1	2412	17.30	0.50	Pass
HT20	MCS0	1	6	2437	17.58	0.50	Pass
HT20	MCS0	1	11	2462	17.56	0.50	Pass
HT40	MCS0	1	3	2422	35.44	0.50	Pass
HT40	MCS0	1	6	2437	35.60	0.50	Pass
HT40	MCS0	1	9	2452	35.32	0.50	Pass

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	19.07	30.00	-0.50	18.57	36.00	Pass
11b	1Mbps	1	6	2437	19.13	30.00	-0.50	18.63	36.00	Pass
11b	1Mbps	1	11	2462	18.74	30.00	-0.50	18.24	36.00	Pass
11g	6Mbps	1	1	2412	19.58	30.00	-0.50	19.08	36.00	Pass
11g	6Mbps	1	2	2417	23.29	30.00	-0.50	22.79	36.00	Pass
11g	6Mbps	1	6	2437	23.47	30.00	-0.50	22.97	36.00	Pass
11g	6Mbps	1	10	2457	23.04	30.00	-0.50	22.54	36.00	Pass
11g	6Mbps	1	11	2462	19.51	30.00	-0.50	19.01	36.00	Pass
HT20	MCS0	1	1	2412	19.84	30.00	-0.50	19.34	36.00	Pass
HT20	MCS0	1	2	2417	21.71	30.00	-0.50	21.21	36.00	Pass
HT20	MCS0	1	6	2437	21.84	30.00	-0.50	21.34	36.00	Pass
HT20	MCS0	1	10	2457	21.06	30.00	-0.50	20.56	36.00	Pass
HT20	MCS0	1	11	2462	19.52	30.00	-0.50	19.02	36.00	Pass
HT40	MCS0	1	3	2422	21.60	30.00	-0.50	21.10	36.00	Pass
HT40	MCS0	1	4	2427	23.60	30.00	-0.50	23.10	36.00	Pass
HT40	MCS0	1	6	2437	23.38	30.00	-0.50	22.88	36.00	Pass
HT40	MCS0	1	8	2447	23.05	30.00	-0.50	22.55	36.00	Pass
HT40	MCS0	1	9	2452	21.28	30.00	-0.50	20.78	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	0.00	17.03	
11b	1Mbps	1	6	2437	0.00	16.85	
11b	1Mbps	1	11	2462	0.00	16.64	
11g	6Mbps	1	1	2412	0.11	10.18	
11g	6Mbps	1	2	2417	0.11	13.73	
11g	6Mbps	1	6	2437	0.11	13.82	
11g	6Mbps	1	10	2457	0.11	13.24	
11g	6Mbps	1	11	2462	0.11	10.04	
HT20	MCS0	1	1	2412	0.07	9.92	
HT20	MCS0	1	2	2417	0.10	11.66	
HT20	MCS0	1	6	2437	0.07	11.61	
HT20	MCS0	1	10	2457	0.07	11.34	
HT20	MCS0	1	11	2462	0.07	9.82	
HT40	MCS0	1	3	2422	0.15	9.65	
HT40	MCS0	1	4	2427	0.15	11.72	
HT40	MCS0	1	6	2437	0.15	11.54	
HT40	MCS0	1	8	2447	0.15	11.10	
HT40	MCS0	1	9	2452	0.15	9.40	

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

TEST RESULTS DATA
Peak Power Spectral Density

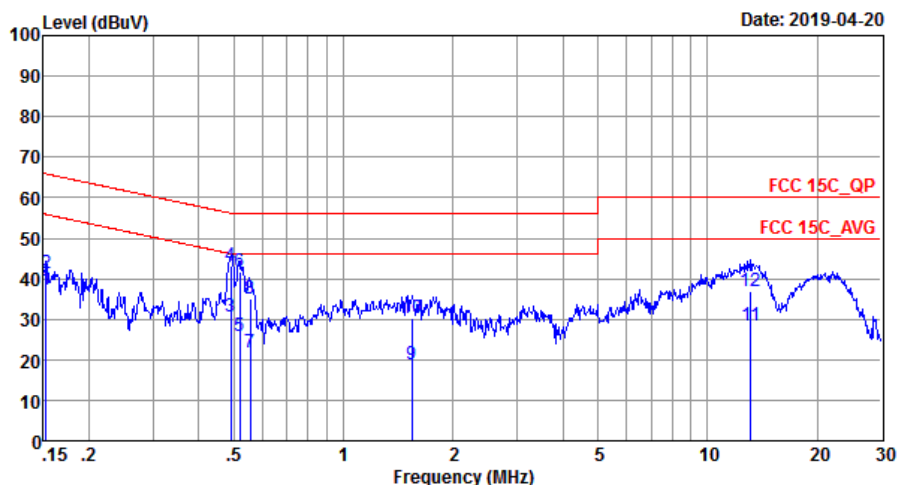
2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)	DG (dBi)	Peak PSD Limit (dBm/3kHz)	Pass/Fail
					Ant 1	Ant 1	Ant 1	
11b	1Mbps	1	1	2412	-5.33	-0.50	8.00	Pass
11b	1Mbps	1	6	2437	-4.70	-0.50	8.00	Pass
11b	1Mbps	1	11	2462	-4.44	-0.50	8.00	Pass
11g	6Mbps	1	1	2412	-13.34	-0.50	8.00	Pass
11g	6Mbps	1	2	2417	-10.09	-0.50	8.00	Pass
11g	6Mbps	1	6	2437	-11.90	-0.50	8.00	Pass
11g	6Mbps	1	10	2457	-10.85	-0.50	8.00	Pass
11g	6Mbps	1	11	2462	-12.36	-0.50	8.00	Pass
HT20	MCS0	1	1	2412	-15.87	-0.50	8.00	Pass
HT20	MCS0	1	6	2437	-13.52	-0.50	8.00	Pass
HT20	MCS0	1	11	2462	-13.78	-0.50	8.00	Pass
HT40	MCS0	1	3	2422	-18.14	-0.50	8.00	Pass
HT40	MCS0	1	6	2437	-17.17	-0.50	8.00	Pass
HT40	MCS0	1	9	2452	-17.94	-0.50	8.00	Pass

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



Appendix B. AC Conducted Emission Test Results

Test Engineer :	Jeff Yao	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



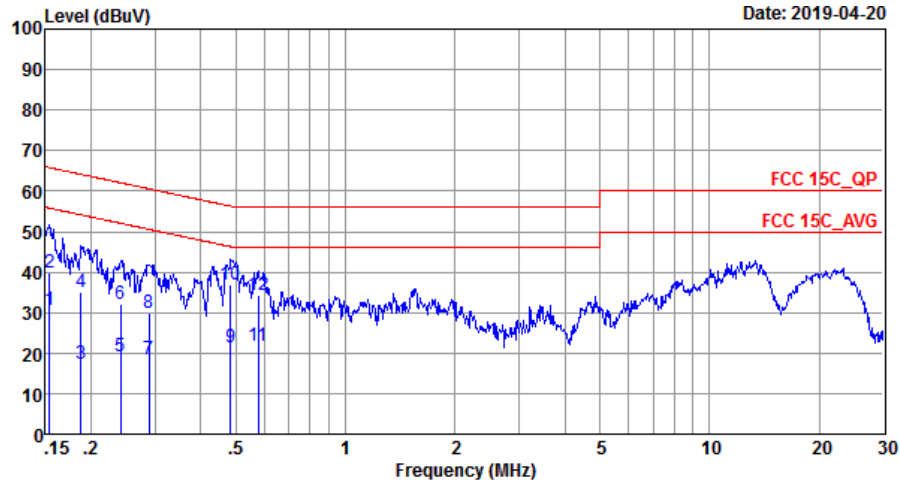
Site : CO01-SZ
Condition: FCC 15C_QP LISN_20180719_L LINE

IMEI : 867285040001637/867285040004151

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	37.29	-18.58	55.87	27.10	0.03	10.16	Average
2	0.15	41.19	-24.68	65.87	31.00	0.03	10.16	QP
3	0.49	30.79	-15.35	46.14	20.60	0.02	10.17	Average
4 *	0.49	43.29	-12.85	56.14	33.10	0.02	10.17	QP
5	0.52	25.99	-20.01	46.00	15.80	0.02	10.17	Average
6	0.52	41.69	-14.31	56.00	31.50	0.02	10.17	QP
7	0.56	21.70	-24.30	46.00	11.50	0.02	10.18	Average
8	0.56	35.20	-20.80	56.00	25.00	0.02	10.18	QP
9	1.54	18.68	-27.32	46.00	8.40	0.09	10.19	Average
10	1.54	30.38	-25.62	56.00	20.10	0.09	10.19	QP
11	13.13	28.53	-21.47	50.00	17.80	0.46	10.27	Average
12	13.13	36.83	-23.17	60.00	26.10	0.46	10.27	QP



Test Engineer :	Jeff Yao	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20180719_N NEUTRAL

IMEI : 867285040001637/867285040004151

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	30.59	-25.19	55.78	20.40	0.03	10.16	Average
2	0.15	39.79	-25.99	65.78	29.60	0.03	10.16	QP
3	0.19	17.49	-36.66	54.15	7.30	0.03	10.16	Average
4	0.19	34.89	-29.26	64.15	24.70	0.03	10.16	QP
5	0.24	19.29	-32.75	52.04	9.10	0.03	10.16	Average
6	0.24	31.99	-30.05	62.04	21.80	0.03	10.16	QP
7	0.29	18.50	-32.04	50.54	8.30	0.03	10.17	Average
8	0.29	29.80	-30.74	60.54	19.60	0.03	10.17	QP
9	0.48	21.39	-24.88	46.27	11.20	0.02	10.17	Average
10 *	0.48	36.99	-19.28	56.27	26.80	0.02	10.17	QP
11	0.58	21.90	-24.10	46.00	11.70	0.02	10.18	Average
12	0.58	34.30	-21.70	56.00	24.10	0.02	10.18	QP



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	Preamplifier 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		2386.96	54.12	-19.88	74	46.48	31.5	9.14	33	148	25	P	H
		2390	44.59	-9.41	54	36.95	31.5	9.14	33	148	25	A	H
	*	2412	105.67	-	-	97.96	31.57	9.14	33	148	25	P	H
	*	2412	104.05	-	-	96.34	31.57	9.14	33	148	25	A	H
		2387.7	54.15	-19.85	74	46.51	31.5	9.14	33	263	85	P	V
		2390	43.81	-10.19	54	36.17	31.5	9.14	33	263	85	A	V
	*	2412	104.03	-	-	96.32	31.57	9.14	33	263	85	P	V
	*	2412	102.39	-	-	94.68	31.57	9.14	33	263	85	A	V
802.11b CH 06 2437MHz		2311.26	53.93	-20.07	74	46.4	31.59	8.94	33	137	28	P	H
		2389.94	42.85	-11.15	54	35.21	31.5	9.14	33	137	28	A	H
	*	2437	104.35	-	-	96.43	31.71	9.21	33	137	28	P	H
	*	2437	102.61	-	-	94.69	31.71	9.21	33	137	28	A	H
		2487.96	53.97	-20.03	74	45.76	31.93	9.28	33	137	28	P	H
		2484.67	43.23	-10.77	54	35.09	31.86	9.28	33	137	28	A	H
		2338.84	54.23	-19.77	74	46.74	31.55	8.94	33	297	95	P	V
		2389.66	42.84	-11.16	54	35.2	31.5	9.14	33	297	95	A	V
	*	2437	102.37	-	-	94.45	31.71	9.21	33	297	95	P	V
	*	2437	100.08	-	-	92.16	31.71	9.21	33	297	95	A	V
		2498.95	53.94	-20.06	74	45.73	31.93	9.28	33	297	95	P	V
		2487.33	43.2	-10.8	54	35.06	31.86	9.28	33	297	95	A	V



802.11b CH 11 2462MHz	*	2462	106.22	-	-	98.22	31.79	9.21	33	143	25	P	H
	*	2462	104.25	-	-	96.25	31.79	9.21	33	143	25	A	H
		2483.72	55.08	-18.92	74	46.94	31.86	9.28	33	143	25	P	H
		2483.52	46.29	-7.71	54	38.15	31.86	9.28	33	143	25	A	H
	*	2462	103.89	-	-	95.89	31.79	9.21	33	293	112	P	V
	*	2462	102.01	-	-	94.01	31.79	9.21	33	293	112	A	V
		2496.52	53.56	-20.44	74	45.35	31.93	9.28	33	293	112	P	V
		2483.52	44.44	-9.56	54	36.3	31.86	9.28	33	293	112	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		4824	48.71	-25.29	74	59.52	33.77	12.9	57.48	185	360	P	H
CH 01		4824	46.41	-7.59	54	57.22	33.77	12.9	57.48	185	360	A	H
2412MHz		4824	46.36	-27.64	74	57.17	33.77	12.9	57.48	185	255	P	V
802.11b		4874	48.66	-25.34	74	59.42	33.75	13.01	57.52	165	185	P	H
CH 06		4874	46.24	-7.76	54	57	33.75	13.01	57.52	165	185	A	H
2437MHz		7311	47.78	-26.22	74	54.73	35.46	16.51	58.92	174	100	P	H
		4874	45.48	-28.52	74	56.24	33.75	13.01	57.52	165	106	P	V
		7311	46.5	-27.5	74	53.45	35.46	16.51	58.92	174	100	P	V
802.11b		4924	48.14	-25.86	74	58.75	33.73	13.21	57.55	150	285	P	H
CH 11		4924	45.77	-8.23	54	56.38	33.73	13.21	57.55	150	285	A	H
2462MHz		7386	47.71	-26.29	74	54.46	35.61	16.6	58.96	155	274	P	H
		4924	45.42	-28.58	74	56.03	33.73	13.21	57.55	182	96	P	V
		7386	47.83	-26.17	74	54.58	35.61	16.6	58.96	155	85	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		2389.8	54.03	-19.97	74	46.39	31.5	9.14	33	149	30	P	H
		2389.8	44.9	-9.1	54	37.26	31.5	9.14	33	149	30	A	H
	*	2412	101.7	-	-	93.99	31.57	9.14	33	149	30	P	H
	*	2412	93.99	-	-	86.28	31.57	9.14	33	149	30	A	H
		2367.75	54.57	-19.43	74	46.99	31.54	9.04	33	265	110	P	V
		2389.38	43.73	-10.27	54	36.09	31.5	9.14	33	265	110	A	V
	*	2412	100.51	-	-	92.8	31.57	9.14	33	265	110	P	V
	*	2412	93.55	-	-	85.84	31.57	9.14	33	265	110	A	V
802.11g CH 06 2437MHz		2335.34	53.72	-20.28	74	46.23	31.55	8.94	33	159	31	P	H
		2387.7	43.7	-10.3	54	36.06	31.5	9.14	33	159	31	A	H
	*	2437	104.84	-	-	96.92	31.71	9.21	33	159	31	P	H
	*	2437	97.45	-	-	89.53	31.71	9.21	33	159	31	A	H
		2486.91	54.3	-19.7	74	46.16	31.86	9.28	33	159	31	P	H
		2488.87	44.13	-9.87	54	35.92	31.93	9.28	33	159	31	A	H
		2377.2	53.7	-20.3	74	46.14	31.52	9.04	33	253	92	P	V
		2362.92	43.68	-10.32	54	36.1	31.54	9.04	33	253	92	A	V
	*	2437	98.04	-	-	90.12	31.71	9.21	33	253	92	P	V
	*	2437	90.96	-	-	83.04	31.71	9.21	33	253	92	A	V
		2492.79	53.66	-20.34	74	45.45	31.93	9.28	33	253	92	P	V
		2496.64	44.13	-9.87	54	35.92	31.93	9.28	33	253	92	A	V



802.11g CH 11 2462MHz	*	2462	103	-	-	95	31.79	9.21	33	163	27	P	H
	*	2462	96.28	-	-	88.28	31.79	9.21	33	163	27	A	H
		2483.68	57.27	-16.73	74	49.13	31.86	9.28	33	163	27	P	H
		2483.6	46.7	-7.3	54	38.56	31.86	9.28	33	163	27	A	H
	*	2462	100.47	-	-	92.47	31.79	9.21	33	295	110	P	V
	*	2462	93.83	-	-	85.83	31.79	9.21	33	295	110	A	V
		2490.12	54.11	-19.89	74	45.9	31.93	9.28	33	295	110	P	V
		2483.68	44.88	-9.12	54	36.74	31.86	9.28	33	295	110	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	46.32	-27.68	74	57.13	33.77	12.9	57.48	185	255	P	H
		4824	46.05	-27.95	74	56.86	33.77	12.9	57.48	185	255	P	V
802.11g CH 06 2437MHz		4874	45.45	-28.55	74	56.21	33.75	13.01	57.52	165	106	P	H
		7311	47.19	-26.81	74	54.14	35.46	16.51	58.92	174	100	P	H
		4874	46.56	-27.44	74	57.32	33.75	13.01	57.52	165	106	P	V
		7311	47.39	-26.61	74	54.34	35.46	16.51	58.92	174	78	P	V
802.11g CH 11 2462MHz		4924	43.7	-30.3	74	54.31	33.73	13.21	57.55	150	285	P	H
		7386	46.77	-27.23	74	53.52	35.61	16.6	58.96	155	274	P	H
		4924	44.54	-29.46	74	55.15	33.73	13.21	57.55	150	285	P	V
		7386	46.75	-27.25	74	53.5	35.61	16.6	58.96	161	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)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.69	54.59	-19.41	74	46.95	31.5	9.14	33	153	27	P	H
		2389.59	45.26	-8.74	54	37.62	31.5	9.14	33	153	27	A	H
	*	2412	102.45	-	-	94.74	31.57	9.14	33	153	27	P	H
	*	2412	94.85	-	-	87.14	31.57	9.14	33	153	27	A	H
		2389.7	54.38	-19.62	74	46.74	31.5	9.14	33	258	82	P	V
		2389.7	45.05	-8.95	54	37.41	31.5	9.14	33	258	82	A	V
	*	2412	97.07	-	-	89.36	31.57	9.14	33	258	82	P	V
	*	2412	89.79	-	-	82.08	31.57	9.14	33	258	82	A	V
802.11n HT20 CH 06 2437MHz		2360.26	53.37	-20.63	74	45.79	31.54	9.04	33	164	31	P	H
		2366.42	43.4	-10.6	54	35.82	31.54	9.04	33	164	31	A	H
	*	2437	104.42	-	-	96.5	31.71	9.21	33	164	31	P	H
	*	2437	95.08	-	-	87.16	31.71	9.21	33	164	31	A	H
		2496.57	53.82	-20.18	74	45.61	31.93	9.28	33	164	31	P	H
		2485.3	44.08	-9.92	54	35.94	31.86	9.28	33	164	31	A	H
		2320.22	53.97	-20.03	74	46.46	31.57	8.94	33	258	82	P	V
		2379.86	43.47	-10.53	54	35.91	31.52	9.04	33	258	82	A	V
	*	2437	99.7	-	-	91.78	31.71	9.21	33	258	82	P	V
	*	2437	93.35	-	-	85.43	31.71	9.21	33	258	82	A	V
		2487.19	53.94	-20.06	74	45.8	31.86	9.28	33	258	82	P	V
		2487.19	43.74	-10.26	54	35.6	31.86	9.28	33	258	82	A	V



802.11n HT20 CH 11 2462MHz	*	2462	102.03	-	-	94.03	31.79	9.21	33	189	27	P	H
	*	2462	92.88	-	-	84.88	31.79	9.21	33	189	27	A	H
		2483.8	55.88	-18.12	74	47.74	31.86	9.28	33	189	27	P	H
		2483.6	45.59	-8.41	54	37.45	31.86	9.28	33	189	27	A	H
	*	2462	97.15	-	-	89.15	31.79	9.21	33	258	82	P	V
	*	2462	91.37	-	-	83.37	31.79	9.21	33	258	82	A	V
		2497.08	53.52	-20.48	74	45.31	31.93	9.28	33	258	82	P	V
		2483.68	44.58	-9.42	54	36.44	31.86	9.28	33	258	82	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)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	45.07	-28.93	74	55.88	33.77	12.9	57.48	148	255	P	H
		4824	45.69	-28.31	74	56.5	33.77	12.9	57.48	185	149	P	V
802.11n HT20 CH 06 2437MHz		4874	45.44	-28.56	74	56.2	33.75	13.01	57.52	165	106	P	H
		7311	46.53	-27.47	74	53.48	35.46	16.51	58.92	174	100	P	H
		4874	45.2	-28.8	74	55.96	33.75	13.01	57.52	165	106	P	V
		7311	45.77	-28.23	74	52.72	35.46	16.51	58.92	161	0	P	V
802.11n HT20 CH 11 2462MHz		4924	43.8	-30.2	74	54.41	33.73	13.21	57.55	150	285	P	H
		7386	46.34	-27.66	74	53.09	35.61	16.6	58.96	155	274	P	H
		4924	44.44	-29.56	74	55.05	33.73	13.21	57.55	149	285	P	V
		7386	46.86	-27.14	74	53.61	35.61	16.6	58.96	198	274	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)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2384.48	53.74	-20.26	74	46.18	31.52	9.04	33	252	23	P	H
		2389.8	44.99	-9.01	54	37.35	31.5	9.14	33	252	23	A	H
	*	2422	96.87	-	-	89.09	31.64	9.14	33	252	23	P	H
	*	2422	89.35	-	-	81.57	31.64	9.14	33	252	23	A	H
		2486.28	53.99	-20.01	74	45.85	31.86	9.28	33	252	23	P	H
		2487.75	43.9	-10.1	54	35.69	31.93	9.28	33	252	23	A	H
		2389.66	54.37	-19.63	74	46.73	31.5	9.14	33	258	82	P	V
		2389.94	44.5	-9.5	54	36.86	31.5	9.14	33	258	82	A	V
	*	2422	94.47	-	-	86.69	31.64	9.14	33	258	82	P	V
	*	2422	86.76	-	-	78.98	31.64	9.14	33	258	82	A	V
		2486.7	54.37	-19.63	74	46.23	31.86	9.28	33	258	82	P	V
		2494.68	43.84	-10.16	54	35.63	31.93	9.28	33	258	82	A	V
802.11n HT40 CH 06 2437MHz		2389.8	56.72	-17.28	74	49.08	31.5	9.14	33	252	23	P	H
		2389.94	45.18	-8.82	54	37.54	31.5	9.14	33	252	23	A	H
	*	2437	99.27	-	-	91.35	31.71	9.21	33	252	23	P	H
	*	2437	91.62	-	-	83.7	31.71	9.21	33	252	23	A	H
		2487.33	54.79	-19.21	74	46.65	31.86	9.28	33	252	23	P	H
		2483.5	45.3	-8.7	54	37.16	31.86	9.28	33	252	23	A	H
		2389.94	52.96	-21.04	74	45.32	31.5	9.14	33	258	82	P	V
		2389.94	44.01	-9.99	54	36.37	31.5	9.14	33	258	82	A	V
	*	2437	96.68	-	-	88.76	31.71	9.21	33	258	82	P	V
	*	2437	89.71	-	-	81.79	31.71	9.21	33	258	82	A	V
		2488.73	53.89	-20.11	74	45.68	31.93	9.28	33	258	82	P	V
		2484.88	43.99	-10.01	54	35.85	31.86	9.28	33	258	82	A	V



802.11n HT40 CH 09 2452MHz		2371.74	53.1	-20.9	74	45.54	31.52	9.04	33	252	22	P	H
		2355.92	43.42	-10.58	54	35.84	31.54	9.04	33	252	22	A	H
	*	2452	96.98	-	-	89.06	31.71	9.21	33	252	22	P	H
	*	2452	89.59	-	-	81.67	31.71	9.21	33	252	22	A	H
		2487.12	55.62	-18.38	74	47.48	31.86	9.28	33	252	22	P	H
		2483.55	45.44	-8.56	54	37.3	31.86	9.28	33	252	22	A	H
		2319.38	53.29	-20.71	74	45.78	31.57	8.94	33	258	82	P	V
		2348.64	43.34	-10.66	54	35.75	31.55	9.04	33	258	82	A	V
	*	2452	94.26	-	-	86.34	31.71	9.21	33	258	82	P	V
	*	2452	87.64	-	-	79.72	31.71	9.21	33	258	82	A	V
		2483.83	54.96	-19.04	74	46.82	31.86	9.28	33	258	82	P	V
		2483.55	44.87	-9.13	54	36.73	31.86	9.28	33	258	82	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		4844	45.19	-28.81	74	55.9	33.77	13.01	57.49	175	350	P	H
HT40		7266	46.07	-27.93	74	53.12	35.4	16.46	58.91	200	360	P	H
CH 03		4844	46.55	-27.45	74	57.26	33.77	13.01	57.49	150	350	P	V
2422MHz		7266	46.63	-27.37	74	53.68	35.4	16.46	58.91	200	185	P	V
802.11n		4874	43.5	-30.5	74	54.26	33.75	13.01	57.52	185	230	P	H
HT40		7311	45.34	-28.66	74	52.29	35.46	16.51	58.92	186	323	P	H
CH 06		4874	46.61	-27.39	74	57.37	33.75	13.01	57.52	165	230	P	V
2437MHz		7311	46.81	-27.19	74	53.76	35.46	16.51	58.92	186	43	P	V
802.11n		4904	43.67	-30.33	74	54.36	33.74	13.11	57.54	150	159	P	H
HT40		7356	47.65	-26.35	74	54.49	35.55	16.55	58.94	165	335	P	H
CH 09		4904	46.53	-27.47	74	57.22	33.74	13.11	57.54	150	360	P	V
2452MHz		7356	46.85	-27.15	74	53.69	35.55	16.55	58.94	165	78	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz
2.4GHz WIFI 802.11g (LF)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11g LF		35.82	25.04	-14.96	40	34.6	20.92	1.02	31.5	100	46	P	H
		96.93	26.96	-16.54	43.5	40.7	16.1	1.76	31.6	-	-	P	H
		206.54	24.45	-19.05	43.5	37.74	15.5	2.56	31.35	-	-	P	H
		404.42	30.03	-15.97	46	36.17	21.69	3.58	31.41	-	-	P	H
		737.13	29.39	-16.61	46	30.42	25.38	4.84	31.25	-	-	P	H
		911.73	30.96	-15.04	46	30.43	26.6	5.38	31.45	-	-	P	H
		52.31	30.53	-9.47	40	47.07	13.78	1.28	31.6	100	73	P	V
		139.61	32.76	-10.74	43.5	44.69	17.4	2.11	31.44	-	-	P	V
		182.29	32.9	-10.6	43.5	46.6	15.24	2.4	31.34	-	-	P	V
		411.21	31.31	-14.69	46	37.31	21.81	3.61	31.42	-	-	P	V
		627.52	29.56	-16.44	46	31.98	24.61	4.46	31.49	-	-	P	V
		843.83	29.95	-16.05	46	29.83	26.33	5.18	31.39	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

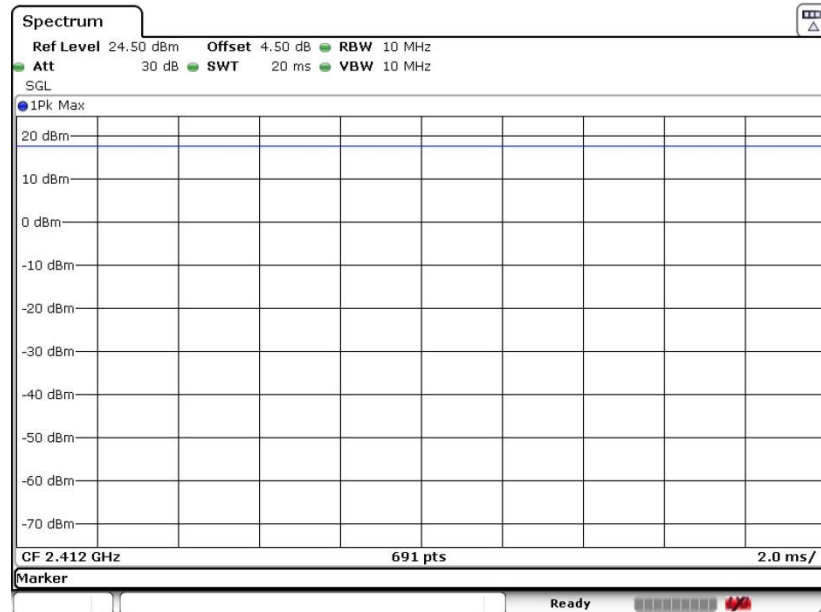
Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix D. Duty Cycle Plots

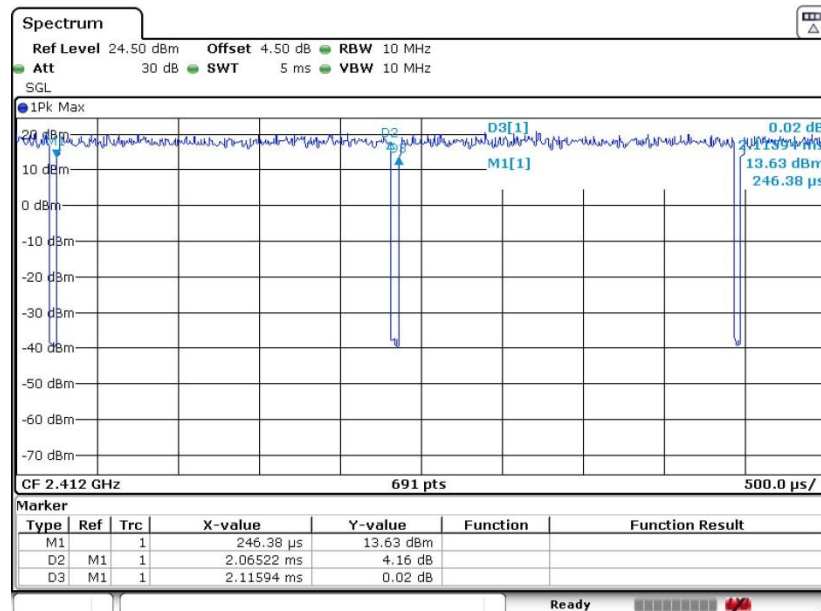
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	97.60	2.065	0.484	1KHz
802.11n HT20	98.36	-	-	10Hz
802.11n HT40	96.69	1.268	0.789	1KHz



802.11b

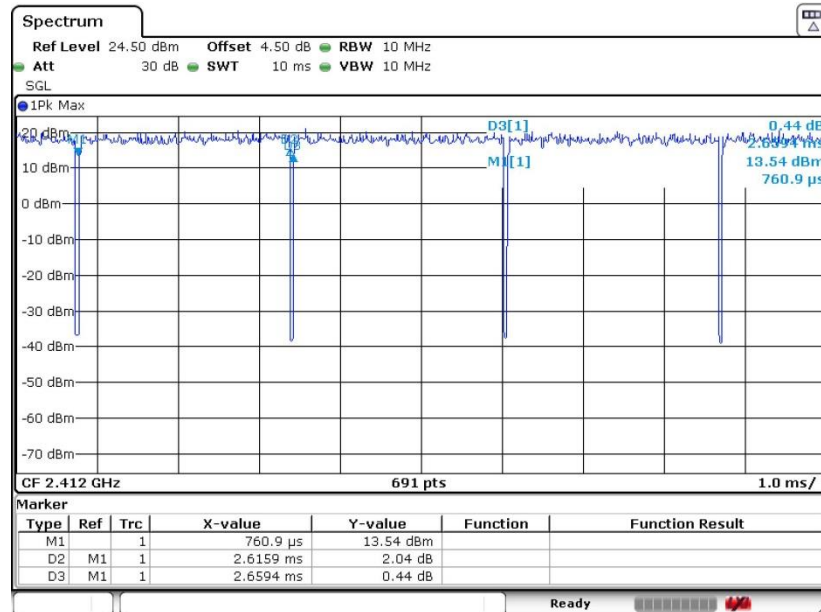


802.11g





802.11n20



802.11n40

