RF Test Report

For

Globe Electric Company Inc.

Test Standards:	Part 15C Subpart C §15.247 RSS 247 Issue 2
Product Description:	50113
Tested Model:	50113
Additional Model No.:	N/A
Brand Name:	N/A
FCC ID:	2AQUQGE50113
IC:	8290A-GE50113
Classification	(DTS) Digital Transmission System
Report No.:	EC1905006RF01
Tested Date:	2019-06-04 to 2019-07-04
Issued Date:	2019-07-04
Prepared By:	Jerry Wang / Engineer
Approved By:	Bacon Wu / RF Manager

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2019.07.04	Valid	Original Report

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Summary Of Test Result

FCC Rule	IC Rule	Description	Limit	Result	Remark
15.247(a)(2)	RSS-247 5.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
-	RSS-Gen 6.7	99% Bandwidth	-	Pass	-
15.247(b)(3)	RSS-247 A5.4(d)	Peak Output Power	≤ 30dBm	Pass	-
15.247(e)	RSS-247 5.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
15.247(d)	RSS-247 5.5	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
15.247(d)	RSS-247 5.5	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.50 dB at 4874 MHz
15.207	RSS-GEN 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 2.94 dB at 0.524 MHz
15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-

1 Test Laboratory

1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244 , Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012, ISED# :24347)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

A2LA (Certificate Code : 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2 General Description

2.1 Applicant

Globe Electric Company Inc.
150, ONEIDA, MONTREAL, QUEBEC, CANADA, H9R 1A8

2.2 Manufacturer

Globe Electric Company Inc.
150, ONEIDA, MONTREAL, QUEBEC, CANADA, H9R 1A8

2.3 General Description Of EUT

Product	50113
Model No.	50113
Additional No.	N/A
Difference Description	N/A
FCC ID	2AQUQGE50113
IC	8290A-GE50113
Power Supply	120Vac
Modulation Technology	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Type	802.11b : DSSS 802.11g/n : OFDM
Operating Frequency	2412-2462MHz
Number Of Channel	11
Max. Output Power	802.11b : 14.61 dBm (0.0289 W) 802.11g : 15.04 dBm (0.0319 W) 802.11n HT20 : 14.91 dBm (0.0310 W)
Antenna Type	PCB Antenna type with 2.5dBi gain
I/O Ports	Refer to user's manual

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.4 Modification of EUT

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

2.5 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- ANSI C63.10-2013
- IC RSS-247 Issue 2
- IC RSS-Gen Issue 5
- KDB 558074 D01 15.247 Meas Guidance v05r02

Remark:

1. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B & ICES-003 recorded in a separate test report.

3 Test Configuration of Equipment Under Test

3.1 Descriptions of Test Mode

11 channels are provided for 802.11b, 802.11g and 802.11n(HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

The transmitter has a maximum peak conducted output power as follows:

Frequency Range(MHz)	Mode	Rate	Output Power(dBm)
2412~2462	802.11b	1Mbps	14.61
2412~2462	802.11g	6Mbps	15.04
2412~2462	802.11n HT20	65Mbps	14.91

a. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

3.2 Test Mode

3.2.1 Antenna Port Conducted Measurement

Summary table of Test Cases			
Test Item	Modulation		
	802.11 b	802.11 g	802.11n HT20
Conducted Test Cases	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11

3.2.2 Radiated Emission Test (Below 1GHz)

Radiated Test Cases	802.11 b
	Mode 1: CH01

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna

diversity architecture) and packet type. Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

2. Following channel(s) was (were) selected for the final test as listed above

3.2.3 Radiated Emission Test (Above 1GHz)

Test Item	Modulation		
	802.11 b	802.11 g	802.11n HT20
Radiated Test Cases	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11	Mode 1: CH01 Mode 2: CH06 Mode 3: CH11

Note : 1. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

2. Following channel(s) was (were) selected for the final test as listed above

3. For frequency above 18GHz, the measured value is much lower than the limit, therefore, it is not reflected in the report.

3.2.4 Power Line Conducted Emission Test:

AC Conducted Emission	Mode 1 : WLAN Link

3.3 Support Equipment

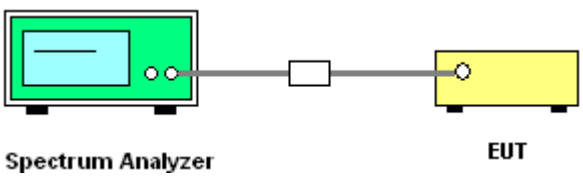
Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	E540	FCC DoC	N/A	shielded cable DC O/P 1.8 m unshielded AC I/P cable1.2 m

3.4 Test Setup

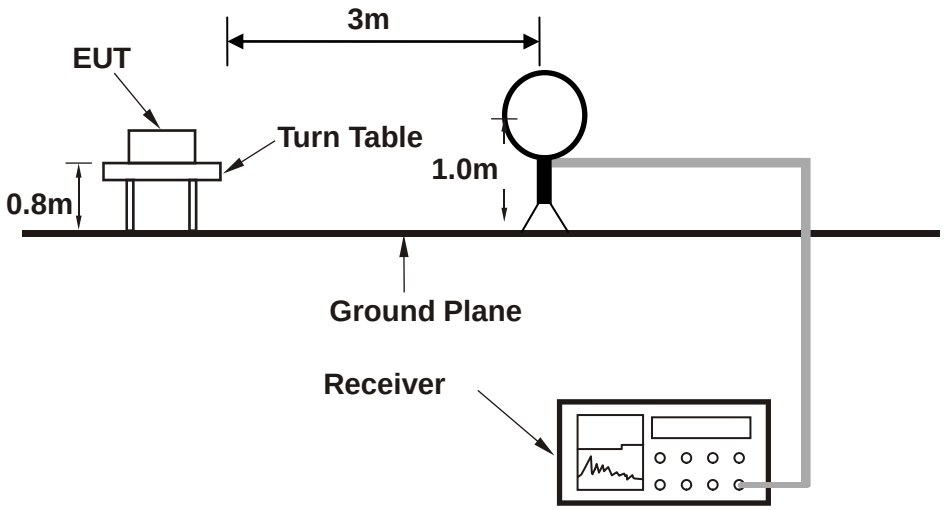
The EUT is continuously communicating to the WiFi tester during the tests.

EUT was set in the Hidden menu mode to enable WiFi communications.

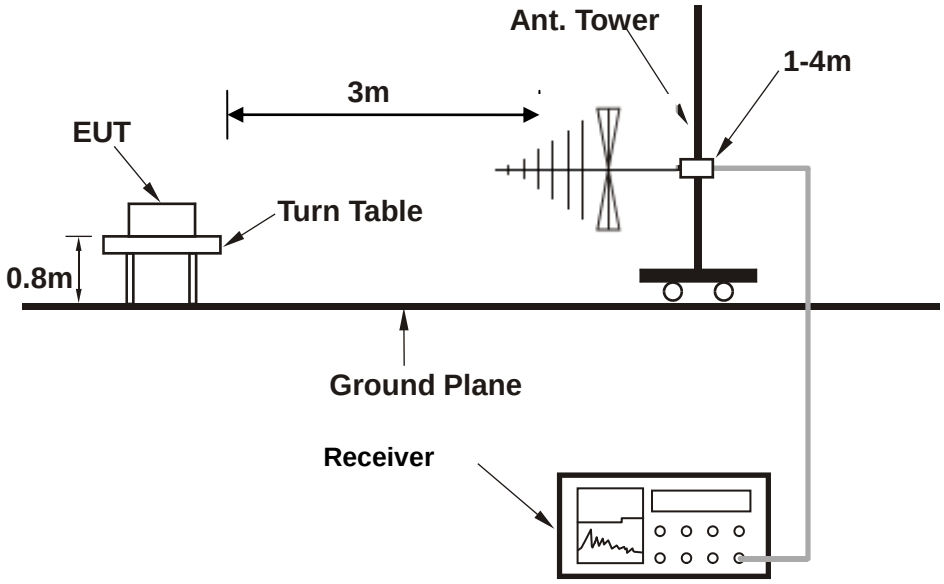
Setup diagram for Conducted Test



Setup diagram for Raidation(9KHz~30MHz) Test



Setup diagram for Raidation(Below 1G) Test



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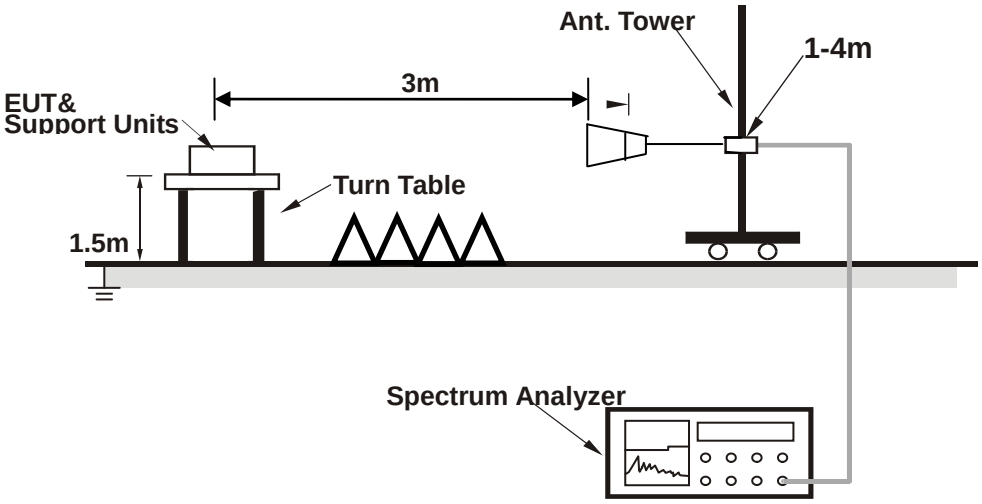
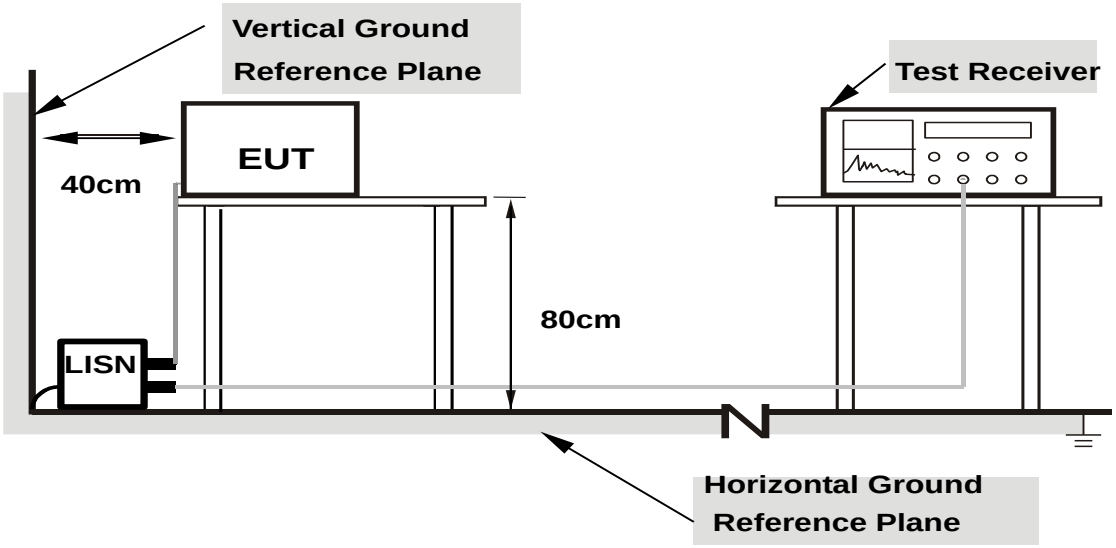


Setup diagram for AC Conducted Emission Test



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.5 Measurement Results Explanation Example

For all conducted test items:

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

Example:

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

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

= 5 + 10 = 15 (dB)

4 Test Result

4.1 6dB and 99% Bandwidth Measurement

4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

IC RSS-247 5.2(a)

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

4.1.2 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v05r02.
2. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
3. Turn on the EUT and connect it to measurement instrument.
4. Set to the maximum power setting and enable Transmitting the EUT transmit continuously
5. 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.
6. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) setting should be 1%-5% of OBW, please revise and set the Video bandwidth (VBW) ≥3* RBW.

4.1.3 Test Result of 6dB and 99% Bandwidth

Test Mode :	Tx	**Temperature :**	24~26℃
Test Engineer :	Victorique Gao	**Relative Humidity :**	50~53%

Mode	Channel	6dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
11B	LCH	8.120	11.372	PASS
11B	MCH	8.080	11.387	PASS
11B	HCH	8.120	11.526	PASS
11G	LCH	15.160	16.308	PASS
11G	MCH	15.520	16.300	PASS
11G	HCH	15.520	16.276	PASS
11N20	LCH	15.400	17.055	PASS
11N20	MCH	15.160	17.075	PASS
11N20	HCH	15.160	17.100	PASS

6dB bandwidth Plot

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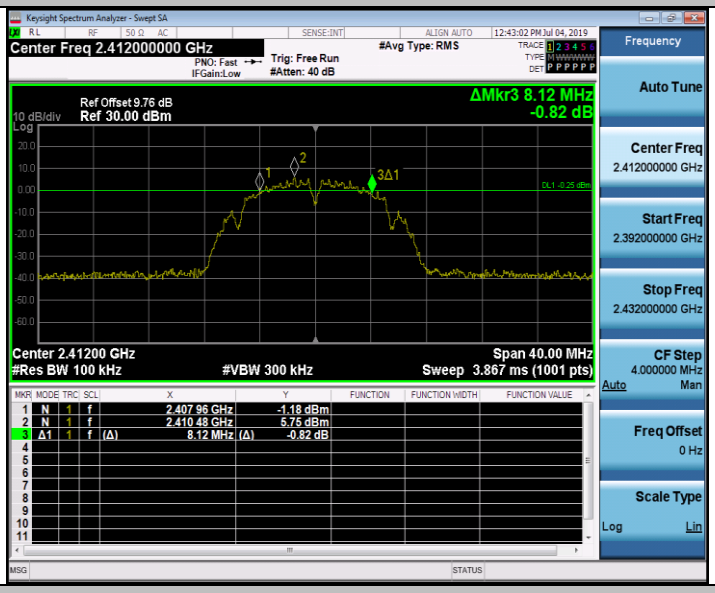
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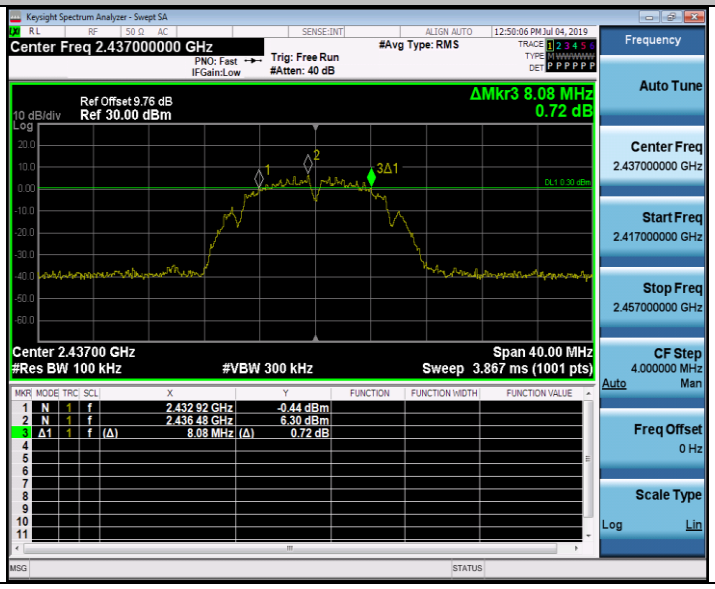

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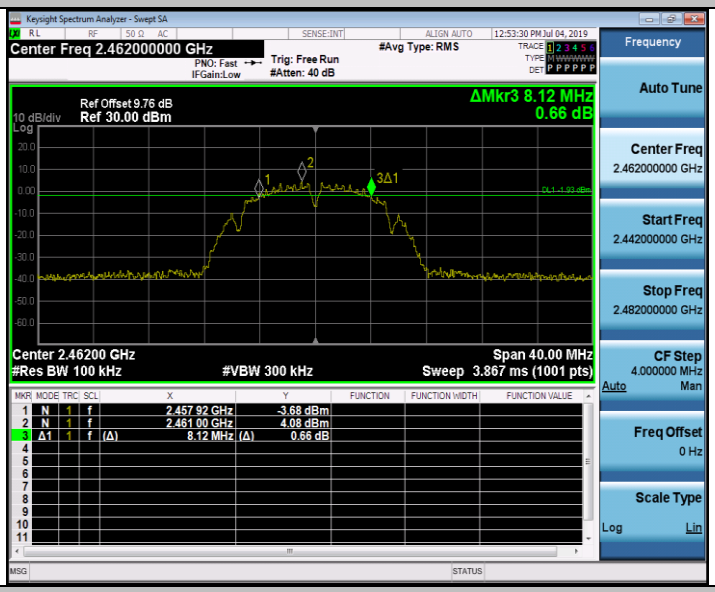

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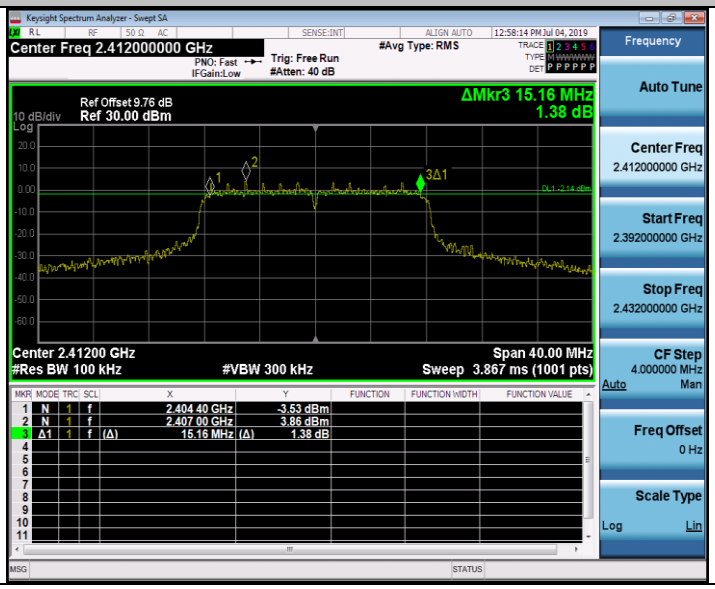

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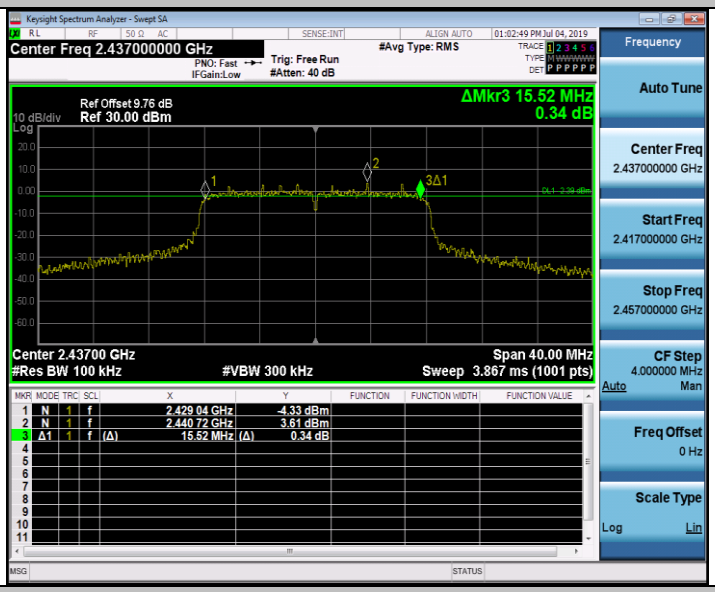
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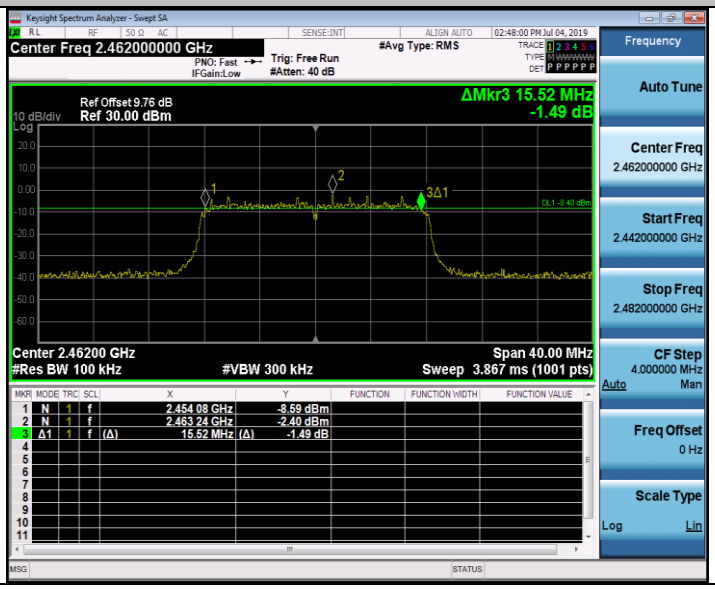

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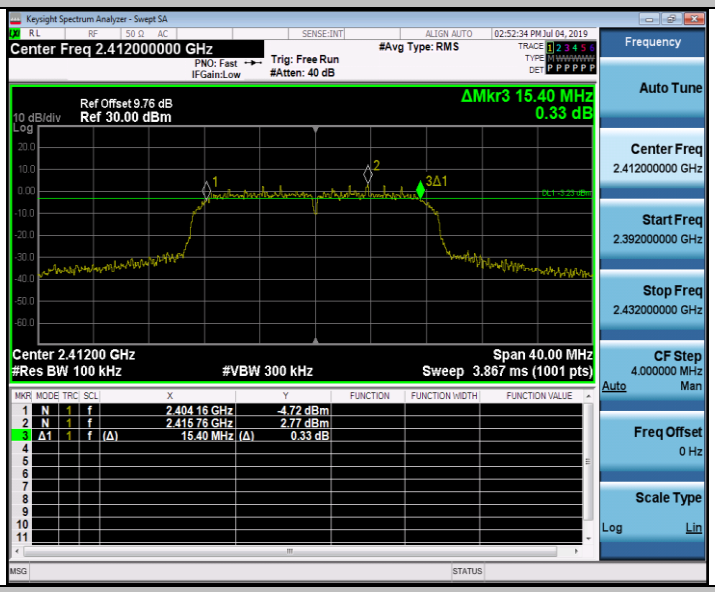
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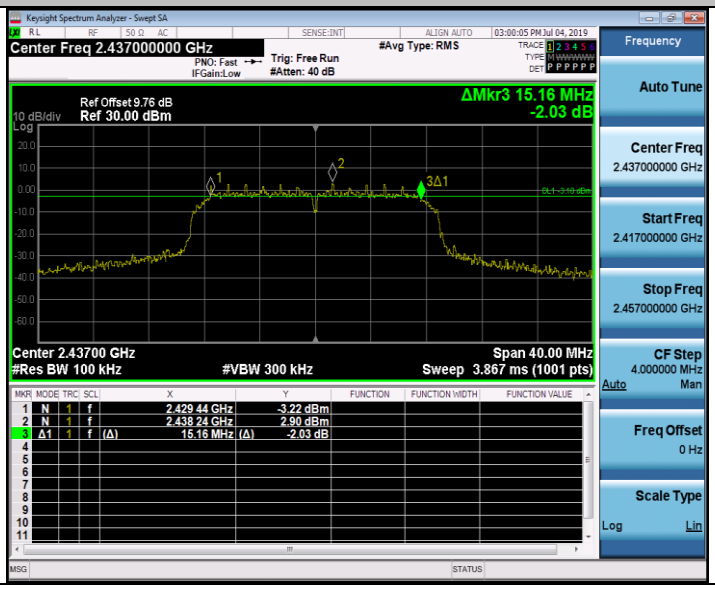

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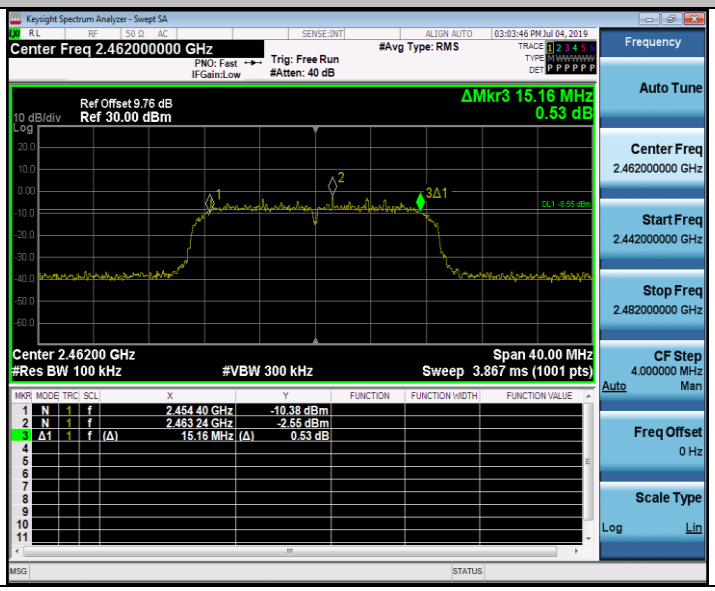

99% Bandwidth Plot

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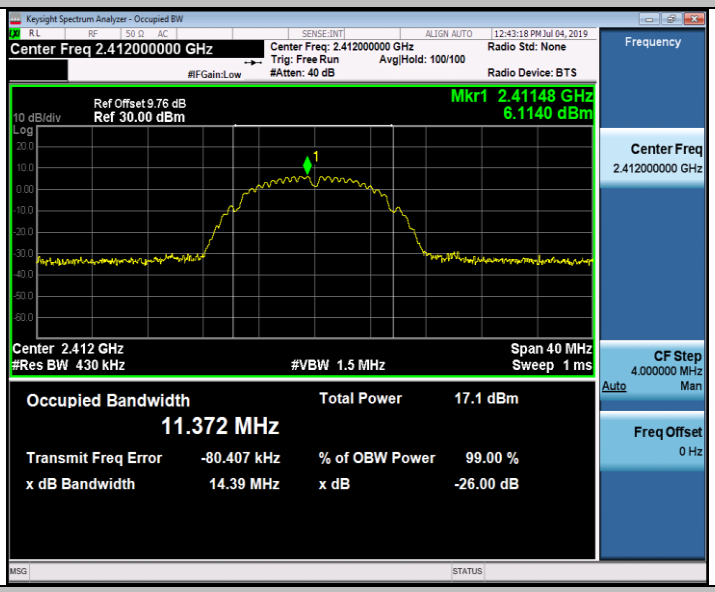
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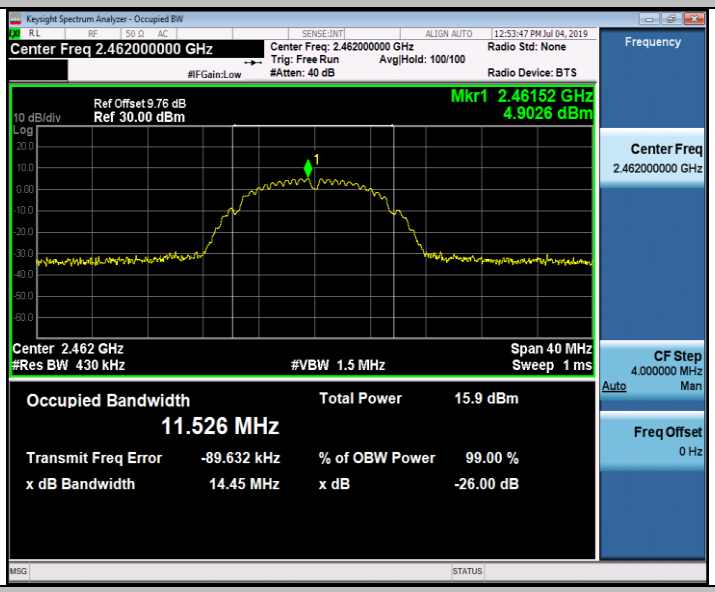
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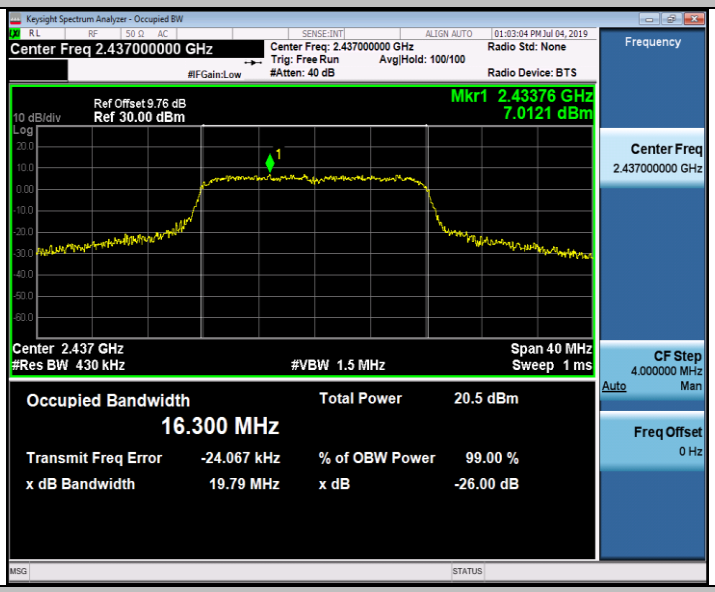
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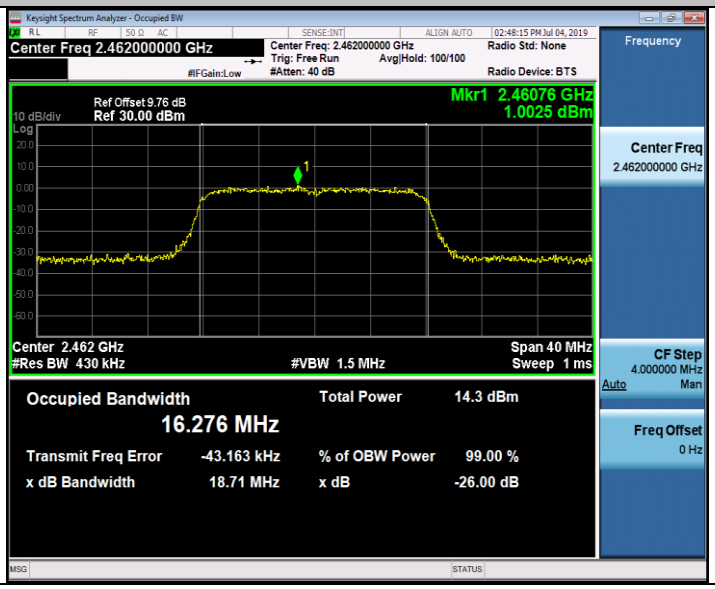

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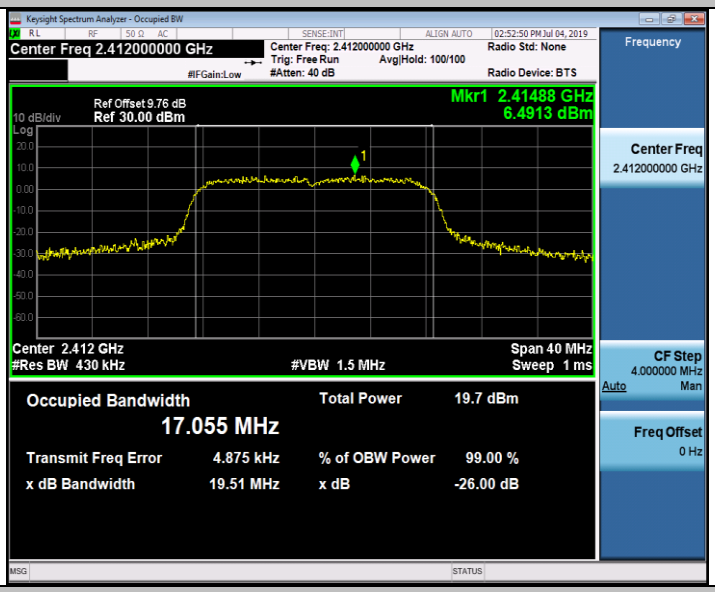
11N20SISO_Ant1_2437


11N20SISO_Ant1_2462


4.2 Output Power Measurement

4.2.1 Limit of Output Power

FCC §15.247 (b)(3)

IC RSS-247 A5.4(4)

For systems using digital modulation in the 2400-2483.5 MHz bands: 30dBm.

4.2.2 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 section 11.9.2.2.4 Measurement using a spectrum analyzer.
2. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
3. Turn on the EUT and connect it to spectrum analyzer.
4. Set to the maximum power setting and enaBle Transmitting the EUT transmit continuously
5. Measure the duty cycle, x, of the transmitter output signal as described in below:
   a. Set the center frequency of the instrument to the center frequency of the transmission.
   b. Set RBW to the largest availaBle Transmitting value.
   c. Set detector = peak
6. Set span to at least 1.5*OBW.Set RBW=1MHz,VBW=3MHz, Number of points in sweep ≥ 2/3* span, Sweep time = auto. Detector = RMS
7. Allow the sweep to “free run”. Trace average 100 traces in RMS mode
8. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s Channel power measurement function with band limits set equal to the OBW band edges.
9. Add 10 log (1/x), where x is the duty cycle.

4.2.3 Test Result of Output Power

Test Mode :		TX	Temperature :		24~26℃	
Test Engineer :		Victorique Gao	Relative Humidity :		50~53%	
Mode	**Channel**	**Meas.Level [dBm]**	**DT**	**10 log (1/x)**	**AV.Power [dBm]**	**Verdict**
11B	LCH	14.10	88.92%	0.51	14.61	PASS
11B	MCH	14.06	88.92%	0.51	14.57	PASS
11B	HCH	12.25	88.87%	0.51	12.76	PASS
11G	LCH	14.53	87.34%	0.51	15.04	PASS
11G	MCH	14.28	86.92%	0.51	14.79	PASS
11G	HCH	8.31	86.76%	0.51	8.82	PASS
11N20	LCH	14.40	86.29%	0.51	14.91	PASS
11N20	MCH	14.10	86.14%	0.51	14.61	PASS
11N20	HCH	8.11	86.00%	0.51	8.62	PASS

Meas.Level Plot

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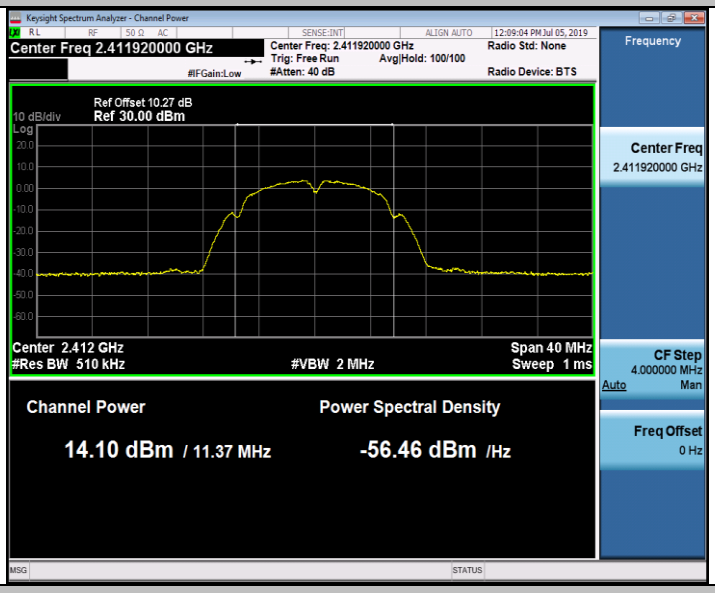
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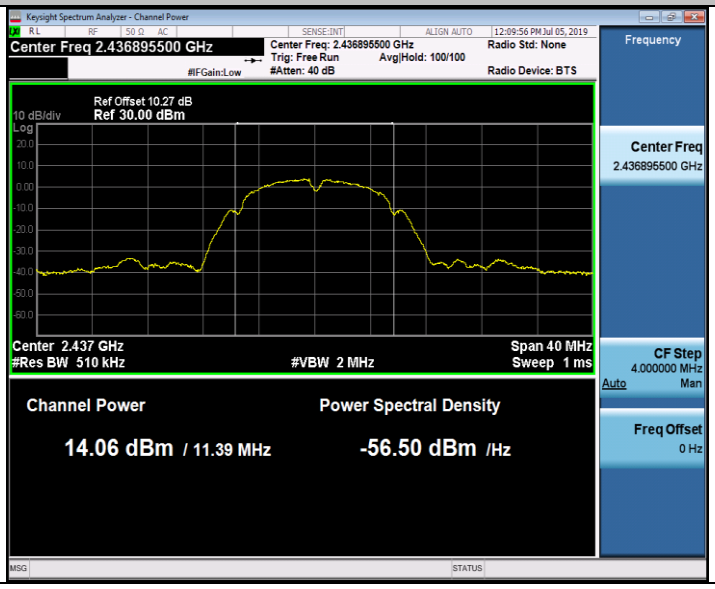

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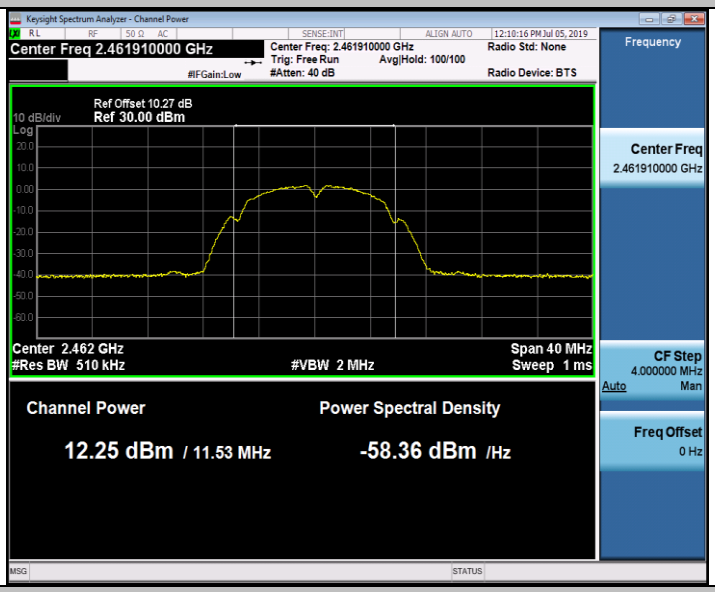
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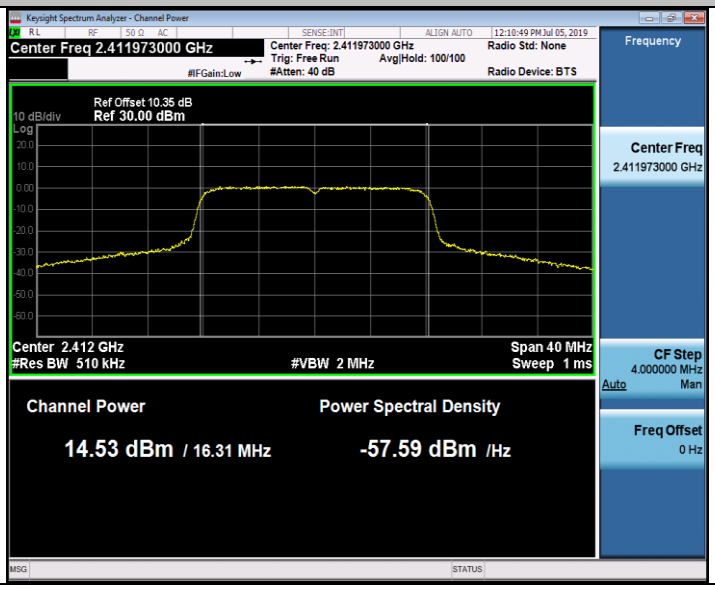

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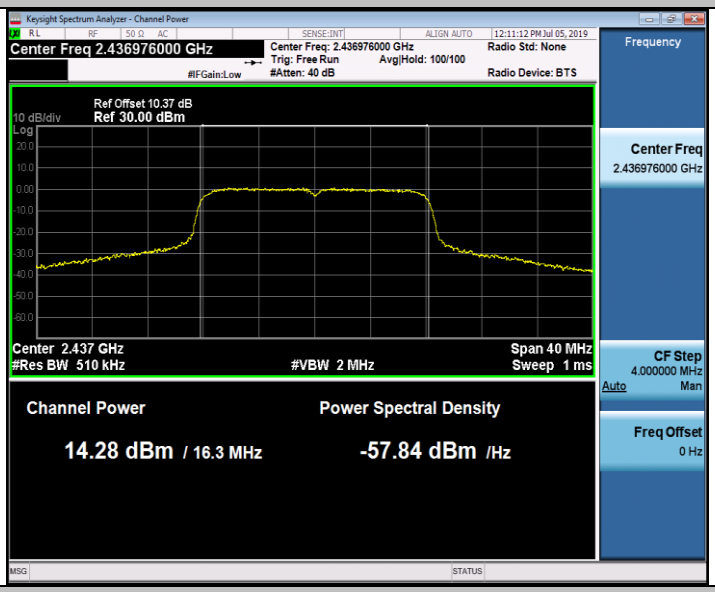
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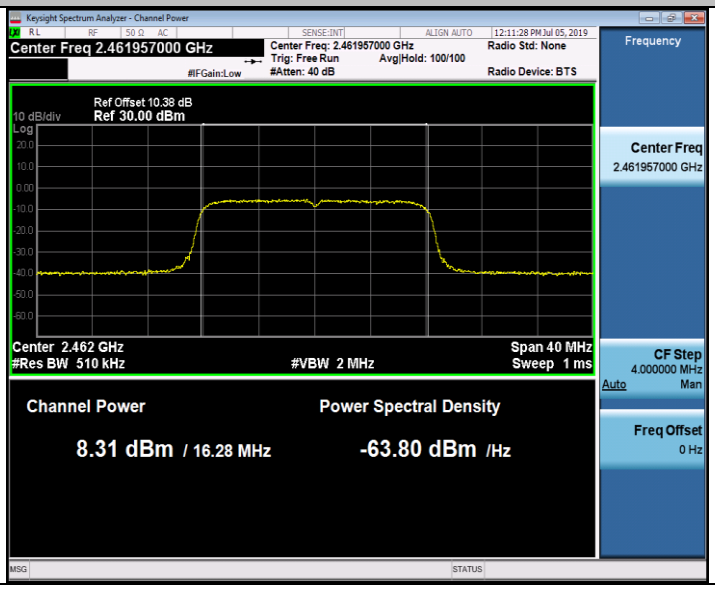

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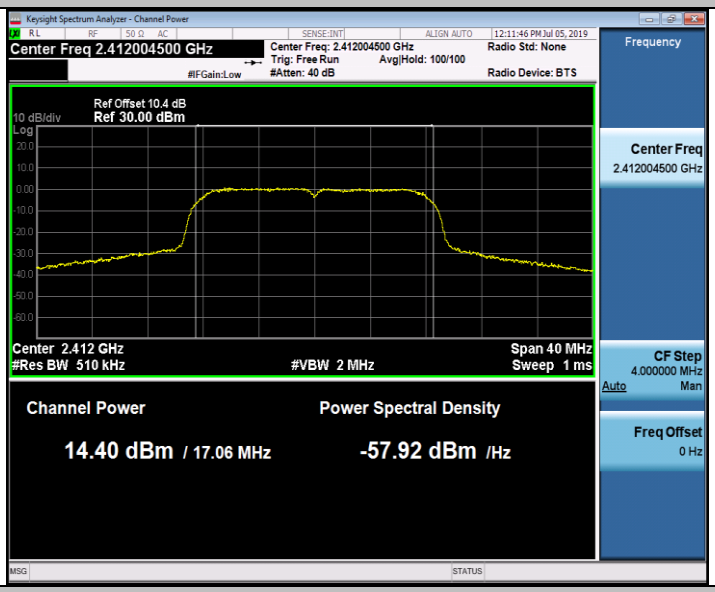
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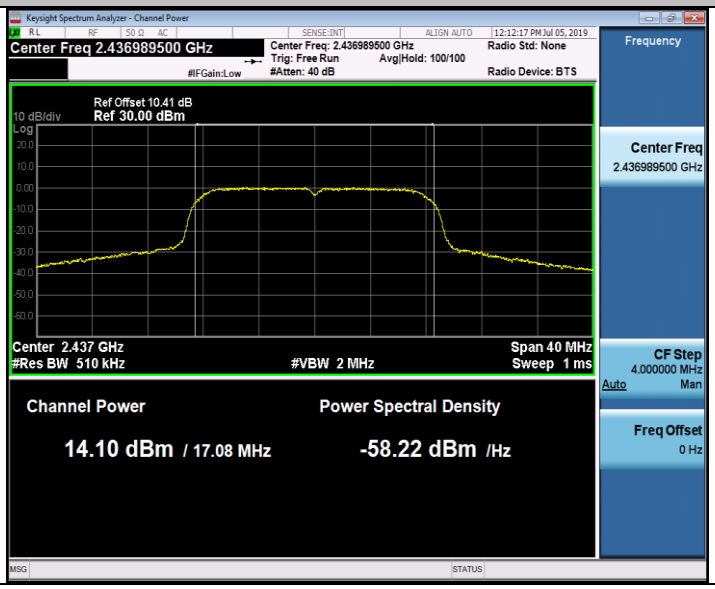

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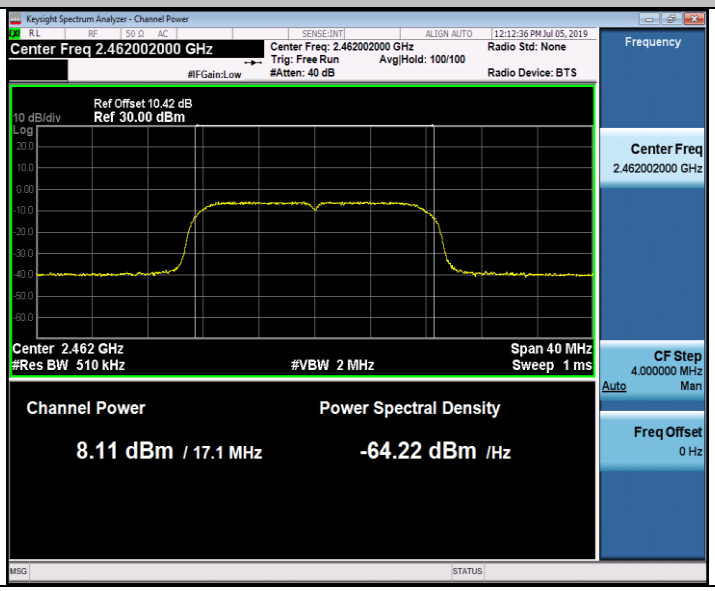

Duty cycle Plot

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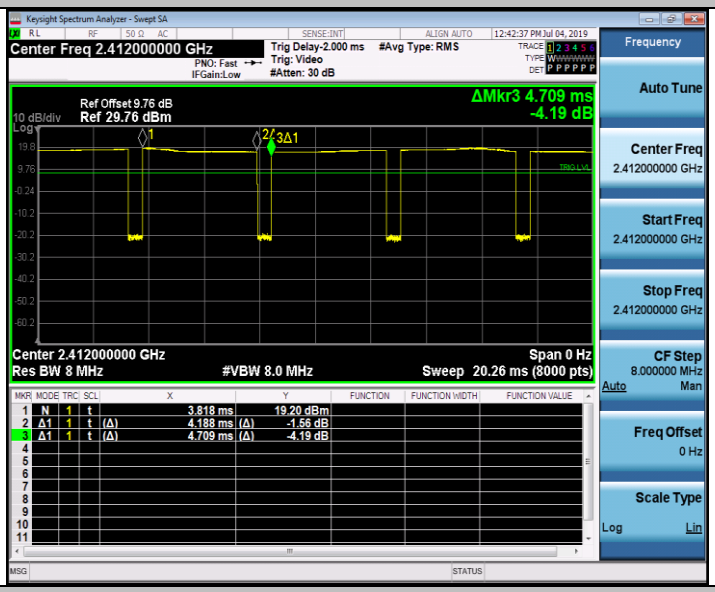
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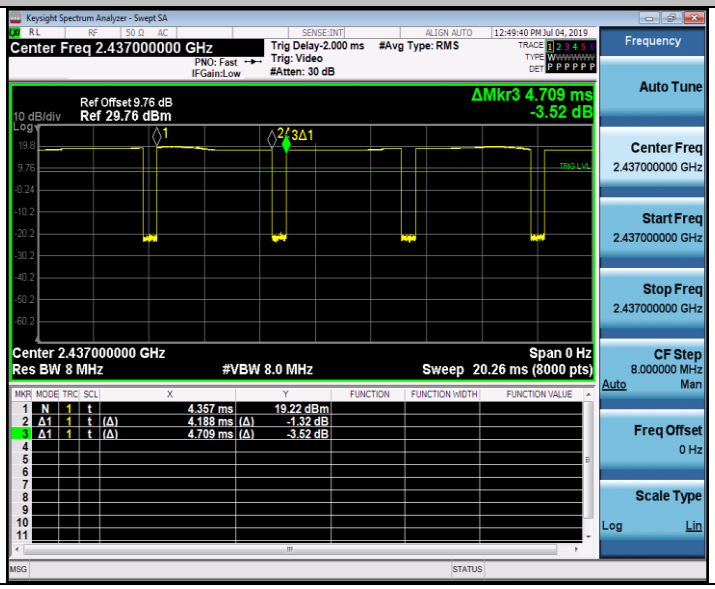

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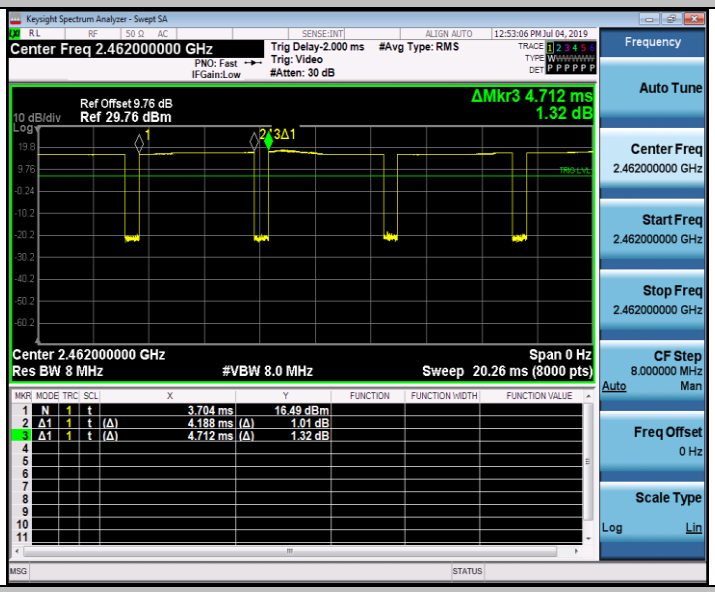
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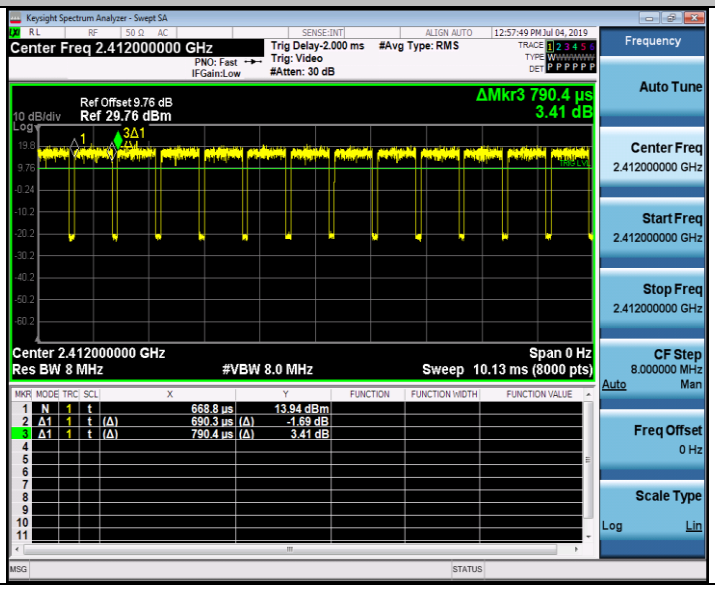

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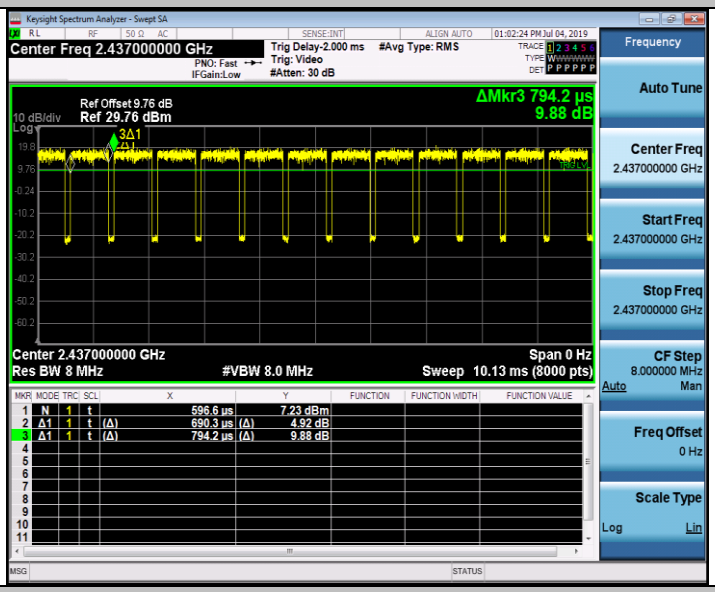
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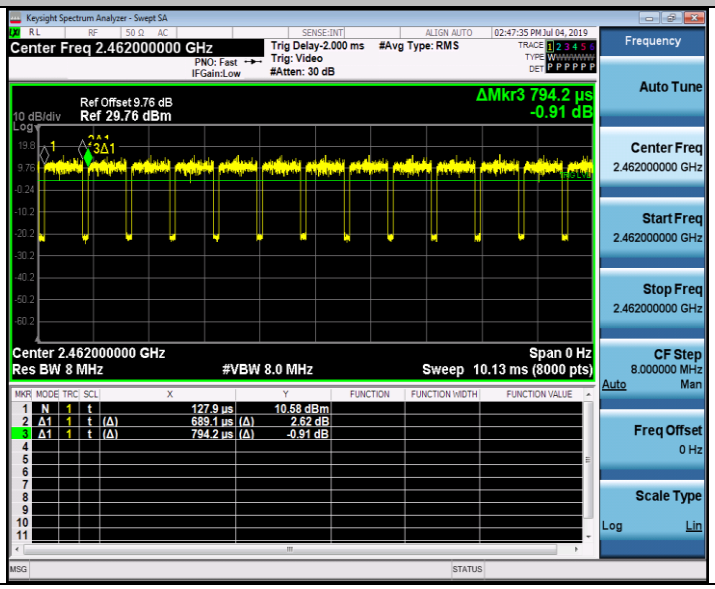

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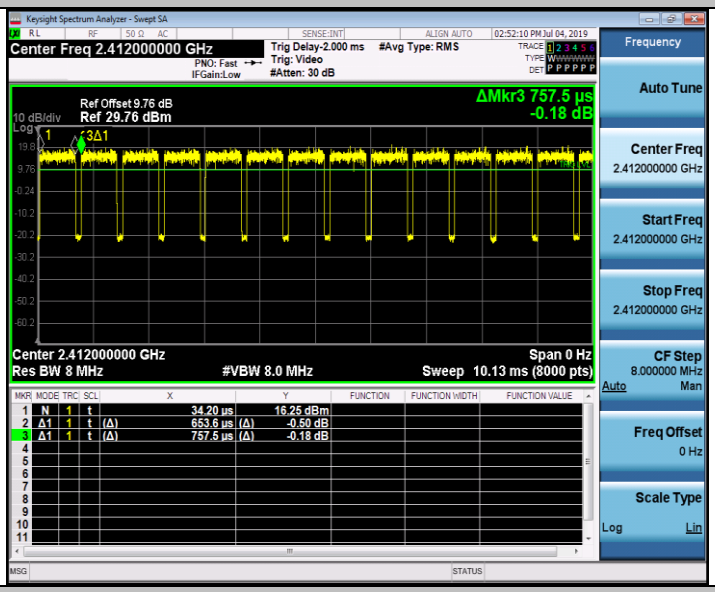
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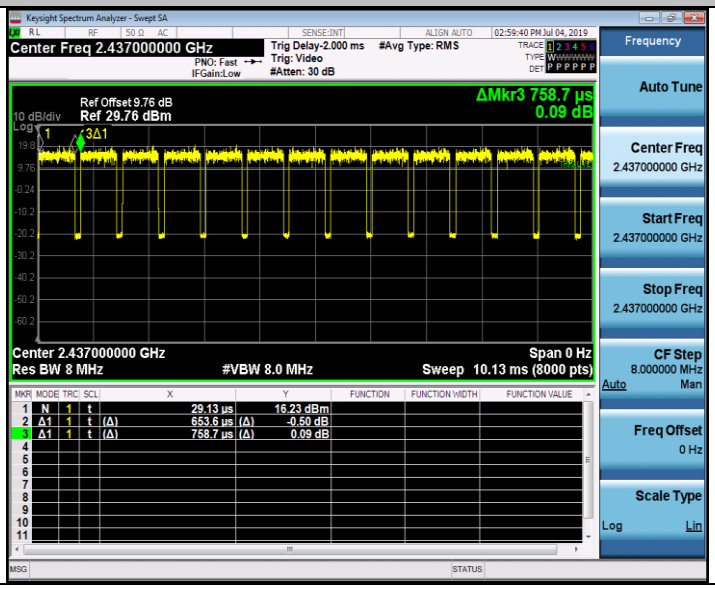

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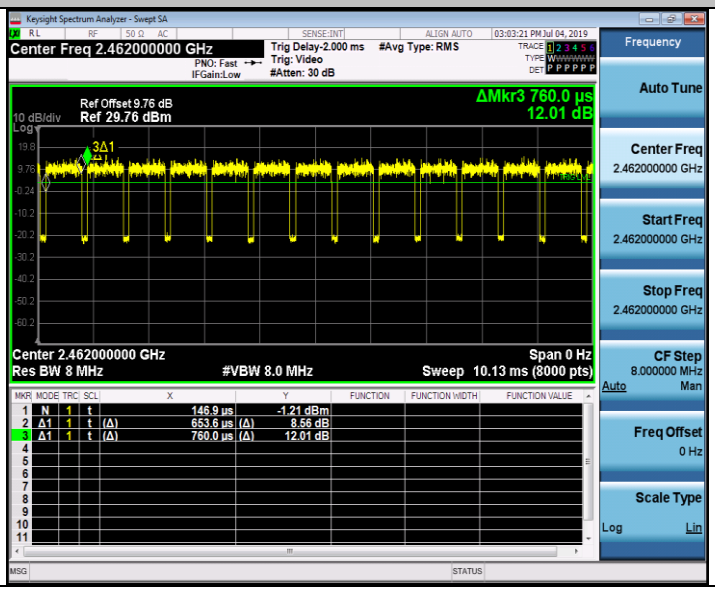

4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density

FCC§15.247(e)

IC RSS-247 5.2(2)

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

4.3.2 Test Procedure

1. The testing follows Measurement Procedure 8.4 DTS maximum power spectral density level in the fundamental emission of ANSI C63.10-2013 section 11.9.2.2.4
2. Turn on the EUT and connect it to measurement instrument.
3. Measure the duty cycle, x, of the transmitter output signal as described in below:
   a. Set the center frequency of the instrument to the center frequency of the transmission.
   b. Set RBW to the largest availaBle Transmitting value.
   c. Set detector = peak
4. Set span to at least 1.5*OBW.Set RBW= 3 KHz,VBW=10 KHz, Number of points in sweep ≥ 2/3* span, Sweep time = auto.
5. Detector = power averaging (rms), Sweep time = auto couple, Trace mode = averaging (rms) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.
6. Add 10 log (1/x), where x is the duty cycle.
7. Measure and record the results in the test report.
8. The Measured power density (dBm)/ 100kHz is a reference level and used as 30dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

4.3.3 Test Result of Power Spectral Density

Test Mode :	Tx	Temperature :	24~26℃
Test Engineer :	Victorique Gao	Relative Humidity :	50~53%

Mode	Channel	Meas.Level [dBm]	DT	10 log (1/x)	Av.PSD [dBm]	Verdict
11B	LCH	-11.53	88.92%	0.51	-11.02	PASS
11B	MCH	-10.99	88.92%	0.51	-10.48	PASS
11B	HCH	-12.76	88.92%	0.51	-12.25	PASS
11G	LCH	-11.74	88.92%	0.51	-11.23	PASS
11G	MCH	-5.5	88.92%	0.51	-4.99	PASS
11G	HCH	-17.93	88.92%	0.51	-17.42	PASS
11N20	LCH	-12.74	88.92%	0.51	-12.23	PASS
11N20	MCH	-12.61	88.92%	0.51	-12.10	PASS
11N20	HCH	-18.14	88.92%	0.51	-17.63	PASS

Power Spectral Density Plot

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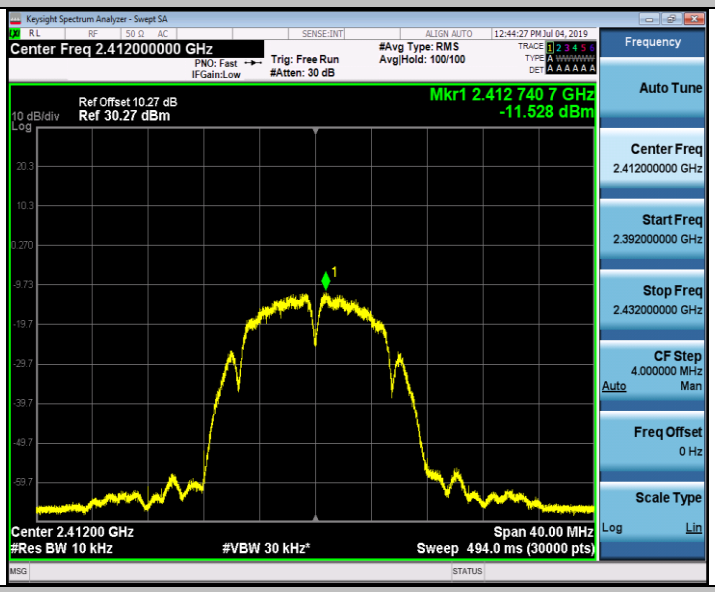
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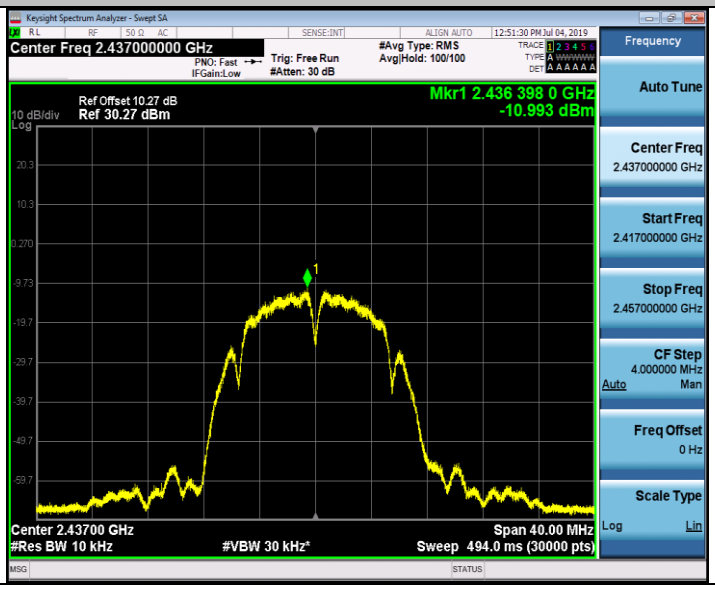

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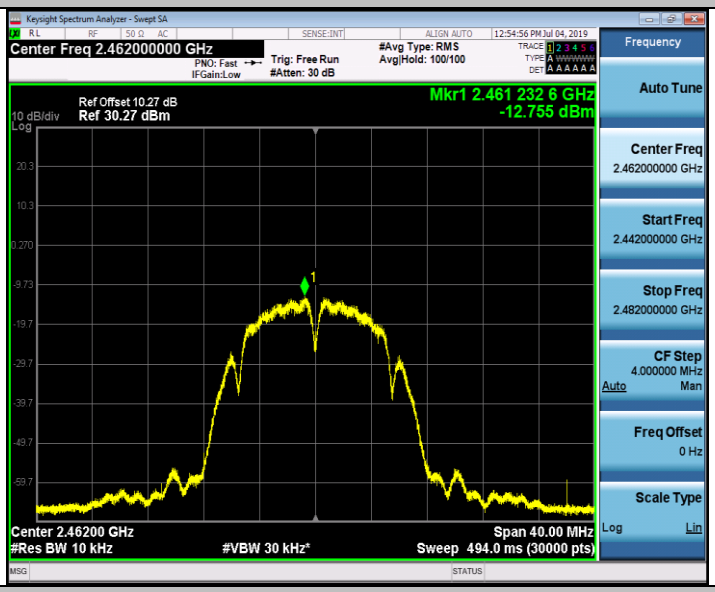

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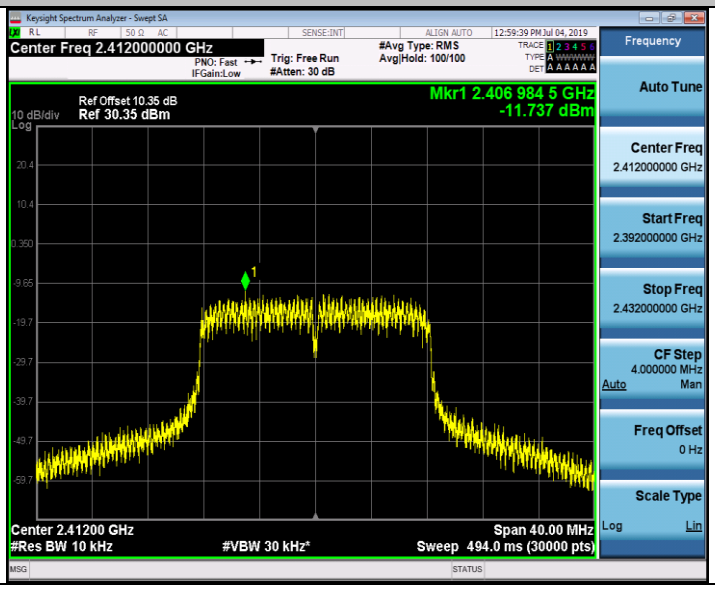

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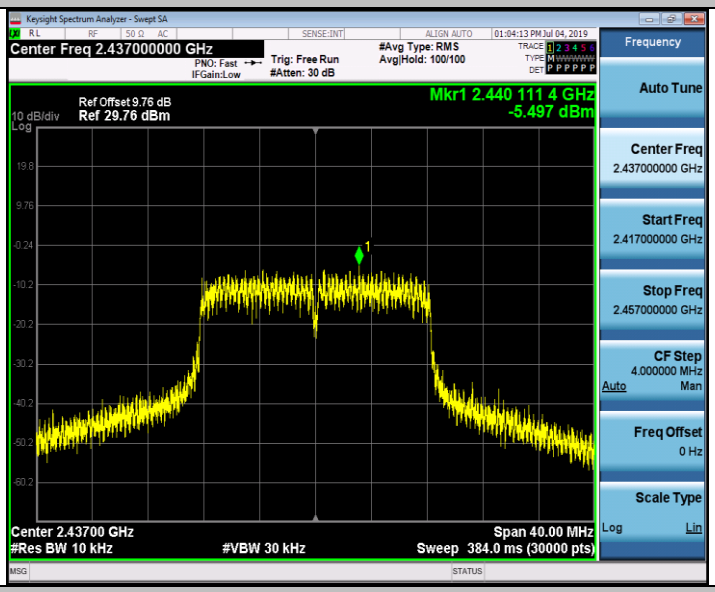
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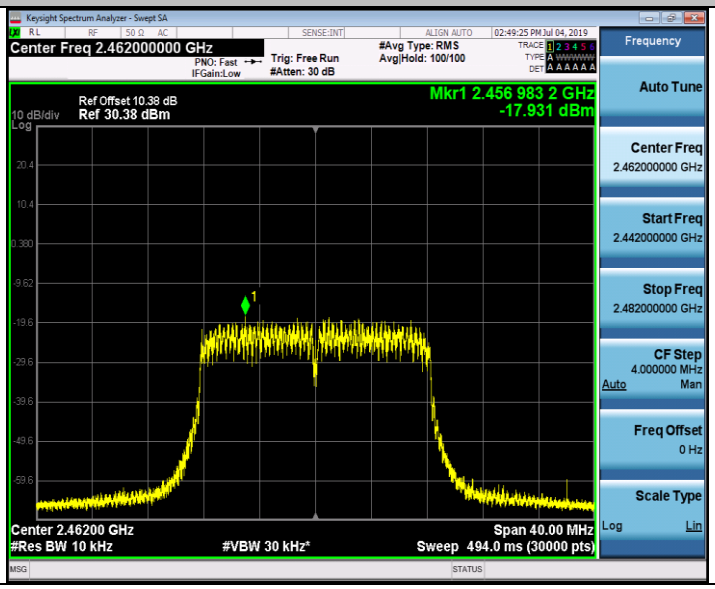

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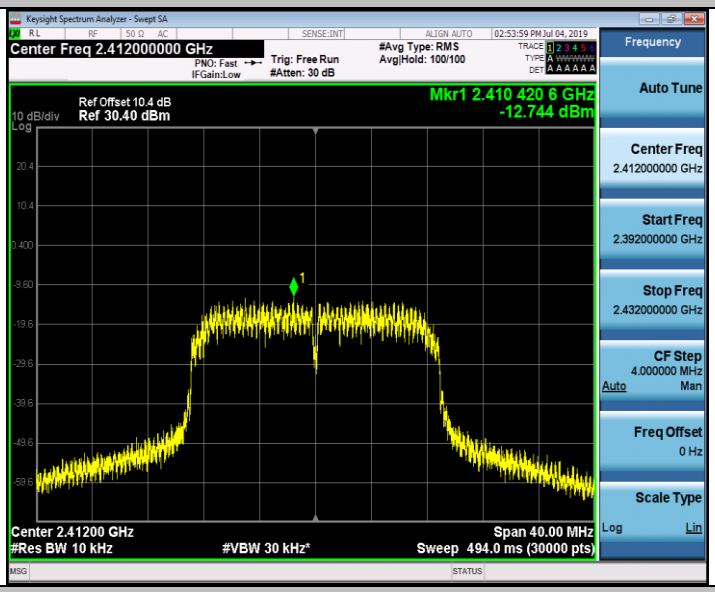
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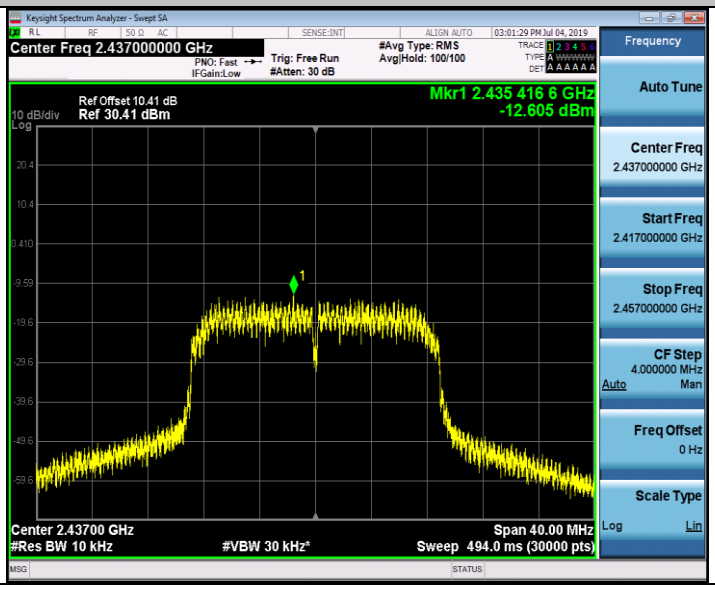

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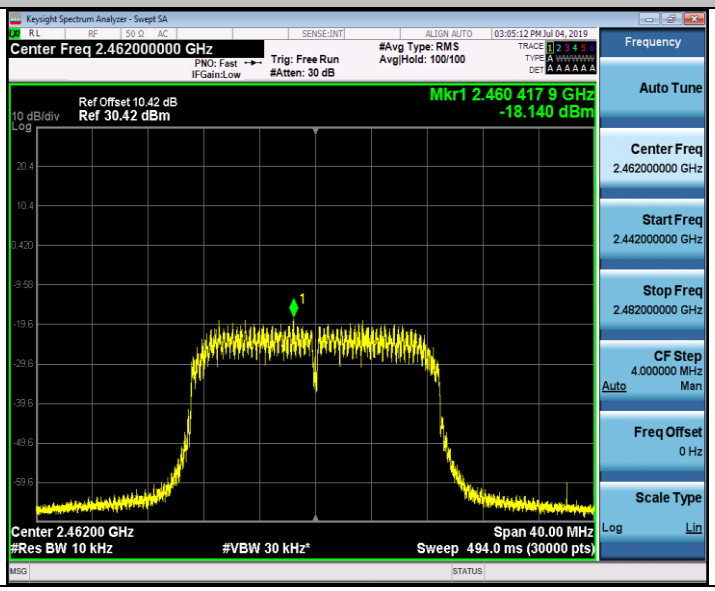

4.4 Conducted Band Edges and Spurious Emission Measurement

4.4.1 Limit of Conducted Band Edges and Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

Maximum conducted (average) output power was used to determine compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

4.4.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. 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).
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.