

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO 47 CFR FCC PART 90Y & INDUSTRY CANADA RSS-111 REQUIREMENT OF

Product Name: FM3200
Marketing Name: Fluidmesh FM3200 、 Fluidmesh FM4200
Brand Name: Fluidmesh FM3200
Model No.: FM3200 、 FM4200 、 FMX200
Model Difference: Exterior and I/O port difference
FCC ID: R5S-FMX200
IC: 10745A-FMX200
Report No.: ER/2014/70031
Issue Date: Mar. 21, 2014
FCC Rule Part: 47 CFR FCC Part 90Y
IC Rule Part: RSS-111 Issue 5, Sep. 2014
Prepared for: Fluidmesh Networks
1359 Barclay Blvd Buffalo Grove, IL 60089
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
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VERIFICATION OF COMPLIANCE

Applicant: Fluidmesh Networks
1359 Barclay Blvd Buffalo Grove, IL 60089

Product Name: FM3200

Marketing Name: Fluidmesh FM3200 、Fluidmesh FM4200

Brand Name: Fluidmesh FM3200

Model No.: FM3200 、FM4200 、FMX200

Model Difference: Exterior and I/O port difference

FCC ID: R5S-FMX200

IC: 10745A-FMX200

File Number: ER/2014/70031

Date of test: Jul. 09, 2014 ~ Jan. 15, 2015

Date of EUT Received: Jul. 09, 2014

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-603-D-2010 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of 47 CFR FCC Part 90Y & RSS-111 issue 5.

The test results of this report relate only to the tested sample identified in this report.

Test By:

Marcus Tseng

Date:

Jan. 20, 2015

Marcus Tseng / Engineer

Prepared By:

Violetta Tang

Date:

Jan. 20, 2015

Violetta Tang / Clerk

Approved By:

Jim Chang

Date:

Jan. 20, 2015

Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Jan. 20, 2015	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name:	FM3200	
Marketing Name:	Fluidmesh FM3200 、Fluidmesh FM4200	
Brand Name:	Fluidmesh FM3200	
Model No.:	FM3200 、FM4200 、FMX200	
Model difference:	Exterior and I/O port difference	
Hardware Version:	1	
Software Version:	8	
Power Supply:	48V by POE Power Adapter, AC 100-240V 50-60Hz	
	Adapter:	Model No.: GME241DA-402250G , Supplier: N/A

WLAN 4.9GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Peak)	Modulation Technology
11j (10MHz)	4940~4990	5	15.84dBm	OFDM
11j (20MHz)	4940~4990	3	17.99dBm	OFDM
Antenna Designation		1.Panel antenna,4.9GHz Gain: 7dBi Model No.: JHP-5159-23D11 2.Sector Antenna, 4.9GHz Gain: 7dBi, Model No.: JHP-5159-16D90A		
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM		
Data Rate		802.11 j_10MHz: 6 – 54Mbps 802.11 j_20MHz: 6 – 54Mbps		
Type of Emission		10MHz=8M2W7D 20MHz=17M7W7D		

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: R5S-FMX200** filing to comply with 47 CFR FCC Part 90Y and **IC: 10745A-FMX200** filing to comply with issue 5 of RSS-Gen 111.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI/TIA-603-D-2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

FCC KDB 971168 D01 Oct. 2014
FCC 04-265

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan which are constructed and calibrated to meet the requirements in documents ANSI/TIA-603-D-2010 .FCC Registration Number is: 990257. Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 455997.

1.5. Special Accessories

There is no special accessories used while test was conducted.

1.6. Equipment Modifications

There was no modification incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the general criterion in ANSI/TIA-603-D-2010, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz, and the measurement clause 2.1.3 is followed to carry out the test.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements ANSI/TIA-603-D-2010.

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2.4. Configuration of Tested System

Fig. 2-1 Radiated Emission

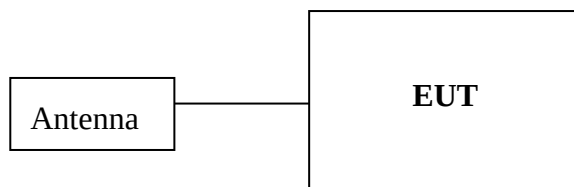


Fig. 2-2 Conducted (Antenna Port) Configuration

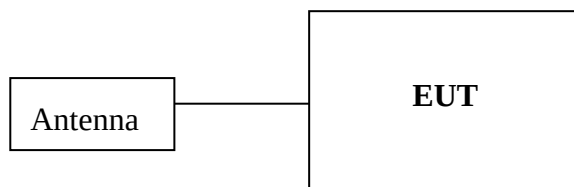


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	QRCT	2.4.83.0	N/A	N/A	N/A

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Fig. 2-3 AC Power Line Conducted Emission

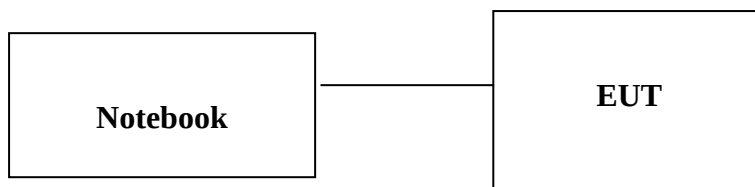


Table 2-2 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	Lenovo	L420	LR-7HXZA	N/A	N/A
2.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A

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3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.07 RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§90.210(L) RSS-111 §5.3	Emission Bandwidth	Compliant
§90.1215(a) RSS-111 §5.3	Maximum Transmitter Power	Compliant
§90.1215(a) RSS 111 §4.2	Peak Power Spectral Density	Compliant
§90.210(L) (M) RSS-111 §5.5	Transmit Spectrum Mask	Compliant
2.1051;90.210(1) (6)	Transmitter Conducted Unwanted Emissions	Compliant
2.1053; 90.210(L)	Transmitter Radiated Unwanted Emissions	Compliant
2.1055;90.213 IC RSS-111 §5.2	Frequency Stability	Compliant
§90.1215(e) IC RSS-111 §5.4	Peak Excursion	Compliant

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4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

10M mode:

4940MHz-4990MHz: Channel lowest(4945MHz) 、Mid(4965MHz) and Highest(4985MHz) with 6Mbps data rate are chosen for full testing

20M mode:

4940MHz-4990MHz: Channel lowest (4950MHz) 、Mid(4965MHz) and Highest (4985MHz) with 6 Mbps data rate are chosen for full testing

The worst case is determined by the output power that generates the highest emission. As examined in the section of output power measurement, the section 7.5, the lowest data rate at p_10/20 resulted the highest level of fundamental emission, and therefore, the lowest data rate is chosen as the worst-case to conduct the remaining of other mandatory test cases.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11j WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26 dB and 99% Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 1.42 dB
Peak Power Spectral Density Measurement	+/- 1.55 dB
Peak Excursion Measurement	+/- 1.55 dB
Undesirable Emission – Conducted Measurement	+/- 1.55 dB
Transmission in case of Absence of Information	+/- 1.55 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6. MEASUREMENT EQUIPMENT USED:

Radiated Test

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100760	05/26/2014	05/25/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	01/20/2014	01/19/2015
Spectrum Analyzer	R&S	FSV-30	101398	10/07/2014	10/06/2015
Loop Antenna	ETS.LINDGREN	6502	00148045	07/03/2014	07/02/2015
Bilog Antenna	SCHWAZBECK	VULB9168	378	05/19/2014	05/18/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2014	05/18/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	01/23/2014	01/22/2015
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2014	01/02/2015
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2014	01/02/2015
Pre-Amplifier	Agilent	8449B	3008A00578	01/03/2014	01/02/2015
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/24/2014	01/23/2015
5150-5350 Band Reject Filter	Micro-Tronics	BRM50703	1	01/03/2014	01/02/2015
5470-5725 Band Reject Filter	Micro-Tronics	BRM50704	1	01/03/2014	01/02/2015
5725-5875 Band Reject Filter	Micro-Tronics	BRM50705	1	01/03/2014	01/02/2015
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	02/27/2014	02/26/2015
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	02/27/2014	02/26/2015
Attenuator	Mini-Circuit	BW-S10W2+	002	02/27/2014	02/26/2015
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/03/2014	01/02/2015
3m Site NSA	SGS	966 chamber	N/A	07/15/2014	07/14/2015

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Conducted Test

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	01/13/2014	01/12/2015
Power Sensor	Anritsu	MA2411B	917032	01/13/2014	01/12/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/08/2014	03/07/2015
DC Block	Mini-Circuits	BLK-18-S+	1	02/27/2014	02/26/2015
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/03/2014	01/02/2015
Attenuator	Mini-Circuit	BW-S10W2+	002	02/27/2014	02/26/2015
Splitter	Agilent	11636B	N/A	02/27/2014	02/26/2015

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7. CONDUCTED EMISSION TEST

7.1. Standard Applicable

According to §15.207, frequency range within 150 KHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1.The lower limit shall apply at the transition frequencies		
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

7.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/26/2014	05/25/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/26/2014	03/25/2015
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/19/2014	03/18/2015
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2013	11/25/2014

7.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI/TIA-603-D-2010.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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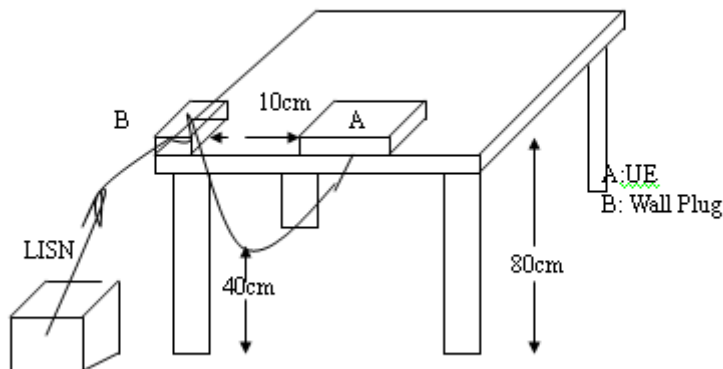
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7.4. Test SET-UP (Block Diagram of Configuration)



7.5. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

7.6. Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode (panel antenna)			Test Date:	Aug. 26, 2014
Temperature:	26 °C	Humidity:	60 %	26 °C	Humidity:

Site ConductionRoom

Phase: **L1**

Temperature: 26 °C

Limit: FCC Class B Conduction(QP)

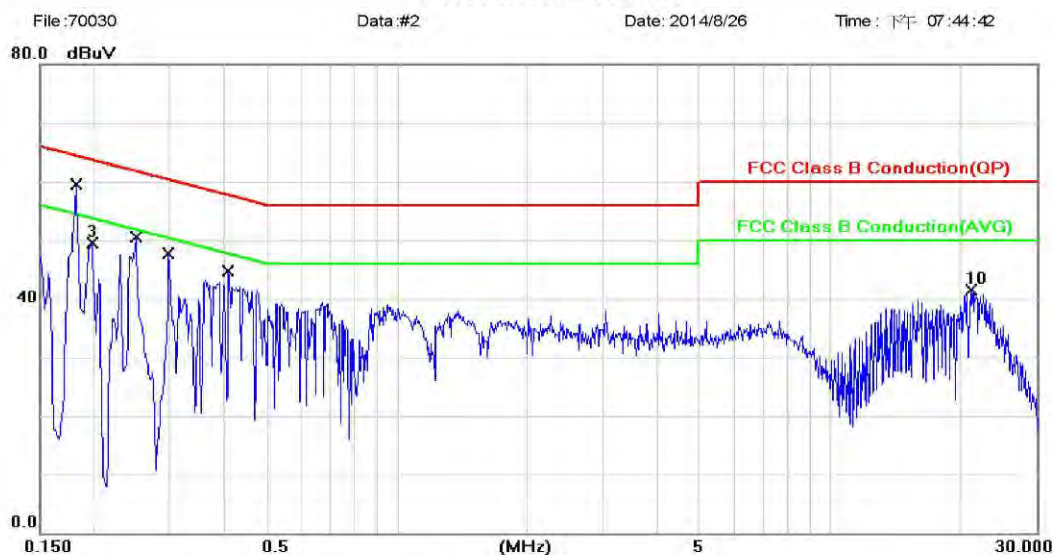
Power: AC 120V/60Hz

Humidity: 60%

Mode: Operation

Note: Adapter:GNE241DA-480050G

ConductedEmission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1820	56.77	0.06	56.83	64.39	-7.56	QP	
2		0.1820	38.10	0.06	38.16	54.39	-16.23	AVG	
3		0.1980	49.54	0.06	49.60	63.69	-14.09	peak	
4		0.2500	48.50	0.06	48.56	61.76	-13.20	QP	
5		0.2500	32.30	0.06	32.36	51.76	-19.40	AVG	
6		0.2980	41.98	0.06	42.04	60.30	-18.26	QP	
7		0.2980	26.50	0.06	26.56	50.30	-23.74	AVG	
8		0.4100	40.40	0.07	40.47	57.65	-17.18	QP	
9		0.4100	23.10	0.07	23.17	47.65	-24.48	AVG	
10		21.1820	40.83	0.62	41.45	60.00	-18.55	peak	

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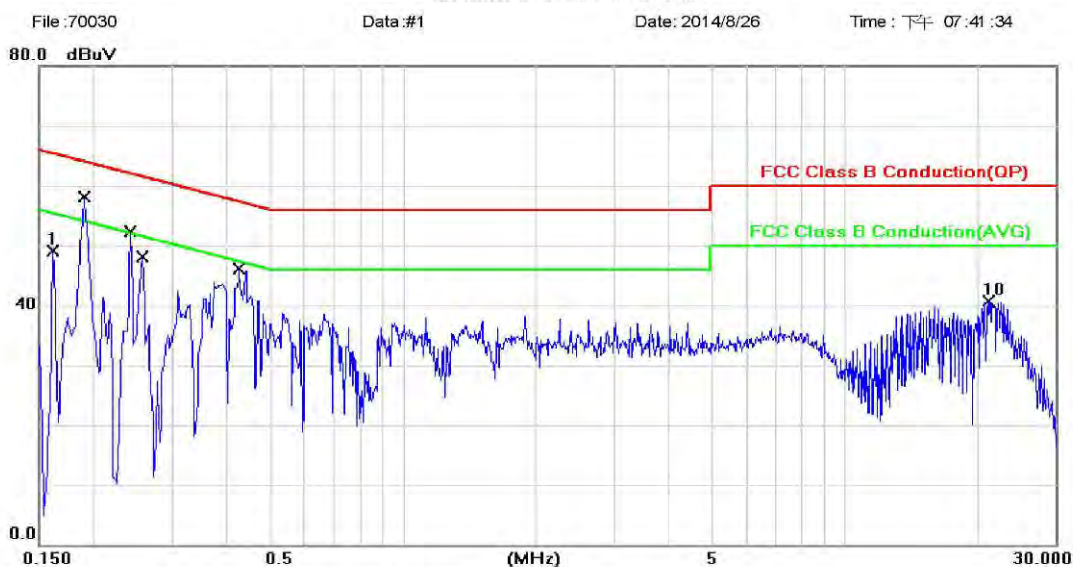
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Site: ConductionRoom
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter:GNE241DA-480050G

Phase: **N**
Power: AC 120V/60Hz

Temperature: 26 °C
Humidity: 60%

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1620	49.01	0.05	49.06	65.36	-16.30	peak	
2		0.1900	55.94	0.06	56.00	64.04	-8.04	QP	
3		0.1900	37.50	0.06	37.56	54.04	-16.48	AVG	
4		0.2420	48.75	0.06	48.81	62.03	-13.22	QP	
5		0.2420	29.50	0.06	29.56	52.03	-22.47	AVG	
6		0.2580	47.09	0.06	47.15	61.50	-14.35	QP	
7 *		0.2580	47.10	0.06	47.16	51.50	-4.34	AVG	
8		0.4260	42.19	0.07	42.26	57.33	-15.07	QP	
9		0.4260	30.20	0.07	30.27	47.33	-17.06	AVG	
10		21.1860	40.17	0.62	40.79	60.00	-19.21	peak	

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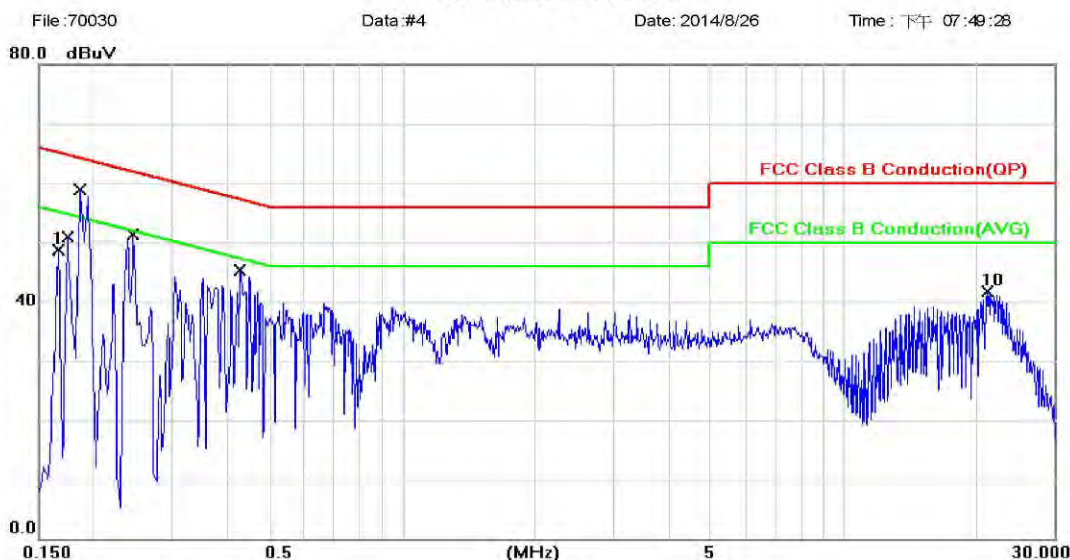
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode (sector antenna)			Test Date:	Aug. 26, 2014
Temperature:	26 °C	Humidity:	60 %	Test By:	Marcus

Site: ConductionRoom Phase: L1 Temperature: 26 °C
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60%
Mode: Operation
Note: Adapter: GNE241DA-480050G

Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1660	48.74	0.05	48.79	65.16	-16.37	peak	
2		0.1740	52.07	0.05	52.12	64.77	-12.65	QP	
3		0.1740	29.78	0.05	29.83	54.77	-24.94	AVG	
4 *		0.1860	56.34	0.06	56.40	64.21	-7.81	QP	
5		0.1860	38.00	0.06	38.06	54.21	-16.15	AVG	
6		0.2460	48.44	0.06	48.50	61.89	-13.39	QP	
7		0.2460	30.30	0.06	30.36	51.89	-21.53	AVG	
8		0.4300	41.87	0.07	41.94	57.25	-15.31	QP	
9		0.4300	29.26	0.07	29.33	47.25	-17.92	AVG	
10		21.1820	41.07	0.62	41.69	60.00	-18.31	peak	

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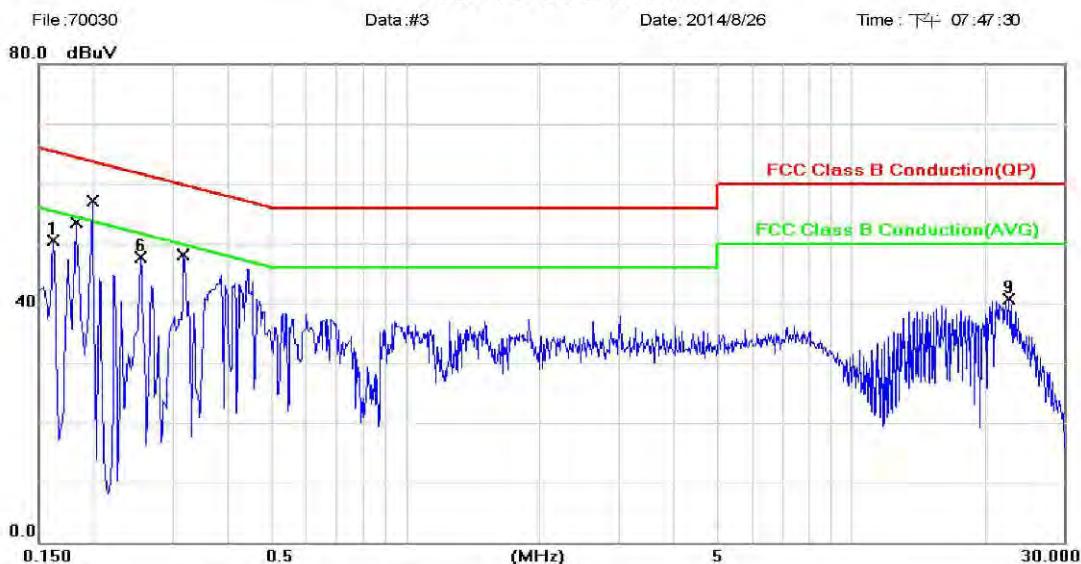
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Site: ConductionRoom
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter:GNE241DA-480050G

Phase: N
Power: AC 120V/60Hz

Temperature: 26 °C
Humidity: 60%

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1620	50.44	0.05	50.49	65.36	-14.87	peak	
2	*	0.1820	56.41	0.06	56.47	64.39	-7.92	QP	
3		0.1820	37.70	0.06	37.76	54.39	-16.63	AVG	
4		0.1980	51.68	0.06	51.74	63.69	-11.95	QP	
5		0.1980	30.40	0.06	30.46	53.69	-23.23	AVG	
6		0.2540	47.55	0.06	47.61	61.63	-14.02	peak	
7		0.3180	42.96	0.07	43.03	59.76	-16.73	QP	
8		0.3180	28.20	0.07	28.27	49.76	-21.49	AVG	
9		22.5700	40.02	0.65	40.67	60.00	-19.33	peak	

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8. EMISSION BANDWIDTH & OCCUPIED BANDWIDTH MEASUREMENT

8.1. Standard Applicable

According to FCC Part 90 §90.210 (L). No Limit required.

According to IC RSS-111 §5.3, The equipment's occupied bandwidth shall not exceed its channel bandwidth.

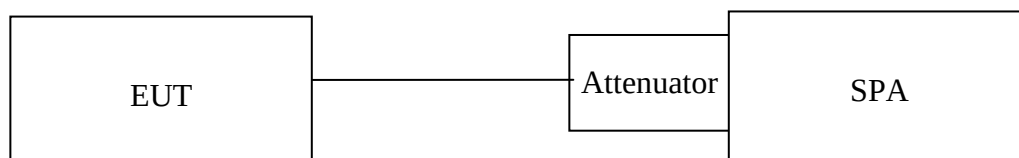
8.2. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
3. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
4. 99% Bandwidth Measurement: set resolution BW as close to 1% of the selected span without it is being lower than 1%, & VBW = 3 XRBW. Detector = Peak or Sample, where sample must be selected whenever it is appropriate, Trace Mode = Max Hold
5. Mark the peak frequency and -26dB (upper and lower) frequency.
6. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.

8.3. Measurement Equipment Used:

Refer to section 6 for details.

8.4. Test SET-UP



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8.5. Measurement Result

26dB Bandwidth

802.11j, 4940~4990MHz (10MHz)-MAIN

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
4945	9.507	9.78
4965	9.420	9.74
4985	9.354	9.71

802.11j, 4940~4990MHz (10MHz)-AUX

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
4945	9.449	9.75
4965	9.255	9.66
4985	9.306	9.69

802.11j, 4940~4990MHz (20MHz)-MAIN

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
4950	22.160	13.46
4965	21.320	13.29
4980	22.060	13.44

802.11j, 4940~4990MHz (20MHz)-AUX

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
4950	21.150	13.25
4965	21.770	13.38
4980	21.530	13.33

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99% Bandwidth

802.11j, 4940~4990MHz (10MHz)-MAIN

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
4945	8.198	9.14
4965	8.214	9.15
4985	8.205	9.14

802.11j, 4940~4990MHz (10MHz)-AUX

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
4945	8.212	9.14
4965	8.211	9.14
4985	8.196	9.14

802.11j, 4940~4990MHz (20MHz)-MAIN

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
4950	17.697	12.48
4965	17.650	12.47
4980	17.704	12.48

802.11j, 4940~4990MHz (20MHz)-AUX

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
4950	17.648	12.47
4965	17.643	12.47
4980	17.633	12.46

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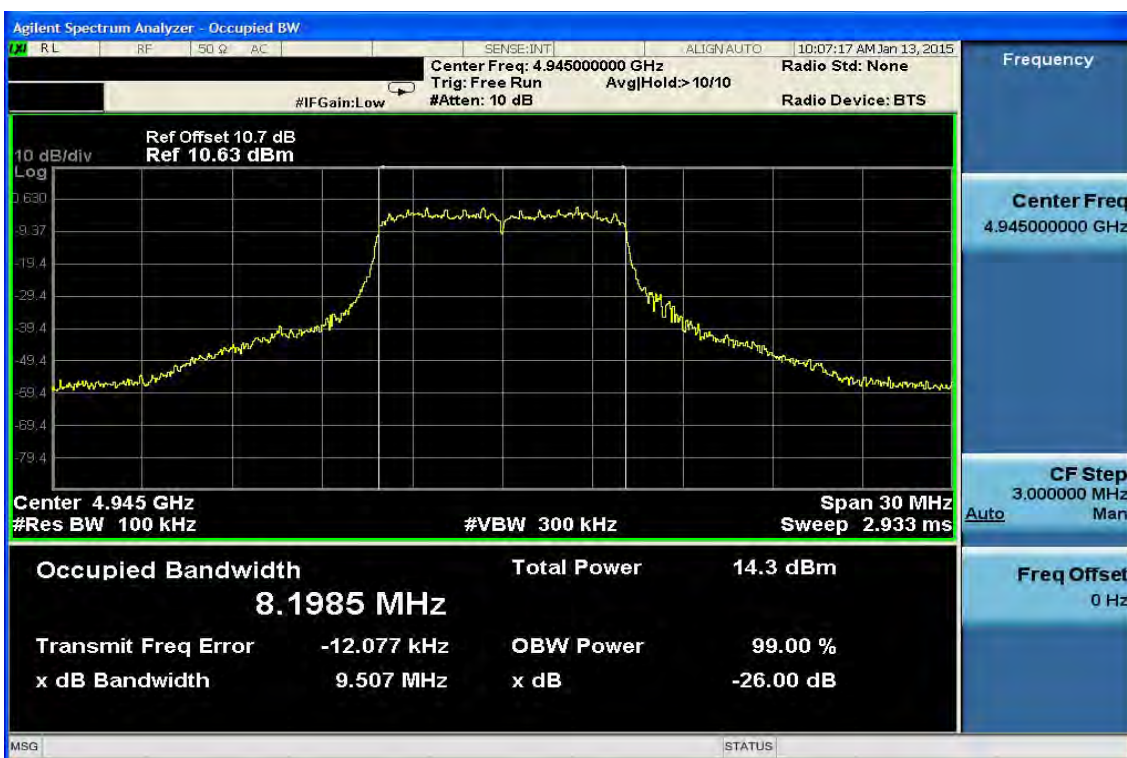
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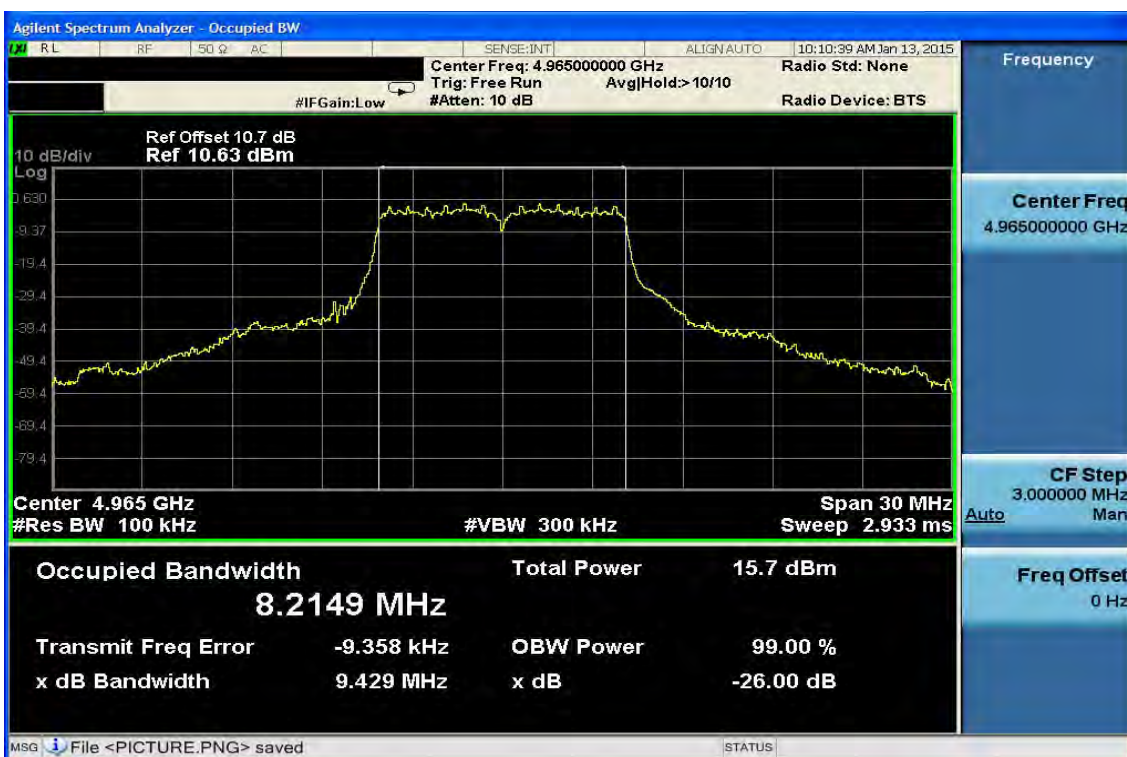
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802.11j, 4940~4990 MHz (10MHz)-MAIN 26dB & 99% Band Width Test Data CH-Low



26dB & 99% Band Width Test Data CH-Mid



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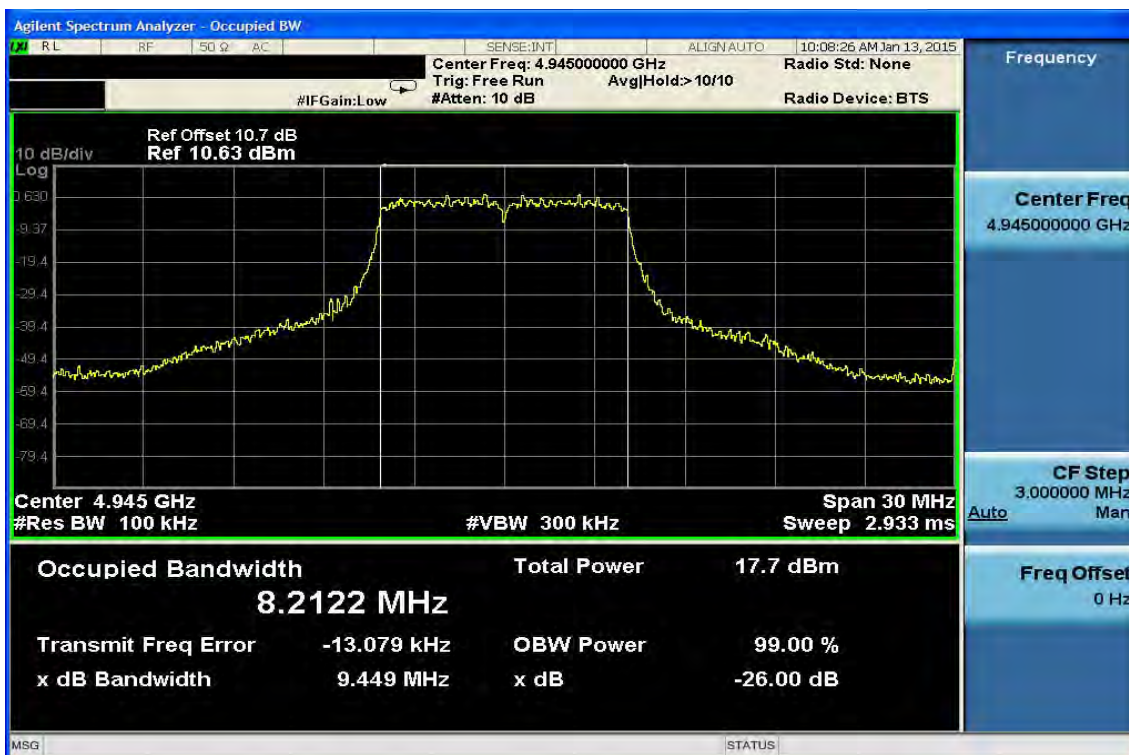
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26dB & 99% Band Width Test Data CH-High



02.11j, 4940~4990 MHz (10MHz)-AUX 26dB & 99% Band Width Test Data CH-Low



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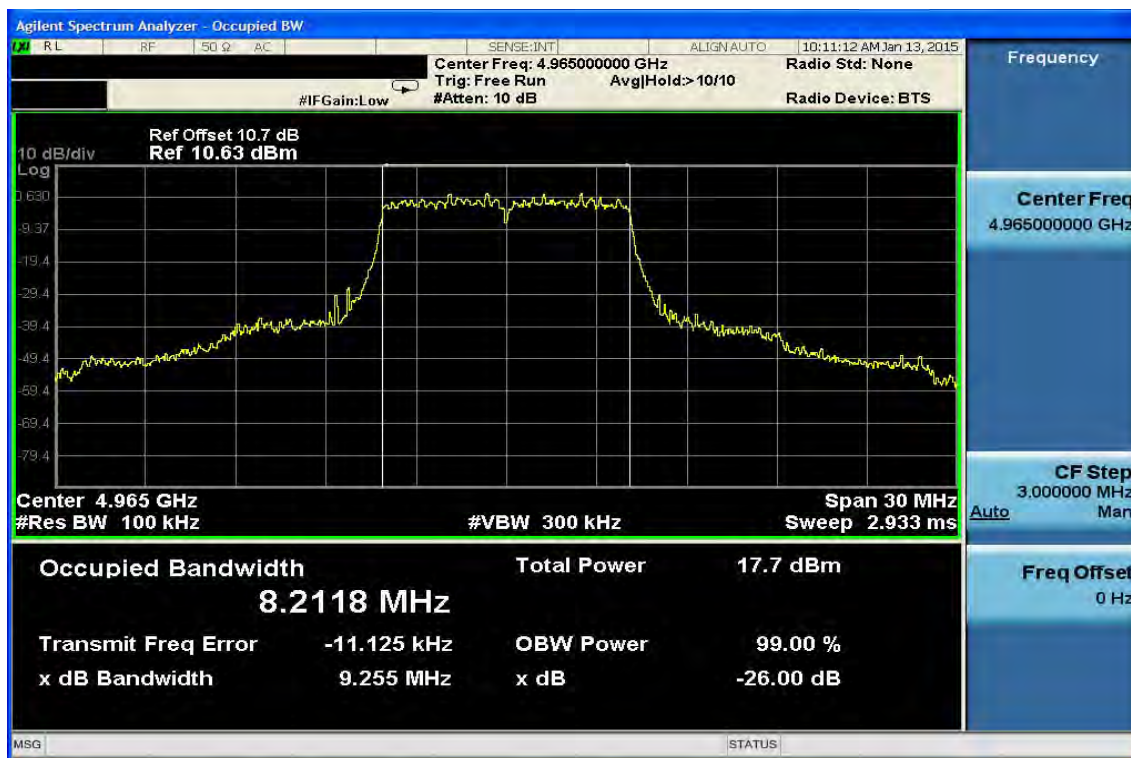
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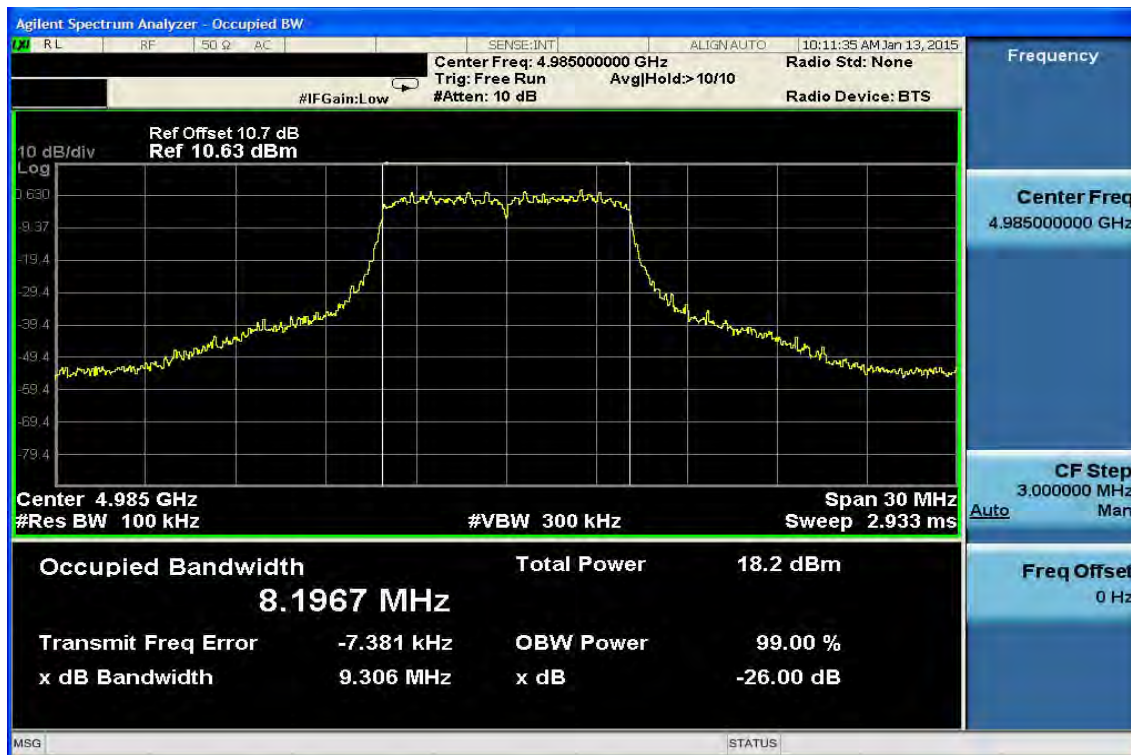
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26dB & 99% Band Width Test Data CH-Mid



26dB & 99% Band Width Test Data CH-High



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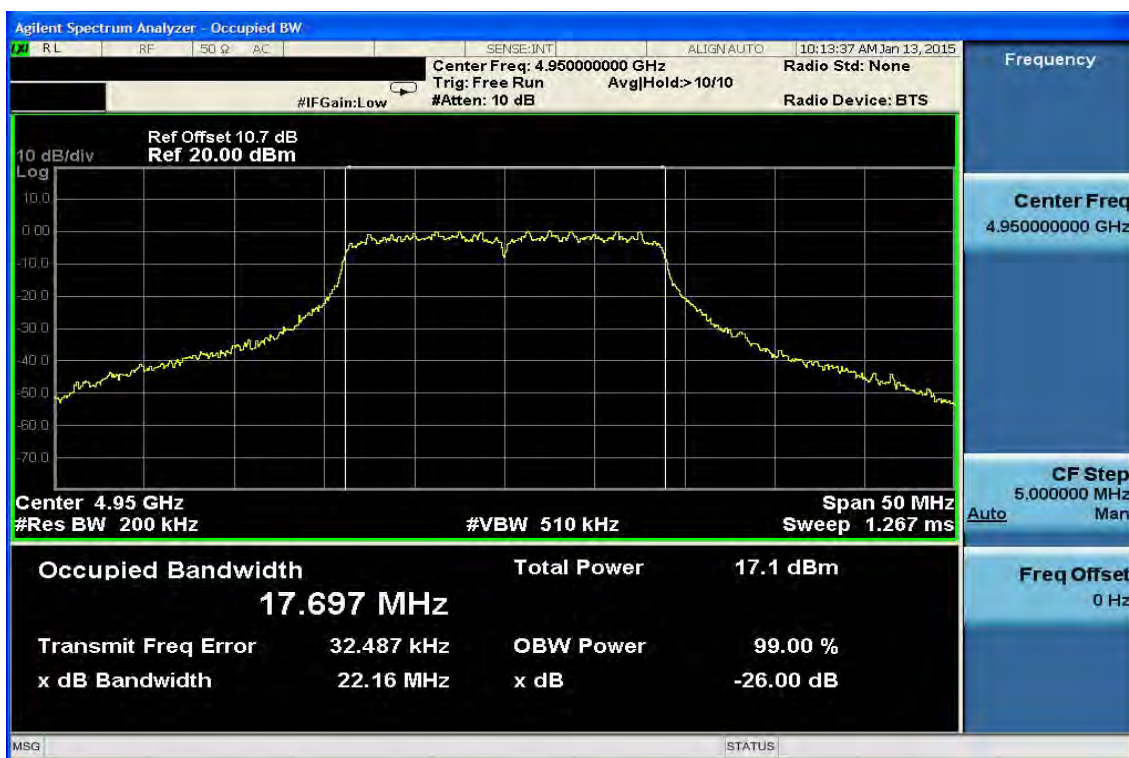
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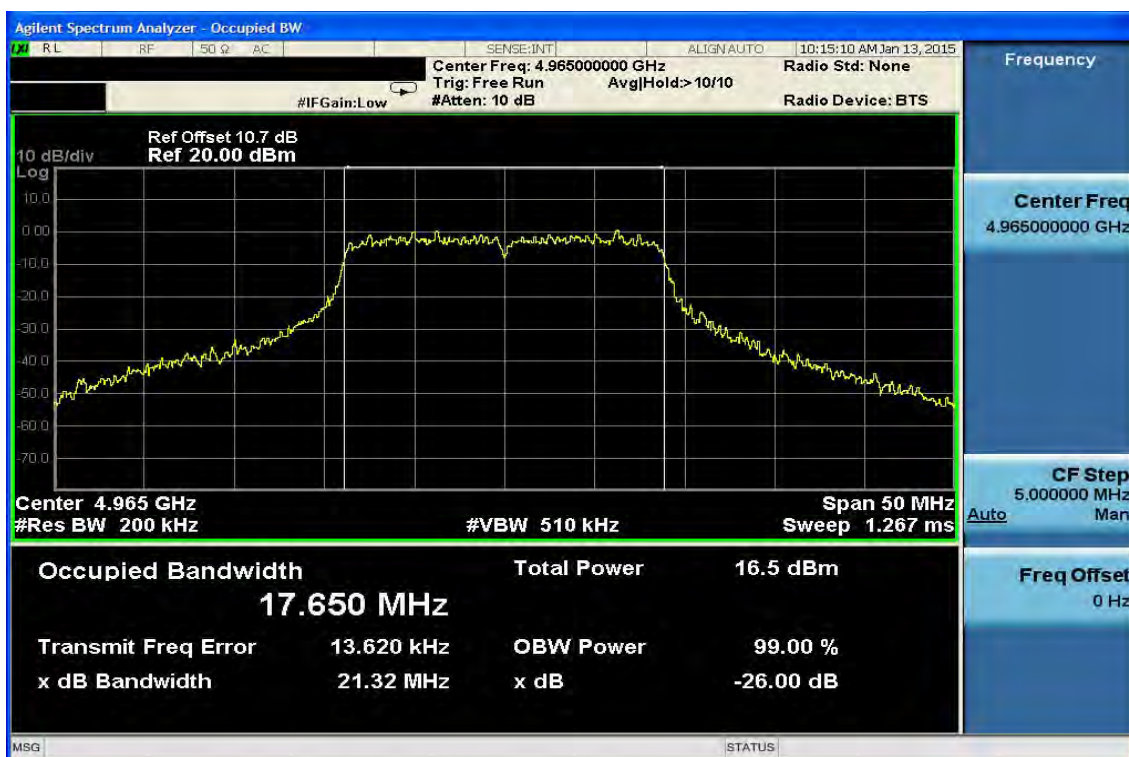
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802.11j, 4940~4990 MHz Ch Low (20MHz)-MAIN 26dB & 99% Band Width Test Data CH-Low



26dB & 99% Band Width Test Data CH-Mid



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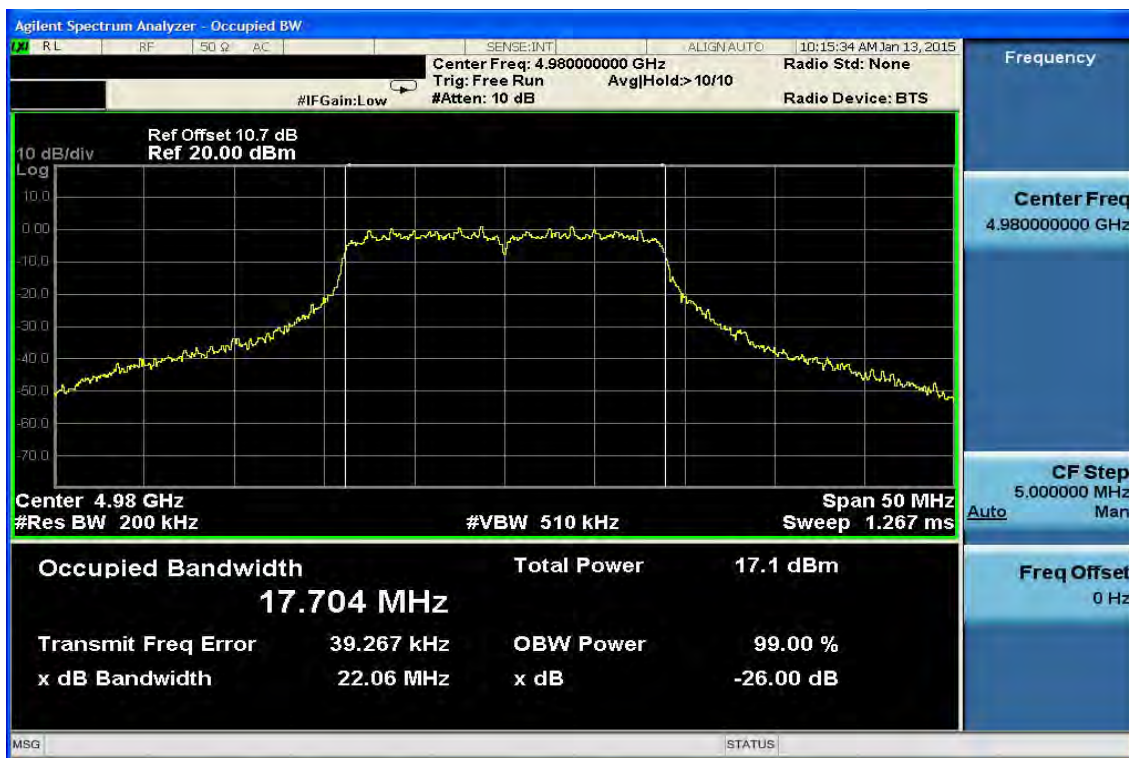
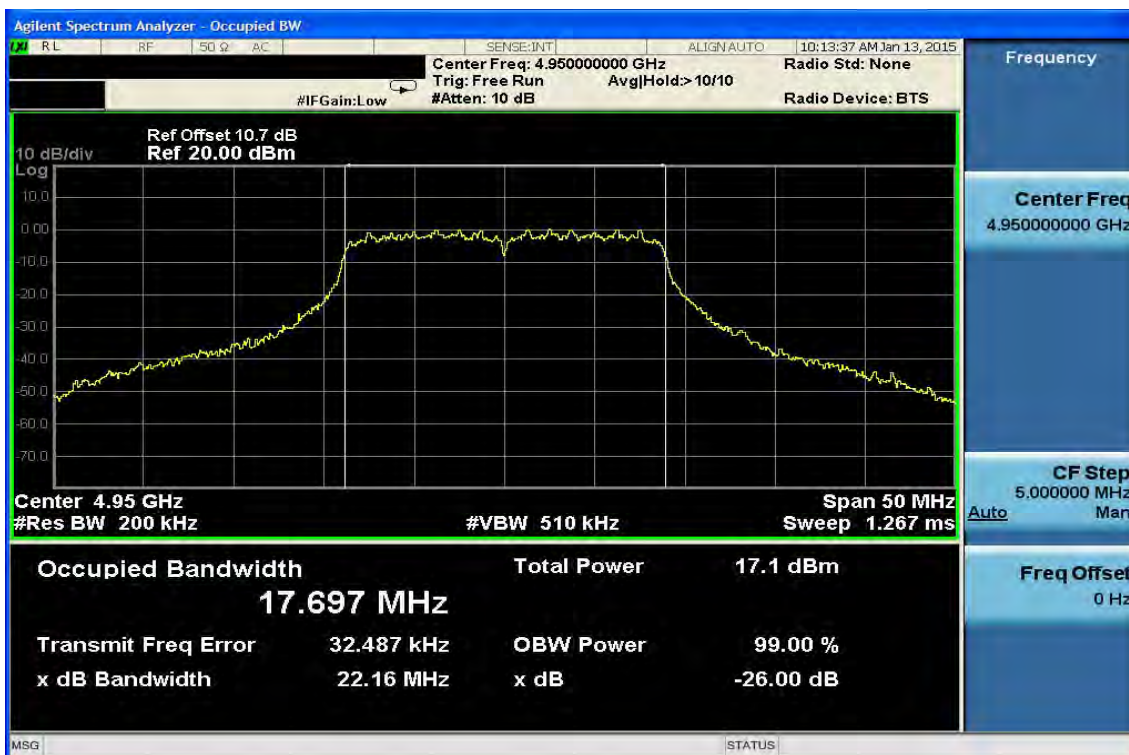
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26dB & 99% Band Width Test Data CH-High

802.11j, 4940~4990 MHz Ch Low (20MHz)-AUX
26dB & 99% Band Width Test Data CH-Low

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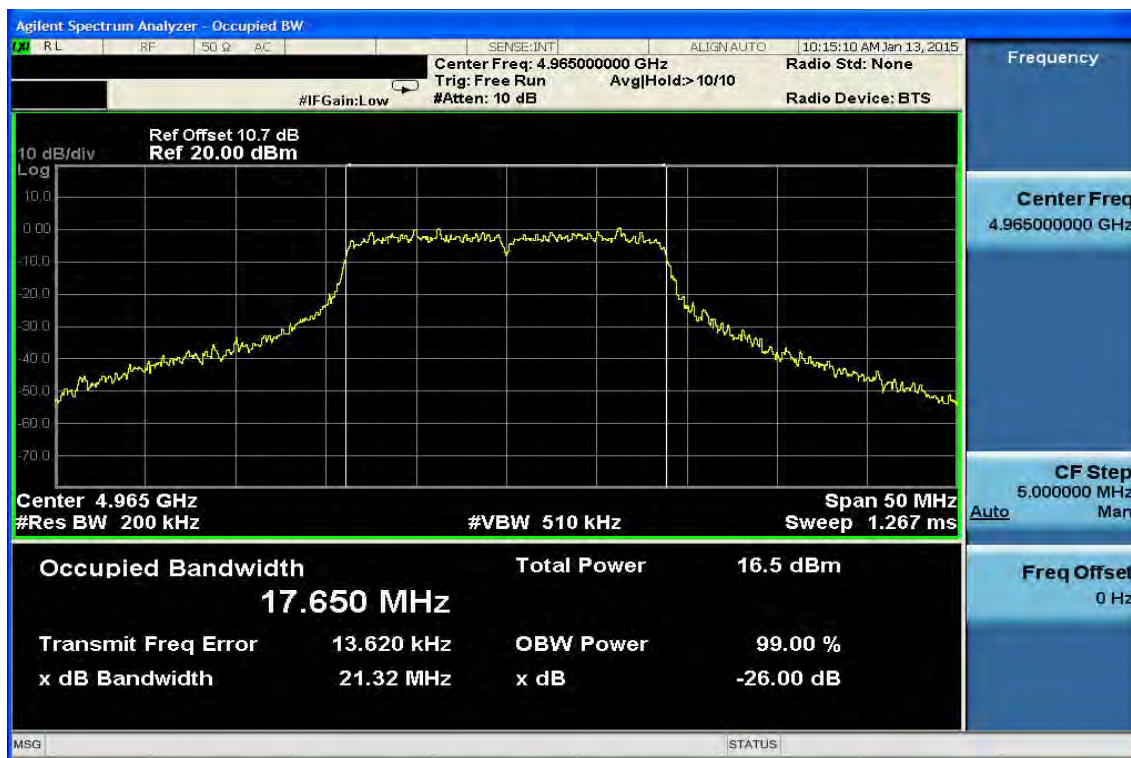
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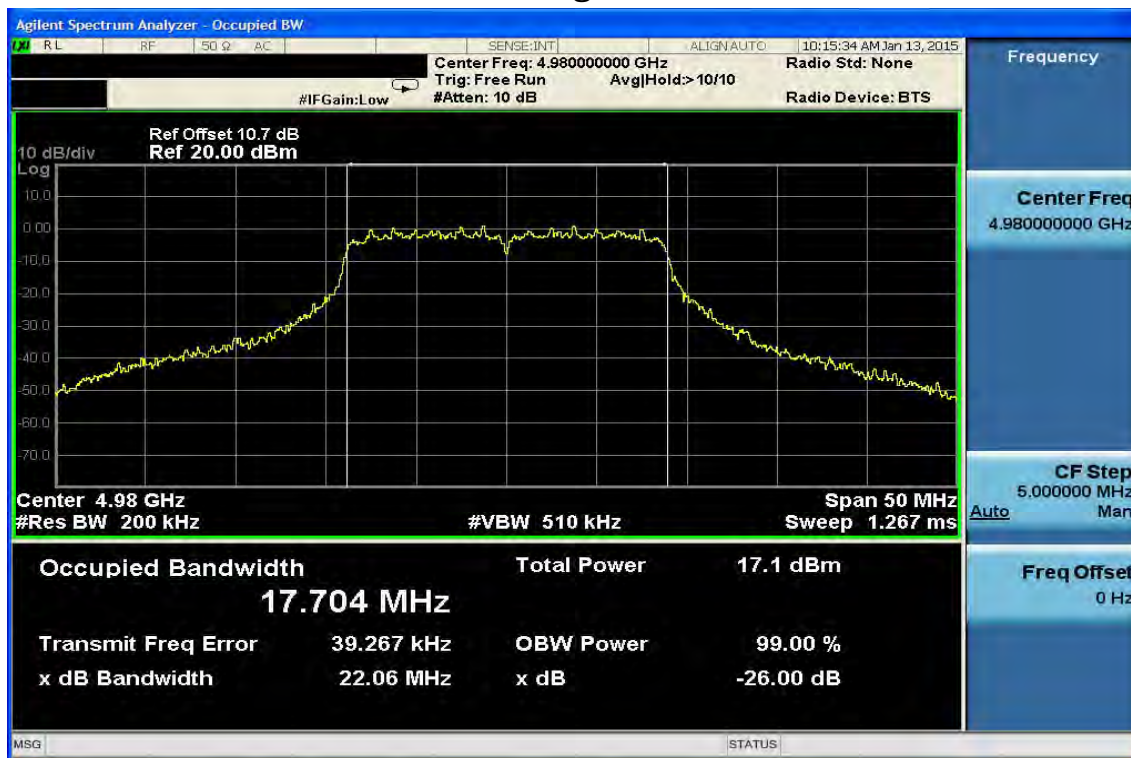
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26dB & 99% Band Width Test Data CH-Mid



26dB & 99% Band Width Test Data CH-High



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9. The MAXIMUM OUTPUT POWER MEASUREMENT

9.1. Standard Applicable

According to FCC Part 90 §90.1215

Channel Bandwidth (MHz)	Low Power Device Peak Transmitter Power (dBm)	High Power Device Peak Transmitter Power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

(b) Low power devices are also limited to a peak power spectral density of 8 dBm per one MHz.

Low power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 8 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi.

According to IC RSS 111§5.3,

The transmitted power of low-power and high-power devices shall not exceed the maximum limits corresponding to the equipment type given

Channel Bandwidth (MHz)	Low Power Device Peak Transmitter Power (dBm)	High Power Device Peak Transmitter Power (dBm)
1	$P \leq 7$	$7 < P \leq 20$
5	$P \leq 14$	$14 < P \leq 27$
10	$P \leq 17$	$17 < P \leq 30$
15	$P \leq 18.8$	$18.8 < P \leq 31.8$
20	$P \leq 20$	$20 < P \leq 33$

Note:

EUT Antenna Gain: 7 dBi, Directional gain : 10.01 dBi

Peak power Limit (10MHz Band): 17dBm – (EUT Antenna Gain above 9dBi) = 15.99 dBm/MHz

Peak power Limit (20MHz Band): 20dBm – (EUT Antenna Gain above 9dBi) = 18.99 dBm/MHz

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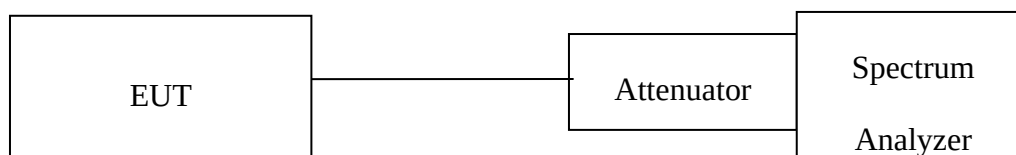
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9.2. Measurement Procedure(following the measurement procedure 5.1.1 of KDB971168 D01):

1. Set the RBW ≥ 1 MHz.
2. Set the VBW $\geq 3 \times$ RBW.
3. Set the span ≥ 2 RBW.
4. Sweep time = auto couple.
5. Detector = peak.
6. Ensure that the number of measurement points $\geq$ span/RBW
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

9.3. Measurement Equipment Used:

Refer to section 6 for details.

9.4. Test Set-up:

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9.5. Measurement Result

802.11j, 4940~4990 MHz (10MHz)

Frequency (MHz)	Peak Output Power(dBm) (MAIN)	Peak Output Power(dBm) (AUX)	Total Output Power(dBm)	Limit (dBm)
4945	14.03	10.88	15.74	15.99
4965	13.86	10.38	15.47	15.99
4985	14.08	11.07	15.84	15.99

802.11j, 4940~4990 MHz (20MHz)

Frequency (MHz)	Peak Output Power(dBm) (MAIN)	Peak Output Power(dBm) (AUX)	Total Output Power(dBm)	Limit (dBm)
4950	15.96	12.11	17.46	18.99
4965	16.08	12.92	17.79	18.99
4980	16.19	13.29	17.99	18.99

Note: Offset 10.7dB

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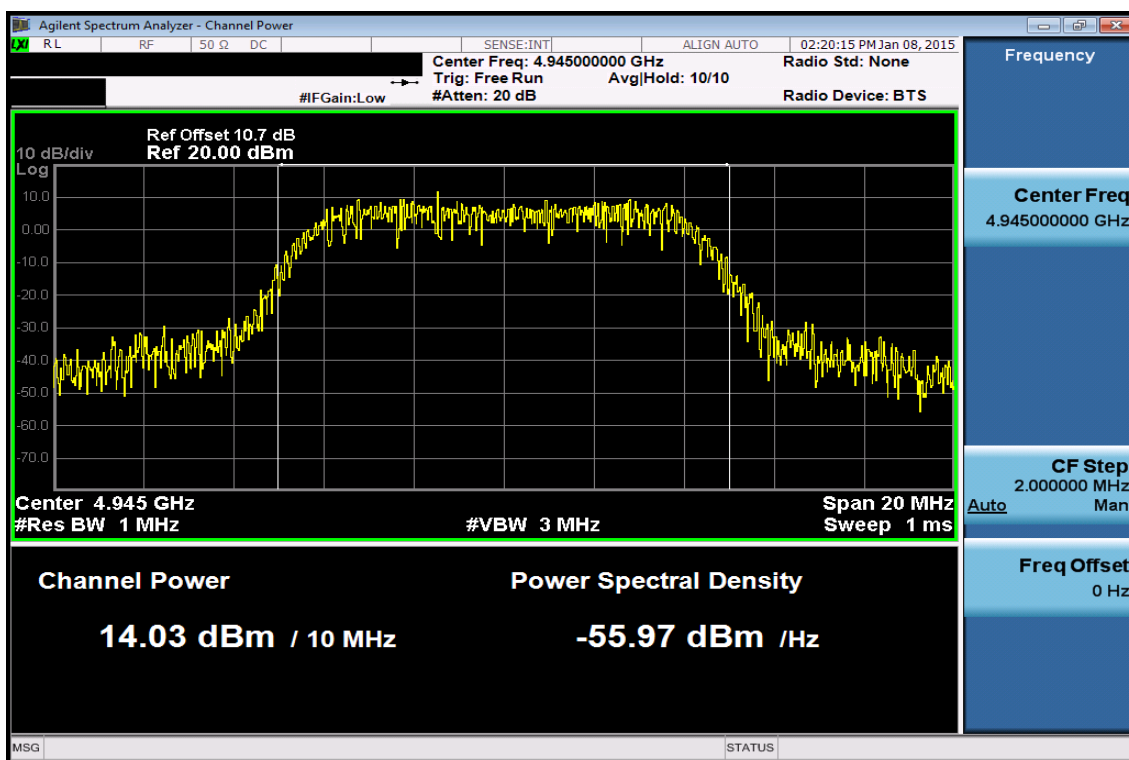
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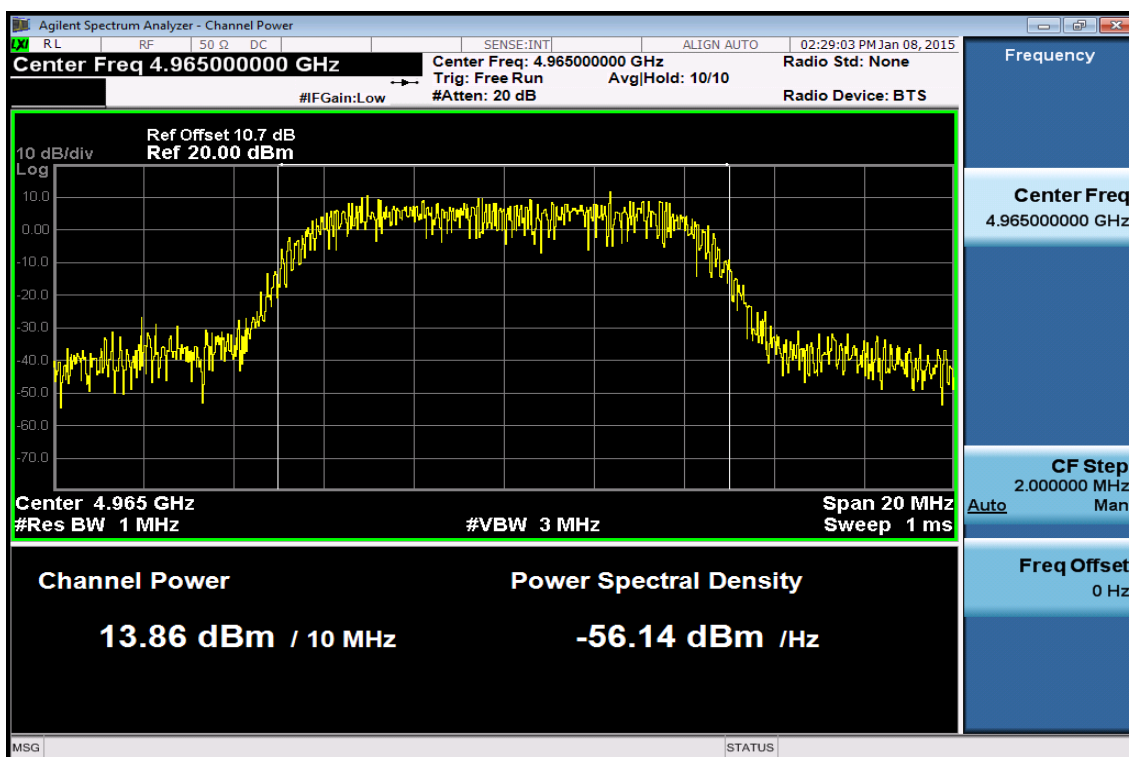
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802.11j, 4940~4990 MHz (10MHz)-Main Test Data CH-Low -



Test Data CH-Mid



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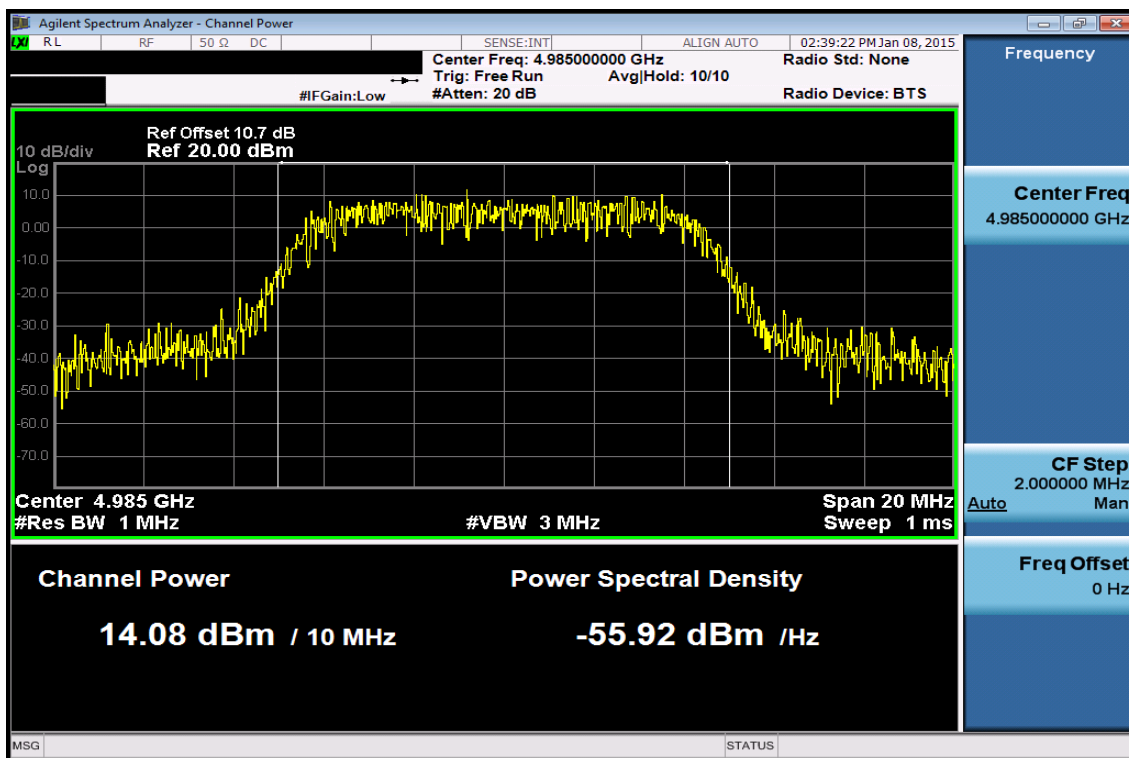
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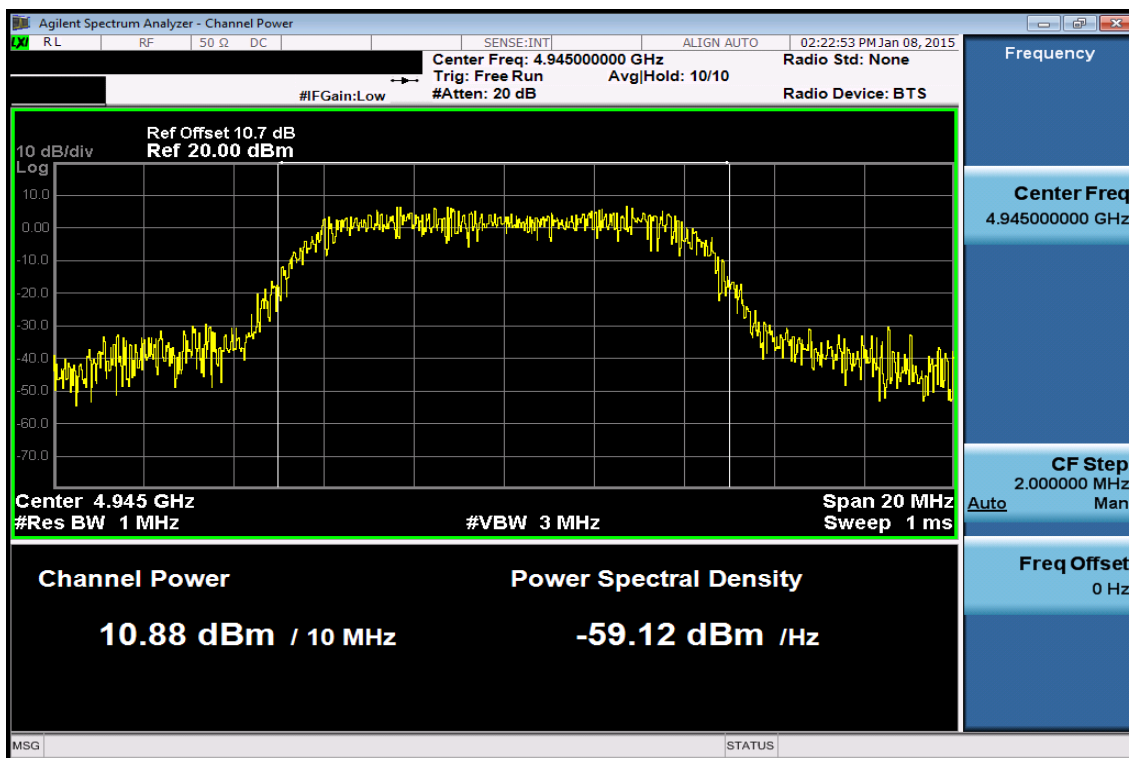
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Test Data CH-High



802.11j, 4940~4990 MHz (10MHz)-AUX

Test Data CH-Low -



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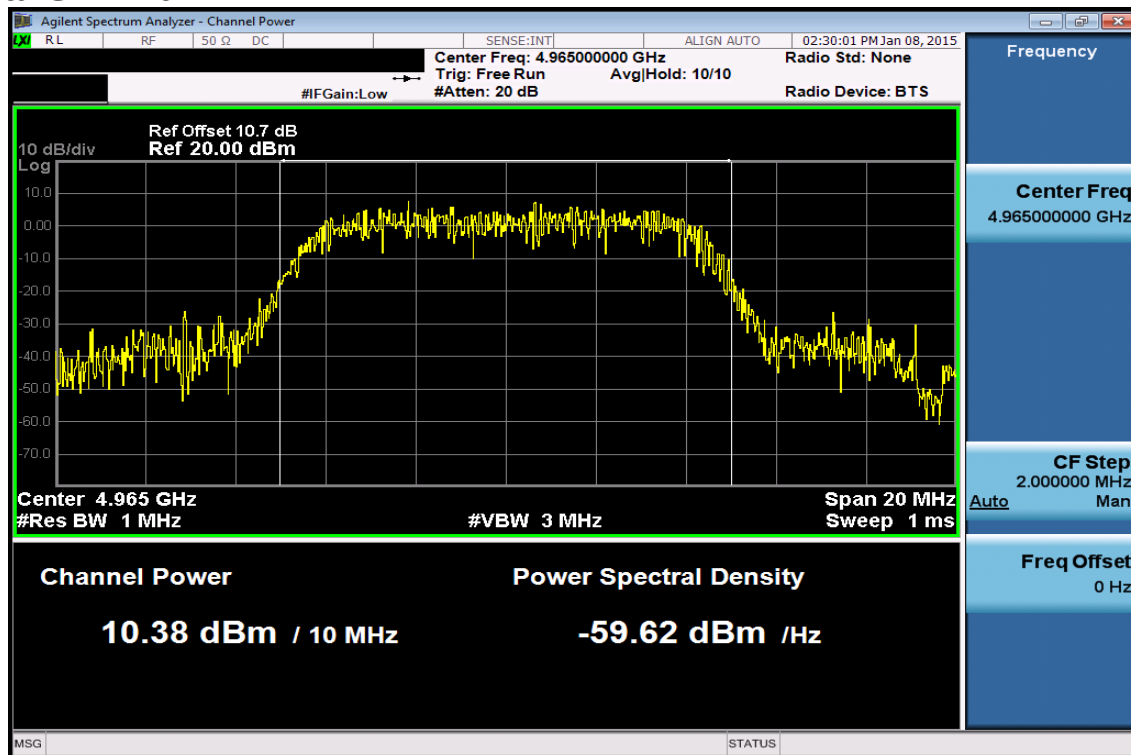
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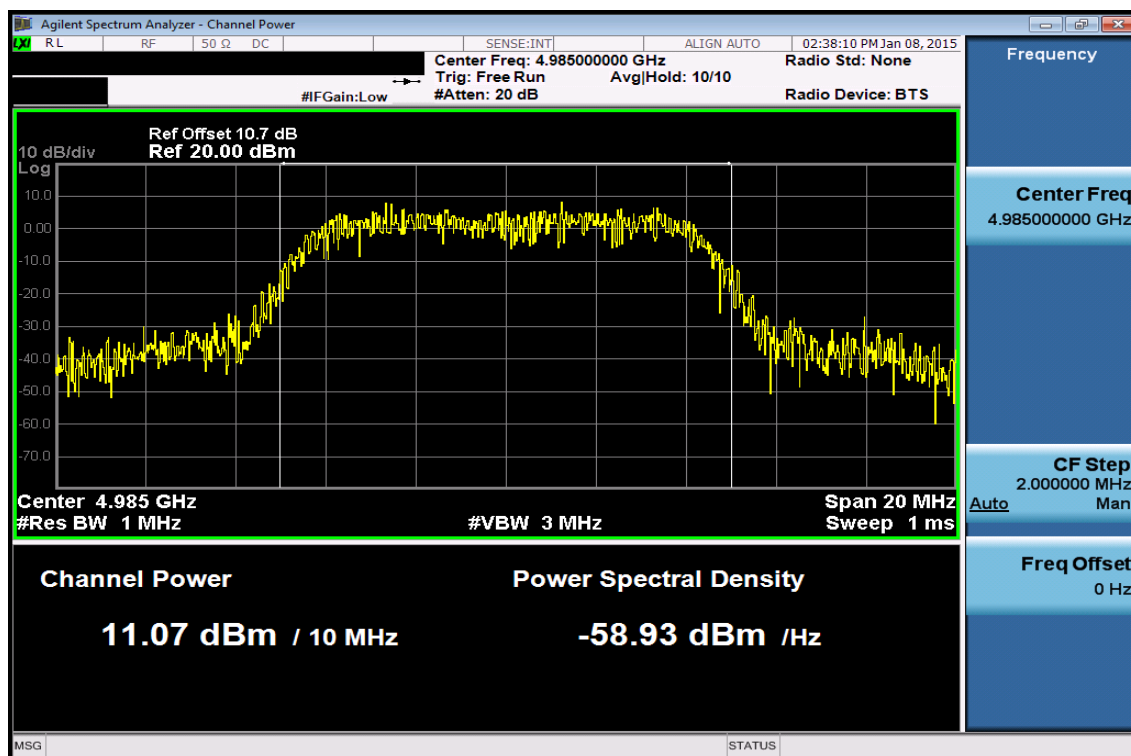
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Test Data CH-Mid



Test Data CH-High



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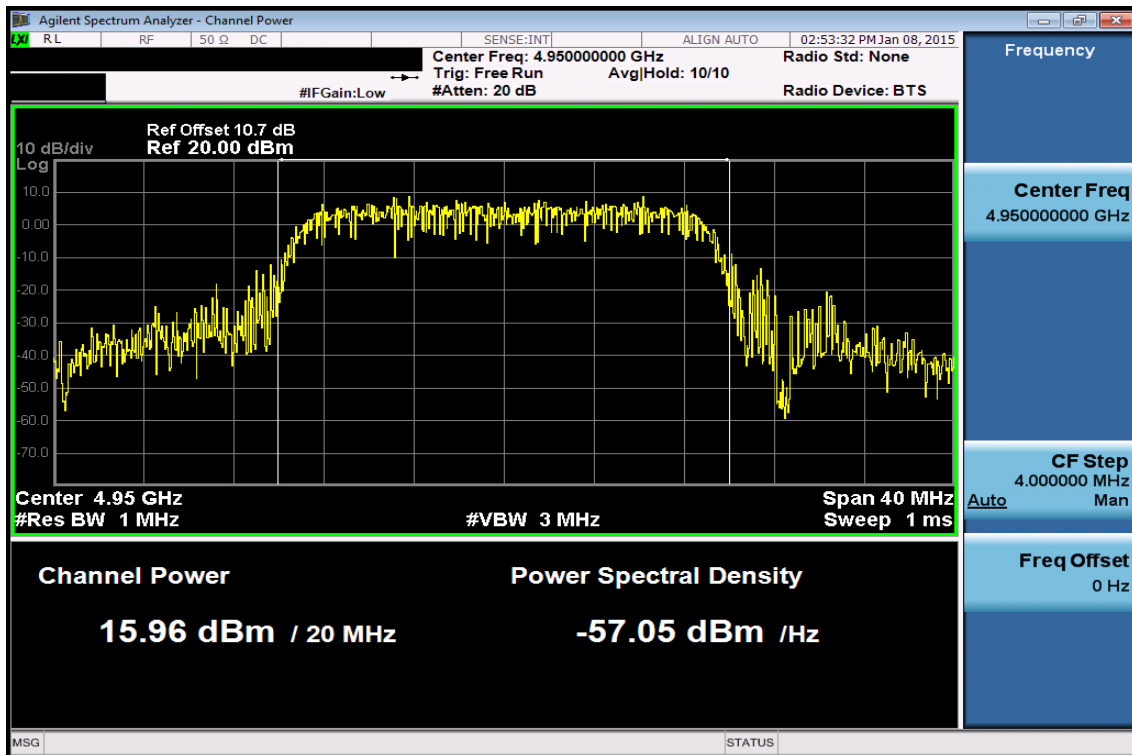
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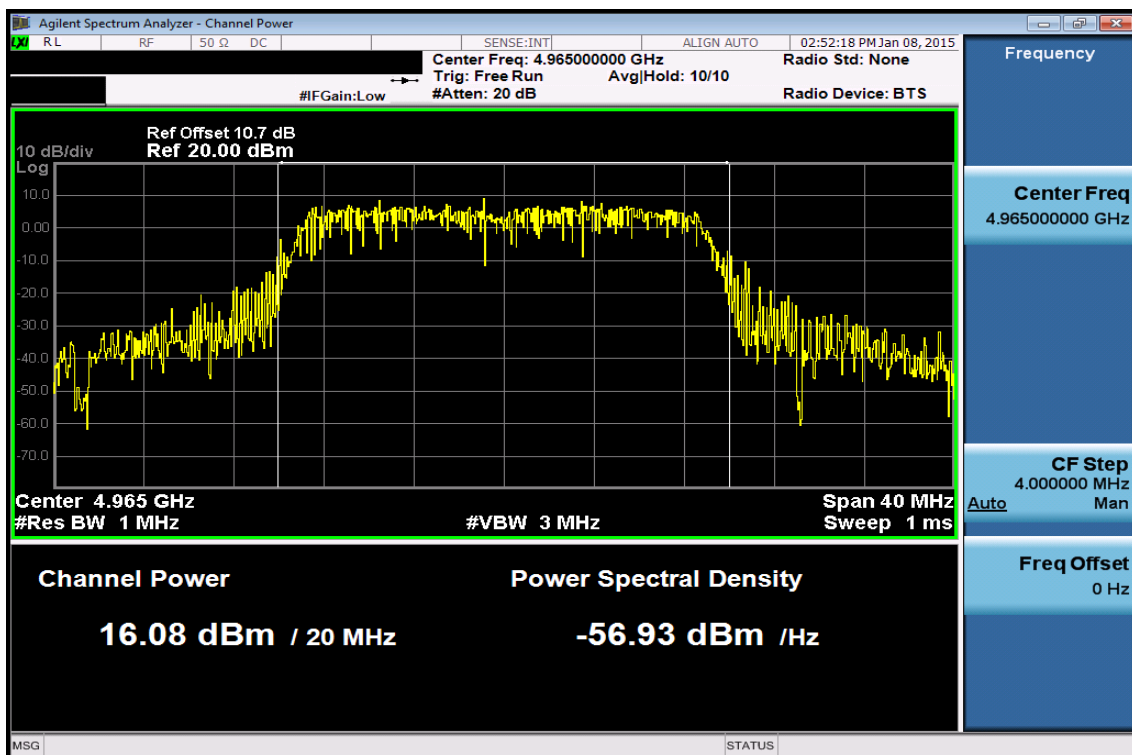
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802.11j, 4940~4990 MHz (20MHz)-Main Test Data CH-Low



Test Data CH-Mid



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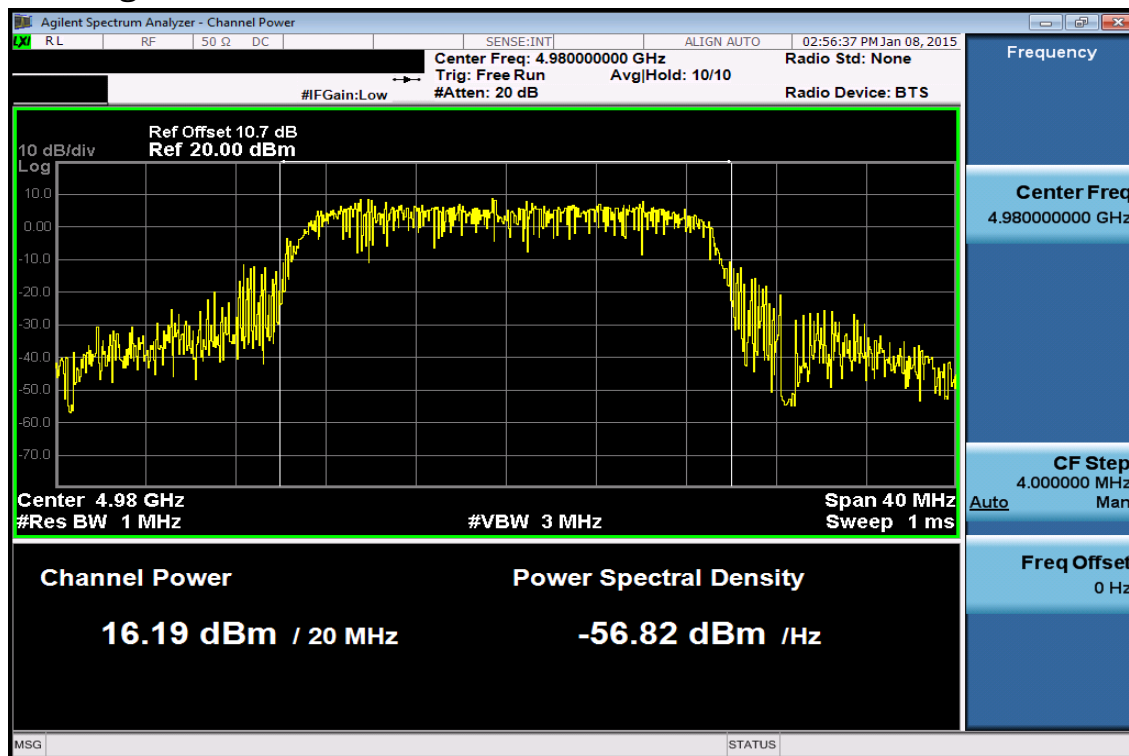
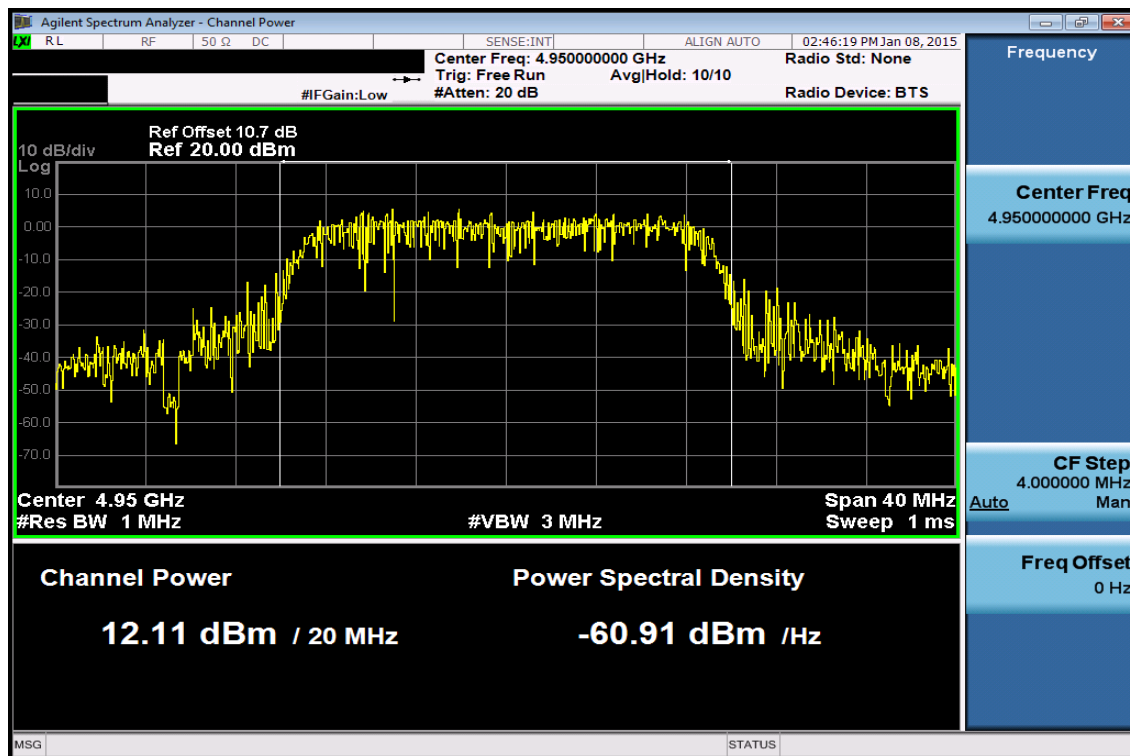
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Test Data CH-High

802.11j, 4940~4990 MHz (20MHz)-AUX
Test Data CH-Low

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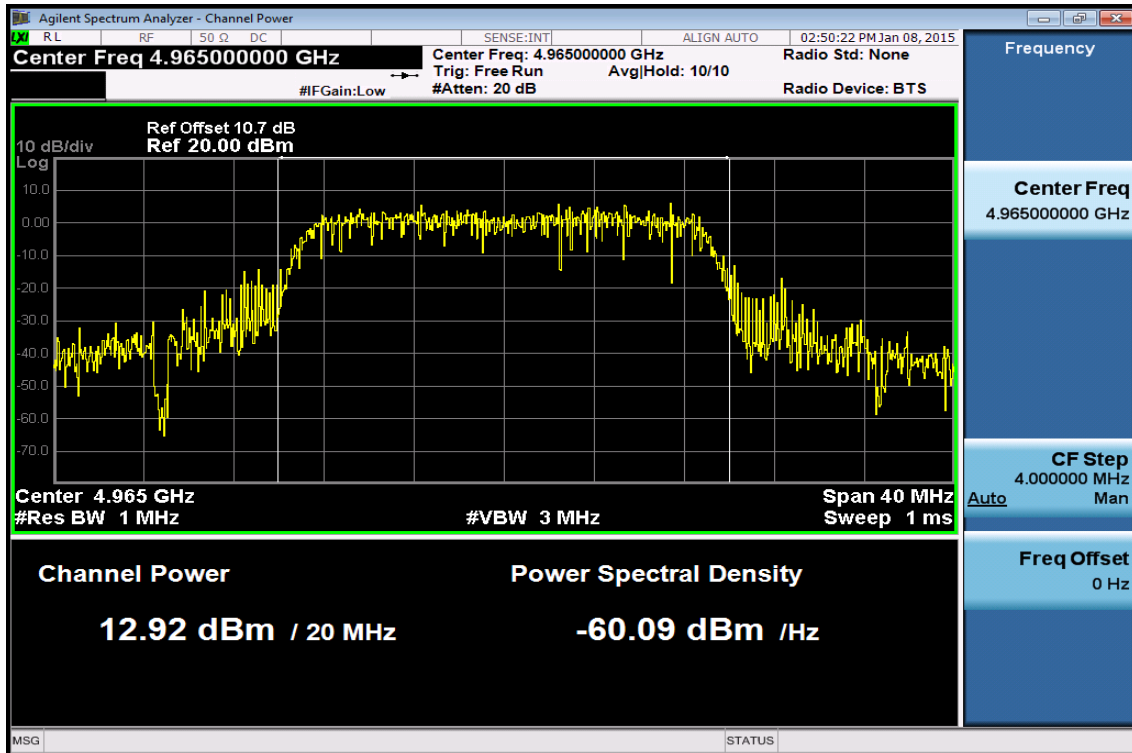
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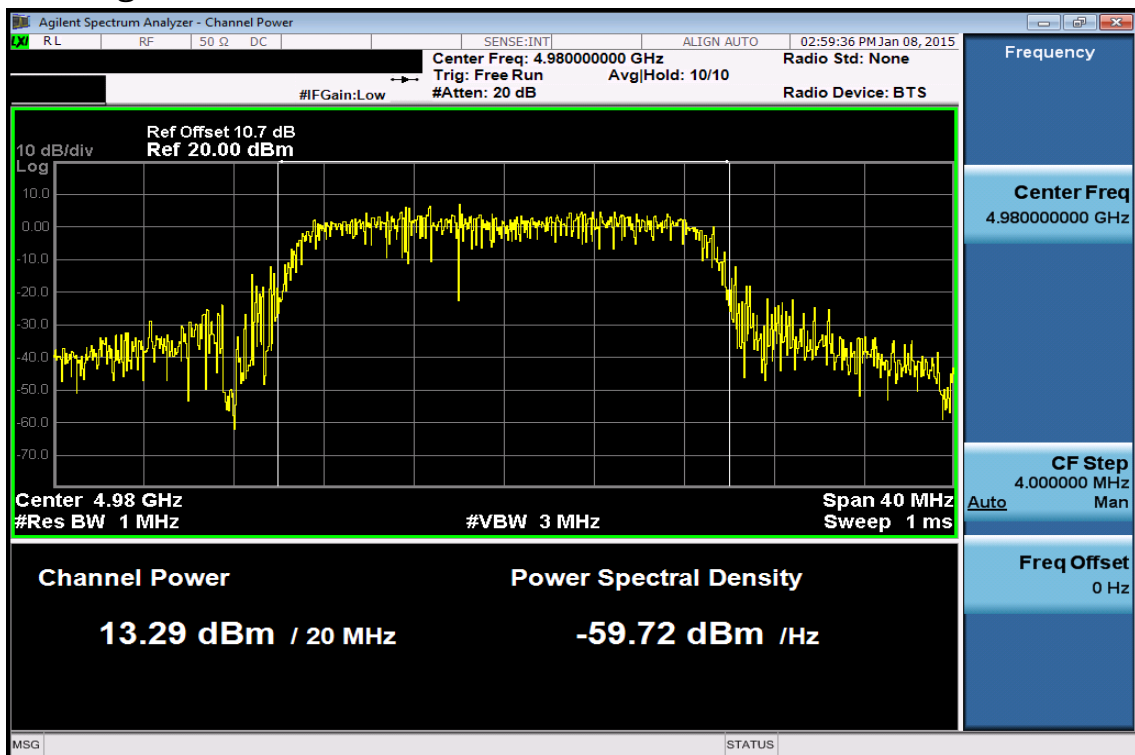
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Test Data CH-Mid



Test Data CH-High



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10. POWER SPECTRAL DENSITY

10.1. Standard Applicable

According to FCC Part 90 §90.1215 (a) Low power devices.

(b) Low power devices are also limited to a peak power spectral density of 8 dBm per one MHz. Low power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 8 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi.

Note:

If transmitting antennas of directional gain greater than 9dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26dBi without any corresponding reduction in the transmitter power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26dBi.

According to RSS 111 §4.2,

The transmitter power spectral density shall be measured over a bandwidth of 1 MHz or 99% of the emission bandwidth, whichever is less, with the power measured as per Section 4.1. A resolution bandwidth less than the measurement bandwidth can be used provided that the measured power is integrated to show total power over the measurement bandwidth.

Note:

EUT Antenna Gain: 7 dBi, Directional gain : 10.01 dBi

PSD Limit: 8dBm/MHz – (EUT Antenna Gain above 9dBi) = 6.99 dBm/MHz

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10.2. Measurement Procedure(following the measurement procedure 5.3 of KDB971168 D01):

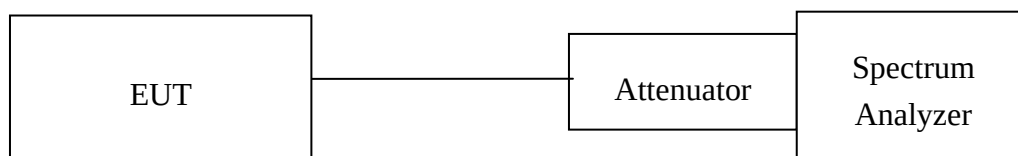
1. Set the analyzer center frequency to the OBW center frequency.
2. Set the span to 1.5 times the OBW bandwidth.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set the VBW $\geq 3 \times$ RBW.
5. Set the number of points in sweep $\geq$ span / RBW.

NOTE: This requirement is applicable only to final measurement. It can be violated for preliminary (pre-scan) measurements when necessary for wide span measurements.

6. Detector = peak.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the specified reference bandwidth (PSD).

10.3. Measurement Equipment Used:

Refer to section 6 for details.

10.4. Test Set-up:

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10.5. Measurement Result

802.11j, 4940~4990 MHz (10MHz)

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
4945	6.76	6.99	-0.23
4965	6.85	6.99	-0.14
4985	6.42	6.99	-0.57

802.11j, 4940~4990 MHz (20MHz)

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
4950	5.09	6.99	-1.90
4965	5.22	6.99	-1.77
4980	5.16	6.99	-1.83

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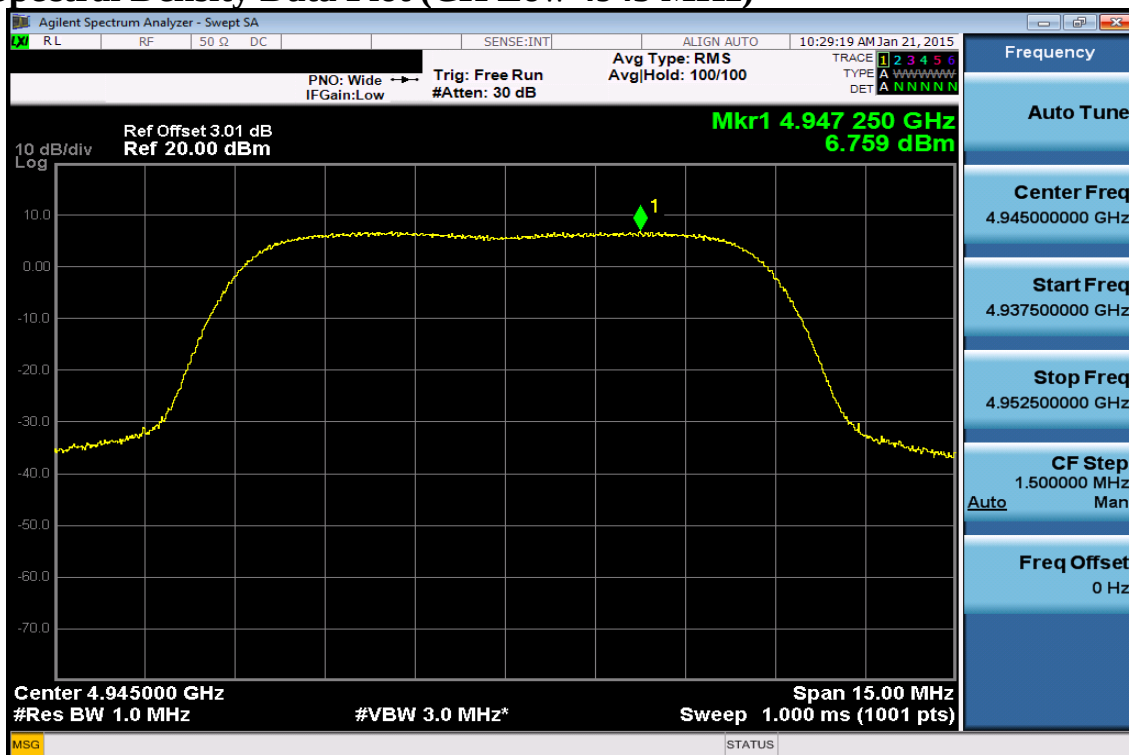
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802.11j, 4940~4990 MHz (10MHz)

Power Spectral Density Data Plot (CH Low 4945 MHz)



Power Spectral Density Data Plot (CH Mid 4965 MHz)



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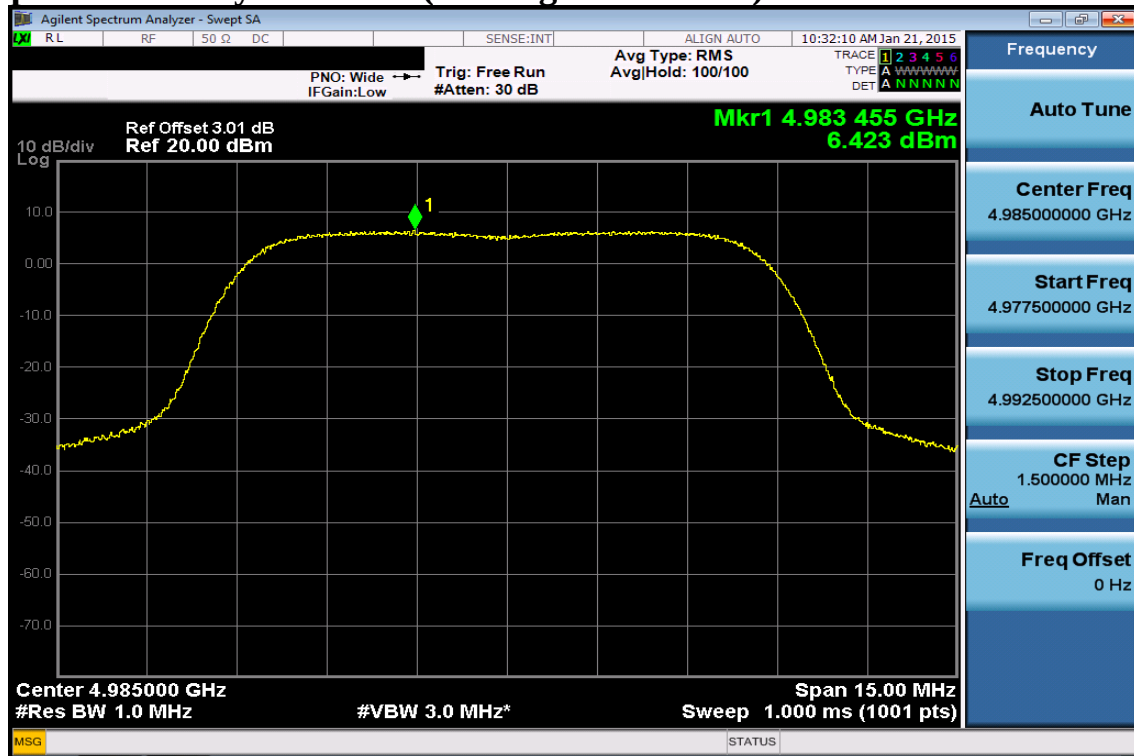
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Power Spectral Density Data Plot (CH High 4980 MHz)



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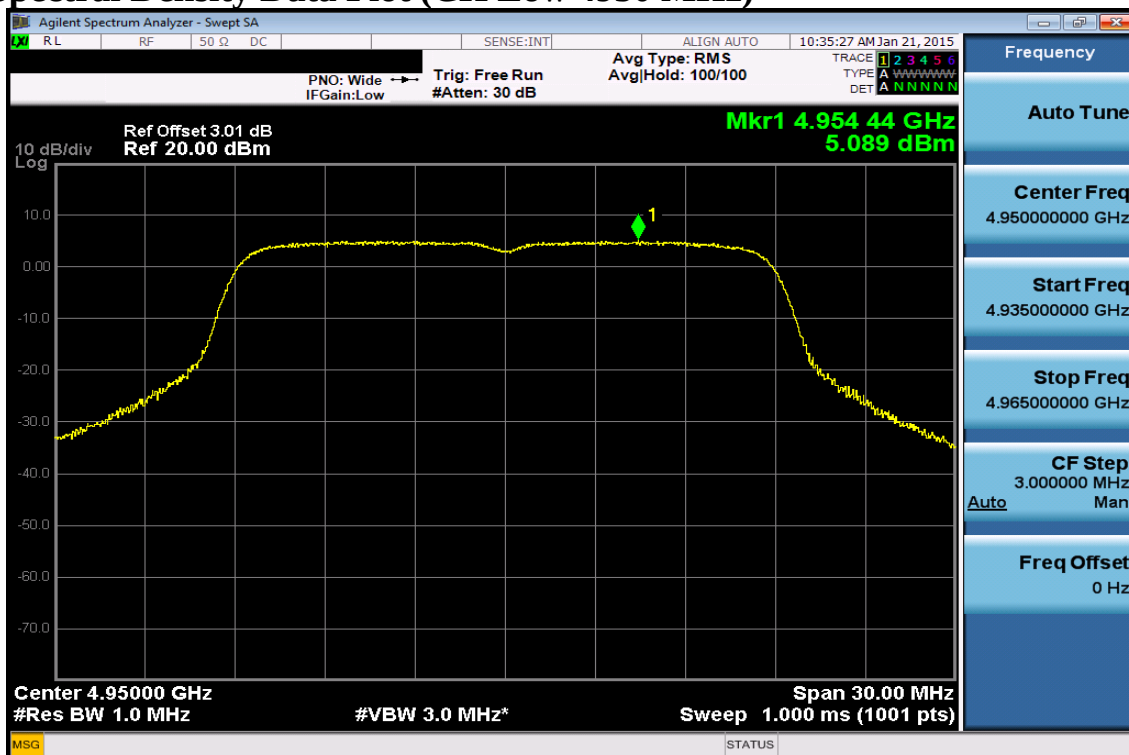
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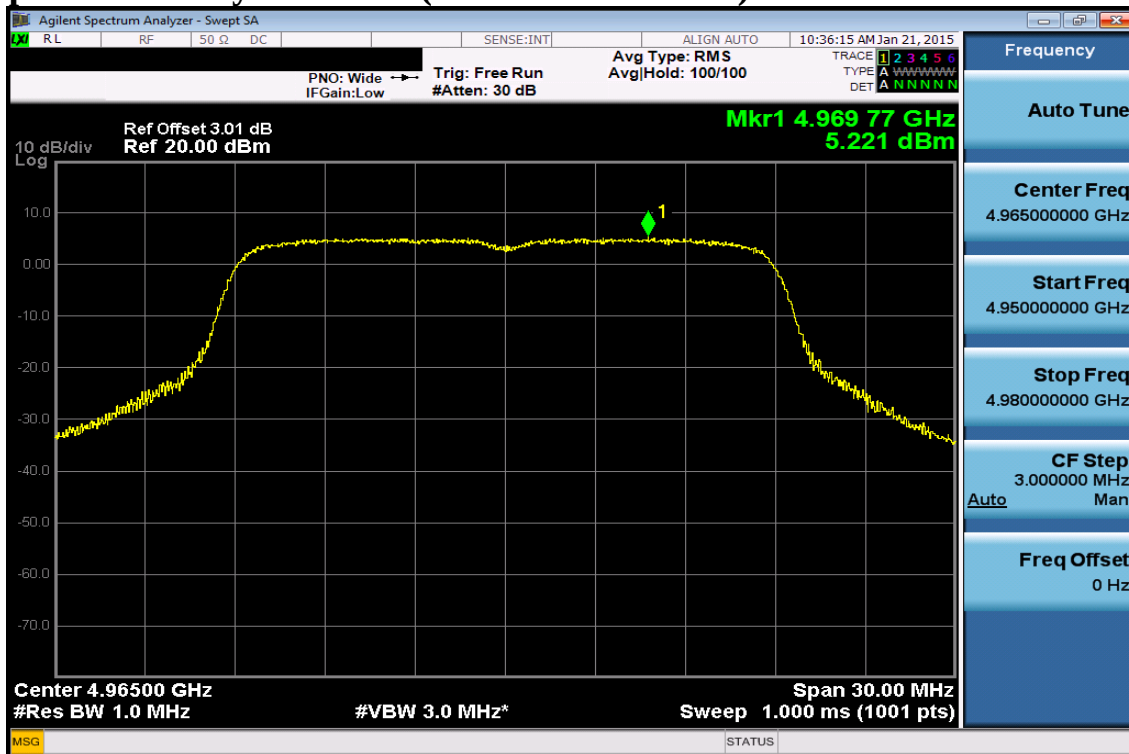
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802.11j, 4940~4990 MHz (20MHz) Power Spectral Density Data Plot (CH Low 4950 MHz)



Power Spectral Density Data Plot (CH Mid 4965 MHz)



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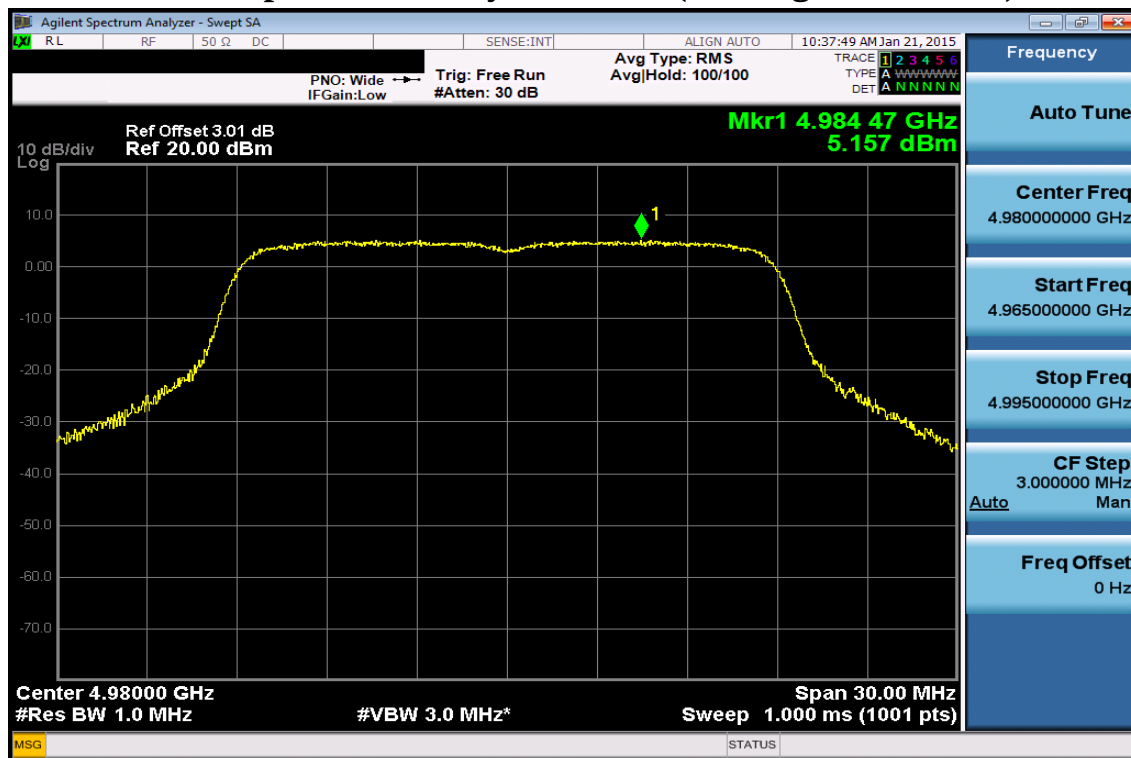
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Power Spectral Density Data Plot (CH High 4980 MHz)



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11. TRANSMIT SPECTRUM MASK

11.1. Standard Applicable

According to FCC Part 90 §90.210 with FCC 04-265

(Emissions Mask L for low power, Emissions Mask M for high power)

Authorized Bandwidth (BW)	Low-power Transmitter	High-power Transmitter
0 - 45 %	0dB	0dB
45 - 50 %	$219 \log (\% \text{ of (BW) } / 45) \text{ dB}$	$568 \log (\% \text{ of (BW) } / 45) \text{ dB}$
50 - 55 %	$10 + 242 \log (\% \text{ of BW } / 50) \text{ dB}$	$26 + 145 \log (\% \text{ of BW } / 50) \text{ dB}$
55 - 100 %	$20 + 31 \log (\% \text{ of (BW) } / 55) \text{ dB}$	$32 + 31 \log (\% \text{ of (BW) } / 55) \text{ dB}$
100 - 150 %	$28 + 68 \log (\% \text{ of (BW) } / 100) \text{ dB}$	$40 + 57 \log (\% \text{ of (BW) } / 100) \text{ dB}$
Above 150 %	50 dB	50 dB or $55 + 10 \log (P) \text{ dB}$, Whichever is the lesser attenuation

Note: The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 The power spectral density is the power measured within the resolution bandwidth of the measurement

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According to IC RSS-111 §5.5

On any frequency f , offset from the channel centre frequency f_c by a separation f_d (expressed as a percentage of the channel bandwidth), the power spectral density of the unwanted emissions for low- and high-power transmitters shall comply with the limits specified below in Table 2. Figure 1 shows the emissions of each transmitter shall comply with the emission limits based on the output power of the transmitter regardless of the total output power of the equipment (i.e. total output power from all the transmitters).

Table 2

Offset Frequency f_d (% of the Equipment's Channel Bandwidth)	Minimum Attenuation (dB)	
	Low-power Transmitter	High-power Transmitter
$0 < f_d \leq 45$	0	0
$45 < f_d \leq 50$	$219 \log (f_d/45)$	$568 \log (f_d/45)$
$50 < f_d \leq 55$	$10 + 242 \log (f_d/50)$	$26 + 145 \log (f_d/50)$
$55 < f_d \leq 100$	$20 + 31 \log (f_d/55)$	$32 + 31 \log (f_d/55)$
$100 < f_d \leq 150$	$28 + 68 \log (f_d/100)$	$40 + 57 \log (f_d/100)$
$f_d > 150$	40	whichever is less stringent 50 or $55 + 10 \log p$

Where:

$$f_d (\%) = ((f - f_c) / \text{channel bandwidth}) \times 100$$

p: transmitter's output power (in watts), measured as per Section 4.1 transmitter power

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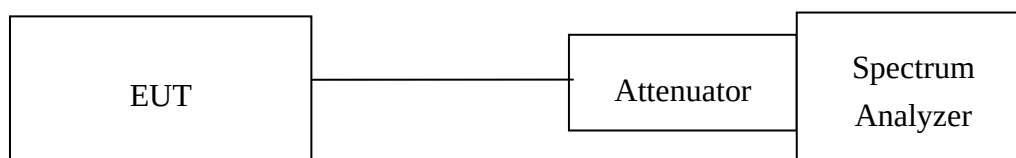
11.2. Measurement Procedure

The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz.

11.3. Measurement Equipment Used:

Refer to section 6 for details.

11.4. Test Set-up:



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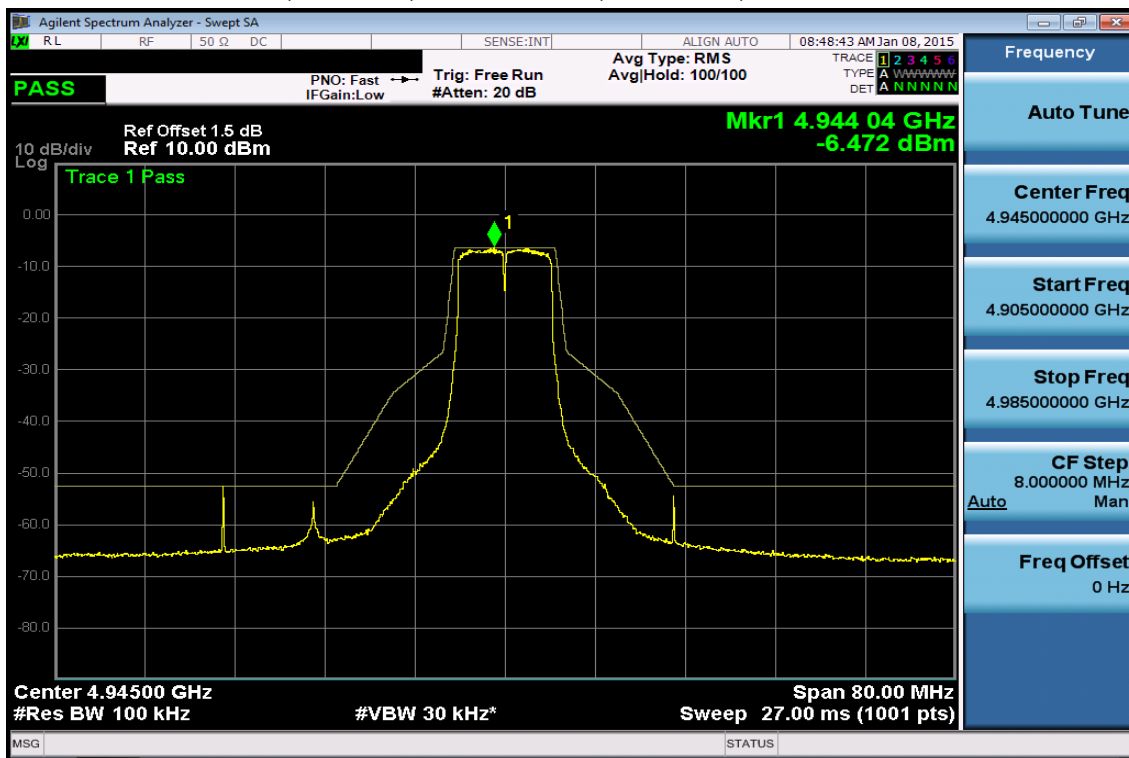
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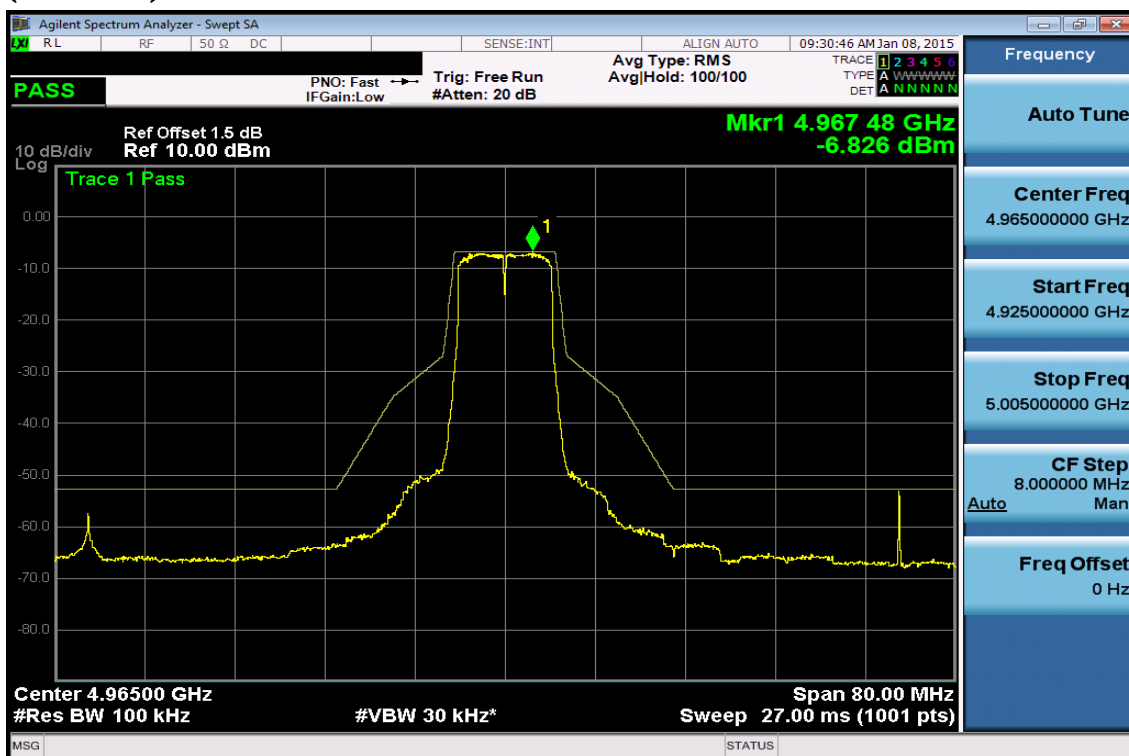
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11.5. Measurement Result

802.11j, 4940~4990 MHz (10MHz) Data Plot (CH Low)



(CH Mid)



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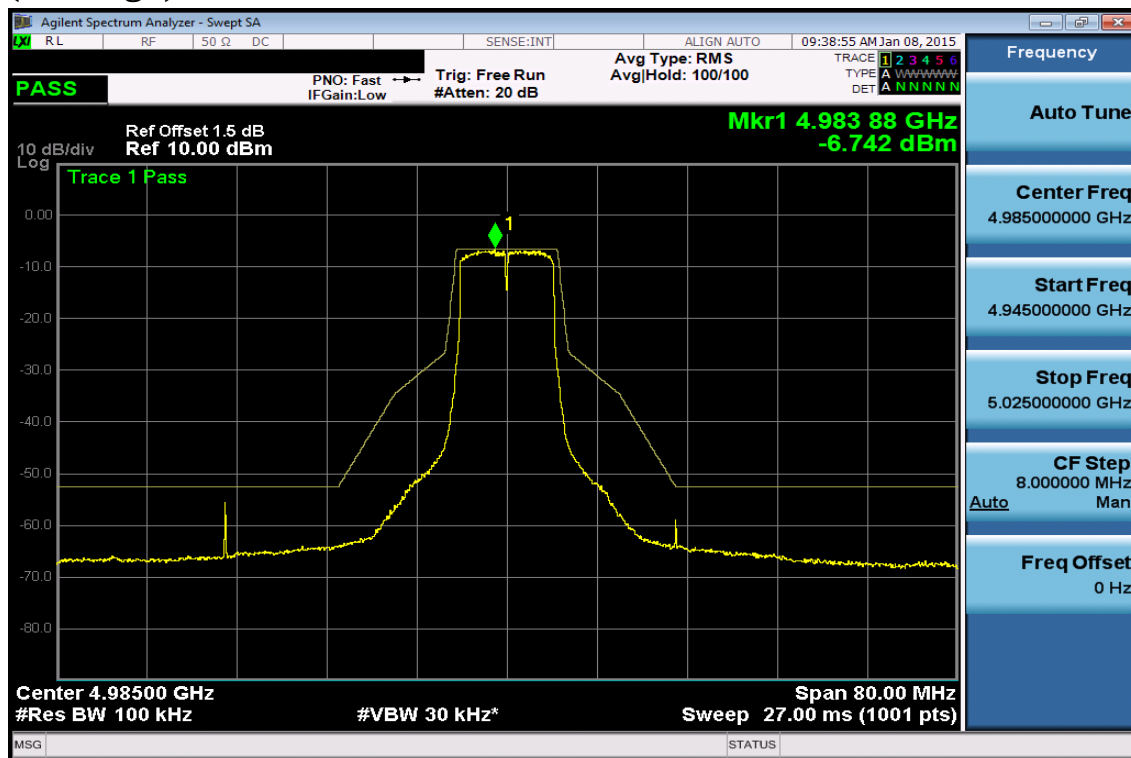
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(CH High)



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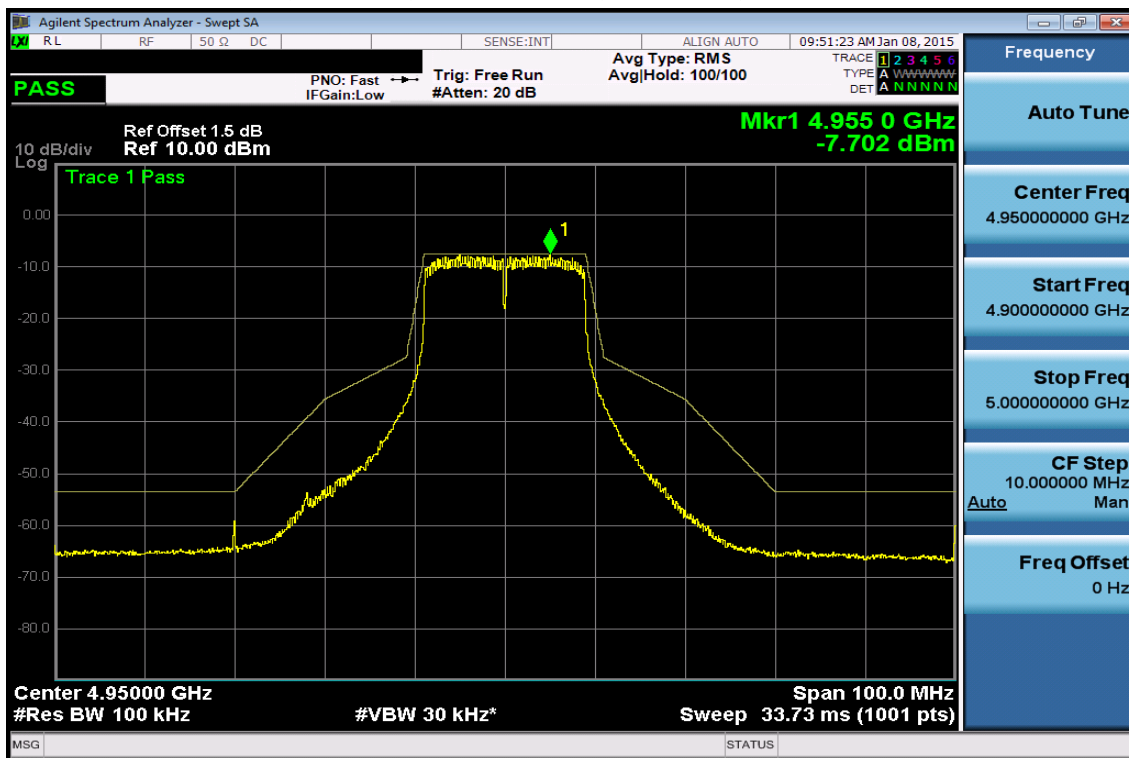
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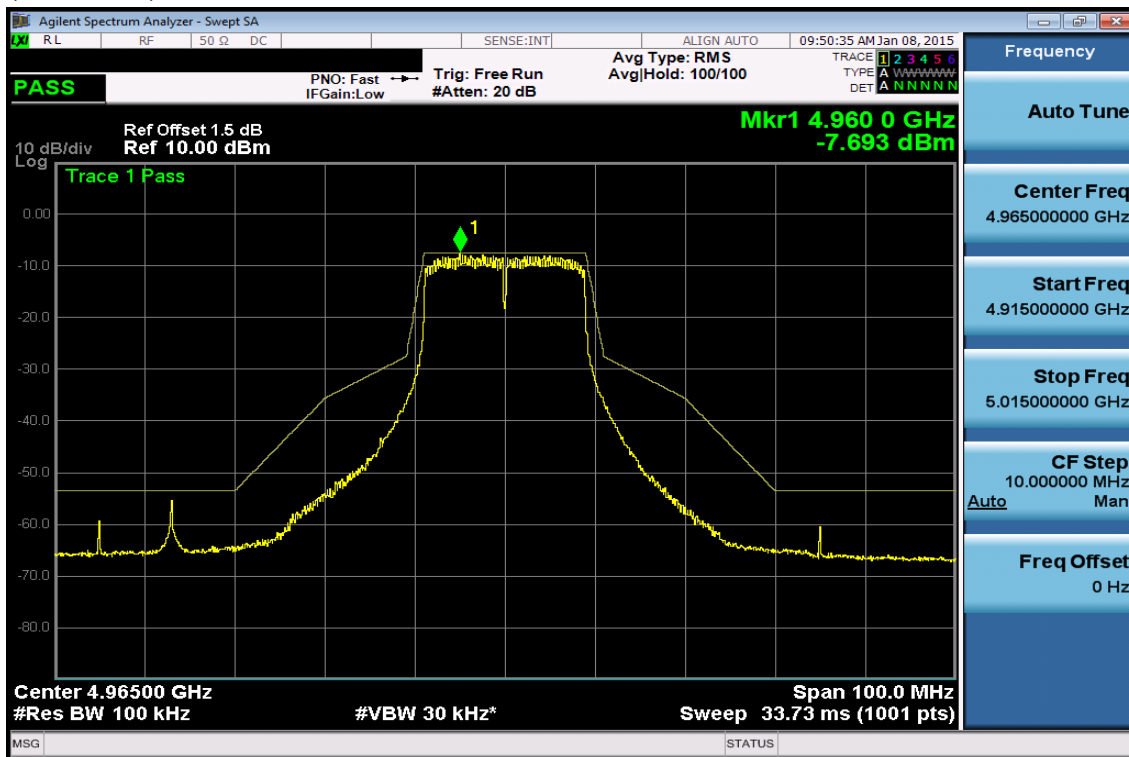
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802.11j, 4940~4990 MHz (10MHz) Data Plot (CH Low)



(CH Mid)



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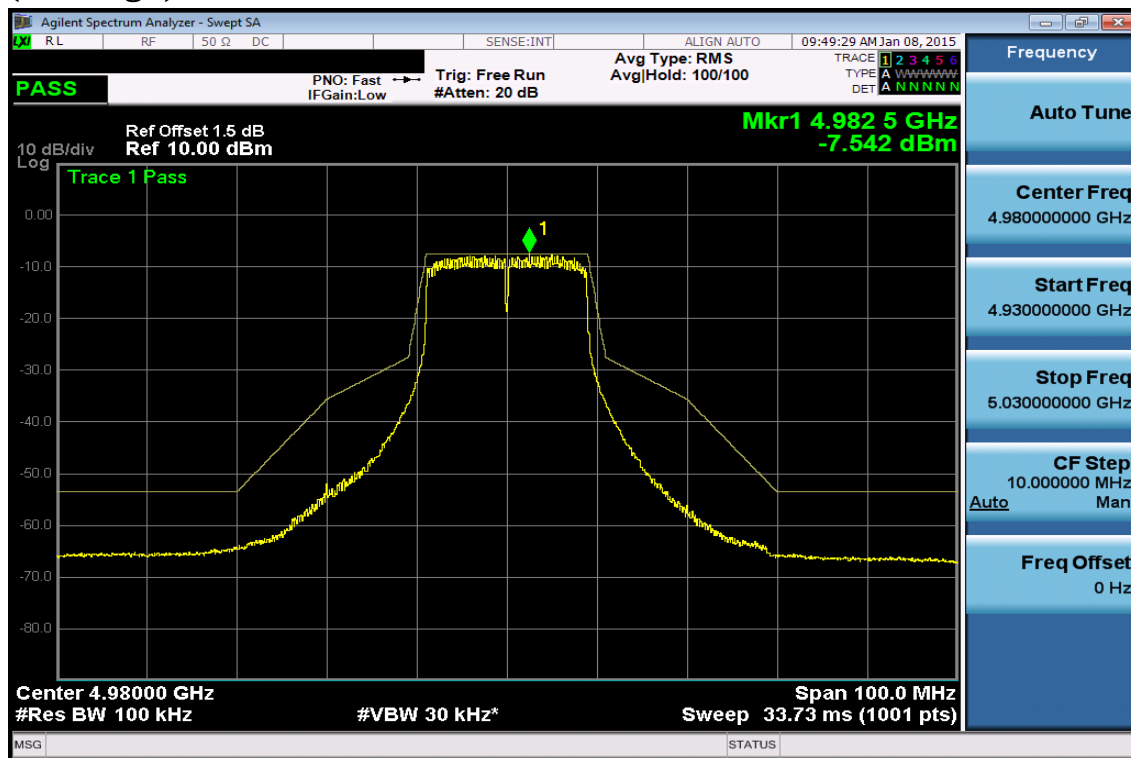
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12. TRANSMITTER CONDUCTED UNWANTED EMISSIONS

12.1. Standard Applicable

Refer as ASTM E2213-03 Clause 8.9.2.

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $[55 + 10 \log (P)]$ (-25dBm).

(l) Emission Mask L. For low power transmitters (20 dBm or less) operating

(6) On any frequency removed from the assigned frequency above 150% of the authorized bandwidth: 40 dB.

(m) Emission Mask M. For high power transmitters (greater than 20 dBm)

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P)$ dB, whichever is the lesser attenuation.

12.2. Measurement Procedure

Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement

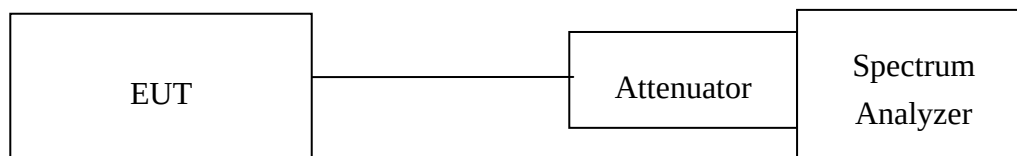
For conducted measurements on devices with multiple transmit chains using options given below:

(i) Option 1: measure and sum the spectra across the transmitter outputs.

12.3. Measurement Equipment Used:

Refer to section 6 for details.

12.4. Test Set-up:



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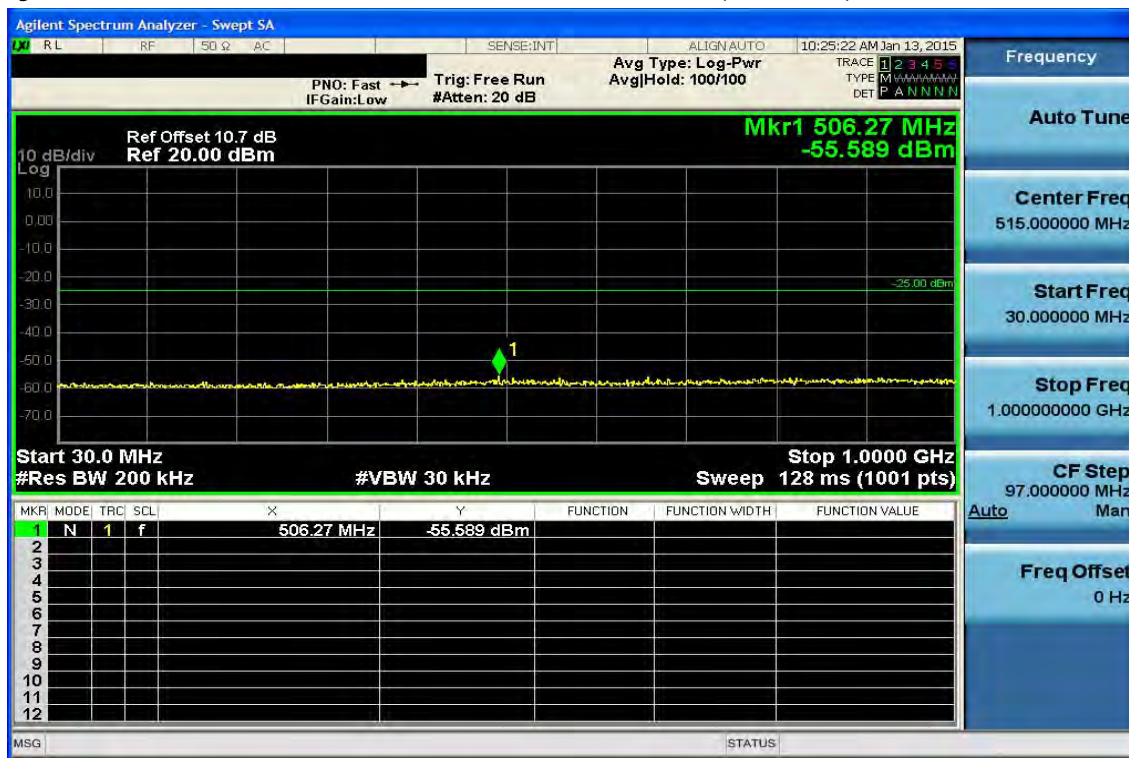
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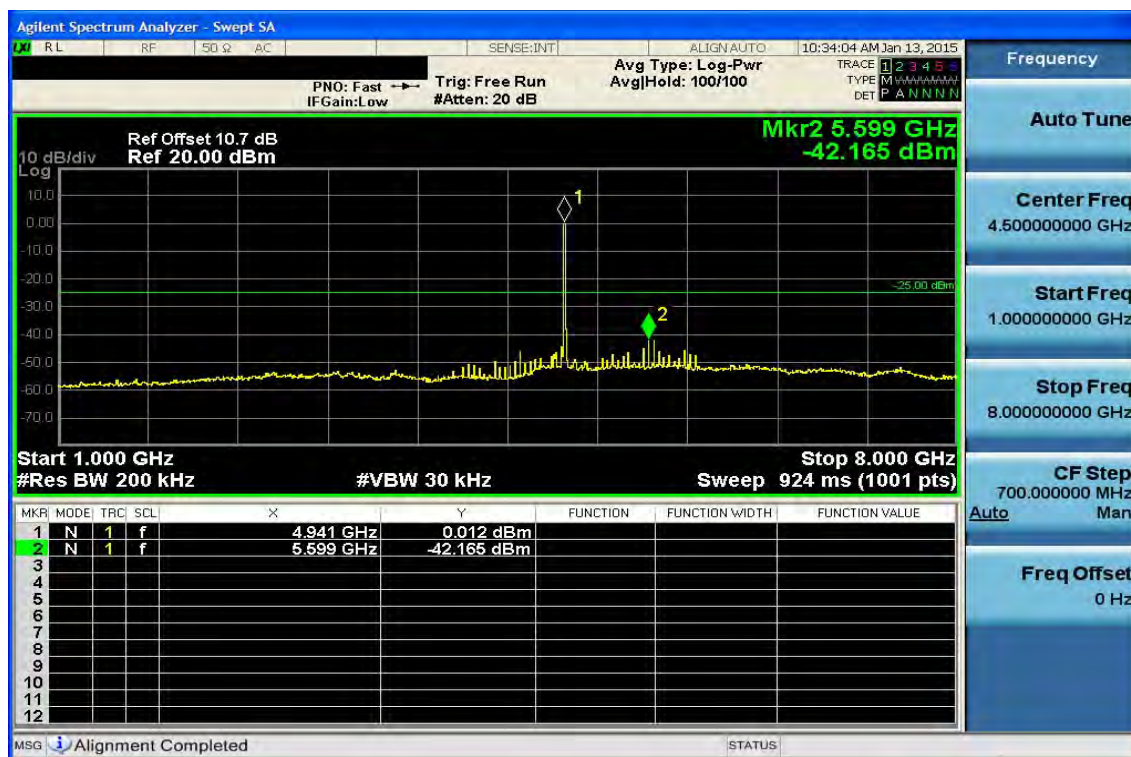
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12.5. Test Results:

802.11j, 4940~4990 MHz Ch Low 30MHz – 1GHz (10MHz)



Ch Low 1GHz – 8GHz



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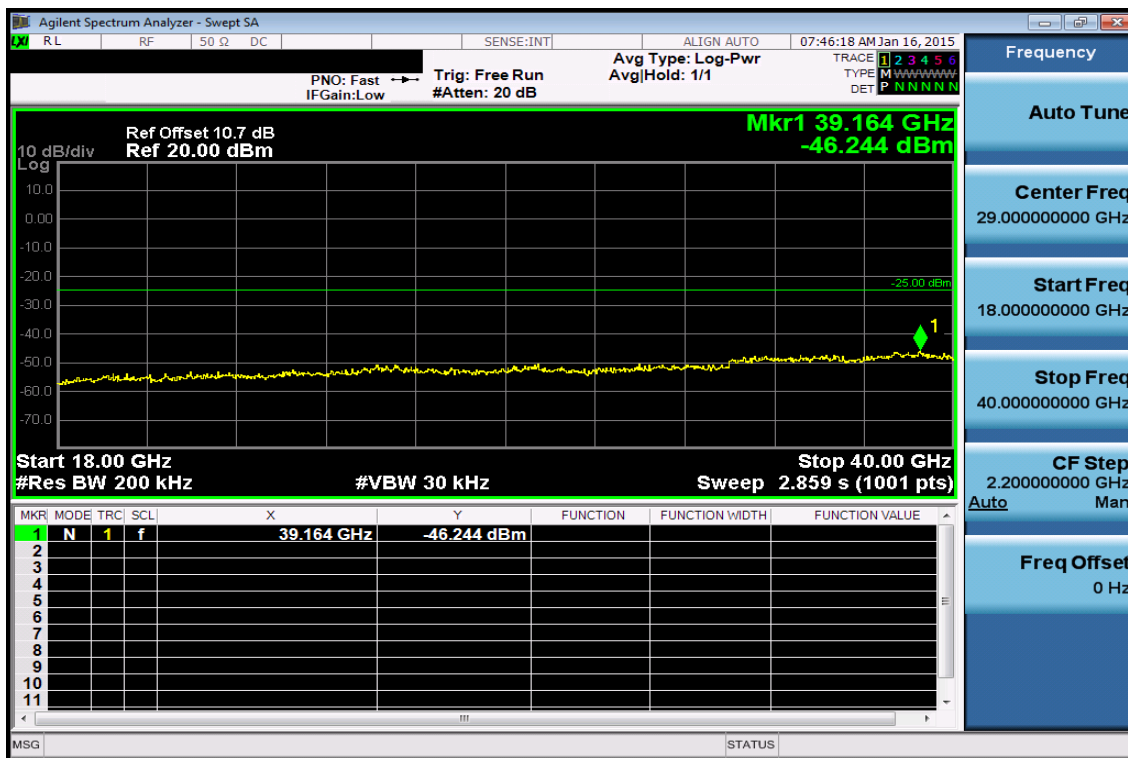
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Ch Low 8GHz – 18GHz



Ch Low 18GHz – 40GHz



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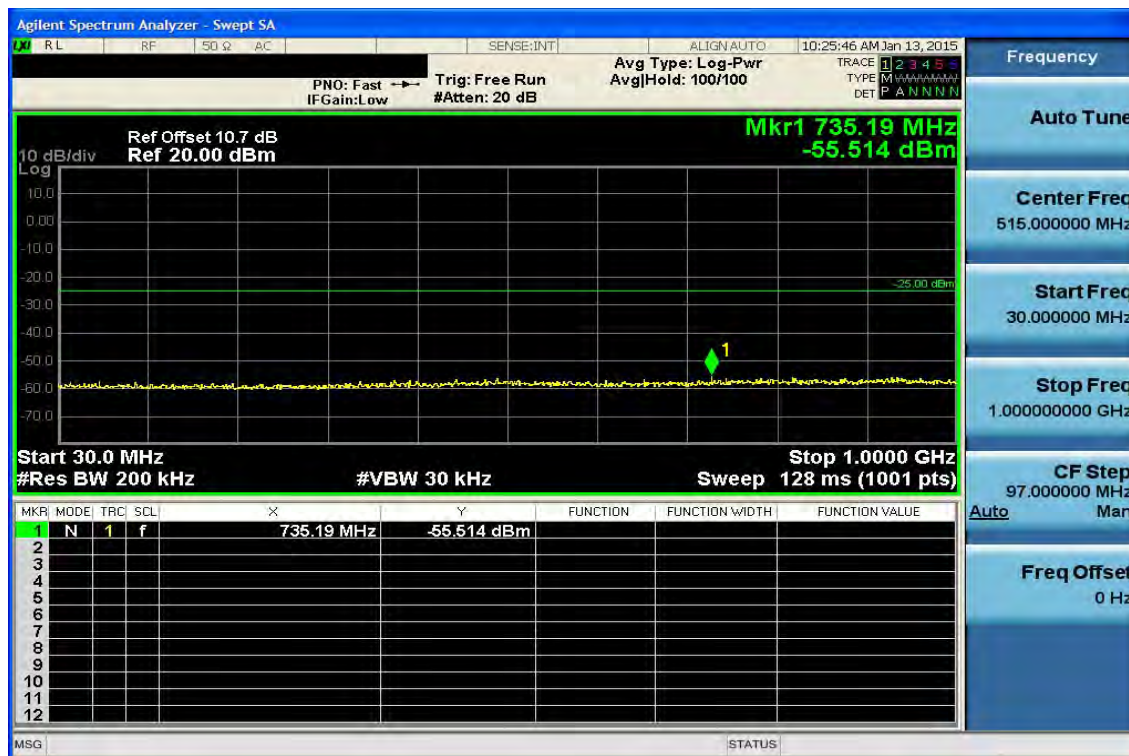
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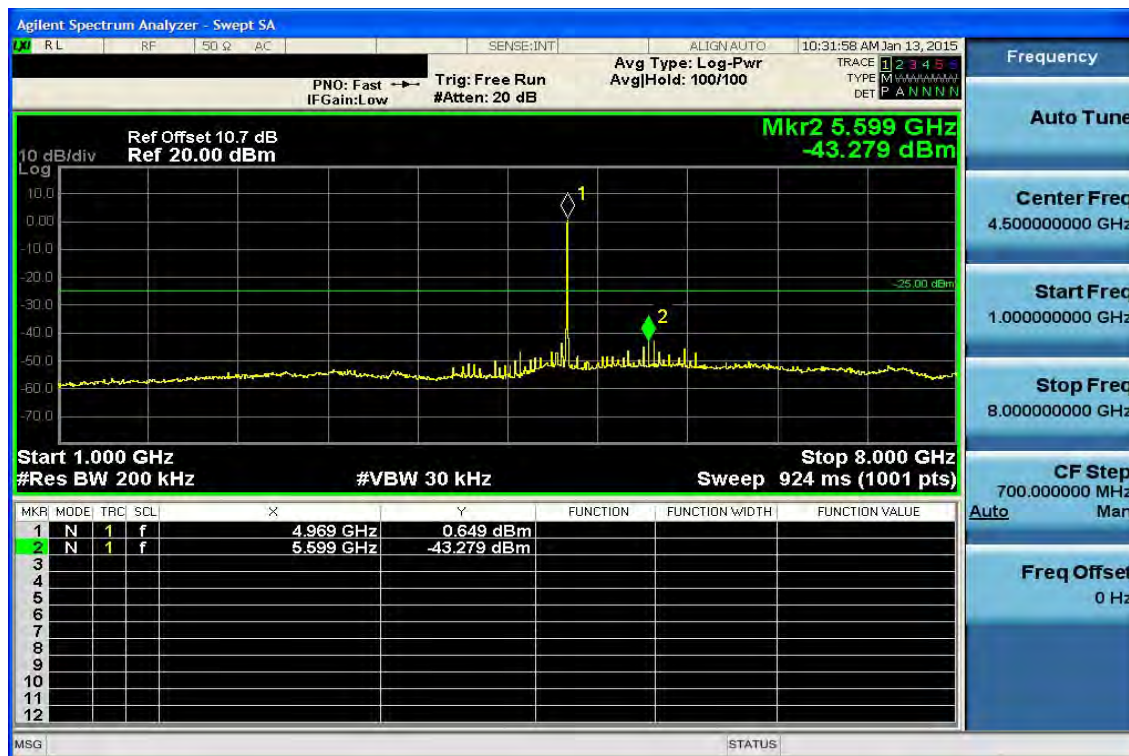
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Ch Mid 30MHz – 1GHz



Ch Mid 1GHz – 8GHz



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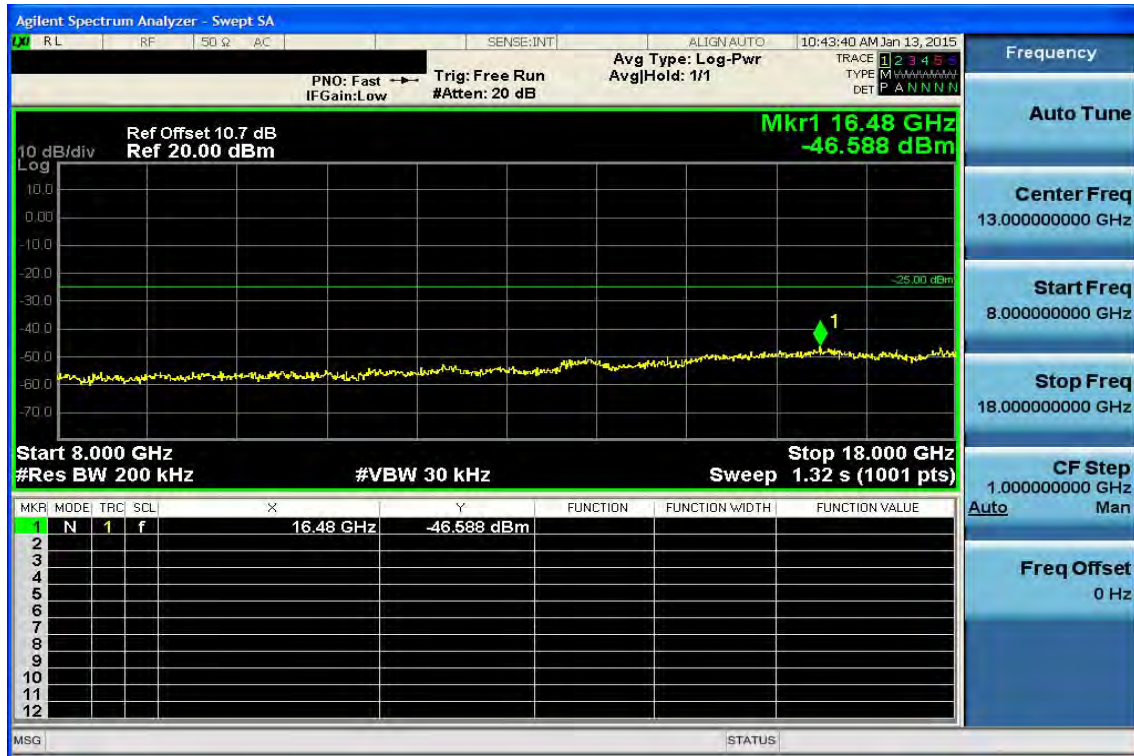
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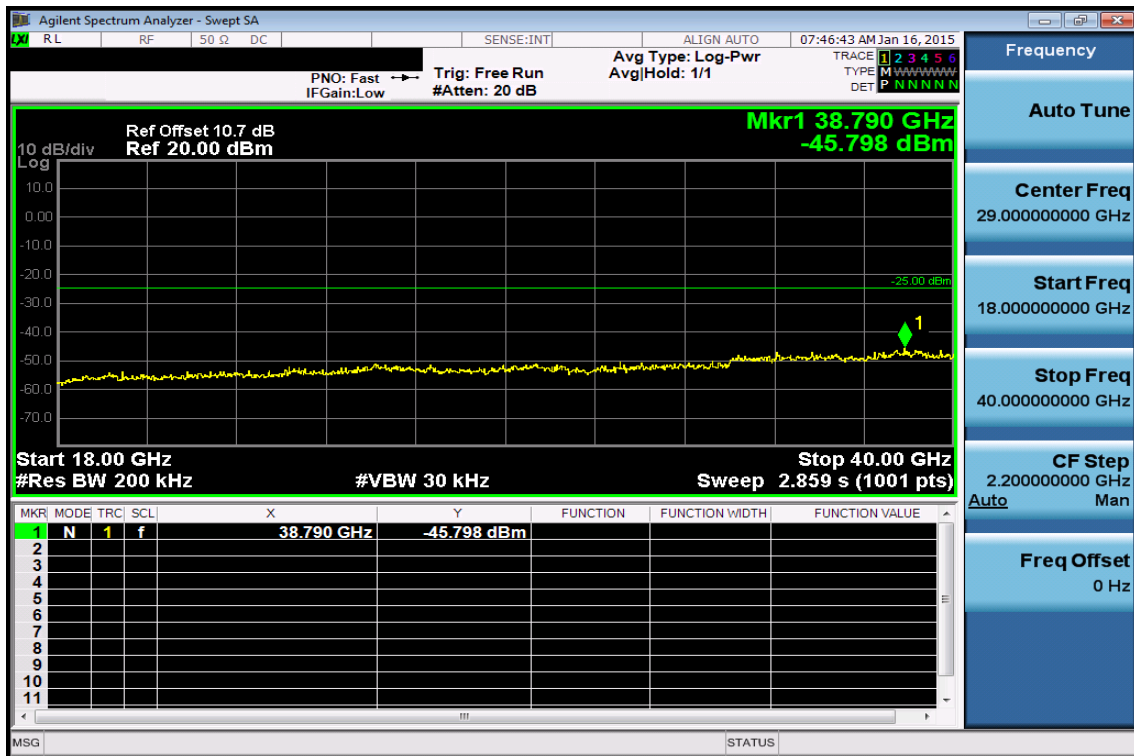
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Ch Mid 8GHz – 18GHz



Ch Mid 18GHz – 40GHz



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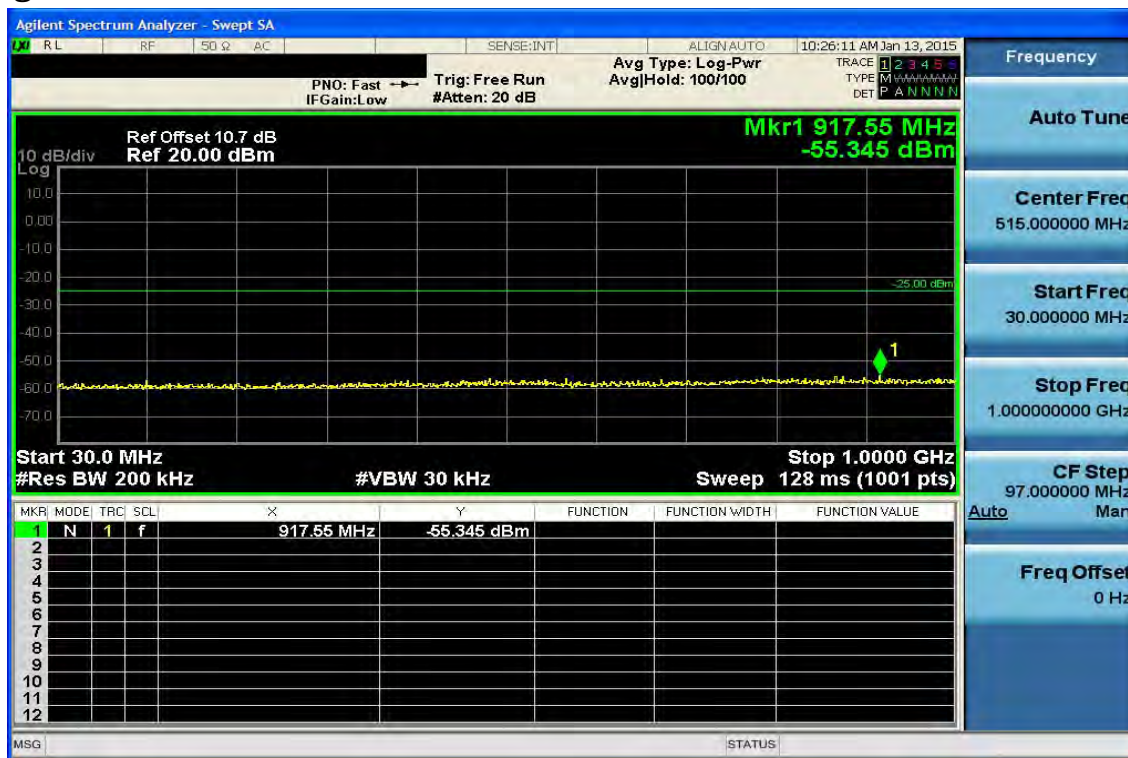
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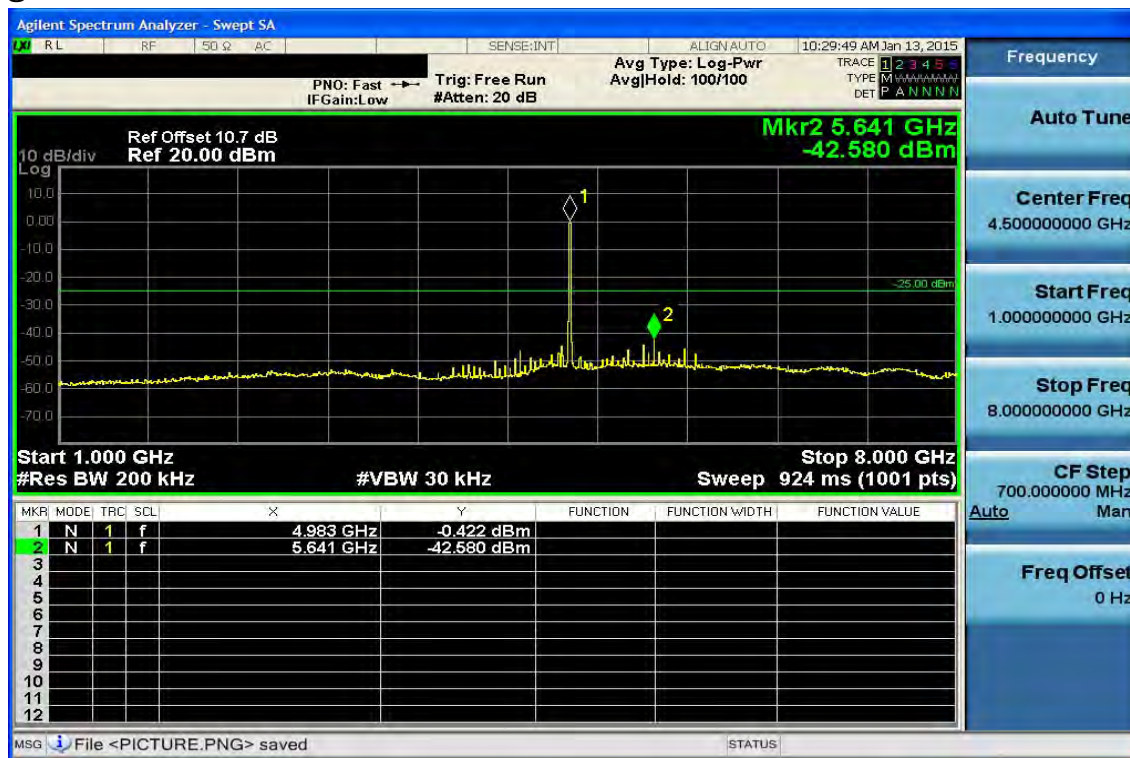
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Ch High 30MHz – 1GHz



Ch High 1GHz – 8GHz



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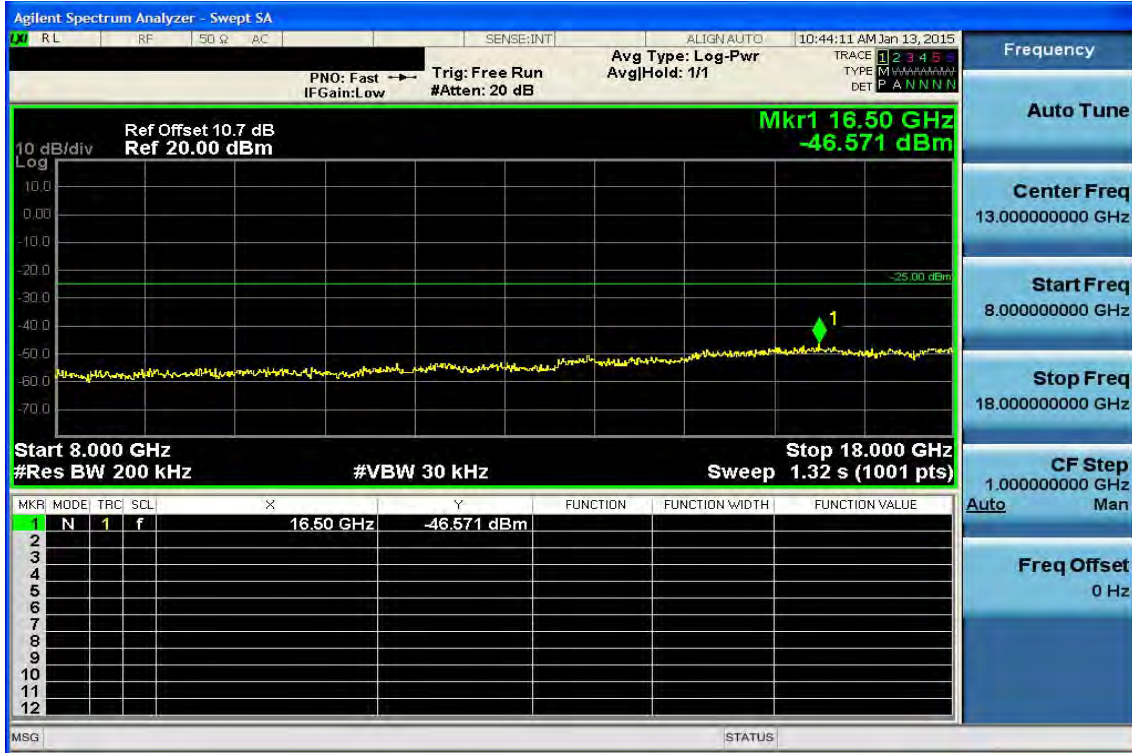
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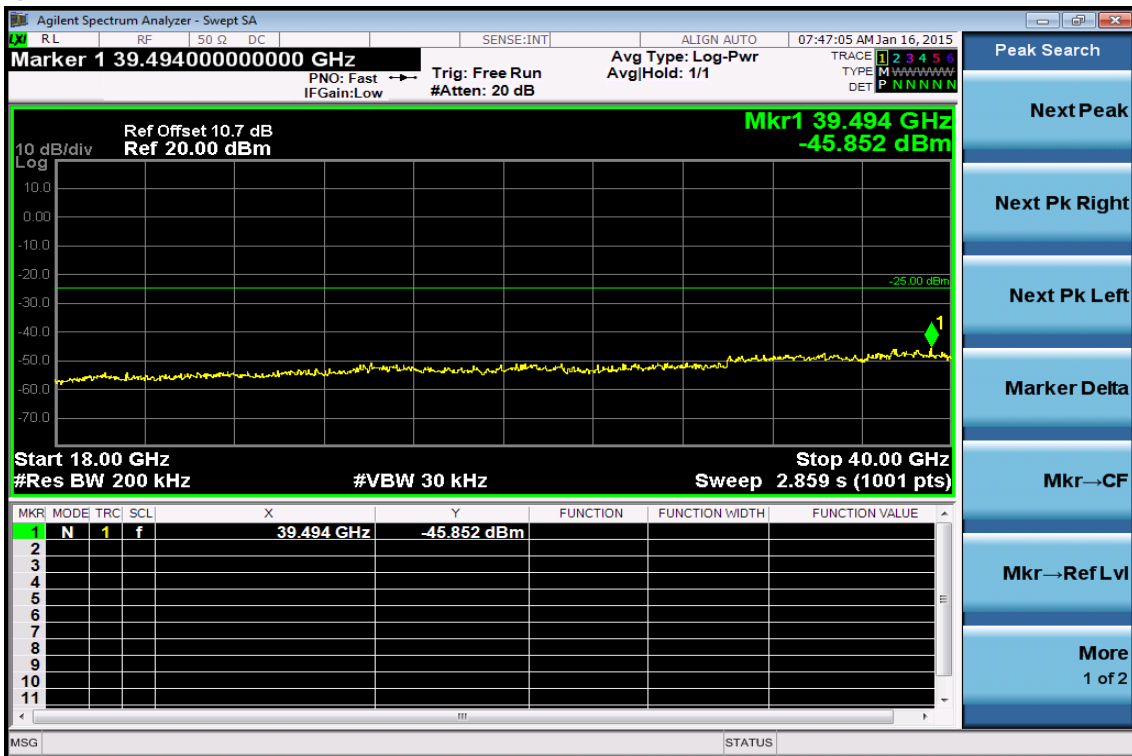
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Ch High 8GHz – 18GHz



Ch High 18GHz – 40GHz



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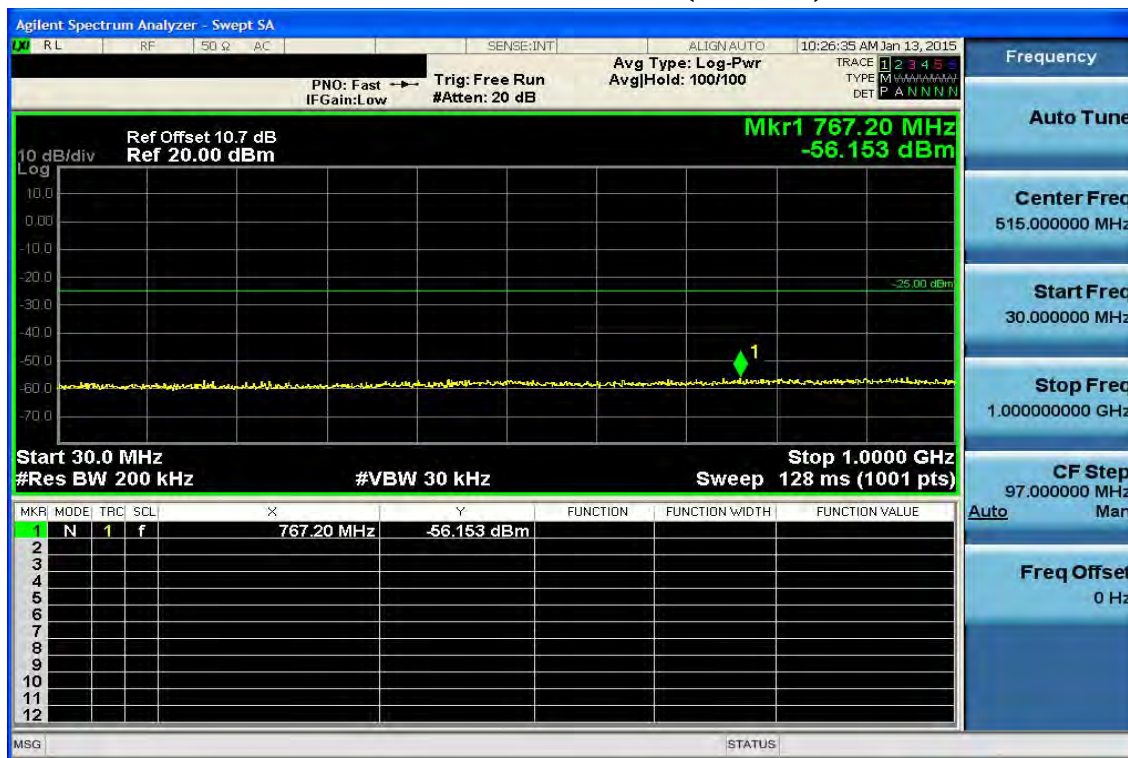
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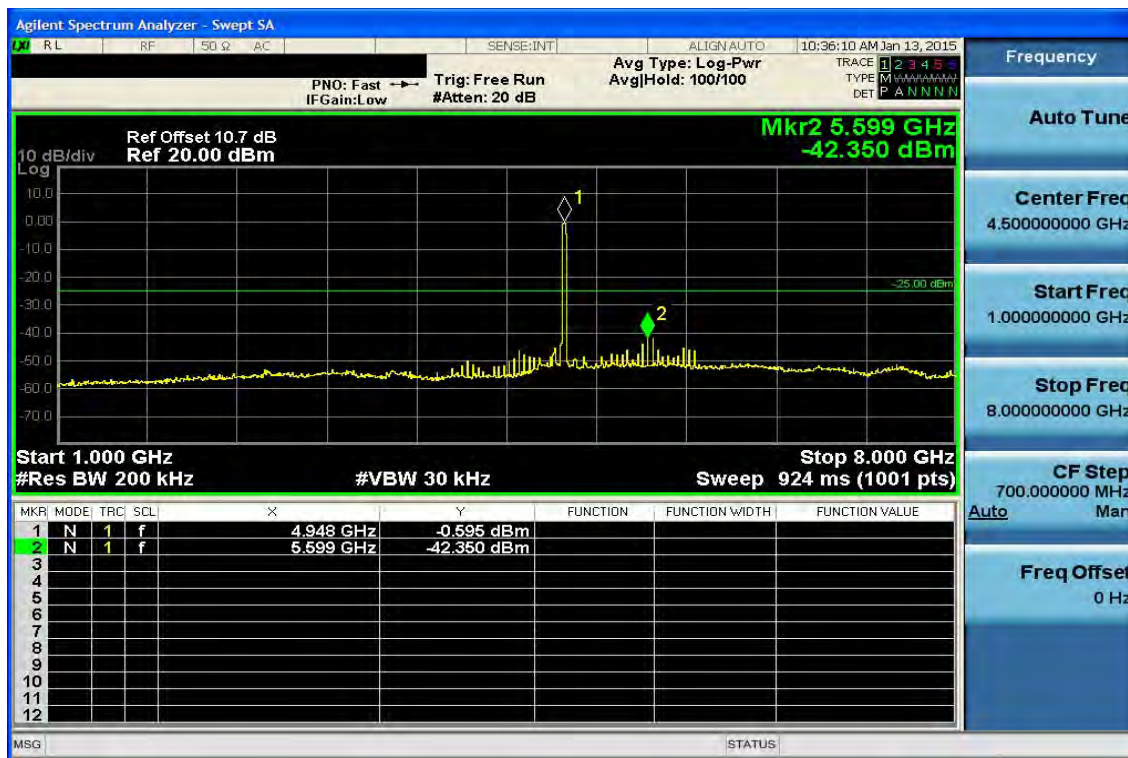
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802.11j, 4940~4990 MHz Ch Low 30MHz – 1GHz (20MHz)



Ch Low 1GHz – 8GHz



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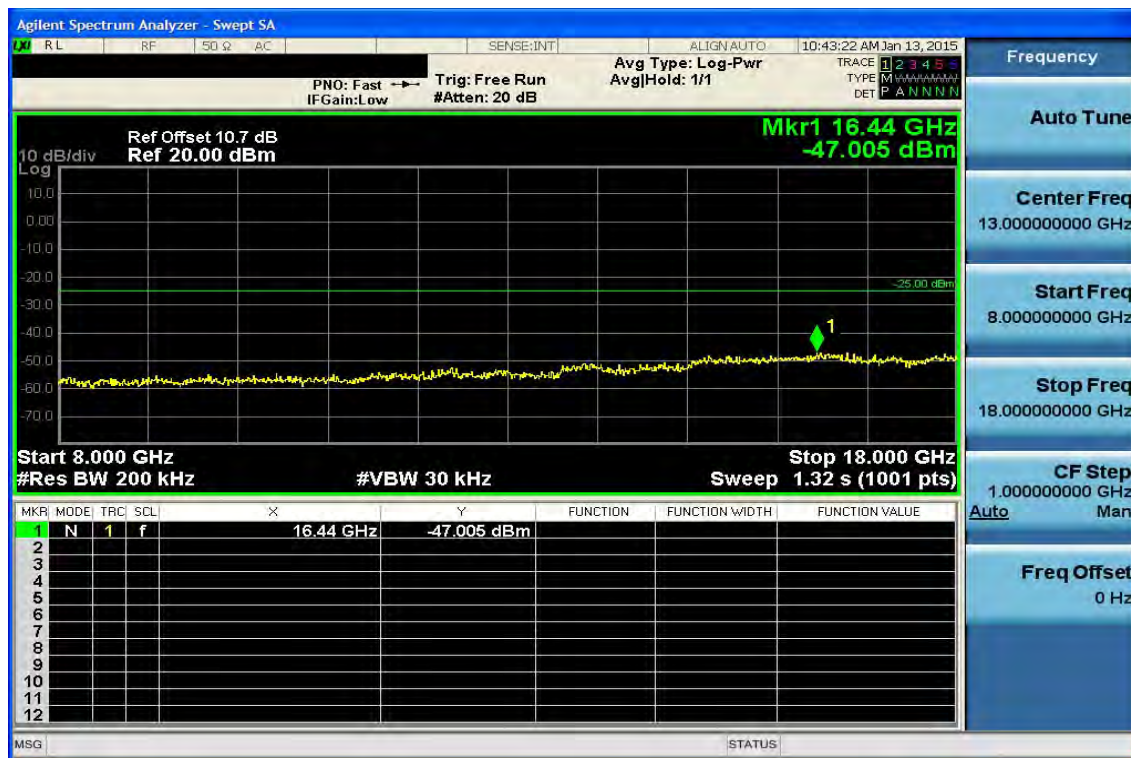
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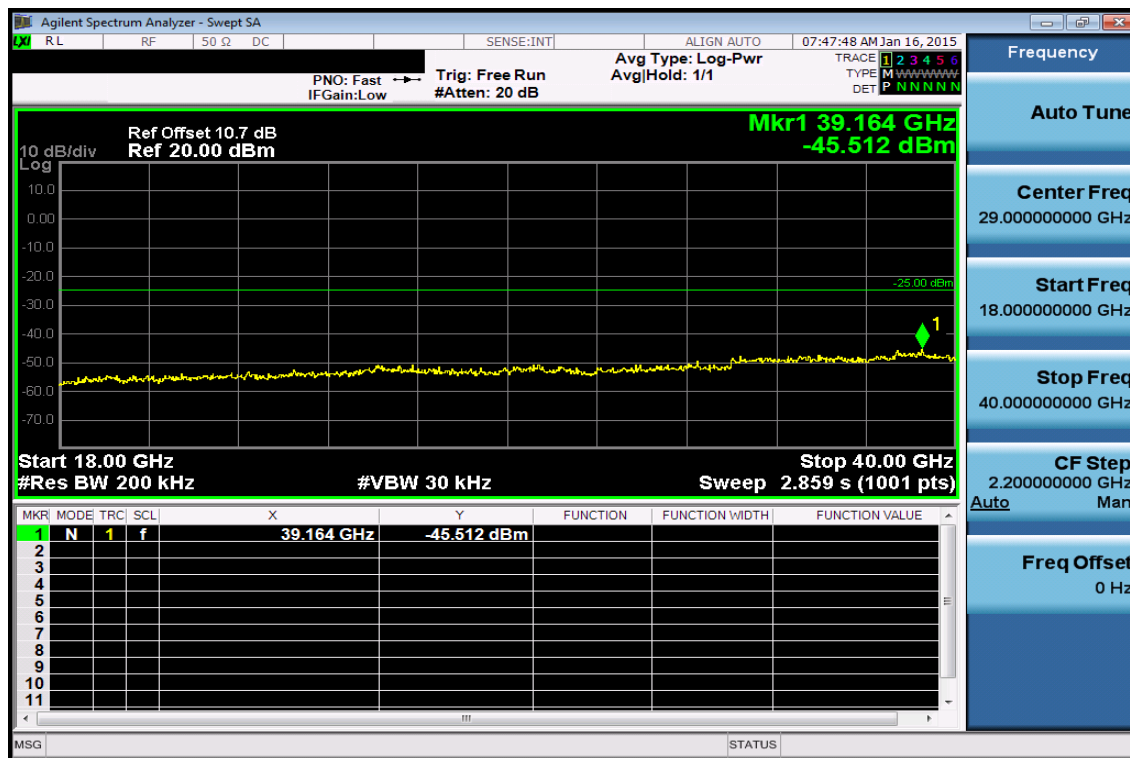
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Ch Low 8GHz – 18GHz



Ch Low 18GHz – 40GHz



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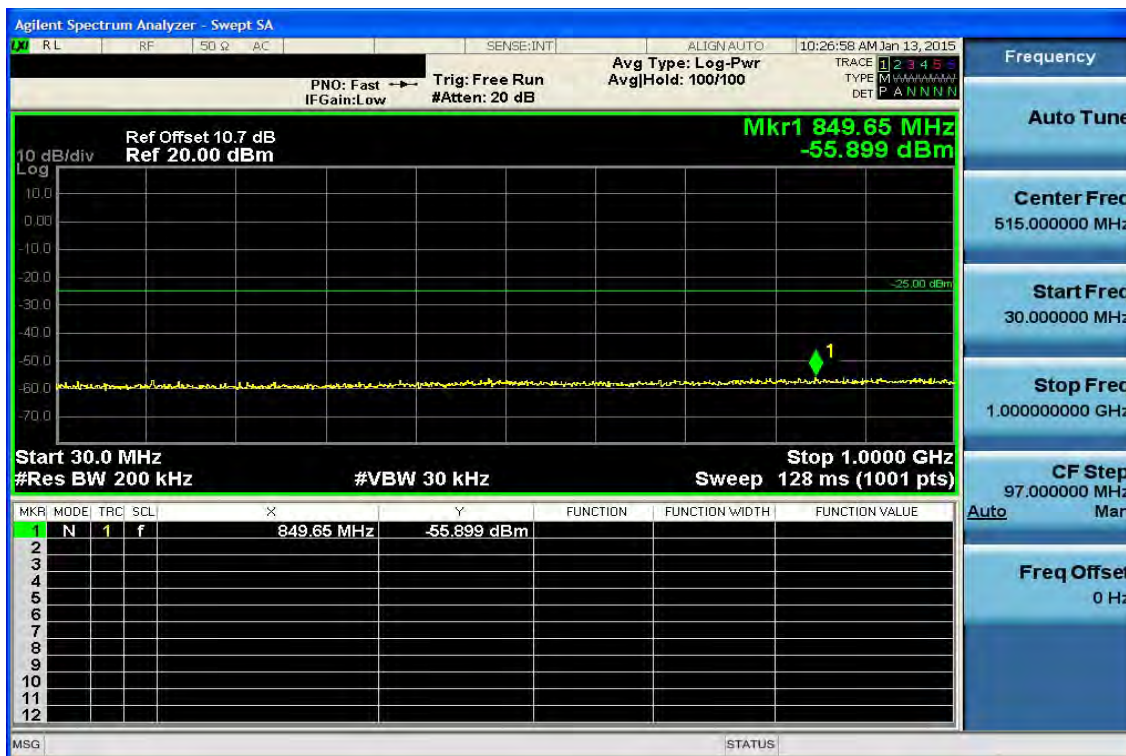
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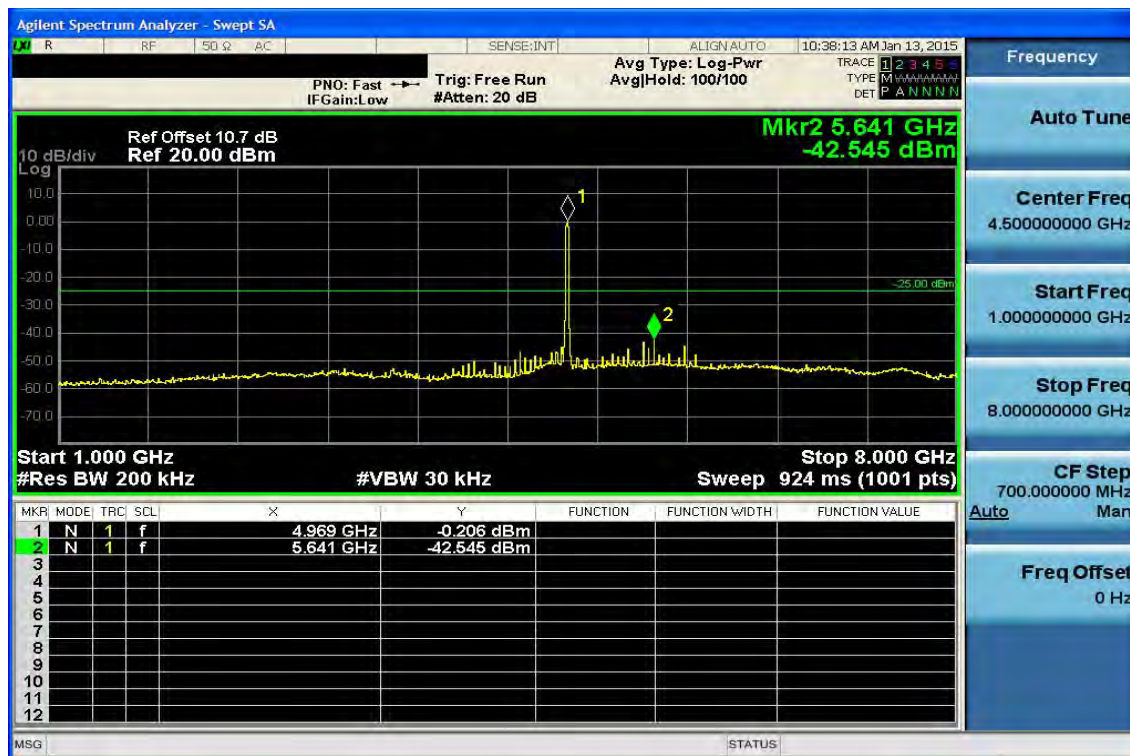
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Ch Mid 30MHz – 1GHz



Ch Mid 1GHz – 8GHz



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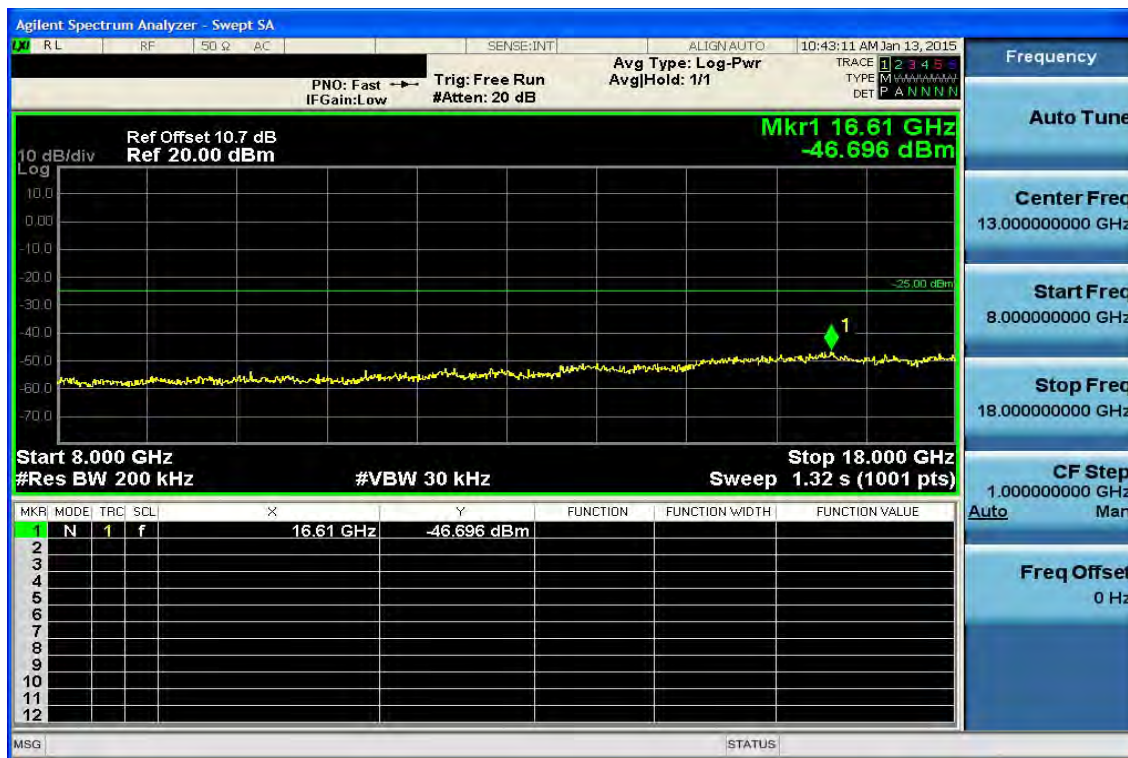
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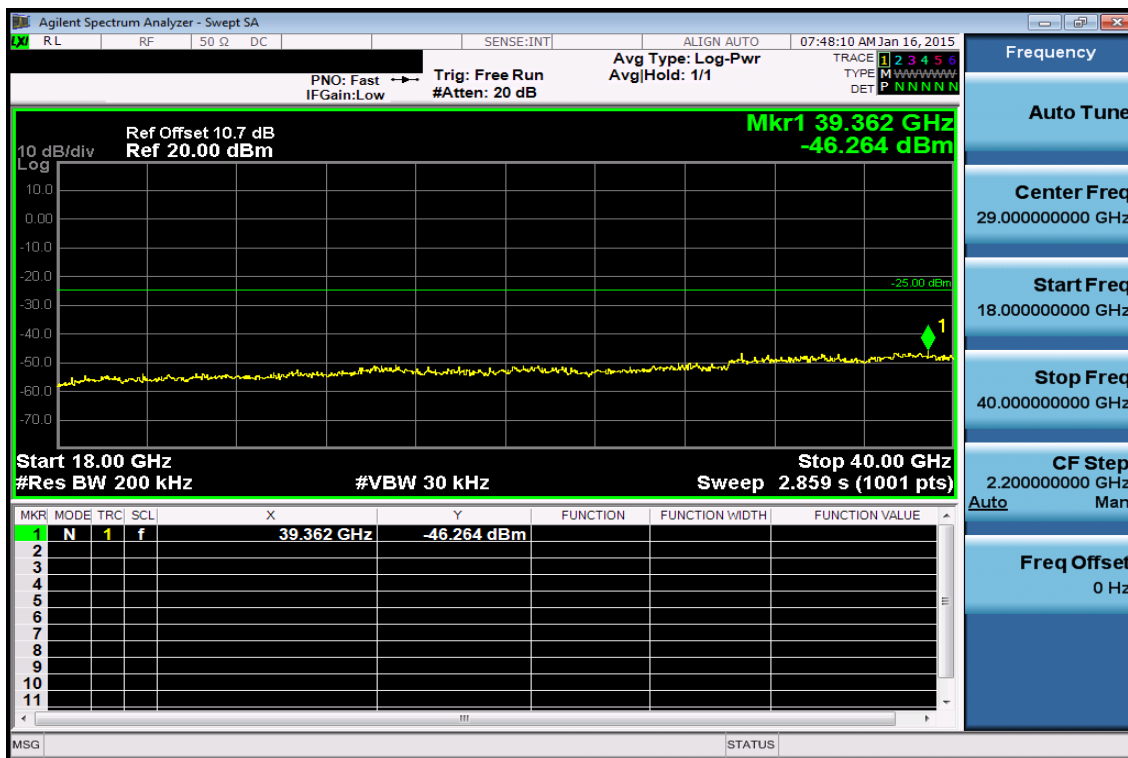
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Ch Mid 8GHz – 18GHz



Ch Mid 18GHz – 40GHz



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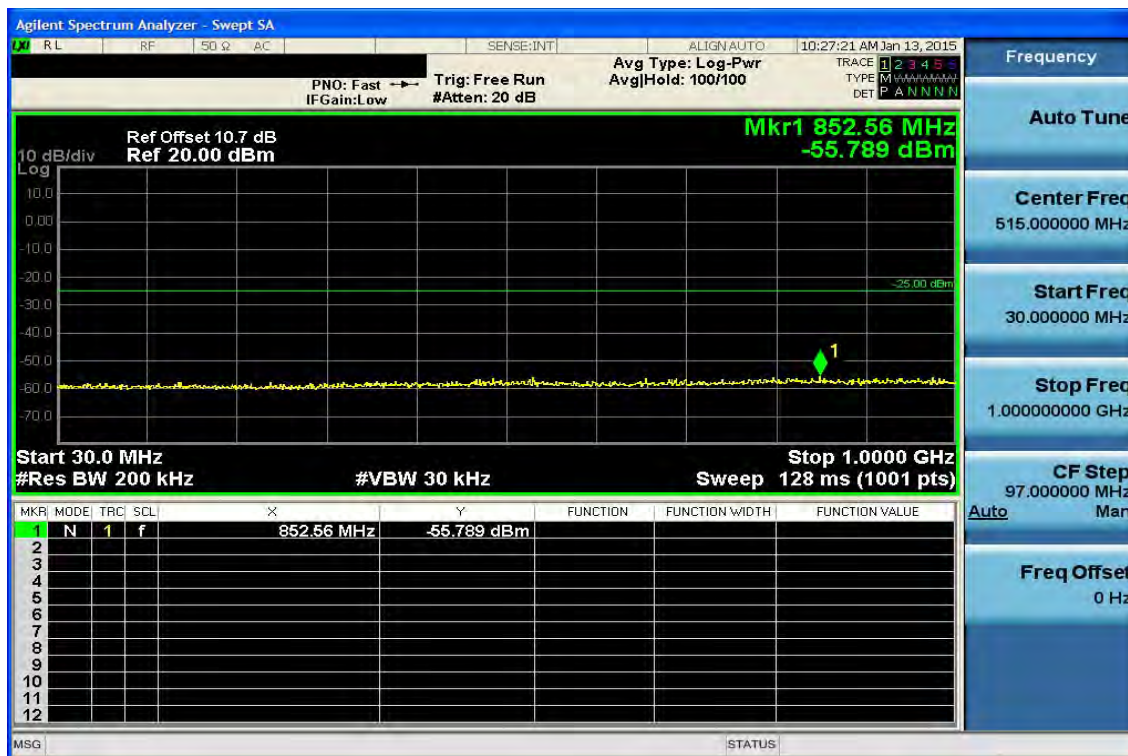
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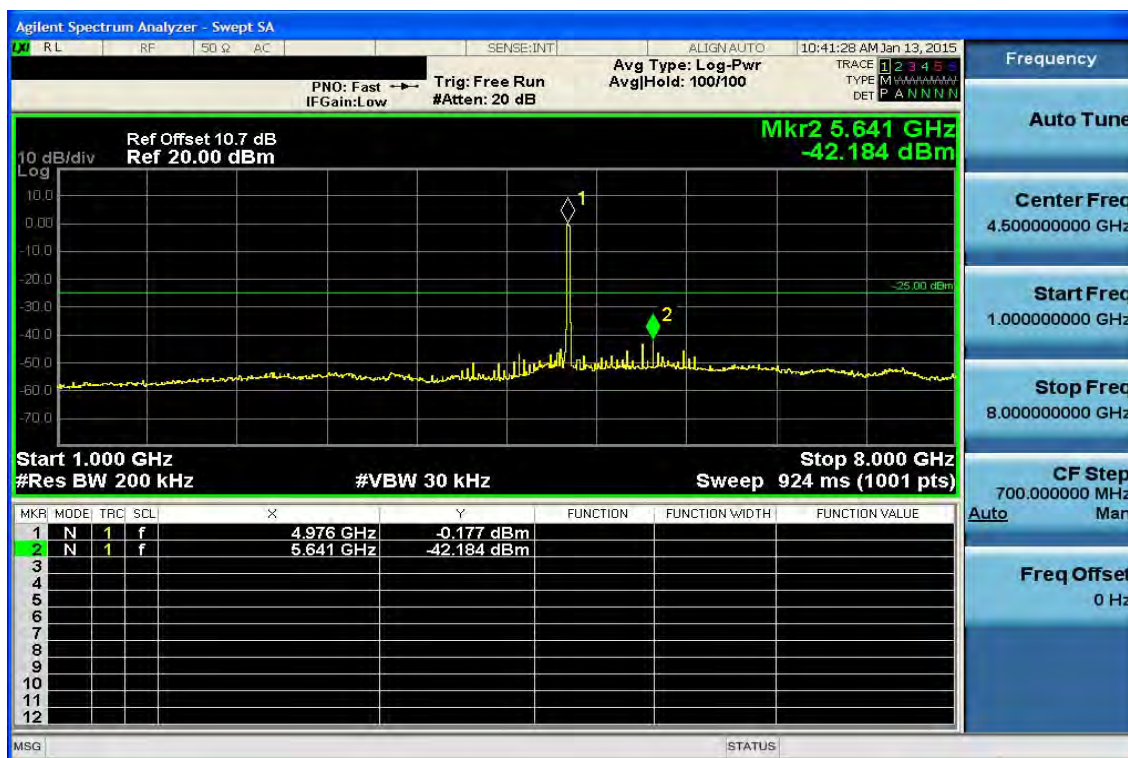
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Ch High 30MHz – 1GHz



Ch High 1GHz – 8GHz



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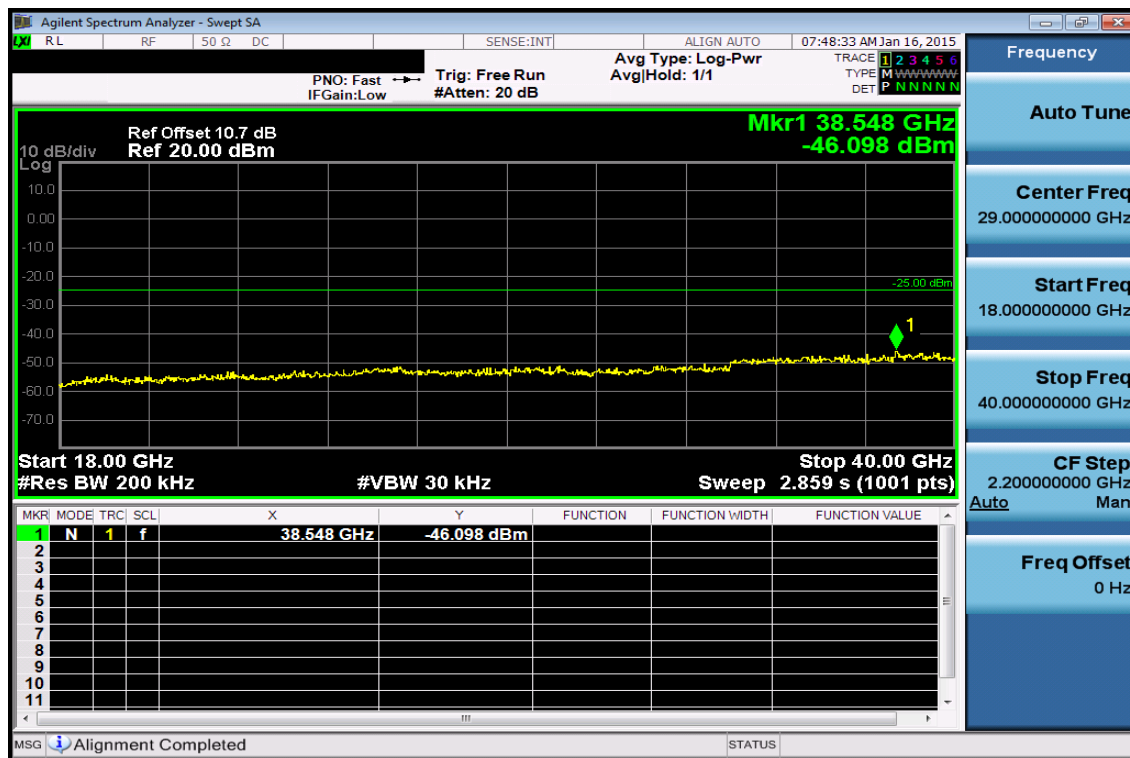
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Ch High 8GHz – 18GHz



Ch High 18GHz – 40GHz



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13. TRANSMITTER RADIATED UNWANTED EMISSIONS

13.1. Standard Applicable

Refer as ASTM E2213-03 Clause 8.9.2.

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $[55 + 10 \log (P)]$ (-25dBm)..

13.2. Measurement Procedure

Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement

For conducted measurements on devices with multiple transmit chains using options given below:

- (i) Option 1: measure and sum the spectra across the transmitter outputs.

13.3. Measurement Equipment Used:

Refer to section 6 for details.

13.4. Test Set-up:

Refer to section 8.4 for details.

13.5. Measurement Result:

Refer to next page for plots.

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

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Radiated Spurious Emission Measurement Result 802.11j, 4940~4990 MHz (10MHz) (Panel Antenna)

ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4945 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-38.06	-26.01	-11.25	-0.80	-25.00	-13.06
64.92	S	-47.07	-40.92	-5.16	-1.00	-25.00	-22.07
95.96	S	-46.54	-46.78	1.44	-1.20	-25.00	-21.54
155.13	S	-62.92	-62.18	0.66	-1.40	-25.00	-37.92
249.22	S	-64.74	-68.52	5.48	-1.71	-25.00	-39.74
778.84	S	-62.63	-65.59	5.87	-2.91	-25.00	-37.63
9890.00	H	-31.88	-33.40	12.96	-11.44	-25.00	-6.88
14835.00	H	---					
19780.00	H	---					
24725.00	H	---					
29670.00	H	---					
34615.00	H	---					
39560.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4945 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-39.97	-27.69	-11.48	-0.80	-25.00	-14.97
63.95	S	-53.51	-47.09	-5.42	-1.00	-25.00	-28.51
156.10	S	-54.63	-54.00	0.77	-1.40	-25.00	-29.63
271.53	S	-62.33	-66.04	5.49	-1.78	-25.00	-37.33
390.84	S	-66.05	-70.17	6.18	-2.05	-25.00	-41.05
666.32	S	-63.92	-67.28	6.07	-2.70	-25.00	-38.92
9890.00	H	-36.40	-37.92	12.96	-11.44	-25.00	-11.40
14835.00	H	---					
19780.00	H	---					
24725.00	H	---					
29670.00	H	---					
34615.00	H	---					
39560.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-38.72	-26.44	-11.48	-0.80	-25.00	-13.72
95.96	S	-47.19	-47.42	1.44	-1.20	-25.00	-22.19
159.98	S	-62.50	-62.30	1.21	-1.41	-25.00	-37.50
349.13	S	-65.09	-69.32	6.21	-1.98	-25.00	-40.09
675.05	S	-62.33	-65.68	6.06	-2.71	-25.00	-37.33
999.03	S	-60.20	-59.44	2.65	-3.41	-25.00	-35.20
9930.00	H	-38.15	-39.62	12.94	-11.47	-25.00	-13.15
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-40.20	-28.15	-11.25	-0.80	-25.00	-15.20
64.92	S	-52.51	-46.36	-5.16	-1.00	-25.00	-27.51
154.16	S	-55.36	-54.51	0.54	-1.39	-25.00	-30.36
268.62	S	-62.56	-66.23	5.44	-1.77	-25.00	-37.56
665.35	S	-61.38	-64.75	6.07	-2.70	-25.00	-36.38
964.11	S	-59.97	-61.26	4.66	-3.36	-25.00	-34.97
9930.00	H	-37.70	-39.17	12.94	-11.47	-25.00	-12.70
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4985 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-37.95	-25.66	-11.48	-0.80	-25.00	-12.95
65.89	S	-47.20	-41.29	-4.90	-1.00	-25.00	-22.20
96.93	S	-48.28	-48.45	1.36	-1.20	-25.00	-23.28
159.98	S	-61.32	-61.12	1.21	-1.41	-25.00	-36.32
250.19	S	-64.15	-67.92	5.49	-1.71	-25.00	-39.15
680.87	S	-63.43	-66.76	6.05	-2.72	-25.00	-38.43
9970.00	H	-37.43	-38.85	12.92	-11.50	-25.00	-12.43
14955.00	H	---					
19940.00	H	---					
24925.00	H	---					
29910.00	H	---					
34895.00	H	---					
39880.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4985 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-39.96	-27.91	-11.25	-0.80	-25.00	-14.96
64.92	S	-53.11	-46.95	-5.16	-1.00	-25.00	-28.11
95.96	S	-54.77	-55.01	1.44	-1.20	-25.00	-29.77
152.22	S	-55.59	-54.52	0.32	-1.39	-25.00	-30.59
246.31	S	-63.02	-66.80	5.47	-1.69	-25.00	-38.02
666.32	S	-62.07	-65.44	6.07	-2.70	-25.00	-37.07
9970.00	H	-38.20	-39.62	12.92	-11.50	-25.00	-13.20
14955.00	H	---					
19940.00	H	---					
24925.00	H	---					
29910.00	H	---					
34895.00	H	---					
39880.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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Radiated Spurious Emission Measurement Result 802.11j, 4940~4990 MHz (20MHz)

ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4950 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-38.04	-25.75	-11.48	-0.80	-25.00	-13.04
64.92	S	-46.54	-40.38	-5.16	-1.00	-25.00	-21.54
94.02	S	-47.37	-47.76	1.59	-1.20	-25.00	-22.37
159.98	S	-63.24	-63.04	1.21	-1.41	-25.00	-38.24
345.25	S	-65.43	-69.64	6.18	-1.97	-25.00	-40.43
678.93	S	-60.64	-63.97	6.06	-2.72	-25.00	-35.64
9900.00	H	-36.02	-37.53	12.96	-11.45	-25.00	-11.02
14850.00	H	---					
19800.00	H	---					
24750.00	H	---					
29700.00	H	---					
34650.00	H	---					
39600.00	H	---					

EIRP(dBm) = SG Level(dBm) + Antenna Gain(dBi) + Cable Loss(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4950 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-40.21	-27.93	-11.48	-0.80	-25.00	-15.21
76.56	S	-53.04	-50.42	-1.61	-1.00	-25.00	-28.04
97.90	S	-54.86	-54.95	1.29	-1.20	-25.00	-29.86
155.13	S	-55.40	-54.66	0.66	-1.40	-25.00	-30.40
666.32	S	-59.82	-63.19	6.07	-2.70	-25.00	-34.82
688.63	S	-64.63	-67.95	6.04	-2.73	-25.00	-39.63
9900.00	H	-38.08	-39.59	12.96	-11.45	-25.00	-13.08
14850.00	H	---					
19800.00	H	---					
24750.00	H	---					
29700.00	H	---					
34650.00	H	---					
39600.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-38.50	-26.22	-11.48	-0.80	-25.00	-13.50
65.89	S	-47.06	-41.16	-4.90	-1.00	-25.00	-22.06
95.96	S	-48.09	-48.33	1.44	-1.20	-25.00	-23.09
320.03	S	-52.31	-56.41	6.01	-1.91	-25.00	-27.31
676.02	S	-60.22	-63.56	6.06	-2.71	-25.00	-35.22
767.20	S	-62.38	-65.34	5.85	-2.88	-25.00	-37.38
9930.00	H	-37.87	-39.34	12.94	-11.47	-25.00	-12.87
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-40.60	-28.31	-11.48	-0.80	-25.00	-15.60
76.56	S	-53.05	-50.44	-1.61	-1.00	-25.00	-28.05
97.90	S	-55.38	-55.47	1.29	-1.20	-25.00	-30.38
151.25	S	-55.42	-54.24	0.20	-1.39	-25.00	-30.42
271.53	S	-63.15	-66.86	5.49	-1.78	-25.00	-38.15
683.78	S	-65.30	-68.63	6.05	-2.72	-25.00	-40.30
9930.00	H	-37.29	-38.76	12.94	-11.47	-25.00	-12.29
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4980 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-38.66	-26.38	-11.48	-0.80	-25.00	-13.66
95.96	S	-46.83	-47.07	1.44	-1.20	-25.00	-21.83
159.98	S	-62.53	-62.33	1.21	-1.41	-25.00	-37.53
350.10	S	-65.26	-69.50	6.21	-1.98	-25.00	-40.26
693.48	S	-63.91	-67.22	6.04	-2.73	-25.00	-38.91
937.92	S	-63.04	-65.26	5.54	-3.32	-25.00	-38.04
9960.00	H	-37.79	-39.22	12.92	-11.49	-25.00	-12.79
14940.00	H	---					
19920.00	H	---					
24900.00	H	---					
29880.00	H	---					
34860.00	H	---					
39840.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4980 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-39.95	-27.66	-11.48	-0.80	-25.00	-14.95
63.95	S	-52.92	-46.51	-5.42	-1.00	-25.00	-27.92
156.10	S	-55.79	-55.16	0.77	-1.40	-25.00	-30.79
181.32	S	-58.50	-60.51	3.47	-1.47	-25.00	-33.50
267.65	S	-63.03	-66.69	5.43	-1.77	-25.00	-38.03
675.05	S	-63.85	-67.19	6.06	-2.71	-25.00	-38.85
9960.00	H	-37.67	-39.11	12.92	-11.49	-25.00	-12.67
14940.00	H	---					
19920.00	H	---					
24900.00	H	---					
29880.00	H	---					
34860.00	H	---					
39840.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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Radiated Spurious Emission Measurement Result 802.11j, 4940~4990 MHz (10MHz) (Sector Antenna)

ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4945 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-37.20	-25.15	-11.25	-0.80	-25.00	-12.20
80.44	S	-47.28	-45.87	-0.40	-1.01	-25.00	-22.28
159.98	S	-61.57	-61.37	1.21	-1.41	-25.00	-36.57
292.87	S	-64.31	-68.05	5.59	-1.85	-25.00	-39.31
666.32	S	-63.83	-67.19	6.07	-2.70	-25.00	-38.83
947.62	S	-63.45	-65.61	5.50	-3.33	-25.00	-38.45
9890.00	H	-45.30	-46.82	12.96	-11.44	-25.00	-20.30
14835.00	H	---					
19780.00	H	---					
24725.00	H	---					
29670.00	H	---					
34615.00	H	---					
39560.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4945 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-39.27	-26.99	-11.48	-0.80	-25.00	-14.27
79.47	S	-53.16	-51.49	-0.68	-1.00	-25.00	-28.16
155.13	S	-55.46	-54.72	0.66	-1.40	-25.00	-30.46
276.38	S	-63.47	-67.27	5.60	-1.80	-25.00	-38.47
688.63	S	-65.15	-68.47	6.04	-2.73	-25.00	-40.15
951.50	S	-63.28	-65.34	5.40	-3.34	-25.00	-38.28
9890.00	H	-38.84	-40.36	12.96	-11.44	-25.00	-13.84
14835.00	H	---					
19780.00	H	---					
24725.00	H	---					
29670.00	H	---					
34615.00	H	---					
39560.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-37.23	-24.95	-11.48	-0.80	-25.00	-12.23
95.96	S	-47.08	-47.32	1.44	-1.20	-25.00	-22.08
161.92	S	-61.49	-61.37	1.30	-1.42	-25.00	-36.49
488.81	S	-66.57	-70.33	6.08	-2.32	-25.00	-41.57
667.29	S	-62.98	-66.35	6.07	-2.70	-25.00	-37.98
939.86	S	-62.99	-65.20	5.53	-3.32	-25.00	-37.99
9930.00	H	-44.60	-46.07	12.94	-11.47	-25.00	-19.60
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-39.15	-27.10	-11.25	-0.80	-25.00	-14.15
97.90	S	-52.89	-52.98	1.29	-1.20	-25.00	-27.89
153.19	S	-57.37	-56.41	0.43	-1.39	-25.00	-32.37
299.66	S	-63.50	-67.49	5.86	-1.87	-25.00	-38.50
662.44	S	-60.15	-63.53	6.07	-2.70	-25.00	-35.15
684.75	S	-65.06	-68.39	6.05	-2.72	-25.00	-40.06
9930.00	H	-39.07	-40.54	12.94	-11.47	-25.00	-14.07
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4985 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-37.04	-24.99	-11.25	-0.80	-25.00	-12.04
95.96	S	-47.28	-47.52	1.44	-1.20	-25.00	-22.28
159.98	S	-61.62	-61.42	1.21	-1.41	-25.00	-36.62
208.48	S	-64.31	-68.74	5.97	-1.55	-25.00	-39.31
664.38	S	-62.21	-65.59	6.07	-2.70	-25.00	-37.21
906.88	S	-62.02	-64.44	5.68	-3.27	-25.00	-37.02
9970.00	H	-42.96	-44.38	12.92	-11.50	-25.00	-17.96
14955.00	H	---					
19940.00	H	---					
24925.00	H	---					
29910.00	H	---					
34895.00	H	---					
39880.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-10M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4985 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-38.59	-26.31	-11.48	-0.80	-25.00	-13.59
95.96	S	-53.63	-53.86	1.44	-1.20	-25.00	-28.63
154.16	S	-57.15	-56.30	0.54	-1.39	-25.00	-32.15
265.71	S	-63.79	-67.43	5.40	-1.76	-25.00	-38.79
662.44	S	-61.24	-64.61	6.07	-2.70	-25.00	-36.24
678.93	S	-64.78	-68.12	6.06	-2.72	-25.00	-39.78
9970.00	H	-36.11	-37.53	12.92	-11.50	-25.00	-11.11
14955.00	H	---					
19940.00	H	---					
24925.00	H	---					
29910.00	H	---					
34895.00	H	---					
39880.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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Radiated Spurious Emission Measurement Result 802.11j, 4940~4990 MHz (20MHz)

ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4950 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-37.28	-25.23	-11.25	-0.80	-25.00	-12.28
81.41	S	-46.98	-45.80	-0.15	-1.03	-25.00	-21.98
159.01	S	-61.23	-60.92	1.10	-1.41	-25.00	-36.23
292.87	S	-65.60	-69.34	5.59	-1.85	-25.00	-40.60
664.38	S	-62.93	-66.30	6.07	-2.70	-25.00	-37.93
770.11	S	-61.23	-64.20	5.86	-2.89	-25.00	-36.23
9900.00	H	-46.34	-47.85	12.96	-11.45	-25.00	-21.34
14850.00	H	---					
19800.00	H	---					
24750.00	H	---					
29700.00	H	---					
34650.00	H	---					
39600.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH LOW	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4950 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-38.97	-26.92	-11.25	-0.80	-25.00	-13.97
96.93	S	-53.31	-53.47	1.36	-1.20	-25.00	-28.31
155.13	S	-56.42	-55.68	0.66	-1.40	-25.00	-31.42
268.62	S	-63.85	-67.52	5.44	-1.77	-25.00	-38.85
665.35	S	-60.49	-63.86	6.07	-2.70	-25.00	-35.49
964.11	S	-61.98	-63.28	4.66	-3.36	-25.00	-36.98
9900.00	H	-37.37	-38.87	12.96	-11.45	-25.00	-12.37
14850.00	H	---					
19800.00	H	---					
24750.00	H	---					
29700.00	H	---					
34650.00	H	---					
39600.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-37.51	-25.46	-11.25	-0.80	-25.00	-12.51
96.93	S	-46.60	-46.76	1.36	-1.20	-25.00	-21.60
160.95	S	-62.11	-61.95	1.25	-1.41	-25.00	-37.11
487.84	S	-66.54	-70.31	6.08	-2.32	-25.00	-41.54
759.44	S	-61.06	-64.04	5.84	-2.87	-25.00	-36.06
932.10	S	-63.49	-65.75	5.57	-3.31	-25.00	-38.49
9930.00	H	-47.31	-48.78	12.94	-11.47	-25.00	-22.31
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH MID	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4965 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
34.85	S	-39.83	-28.00	-11.02	-0.80	-25.00	-14.83
97.90	S	-53.09	-53.18	1.29	-1.20	-25.00	-28.09
151.25	S	-57.26	-56.08	0.20	-1.39	-25.00	-32.26
269.59	S	-63.27	-66.95	5.45	-1.78	-25.00	-38.27
664.38	S	-61.82	-65.19	6.07	-2.70	-25.00	-36.82
940.83	S	-61.03	-63.23	5.53	-3.32	-25.00	-36.03
9930.00	H	-40.40	-41.87	12.94	-11.47	-25.00	-15.40
14895.00	H	---					
19860.00	H	---					
24825.00	H	---					
29790.00	H	---					
34755.00	H	---					
39720.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4980 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-37.53	-25.48	-11.25	-0.80	-25.00	-12.53
95.96	S	-46.97	-47.21	1.44	-1.20	-25.00	-21.97
159.01	S	-60.39	-60.09	1.10	-1.41	-25.00	-35.39
204.60	S	-63.95	-68.38	5.96	-1.53	-25.00	-38.95
606.18	S	-65.58	-68.78	5.83	-2.63	-25.00	-40.58
951.50	S	-63.17	-65.23	5.40	-3.34	-25.00	-38.17
9960.00	H	-44.49	-45.92	12.92	-11.49	-25.00	-19.49
14940.00	H	---					
19920.00	H	---					
24900.00	H	---					
29880.00	H	---					
34860.00	H	---					
39840.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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ARFCN	:CH HIGH	Test Date	:2015-01-14
Operation Band	:4.9G-20M	Temp./Humi.	:27 deg_C / 66 RH
Fundamental Frequency	:4980 MHz	Engineer	:Curry
Operation Mode	:TX HIGH		
EUT Pol.	:H Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	EIRP	SG	Antenna	Cable	Limit	Margin
MHz	F/H/E/S	dBm	Output Level dBm	Gain dBi	Loss dB	dBm	dB
33.88	S	-39.00	-26.95	-11.25	-0.80	-25.00	-14.00
96.93	S	-53.52	-53.68	1.36	-1.20	-25.00	-28.52
156.10	S	-57.09	-56.46	0.77	-1.40	-25.00	-32.09
660.50	S	-62.57	-65.95	6.08	-2.69	-25.00	-37.57
682.81	S	-64.03	-67.36	6.05	-2.72	-25.00	-39.03
951.50	S	-62.04	-64.09	5.40	-3.34	-25.00	-37.04
9960.00	H	-39.54	-40.98	12.92	-11.49	-25.00	-14.54
14940.00	H	---					
19920.00	H	---					
24900.00	H	---					
29880.00	H	---					
34860.00	H	---					
39840.00	H	---					

$EIRP(dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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14. FREQUENCY STABILITY

14.1. Standard Applicable

According to FCC §2.1055(d) (2) and §90.213

- (a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5,11} 5	⁶ 5	^{4,6} 50
216-220	1.0		1.0
220-222 ¹²	0.1	1.5	1.5
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928 ¹³	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁹ 300	300	300
Above 2450 ¹⁰			

According to IC RSS-111 §5.2

The applicant shall ensure frequency stability by showing that the occupied bandwidth is maintained within the band of operation when tested at the temperature and supply voltage variations specified for the frequency stability measurement in RSS-Gen.

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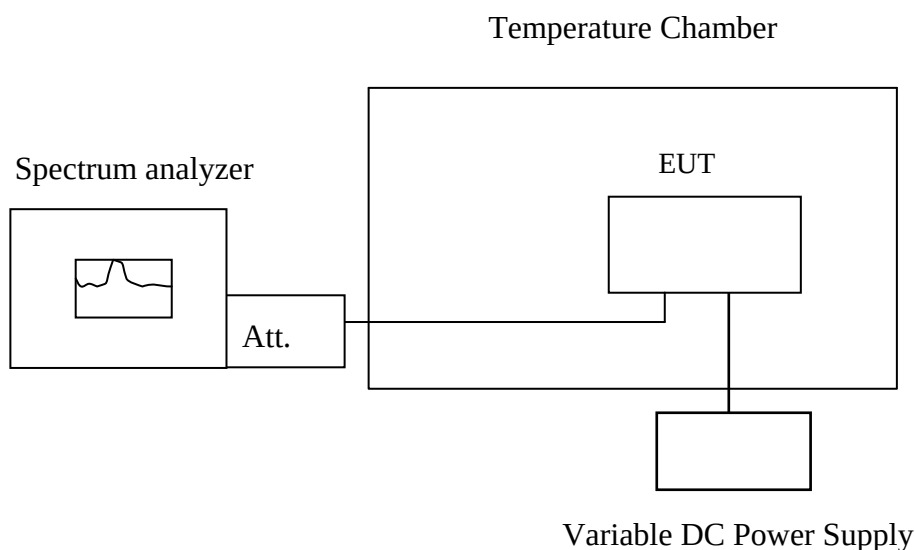
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14.2. Measurement Procedure

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change

14.3. Test SET-UP (Block Diagram of Configuration)



Note: Measurement setup for testing on Antenna connector

14.4. Measurement Equipment Used:

Refer to section 6 in this report

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14.5. Measurement Result

Test Temp.	2 Minute		
	Test Voltage (Vac)	Measured Frequency (MHz)	Frequency Error %
50	138	4964.9877	0.000248
	120	4964.9809	0.000385
	102	4964.9805	0.000393
40	138	4964.9806	0.000391
	120	4964.9815	0.000373
	102	4964.9821	0.000361
30	138	4964.9817	0.000369
	120	4964.9815	0.000373
	102	4964.9799	0.000405
20	138	4964.9826	0.000350
	120	4964.9833	0.000336
	102	4964.9811	0.000381
10	138	4964.9855	0.000292
	120	4964.9817	0.000369
	102	4964.9833	0.000336
0	138	4965.0111	0.000224
	120	4965.0122	0.000246
	102	4965.0008	0.000016
-10	138	4965.0008	0.000017
	120	4965.0000	0.000000
	102	4965.0009	0.000018
-20	138	4965.0006	0.000012
	120	4965.0003	0.000005
	102	4965.0004	0.000007
-30	138	4965.0007	0.000014
	120	4965.0006	0.000012
	102	4965.0004	0.000009

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Test Temp.	5 Minute		
	Test Voltage (Vac)	Measured Frequency (MHz)	Frequency Error %
50	138	4964.9985	0.000031
	120	4964.9983	0.000034
	102	4964.9983	0.000034
40	138	4964.9988	0.000025
	120	4964.9985	0.000031
	102	4964.9982	0.000037
30	138	4964.9983	0.000034
	120	4964.9983	0.000035
	102	4964.9982	0.000036
20	138	4964.9988	0.000025
	120	4964.9984	0.000032
	102	4964.9988	0.000024
10	138	4964.9980	0.000040
	120	4964.9989	0.000022
	102	4964.9987	0.000027
0	138	4964.9982	0.000035
	120	4964.9990	0.000020
	102	4964.9986	0.000029
-10	138	4965.0001	0.000002
	120	4965.0003	0.000007
	102	4965.0005	0.000011
-20	138	4965.0007	0.000013
	120	4965.0004	0.000008
	102	4965.0009	0.000017
-30	138	4965.0001	0.000003
	120	4965.0007	0.000013
	102	4965.0008	0.000017

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	10 Minute		
Test Temp.	Test Voltage	Measured Frequency	Frequency Error
	(Vac)	(MHz)	%
50	138	4964.9987	0.000026
	120	4964.9989	0.000023
	102	4964.9989	0.000021
40	138	4964.9980	0.000040
	120	4964.9989	0.000022
	102	4964.9984	0.000032
30	138	4964.9985	0.000030
	120	4964.9982	0.000037
	102	4964.9988	0.000024
20	138	4964.9981	0.000037
	120	4964.9988	0.000023
	102	4964.9987	0.000027
10	138	4964.9989	0.000023
	120	4964.9985	0.000030
	102	4964.9985	0.000029
0	138	4964.9980	0.000040
	120	4964.9982	0.000036
	102	4964.9988	0.000025
-10	138	4965.0007	0.000014
	120	4965.0003	0.000005
	102	4965.0001	0.000002
-20	138	4965.0002	0.000004
	120	4965.0010	0.000019
	102	4965.0002	0.000005
-30	138	4965.0003	0.000005
	120	4965.0003	0.000006
	102	4965.0004	0.000009

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15. PEAK EXCURSION

15.1 Standard Applicable

According to FCC Part 90 §90.1215 (e)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

According to IC RSS-111 §5.4

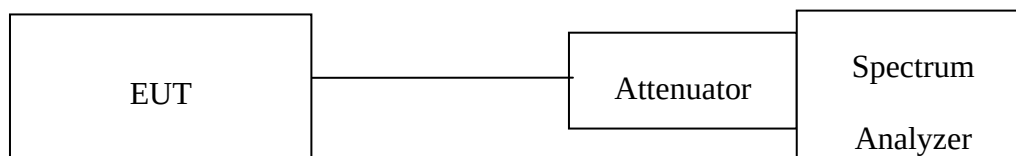
The PAPR of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.¹

15.2 Measurement Procedure(following the measurement procedure 5.7.1 of KDB971168 D01):

Use one of the procedures presented in KDB971168 D01 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented KDB971168 D01 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\text{PAPR (dB)} = \text{PPk(dBm)} - \text{PAvg(dBm)}.$$

15.3 Test SET-UP (Block Diagram of Configuration)



15.4 Measurement Equipment Used:

Refer to section 6 in this report

15.5 Measurement Result

Refer to next page for measurement data and plots.

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802.11j, 4940~4990 MHz (10MHz) Data Plot (CH Low)



(CH Mid)



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802.11j, 4940~4990 MHz (20MHz) Data Plot (CH Low)



(CH Mid)



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(CH High)



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16. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

16.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

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16.2 Maximum Permissible Exposure (MPE) Evaluation

802.11j, 4940~4990 MHz (10MHz)

Frequency (MHz)	Peak Output Power(dBm) (MAIN)	Peak Output Power(dBm) (AUX)	Total Output Power(dBm)	Limit (dBm)
4945	14.03	10.88	15.74	15.99
4965	13.86	10.38	15.47	15.99
4985	14.08	11.07	15.84	15.99

MPE Prediction (802.11j, 4940~4990 MHz (10MHz))

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P}{4\pi R^2}$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	15.84	(dBm)
Maximum peak output power at antenna input terminal:	38.37072455	(mW)
Duty cycle:	100	(%)
Maximum Pav :	38.37072455	(mW)
Antenna gain (typical):	7	(dBi)
Maximum antenna gain:	5.011872336	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	4985	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0382781	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.038 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 4985MHz.

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802.11j, 4940~4990 MHz (20MHz)

Frequency (MHz)	Peak Output Power(dBm) (MAIN)	Peak Output Power(dBm) (AUX)	Total Output Power(dBm)	Limit (dBm)
4950	15.96	12.11	17.46	18.99
4965	16.08	12.92	17.79	18.99
4980	16.19	13.29	17.99	18.99

MPE Prediction (802.11j, 4940~4990 MHz (10MHz))

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4 \pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	17.99	(dBm)
Maximum peak output power at antenna input terminal:	62.95061829	(mW)
Duty cycle:	100	(%)
Maximum Pav :	62.95061829	(mW)
Antenna gain (typical):	7	(dBi)
Maximum antenna gain:	5.011872336	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	4980	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0627987	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.063 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 4980MHz.

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17. MAXIMUM PERMISSIBLE EXPOSURE (MPE)**17.1 Standard Applicable**

According to RSS 102 issue 4 §2.5.2 RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 2.5 W;

at or above 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 5 W.

This is a Mobile device, at which separation distance between the user and the device's antenna is 20cm. Therefore, section 2.5.2 shall be complied with.

RF Evaluation**802.11j, 4940~4990 MHz (10MHz)**

Maximum average output power at antenna input	15.84	(dBm)
Maximum average output power at antenna input	38.37072455	(mW)
Antenna gain (typical):	7	(dBi)
Maximum antenna gain:	5.011872336	(numeric)

Evaluation Result

The radiated power is $15.84 + 7 = 22.84$ dBm(EIRP) = 192.309mW = 0.192309W that is less than or equal to 5W. Hence, following section 2.5.2 of RSS102 issue 4, RF exposure evaluation is no longer required.

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802.11j, 4940~4990 MHz (20MHz)

Maximum average output power at antenna input	17.99	(dBm)
Maximum average output power at antenna input	62.95061829	(mW)
Antenna gain (typical):	7	(dBi)
Maximum antenna gain:	5.011872336	(numeric)

Evaluation Result

The radiated power is $17.99 + 7 = 24.99$ dBm(EIRP) = 315.5mW = 0.3155W
that is less than or equal to 5W. Hence, following section 2.5.2 of RSS102 issue 4,
RF exposure evaluation is no longer required.

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