

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

**Applicant:** Cal-Comp Big Data, Inc.  
No. 147, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei City 222,  
Taiwan (R.O.C.)

**Product Name:** HiMirror Mini

**Brand Name:** HiMirror

**Model No.:** BM668

**Model Difference:** N/A

**FCC ID:** 2AJTF-BM668

**IC ID:** 21978-BM668

**Report Number:** E2/2018/10157

**FCC Rule Part:** §15.407, Cat: NII

**IC Rule:** RSS-247 issue 2 Feb. 2017

**Issue Date:** Feb. 26, 2018

**Date of Test:** Jan. 18, 2018 ~ Jan. 29, 2018

**Date of EUT Received:** Jan. 18, 2018

**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 C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits. The test results of this report relate only to the tested sample identified in this report.

**Prepared By:** Elle Chang  
Elle Chang / Clerk

**Approved By:** Jim Chang  
Jim Chang / Manager



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## Revision History

Report Number	Revision	Description	Issue Date
E2/2018/10157	Rev.00	Initial creation of document	Feb. 26, 2018

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# 1 GENERAL INFORMATION

## 1.1 Product Description

### General:

Product Name:	HiMirror Mini	
Brand Name:	HiMirror	
Model No.:	BM668	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	12Vdc from AC/DC adapter	
	Adapter:	1. Model No.: WA-36A12FU Supplier: Asian Power Devices Inc. 2. Model No.: KSAS0361200300HU Supplier: Ktec

### FCC WLAN 5GHz:

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology
a	5150~5250	4	Main: 13.79 / Aux: 14.00	OFDM
n_HT 20M	5150~5250	4	HT: 14.74	OFDM
n_HT 40M	5150~5250	2	HT: 14.58	OFDM
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps			

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**IC WLAN 5GHz:**

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (EIRP) (dBm)	Modulation Technology
a	5180~5240	4	Main: 18.69 / Aux: 18.41	OFDM
n_HT 20M	5180~5240	4	HT: 22.41	OFDM
n_HT 40M	5180~5240	2	HT: 22.25	OFDM
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps			

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB / Main	Walsin Technology Corporation	RFPCA350805IMLB902	5150~5250	4.90
PCB / Aux		RFPCA350817IMLB901	5150~5250	4.41

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 662911 D01 Multiple Transmitter Output

FCC KDB 644545 D03 Guidance for IEEE 802.11ac

RSS-247 issue 2 Feb. 2017

RSS-Gen issue4 Nov. 2014

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,  
Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Number and Designation number are: 735305 / TW0002

Canada Registration Number: 4620A-5

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 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. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. 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 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.

### 2.4 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 attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

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

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## 2.5 Configuration of Tested System

Fig. 2-1 Conducted (Antenna Port) Emission Configuration

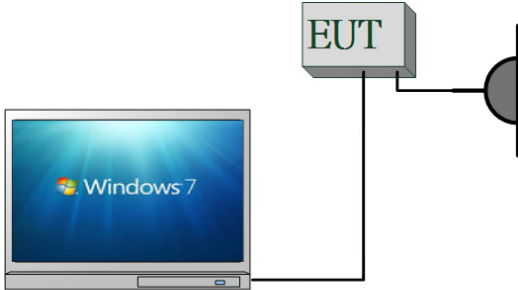


Fig 2-3 Conduction (AC Power Line) Radiated Emission

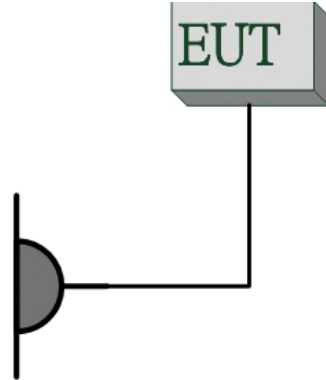


Fig 2-2 Radiated Emission

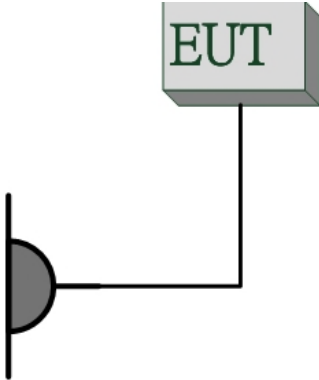


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-YYG88	Shielded	Unshielded

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### 3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.6	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203 §15.407(a)	RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
36	5180
40	5200
44	5220
48	5240

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
38	5190
46	5230

### 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

### RADIATED EMISSION TEST:

MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
<b>RADIATED EMISSION TEST (BELOW 1 GHz)</b>						
802.11a	5180~5240	36 to 48	44	OFDM	6	Main
<b>RADIATED EMISSION TEST (ABOVE 1 GHz)</b>						
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Main
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO

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

### ANTENNA PORT CONDUCTED MEASUREMENT:

<b>CONDUCTED TEST</b>						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Main
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

### Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	9kHz-30MHz: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	9kHz-30MHz: +/-2.87dB
	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 CONDUCTED EMISSION TEST

### 6.1. Standard Applicable

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.

### 6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 7	100950	12/24/2017	12/23/2018
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	08/30/2017	08/29/2018
LISN	Schwarzbeck	NSLK 8127	8127-648	06/18/2017	06/17/2018
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

### 6.3. EUT Setup

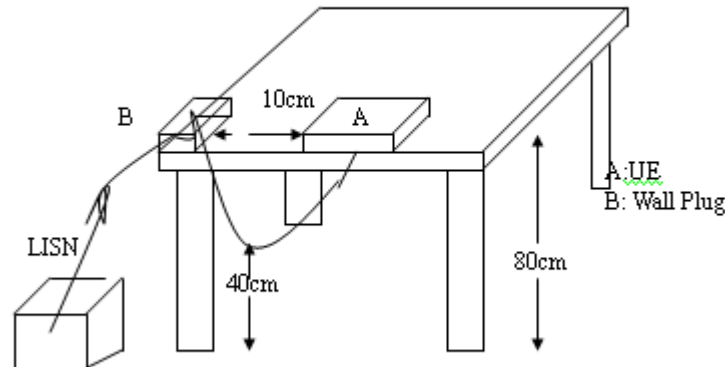
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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## 6.4. Test SET-UP



## 6.5. 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.

## 6.6. Measurement Result

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

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

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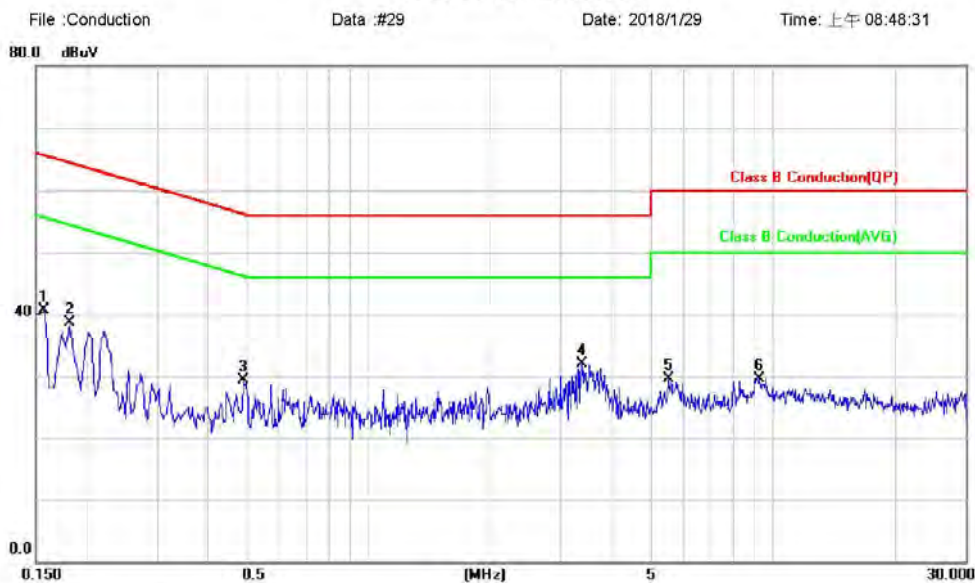
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Site: Conduction Room	Phase: <b>L1</b>	Temperature: 21 °C
Limit: CNS 13438 (QP)	Power: AC 120V/60Hz	Humidity: 70 %
Mode:		
Note:		

### Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1580	21.08	19.65	40.73	65.57	-24.84	peak	
2		0.1820	19.06	19.64	38.70	64.39	-25.69	peak	
3		0.4900	9.14	20.11	29.25	56.17	-26.92	peak	
4	*	3.3740	11.54	20.35	31.89	56.00	-24.11	peak	
5		5.5340	9.36	20.09	29.45	60.00	-30.55	peak	
6		9.2860	9.50	20.07	29.57	60.00	-30.43	peak	

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Site : Conduction Room      Phase: L1      Temperature: 19 °C  
 Limit: FCC Class B Conduction(QP)      Power: AC 120V/60Hz      Humidity: 46 %  
 Mode: Mode\_6  
 Note:

### Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1580	55.20	0.04	55.24	65.57	-10.33	QP	
2		0.1580	35.40	0.04	35.44	55.57	-20.13	AVG	
3		0.1860	52.20	0.03	52.23	64.21	-11.98	QP	
4		0.1860	31.50	0.03	31.53	54.21	-22.68	AVG	
5		0.2060	50.90	0.03	50.93	63.37	-12.44	QP	
6		0.2060	29.80	0.03	29.83	53.37	-23.54	AVG	
7		0.2300	46.70	0.03	46.73	62.45	-15.72	QP	
8		0.2300	27.60	0.03	27.63	52.45	-24.82	AVG	
9		0.2540	42.10	0.03	42.13	61.63	-19.50	QP	
10		0.2540	25.50	0.03	25.53	51.63	-26.10	AVG	
11		0.5700	32.20	0.05	32.25	56.00	-23.75	QP	
12		0.5700	24.70	0.05	24.75	46.00	-21.25	AVG	

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## 7 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

### Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11a	93.38	0.30	0.71	1.00
802.11n_20	92.96	0.32	0.77	1.00
802.11n_40	86.76	0.62	1.57	2.00

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9338) = 0.3$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9296) = 0.32$$

#DIV/0!

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8676) = 0.62$$

#DIV/0!

#DIV/0!

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## DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



## 802.11n HT20



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### 802.11n HT 40



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## 8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.  
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

### 8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - a. 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.
  - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
  - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

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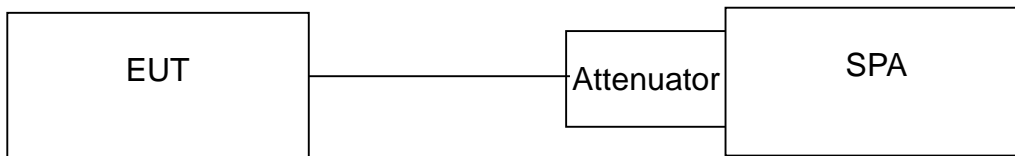
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### 8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2017	05/01/2018

### 8.4 Test Set-up



### 8.5 Measurement Result 26dB Bandwidth

**802.11a\_Main**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.34	13.491
5220	19.54	12.909
5240	17.31	12.383

**802.11a\_Aux1**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.30	13.285
5220	19.34	12.864
5240	17.23	12.362

**802.11n\_HT20\_Main**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.42	12.882
5220	19.58	12.919
5240	20.96	13.214

**802.11n\_HT20\_Aux1**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.56	12.913
5220	19.56	12.914
5240	19.90	12.989

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802.11n\_HT40\_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	44.33	16.467
5230	41.98	16.230

802.11n\_HT40\_Aux1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	45.58	16.588
5230	45.10	16.542

99% BW to prove that all signals in band I is no over band I

802.11a\_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.593	12.199
5220	16.426	12.155
5240	16.429	12.156

802.11a\_Aux1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.567	12.192
5220	16.435	12.158
5240	16.419	12.153

802.11n\_HT20\_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.494	12.429
5220	17.446	12.417
5240	17.476	12.424

802.11n\_HT20\_Aux1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.489	12.428
5220	17.450	12.418
5240	17.461	12.421

802.11n\_HT40\_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.244	15.592
5230	36.241	15.592

802.11n\_HT40\_Aux1

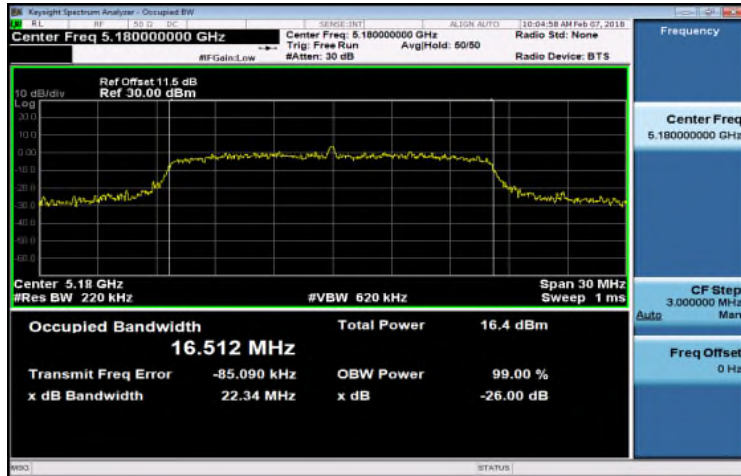
Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.229	15.591
5230	36.229	15.591

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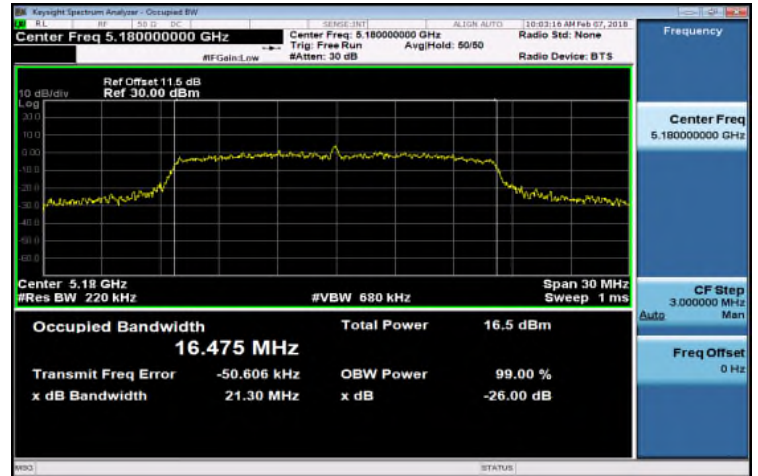
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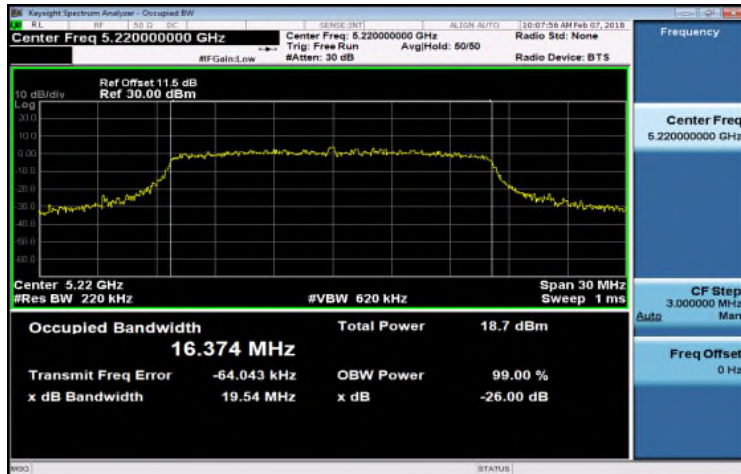
26dB 802.11a (Main)



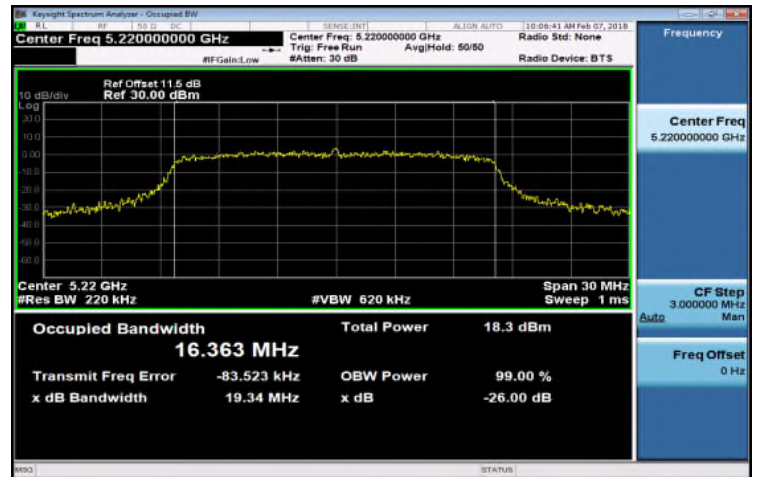
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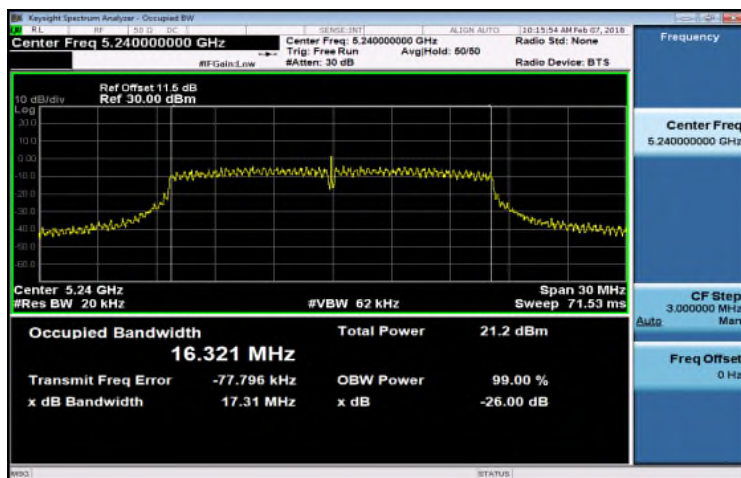
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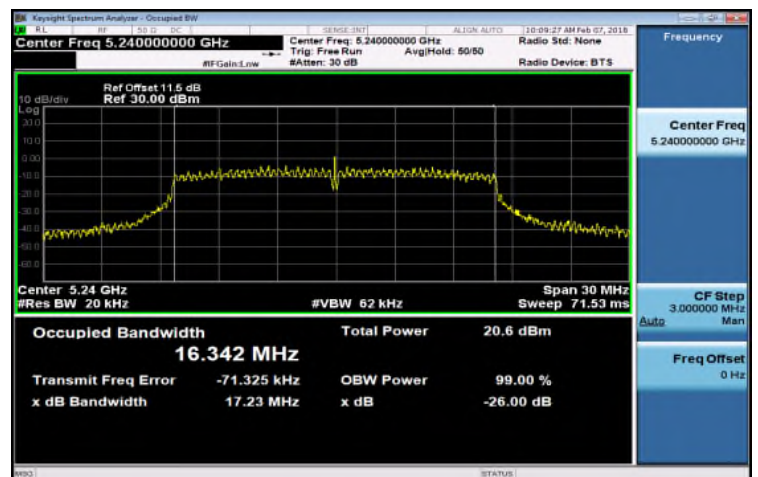
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802.11a



802.11a



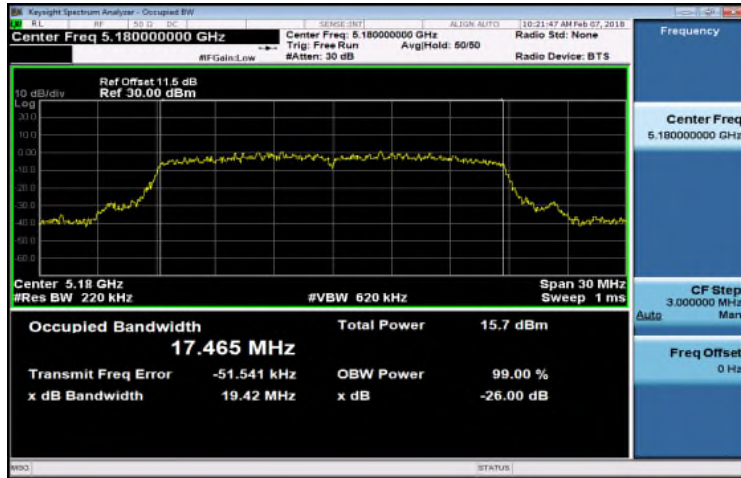
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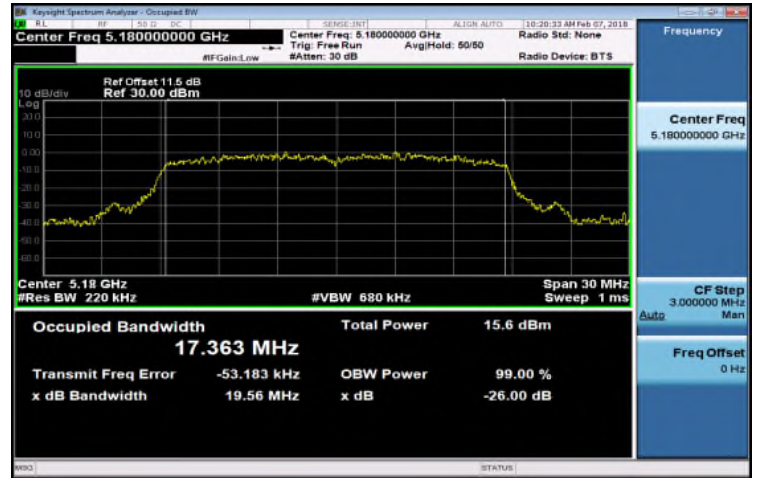
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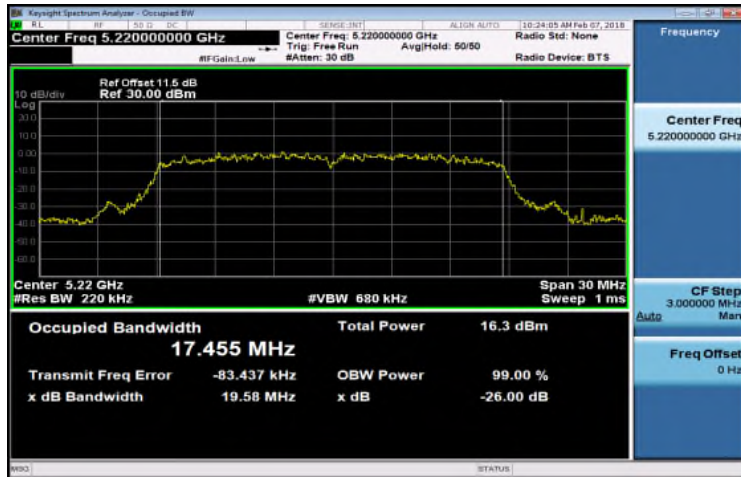
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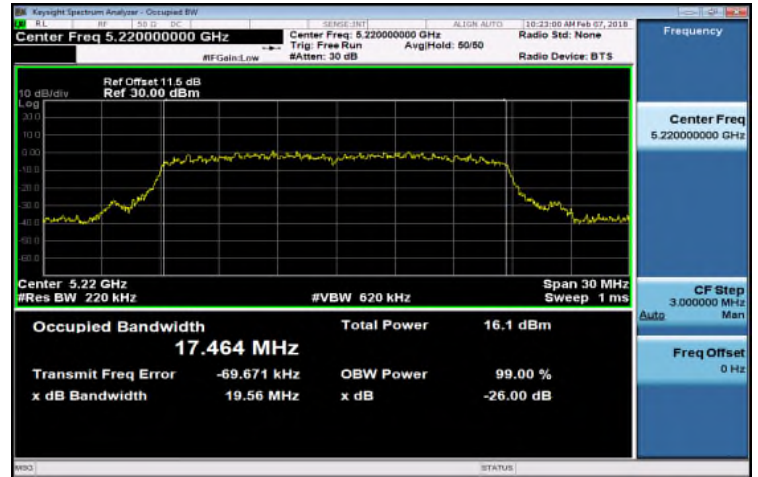
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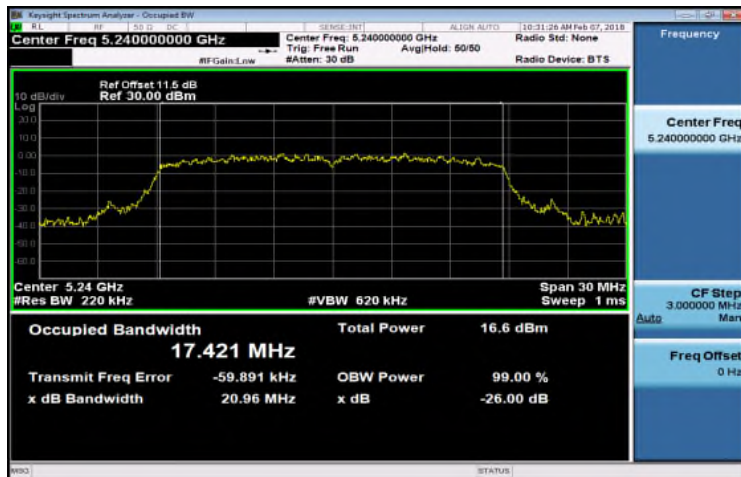
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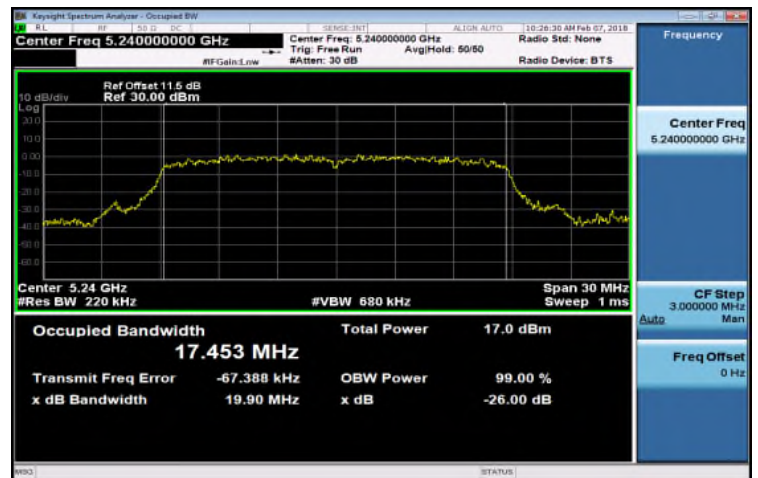
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802.11n20



802.11n20

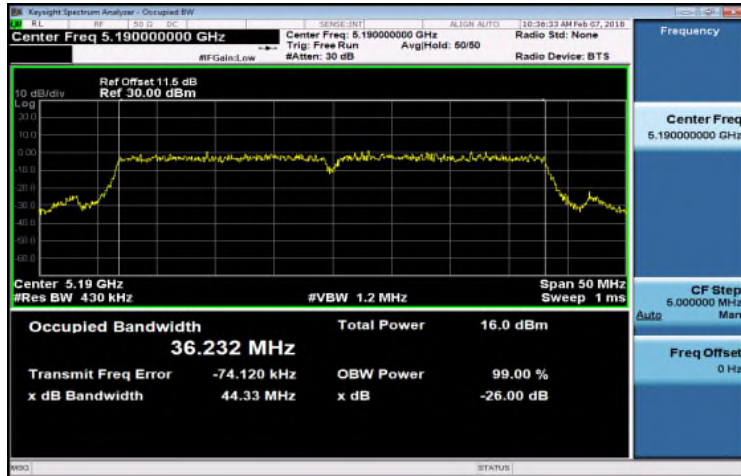


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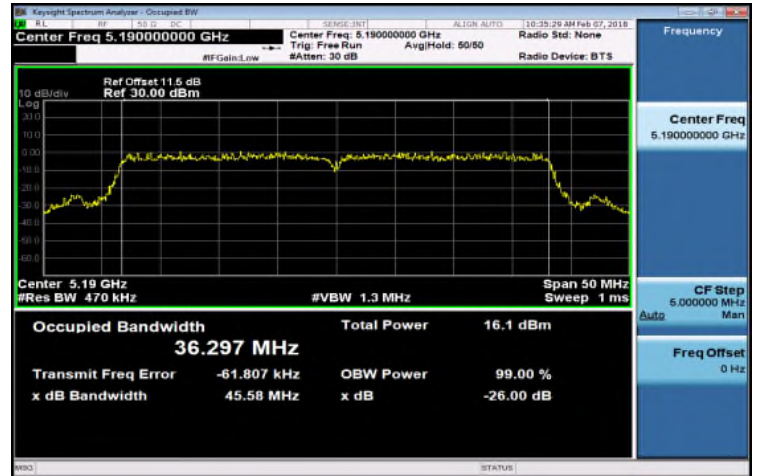
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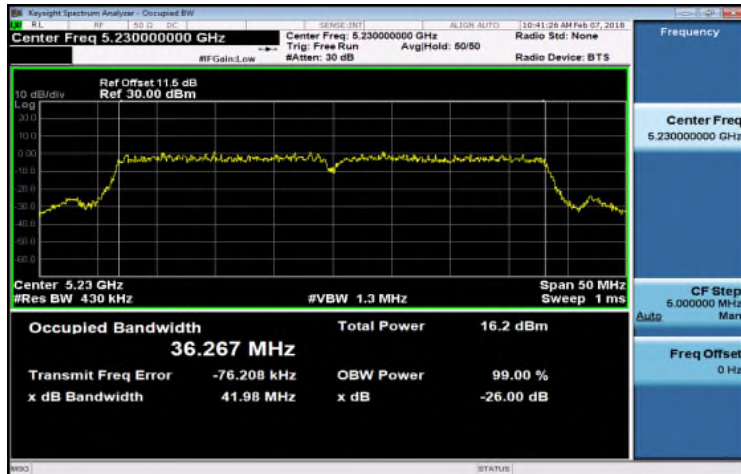
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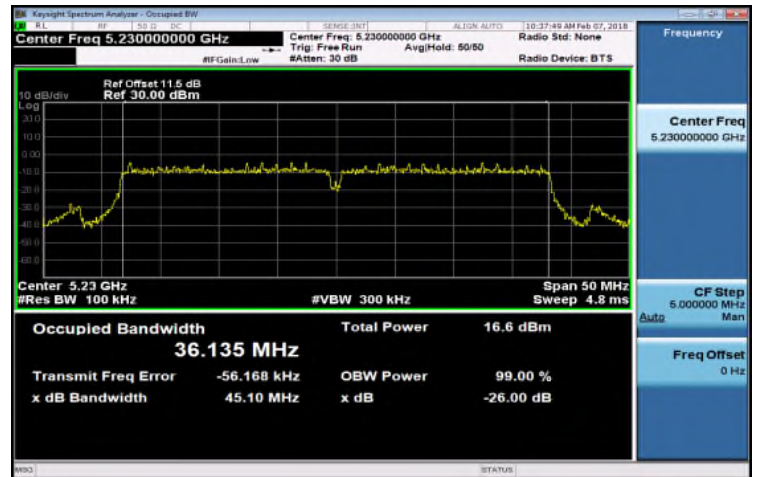
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802.11n40



802.11n40

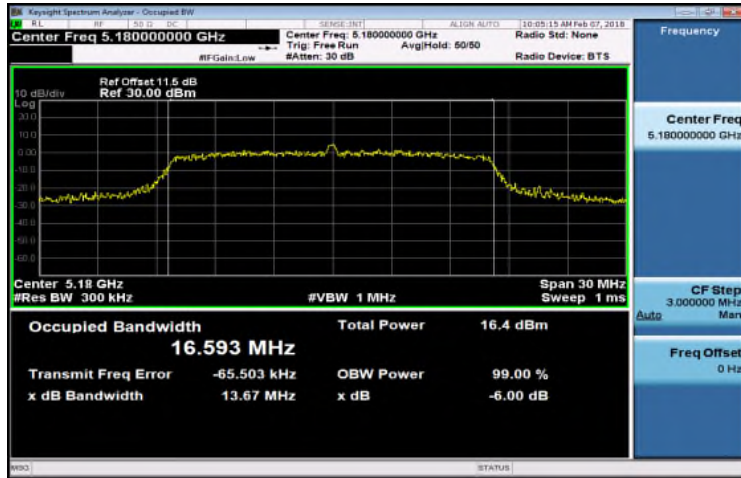


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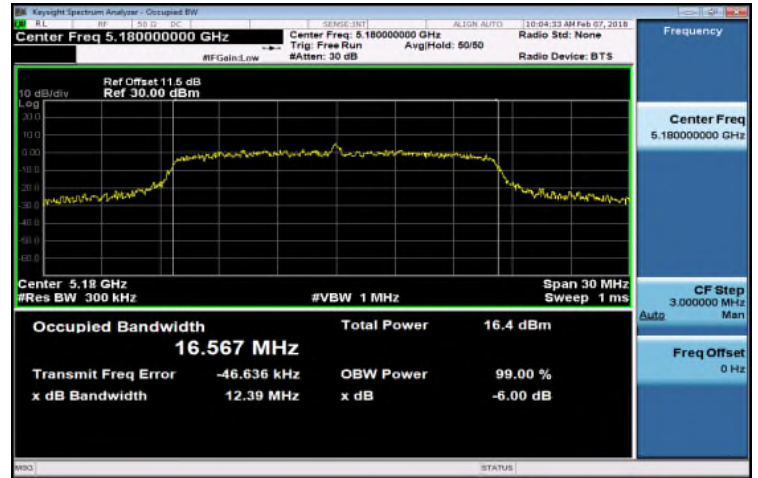
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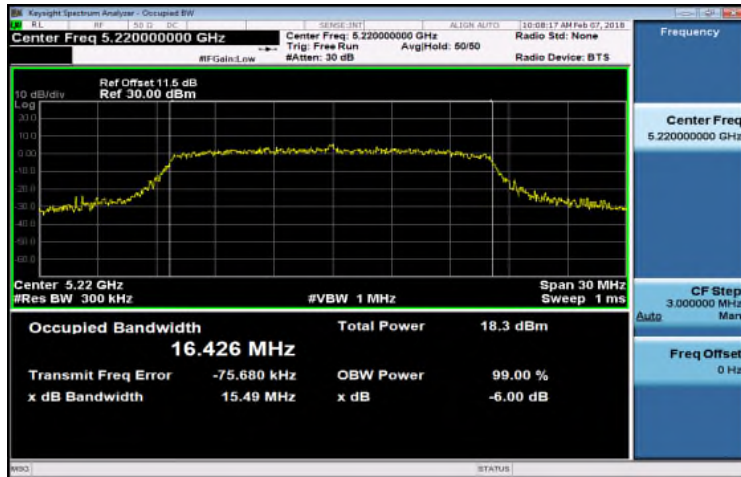
99% 802.11a (Main)



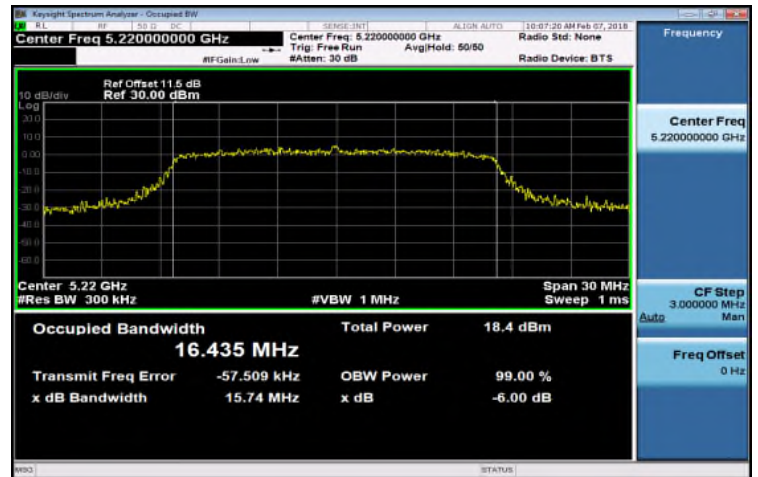
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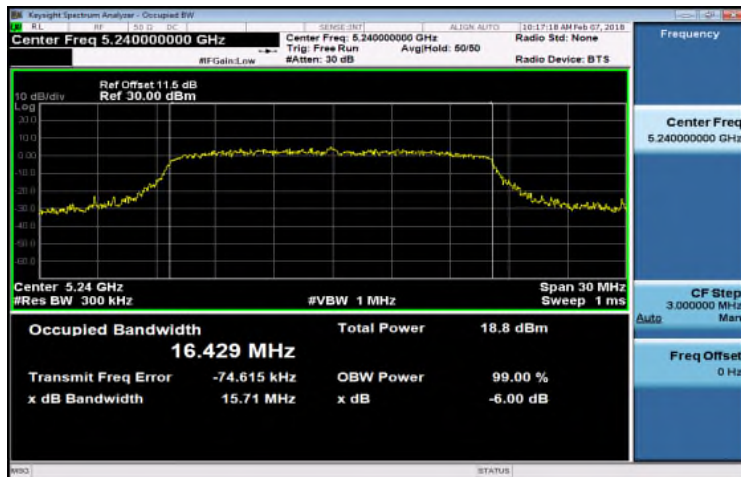
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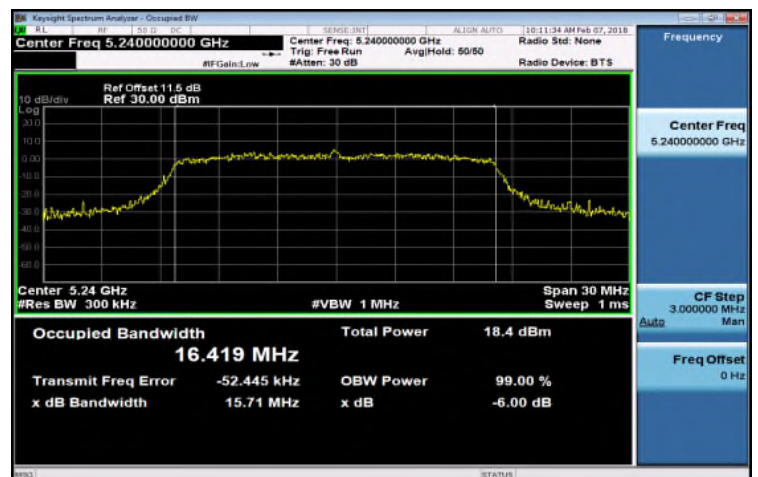
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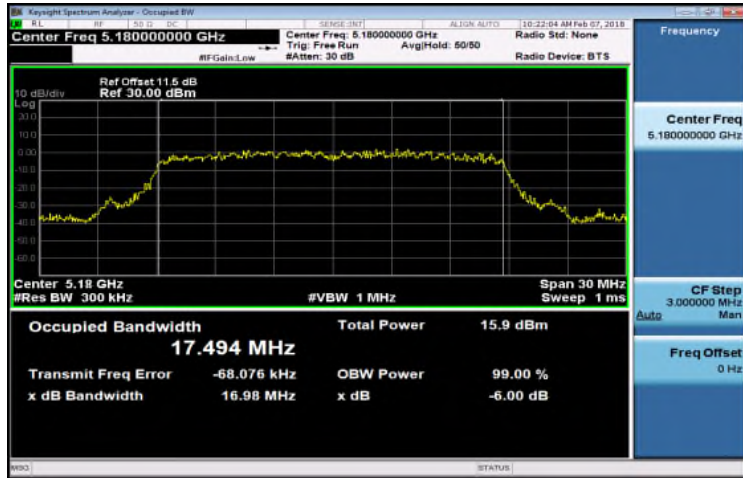


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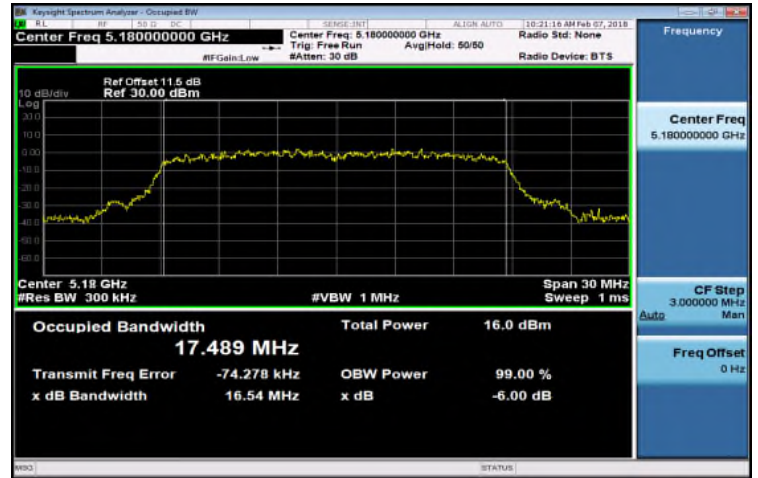
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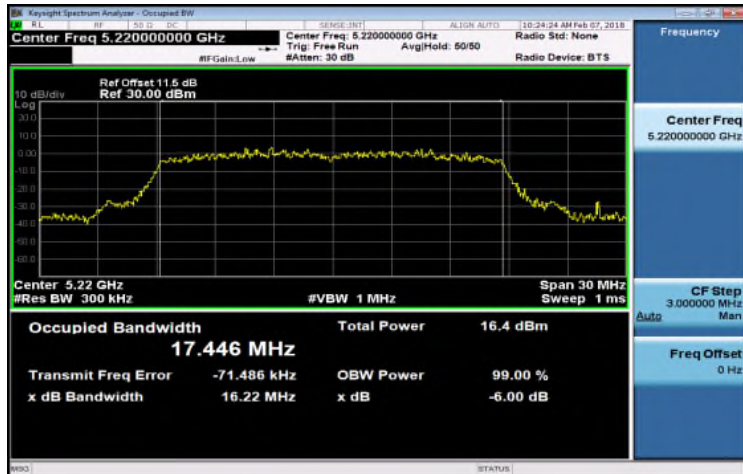
99% 802.11n20 (Main)



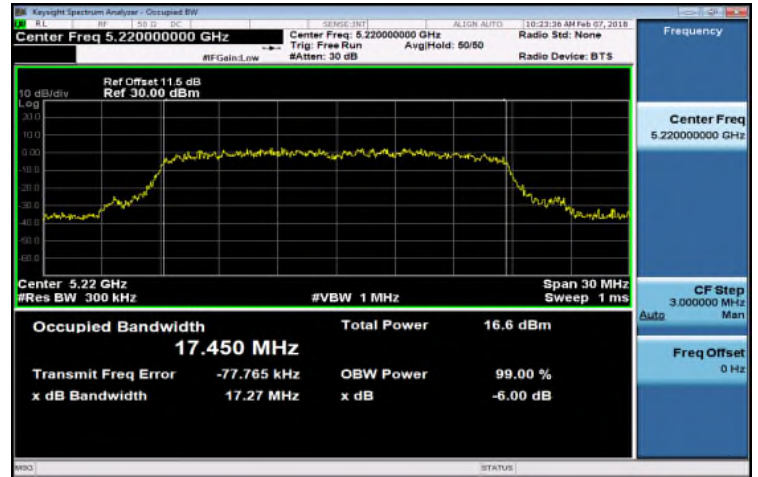
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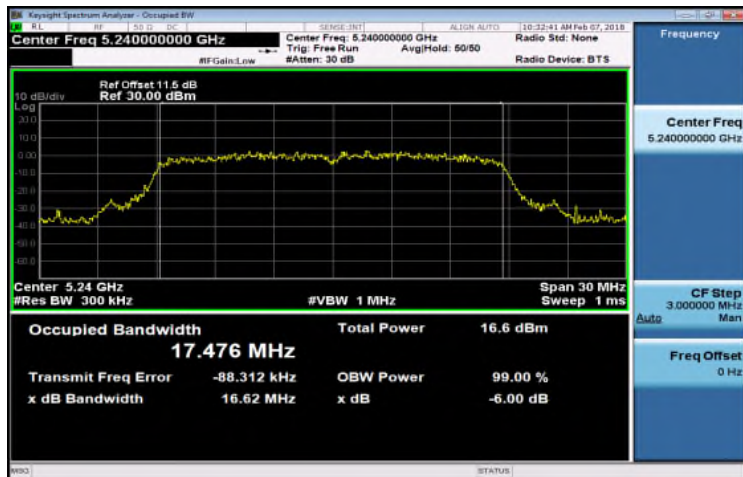
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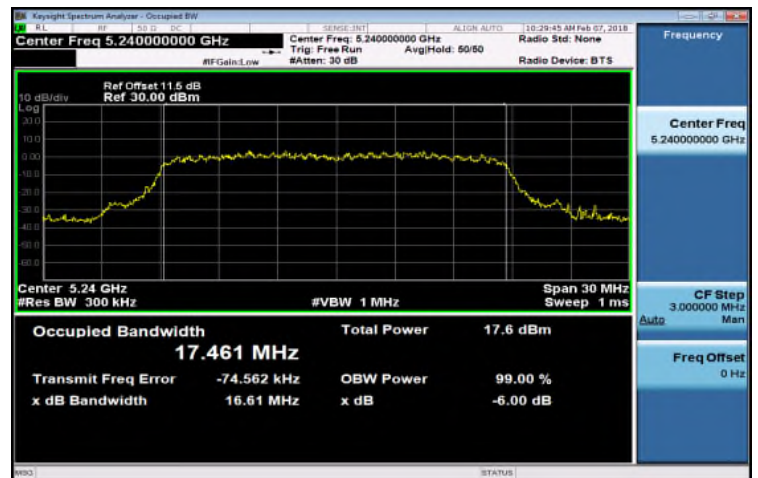
802.11n20



802.11n20



802.11n20

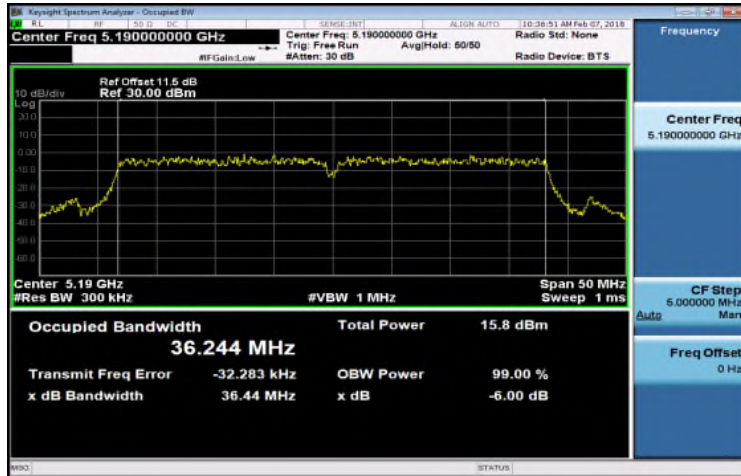


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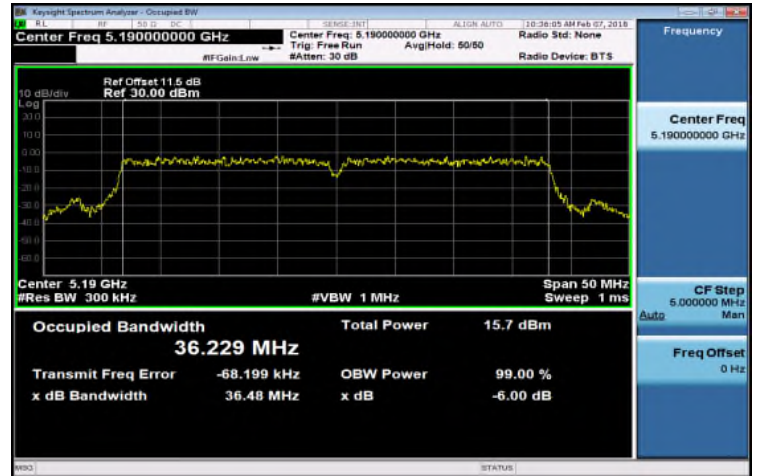
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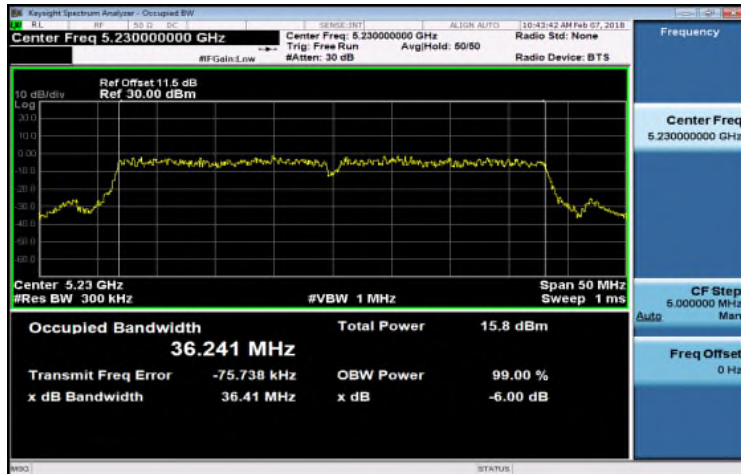
99% 802.11n40 (Main)



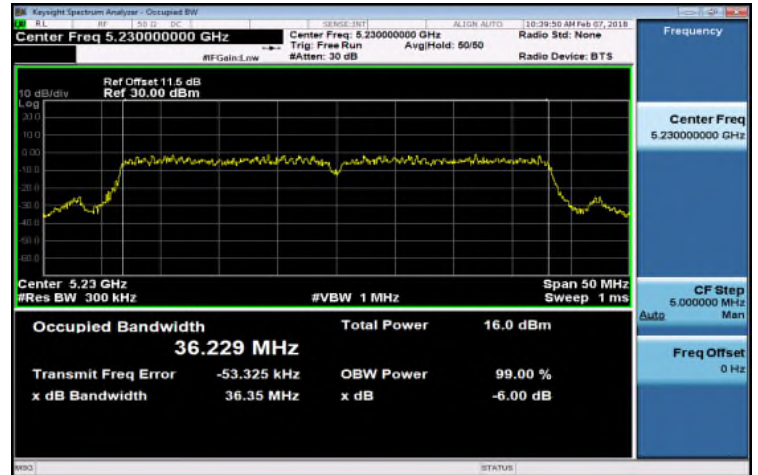
802.11n40 (Aux)



802.11n40



802.11n40



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## 9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 9.1 Standard Applicable

OPERZTION Band	EUT CATEGORY	LIMIT
U-NII-1	Access Point (Mater device )	1 Watt(30dBm)
	Fixed point-to-point Acess Ponit	1 Watt(30dBm)
	√ Mobile and portable clinet device	250mW(23.98dBm)
U-NII-2A		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3		1 Watt(30dBm)

### IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or $10 + 10 \log_{10}B$ , dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10}B$ , dBm
5470-5600 MHz and 5650-5725 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10}B$ , dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### Note:

The antenna gain is granter than 6 dBi in MIMO mode the limit reduce as below:

Directional gain = gain of antenna element +  $10 \log$  (# of TX antenna elements)

	Effective Legacy Gain (dBi)	Limit
UNII-1	7.67	9.33dBm

Therefore the limit no needs to reduce for the UNII-1, U-NII-2A, U-NII-2C and U-NII-3 band.

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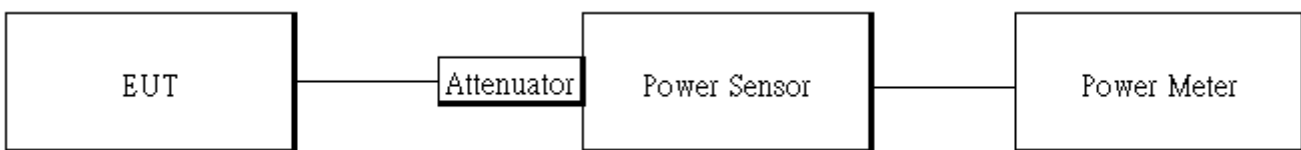
## 9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

## 9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/24/2017	12/23/2018
DC Block	PASTERNAK	PE8210	RF29	12/24/2017	12/23/2018
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2017	05/01/2018

## 9.4 Test Set-up



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## 9.5 Measurement Result

### Conducted output power

#### 802.11a\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	13.72	23.537	23.98	PASS
44	5220	6	13.76	23.755	23.98	PASS
48	5240	6	13.79	23.919	23.98	PASS

#### 802.11a\_Aux1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	13.97	24.931	23.98	PASS
44	5220	6	13.99	25.046	23.98	PASS
48	5240	6	<b>14.00</b>	25.104	23.98	PASS

#### 802.11n\_HT20\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.66	18.438	23.98	PASS
44	5220	MCS0	12.63	18.311	23.98	PASS
48	5240	MCS0	12.62	18.269	23.98	PASS

#### 802.11n\_HT20\_Aux1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.97	19.802	23.98	PASS
44	5220	MCS0	12.96	19.756	23.98	PASS
48	5240	MCS0	<b>12.98</b>	19.847	23.98	PASS

#### 802.11n\_HT20\_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1			
36	5180	MCS8	11.88	10.46	14.56	22.30779307	PASS
44	5220	MCS8	12.04	10.68	<b>14.74</b>	22.30779307	PASS
48	5240	MCS8	11.92	10.58	<b>14.63</b>	22.30779307	PASS

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**802.11n\_HT40\_Main**

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.63	14.544	23.98	PASS
46	5230	MCS0	11.68	14.712	23.98	PASS

**802.11n\_HT40\_Aux1**

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	<b>11.94</b>	15.620	23.98	PASS
46	5230	MCS0	11.91	15.512	23.98	PASS

**802.11n\_HT40\_MIMO**

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1			
38	5190	MCS8	11.58	10.21	<b>14.58</b>	22.30779307	PASS
46	5230	MCS8	11.49	10.2	14.52	22.30779307	PASS

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**Conducted output power (IC)**
**EIRP**
**802.11a\_Main**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.72	4.900	18.62	72.735	23.01 or 10+10log(B)= 22.20	PASS
44	5220	13.76	4.900	18.66	73.408	23.01 or 10+10log(B)= 22.16	PASS
48	5240	<b>13.79</b>	4.900	<b>18.69</b>	<b>73.917</b>	23.01 or 10+10log(B)= 22.16	PASS

**802.11a\_Aux1**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.97	4.410	18.38	68.825	23.01 or 10+10log(B)= 22.19	PASS
44	5220	13.99	4.410	18.40	69.143	23.01 or 10+10log(B)= 22.16	PASS
48	5240	<b>14.00</b>	4.410	<b>18.41</b>	<b>69.302</b>	23.01 or 10+10log(B)= 22.15	PASS

**802.11n\_HT20\_Main**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	<b>12.66</b>	4.900	<b>17.56</b>	<b>56.978</b>	23.01 or 10+10log(B)= 22.43	PASS
44	5220	12.63	4.900	17.53	56.585	23.01 or 10+10log(B)= 22.42	PASS
48	5240	12.62	4.900	17.52	56.455	23.01 or 10+10log(B)= 22.42	PASS

**802.11n\_HT20\_Aux1**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	12.97	4.410	17.38	54.664	23.01 or 10+10log(B)= 22.43	PASS
44	5220	12.96	4.410	17.37	54.539	23.01 or 10+10log(B)= 22.42	PASS
48	5240	<b>12.98</b>	4.410	<b>17.39</b>	<b>54.790</b>	23.01 or 10+10log(B)= 22.42	PASS

**802.11n\_HT20\_MIMO**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	14.56	7.672	22.23	167.006	23.01 or 10+10log(B)= 22.43	PASS
44	5220	<b>14.74</b>	7.672	<b>22.41</b>	<b>174.284</b>	23.01 or 10+10log(B)= 22.42	PASS
48	5240	14.63	7.672	22.30	169.864	23.01 or 10+10log(B)= 22.42	PASS

**802.11n\_HT40\_Main**

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	11.63	4.900	16.53	44.945	23.01 or 10+10log(B)= 25.59	PASS
46	5230	<b>11.68</b>	4.900	<b>16.58</b>	<b>45.465</b>	23.01 or 10+10log(B)= 25.59	PASS

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## 802.11n\_HT40\_Aux1

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	11.94	4.410	16.35	43.120	23.01 or $10+10\log(B)=$ 25.59	PASS
46	5230	11.91	4.410	16.32	42.823	23.01 or $10+10\log(B)=$ 25.59	PASS

## 802.11n\_HT40\_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	14.58	7.672	22.25	167.807	23.01 or $10+10\log(B)=$ 25.59	PASS
46	5230	14.52	7.672	22.19	165.655	23.01 or $10+10\log(B)=$ 25.59	PASS

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## 10 PEAK POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device )	17dBm/ MHz
		Fixed point-to-point Acss Ponit	
	√	Mobile and portable clinet device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3			30dBm/ 500kHz

### IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / 500 kHz

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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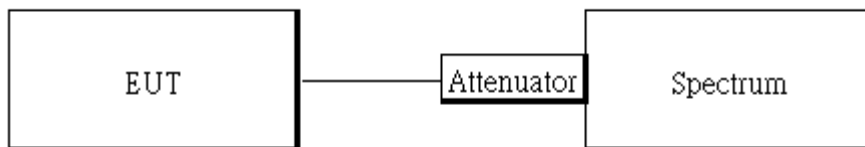
### 10.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**  
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)  
**For U-NII-3 Band:**  
Set RBW=500 kHz, VBW≥ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

### 10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/24/2017	12/23/2018
DC Block	PASTERNAK	PE8210	RF29	12/24/2017	12/23/2018
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2017	05/01/2018

### 10.4 Test Set-up



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## 10.5 Measurement Result

POWER DENSITY 802.11a MODE					
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	-1.69	0.30	-1.39	11	-12.39
5220	0.39	0.30	0.69	11	-10.31
5240	-1.31	0.30	-1.01	11	-12.01
POWER DENSITY 802.11n HT20 MODE					
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180	-1.63	0.32	-1.31	9.32779	-10.64
5220	-0.27	0.32	0.05	9.32779	-9.28
5240	-2.59	0.32	-2.27	9.32779	-11.60
POWER DENSITY 802.11n HT40 MODE					
Frequency (MHz)	PPSD W/O Duty Factor (dBm)	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5190	-10.69	0.62	-10.07	9.32779	-19.40
5230	-11.29	0.62	-10.67	9.32779	-20.00

EIRP spectral density 802.11a MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	-1.39	4.90	3.51	10	-11.39
5220	0.69	4.90	5.59	10	-9.31
5240	-1.01	4.90	3.89	10	-11.01
EIRP spectral density 802.11n HT20 MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	-1.31	7.67	6.36	10	-11.31
5220	0.05	7.67	7.72	10	-9.95
5240	-2.27	7.67	5.40	10	-12.27
EIRP spectral density 802.11n HT40 MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	-10.07	7.67	-2.40	10	-20.07
5220	-10.67	7.67	-3.00	10	-20.67

**Note:**

SISO offset=

11.5 dB

MIMO offset=

14.5 dB

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802.11a 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



802.11n HT20, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



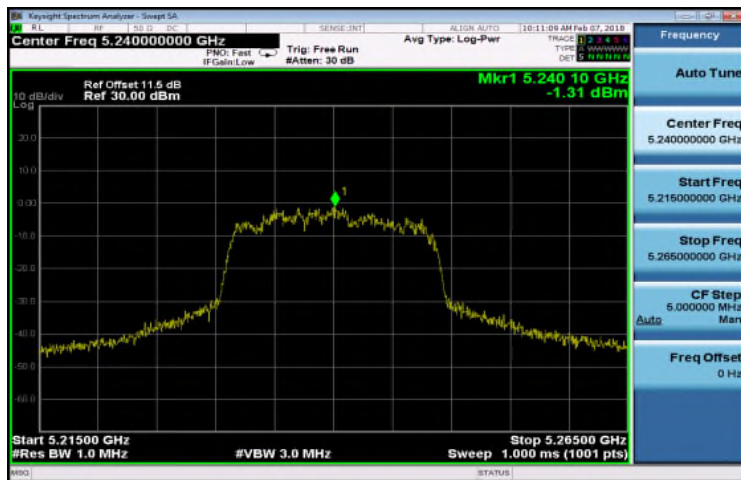
Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



Peak Power Spectral Density Data Plot (CH High 5240 MHz)



Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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802.11n HT40, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



Peak Power Spectral Density Data Plot (CH High 5230 MHz)



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## 11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

### 11.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBµV/m)	AV 54 (dBµV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBµV/m) *1 PK:105.2 (dBµV/m) *2 PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4
*1 beyond 75 MHz or more above of the bandedge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

$EIRP = (E \cdot d)^2 / 30$ , where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**Note:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBµV/m) = 20 log Emission level (dBµV/m)

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## 11.2 Measurement Equipment Used

SGS SAC-III					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESU 40	100363	04/18/2017	04/17/2018
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2017	12/22/2018
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2017	11/02/2018
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2017	12/16/2018
Horn Antenna	Schwarzbeck	BBHA9170	185	08/01/2017	07/31/2018
Pre Amplifier	EMC Instruments	EMC330	980096	12/24/2017	12/23/2018
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/24/2017	12/23/2018
Pre Amplifier	R&S	SCU-18	10204	12/24/2017	12/23/2018
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/24/2017	12/23/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF27	12/24/2017	12/23/2018
Site NSA	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
Site VSWR	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2017	05/03/2018
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

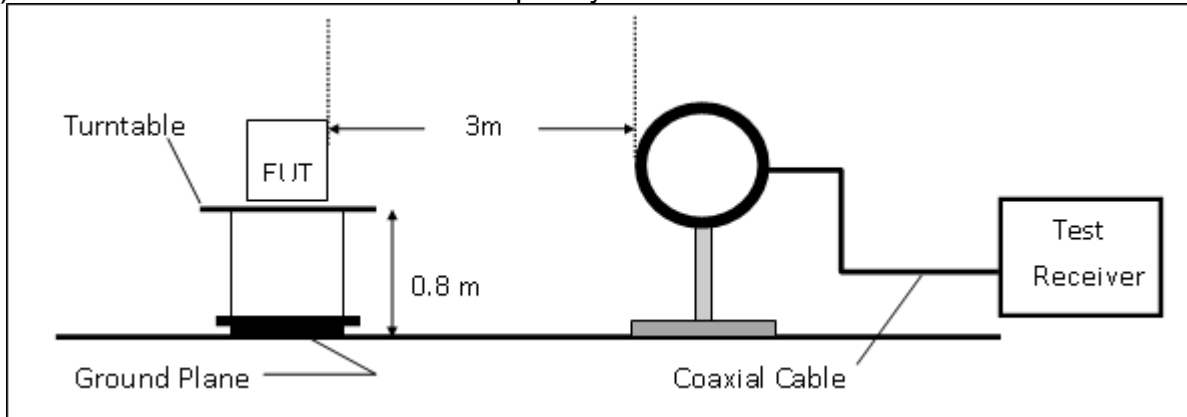
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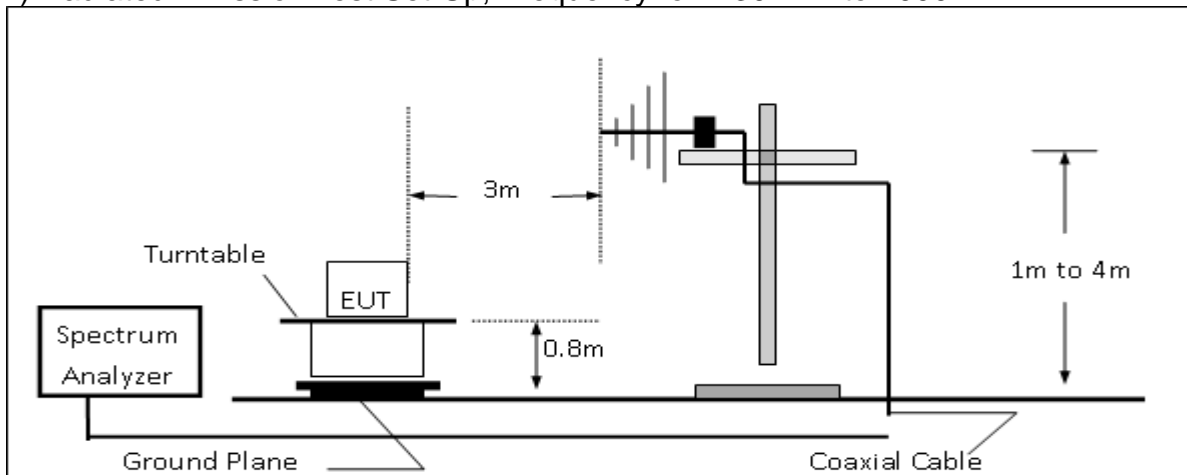
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### 11.3 Test SET-UP

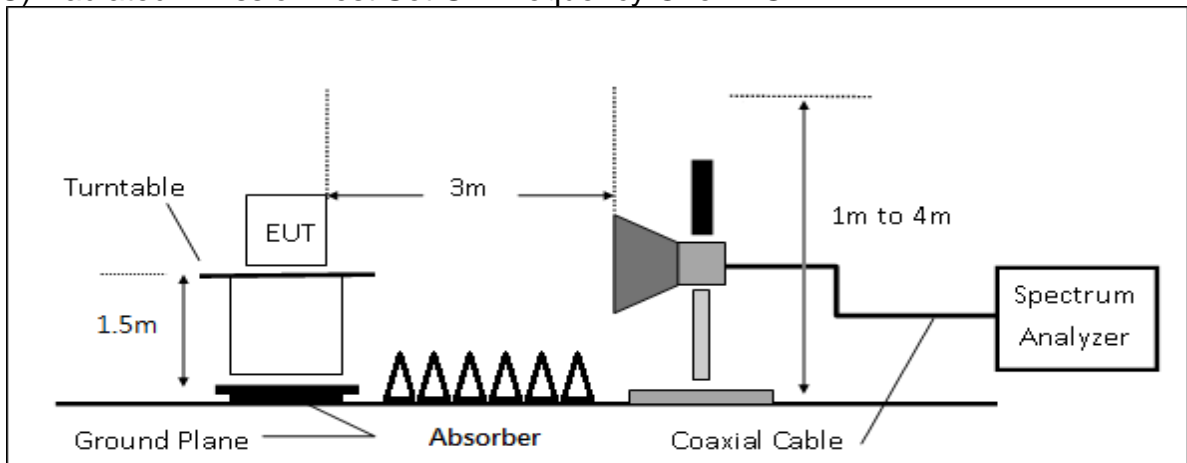
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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### 11.4 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.

Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
802.11a	93.25	1397	0.71	1kHz
802.11n_20	92.91	1297	0.77	1kHz
802.11n_40	86.82	636.5	1.57	3kHz

9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency measured were complete.

### 11.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

$$\text{Actual FS(dB}\mu\text{V/m)} = \text{SPA. Reading level(dB}\mu\text{V)} + \text{Factor(dB)}$$

$$\text{Factor(dB)} = \text{Antenna Factor(dB}\mu\text{V/m)} + \text{Cable Loss(dB)} - \text{Pre\_Amplifier Gain(dB)}$$

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**Note :**

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

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

**11.6 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

**11.7 Measurement Result**

Refer to next page for tabular data sheets.

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

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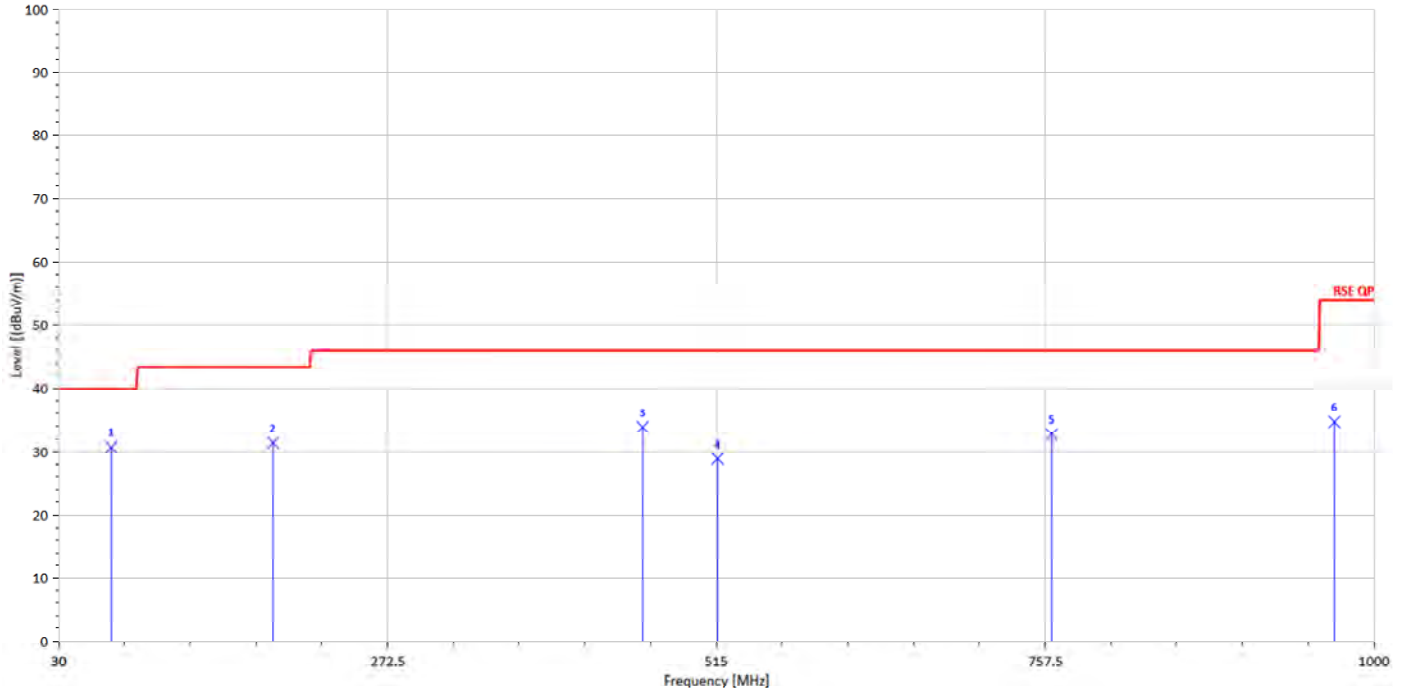
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**Radiated Spurious Emission Measurement Result**  
**Below 1GHz Worst-Case Data:**

Operation Mode :	802.11aB1	Test Date :	2018/1/26
Fundamental Frequency :	5220 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH MID	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



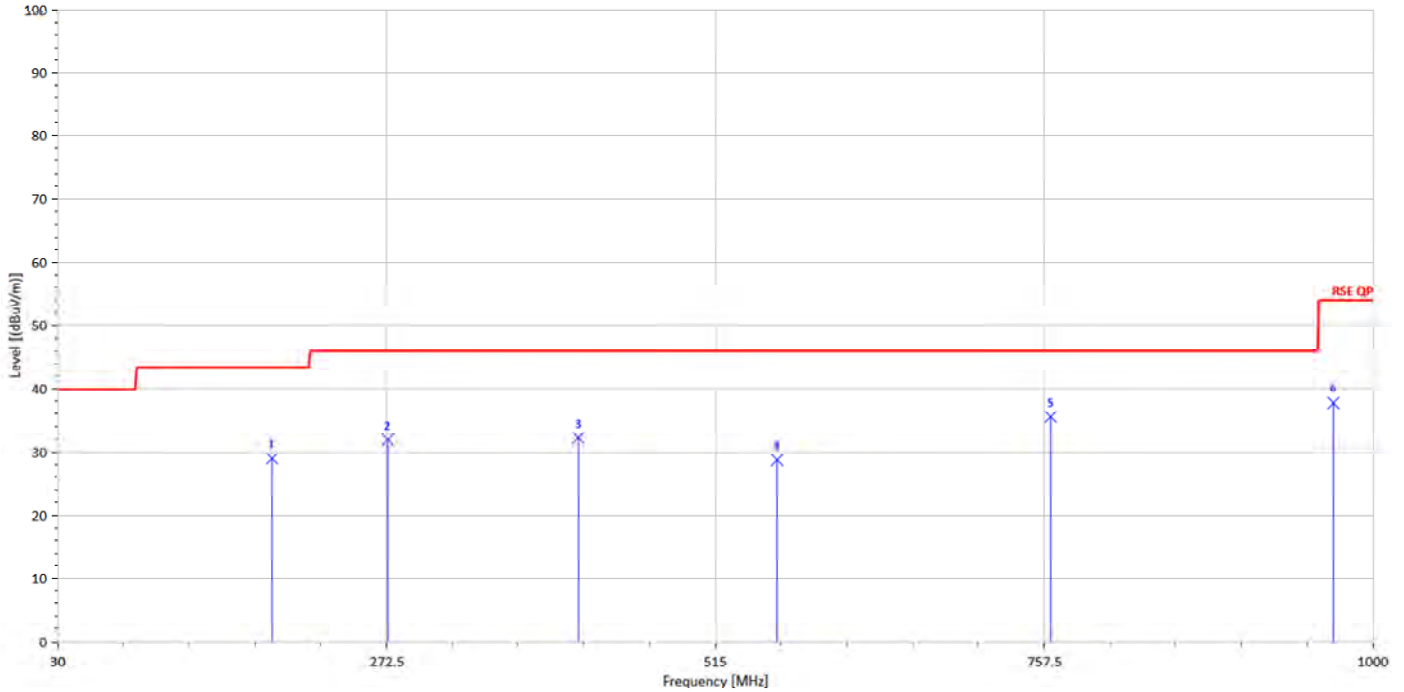
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
68.80	S	Peak	52.66	-21.95	30.71	40	-9.29
188.11	S	Peak	49.82	-18.43	31.40	43.5	-12.10
460.68	S	Peak	42.05	-8.15	33.90	46	-12.10
515.97	S	Peak	36.52	-7.67	28.85	46	-17.15
762.35	S	Peak	36.92	-4.17	32.75	46	-13.25
970.90	S	Peak	36.27	-1.57	34.70	54	-19.30

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Operation Mode : 802.11aB1 Test Date : 2018/1/26  
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH MID Test Engineer : Ashton  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
188.11	S	Peak	47.34	-18.43	28.92	43.5	-14.58
273.47	S	Peak	45.72	-13.82	31.90	46	-14.10
414.12	S	Peak	41.42	-9.21	32.21	46	-13.79
560.59	S	Peak	35.33	-6.64	28.69	46	-17.31
762.35	S	Peak	39.72	-4.17	35.55	46	-10.45
970.90	S	Peak	39.36	-1.57	37.78	54	-16.22

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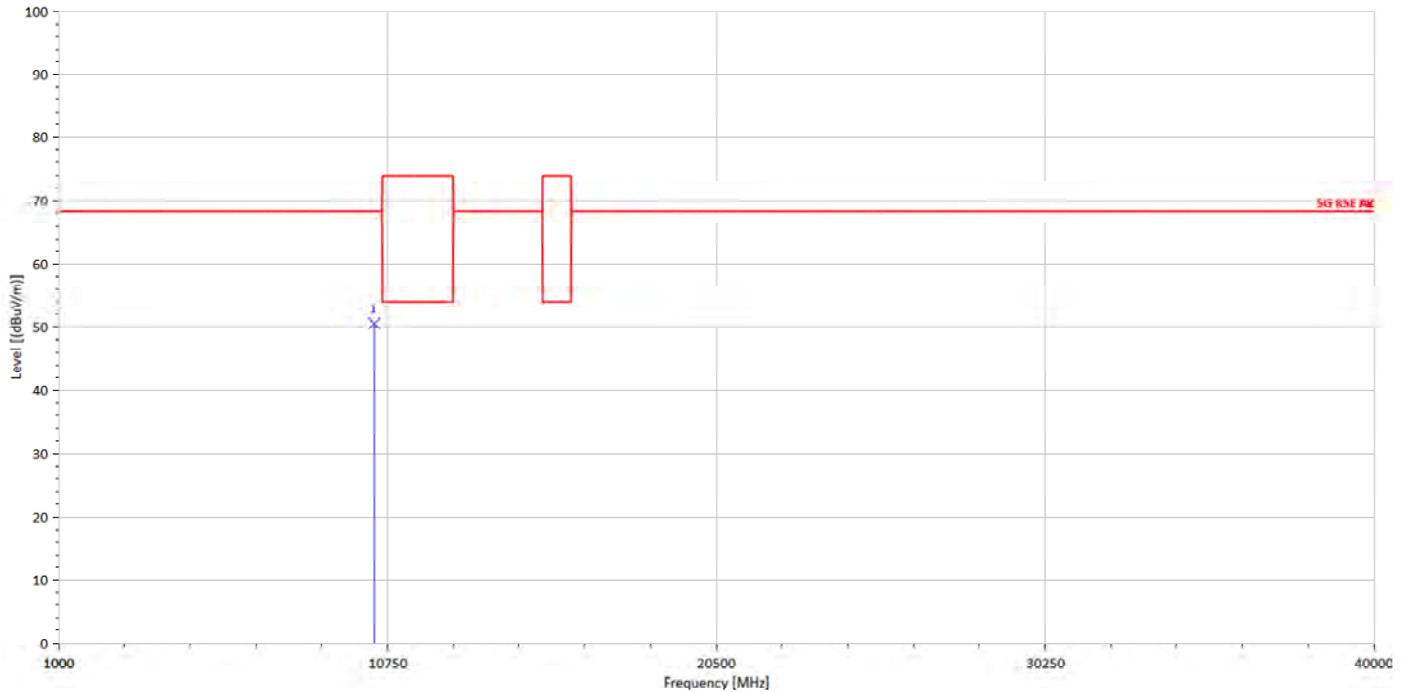
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**Above 1GHz Worst-Case Data:**

**Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz**

Operation Mode :	802.11aB1	Test Date :	2018/1/29
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	30.35	20.18	50.53	68.3	-17.77

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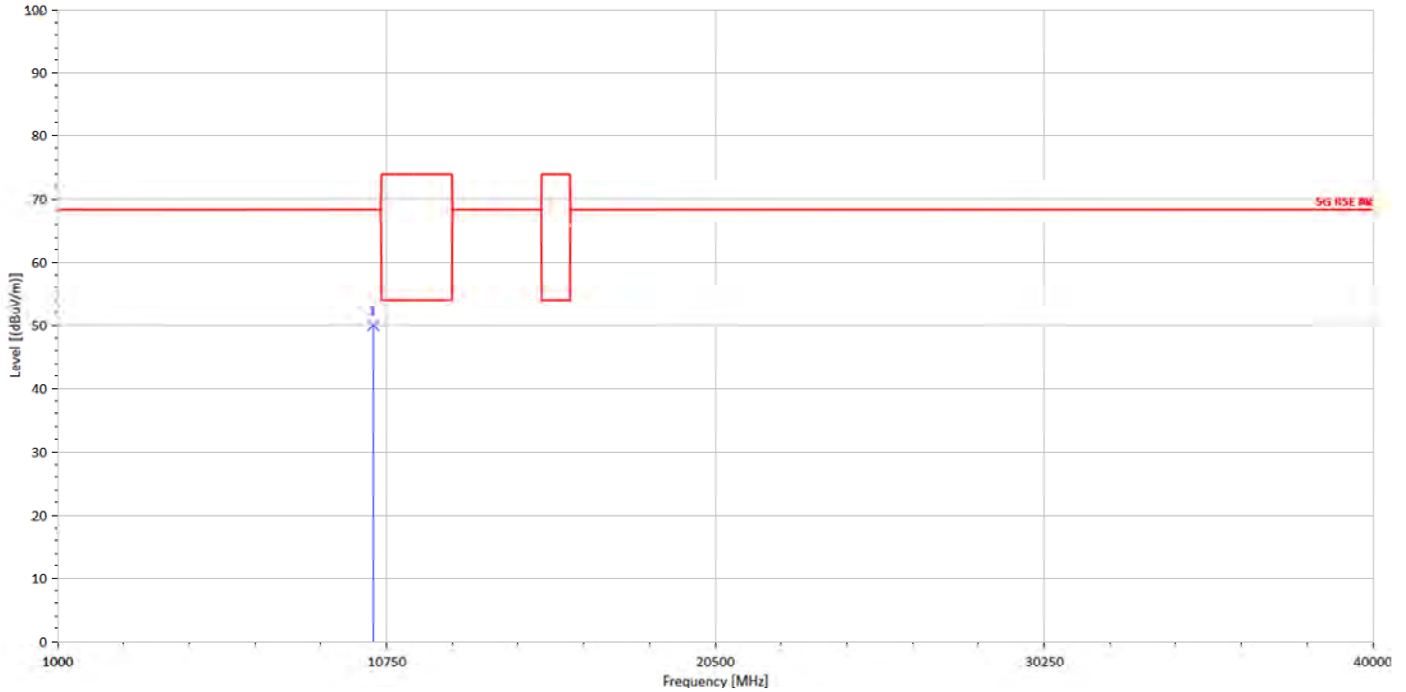
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Operation Mode :	802.11aB1	Test Date :	2018/1/29
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10360.00	H	Peak	29.78	20.18	49.96	68.3	-18.34

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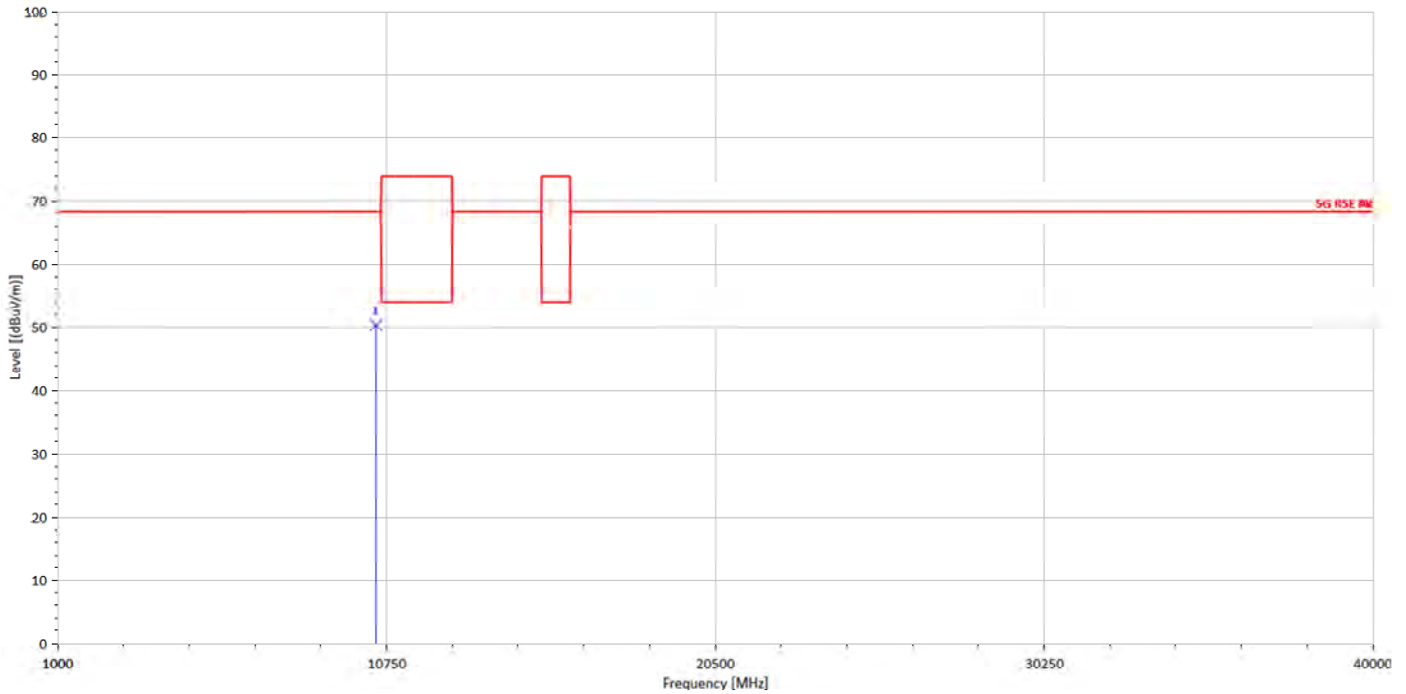
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Operation Mode : 802.11aB1 Test Date : 2018/1/29  
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH MID Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	H	Peak	30.03	20.29	50.33	68.3	-17.97

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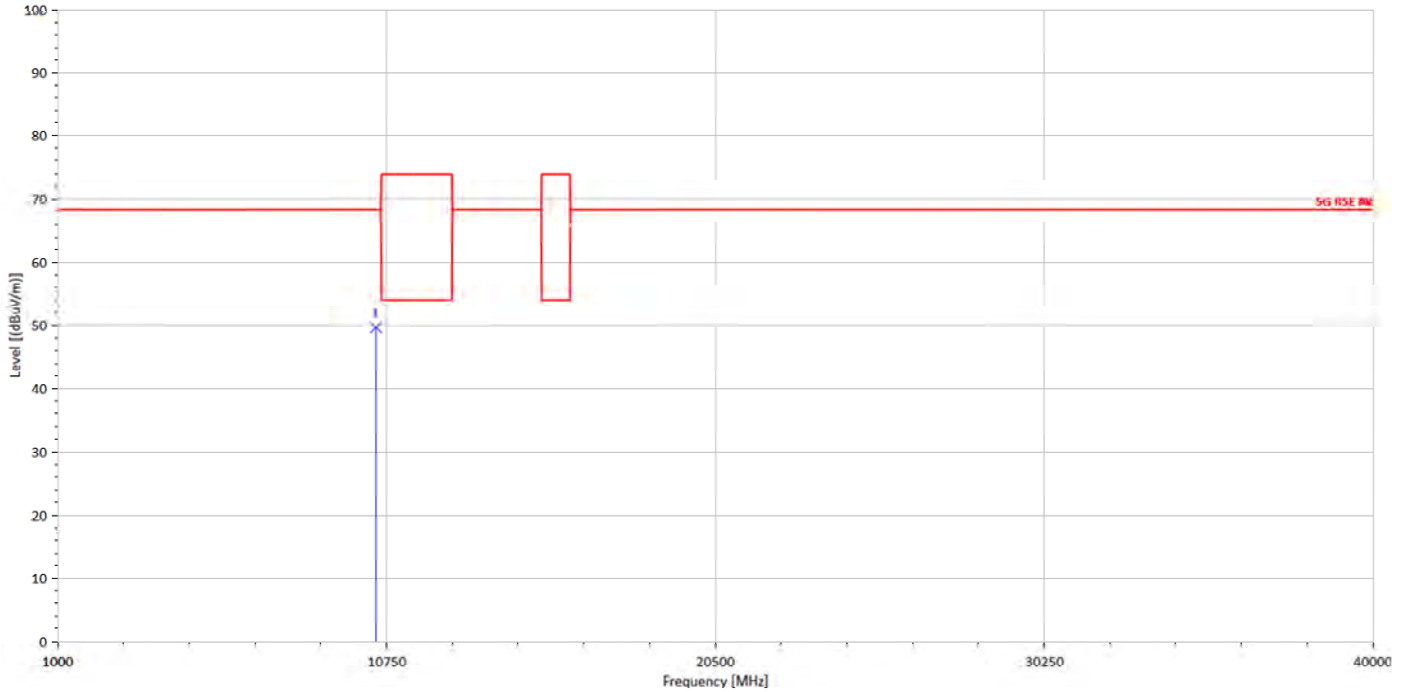
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Operation Mode : 802.11aB1 Test Date : 2018/1/29  
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH MID Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10440.00	H	Peak	29.36	20.29	49.65	68.3	-18.65

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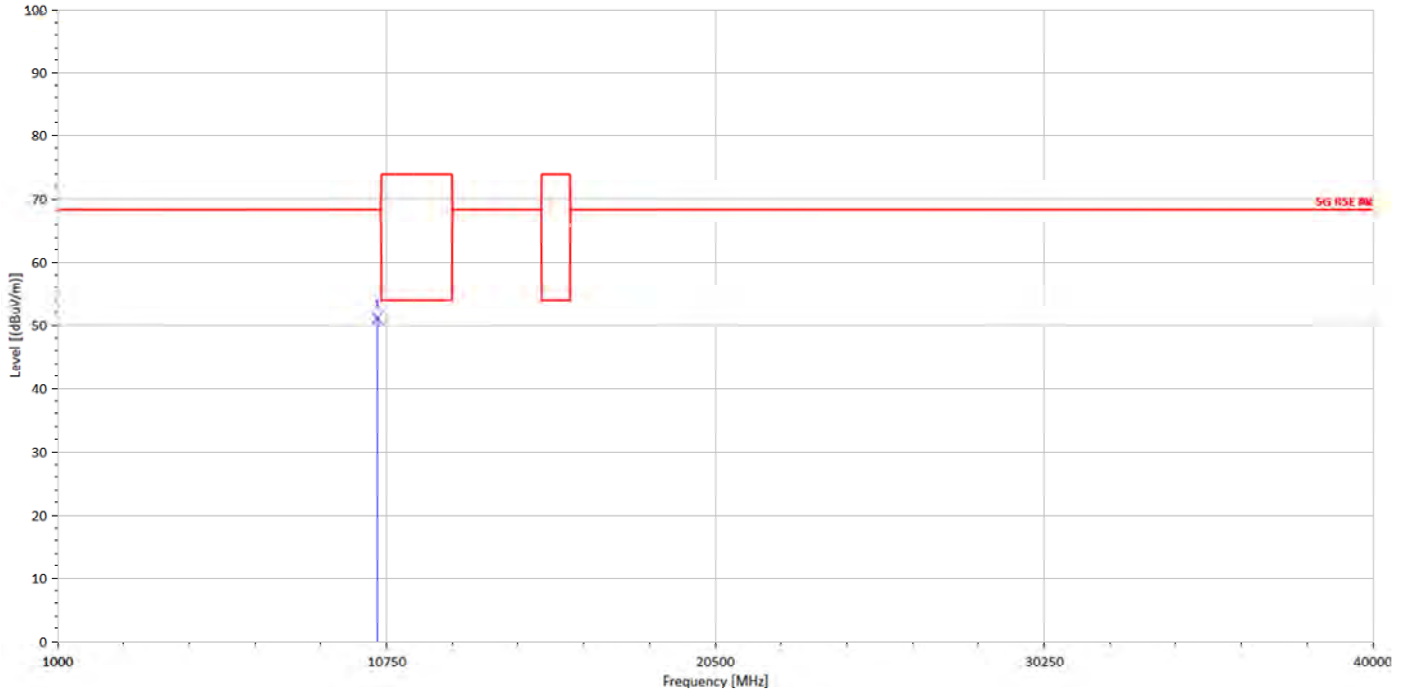
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Operation Mode :	802.11aB1	Test Date :	2018/1/29
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH HIGH	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10480.00	H	Peak	30.45	20.68	51.13	68.3	-17.17

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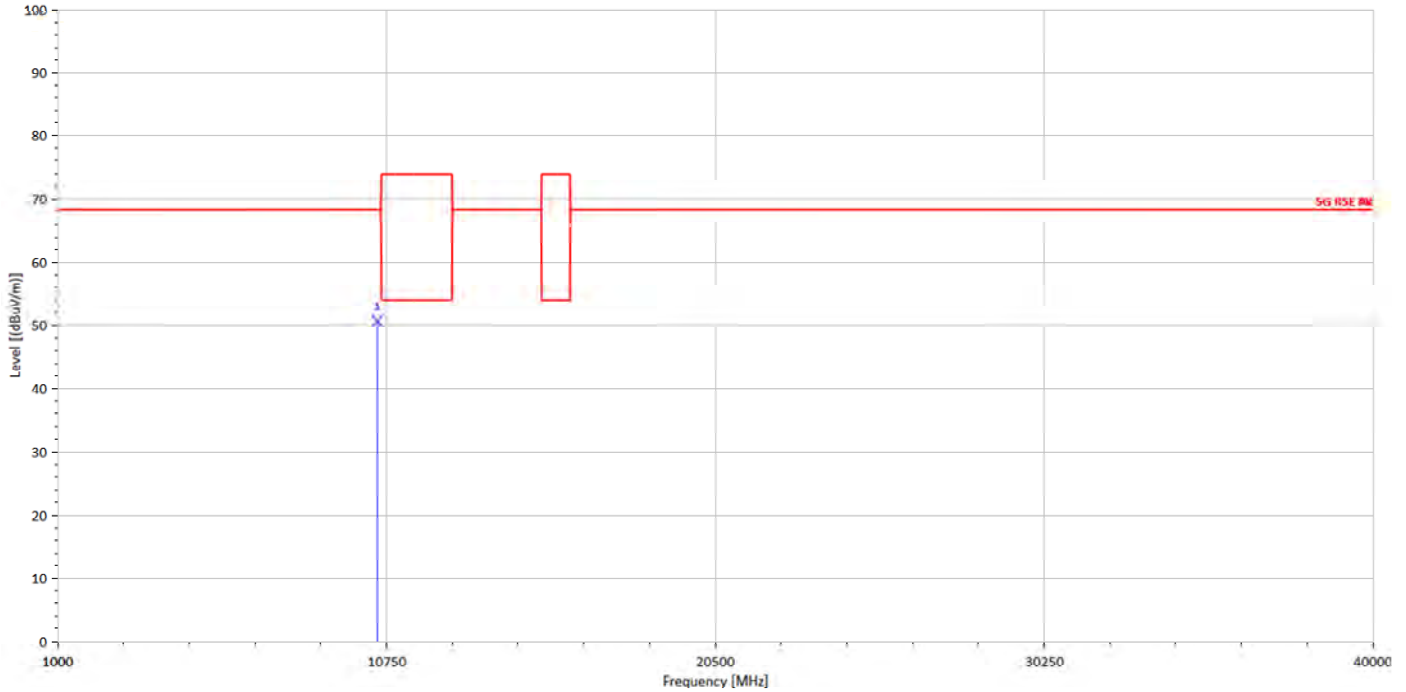
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Operation Mode :	802.11aB1	Test Date :	2018/1/29
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH HIGH	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10480.00	H	Peak	30.02	20.68	50.70	68.3	-17.60

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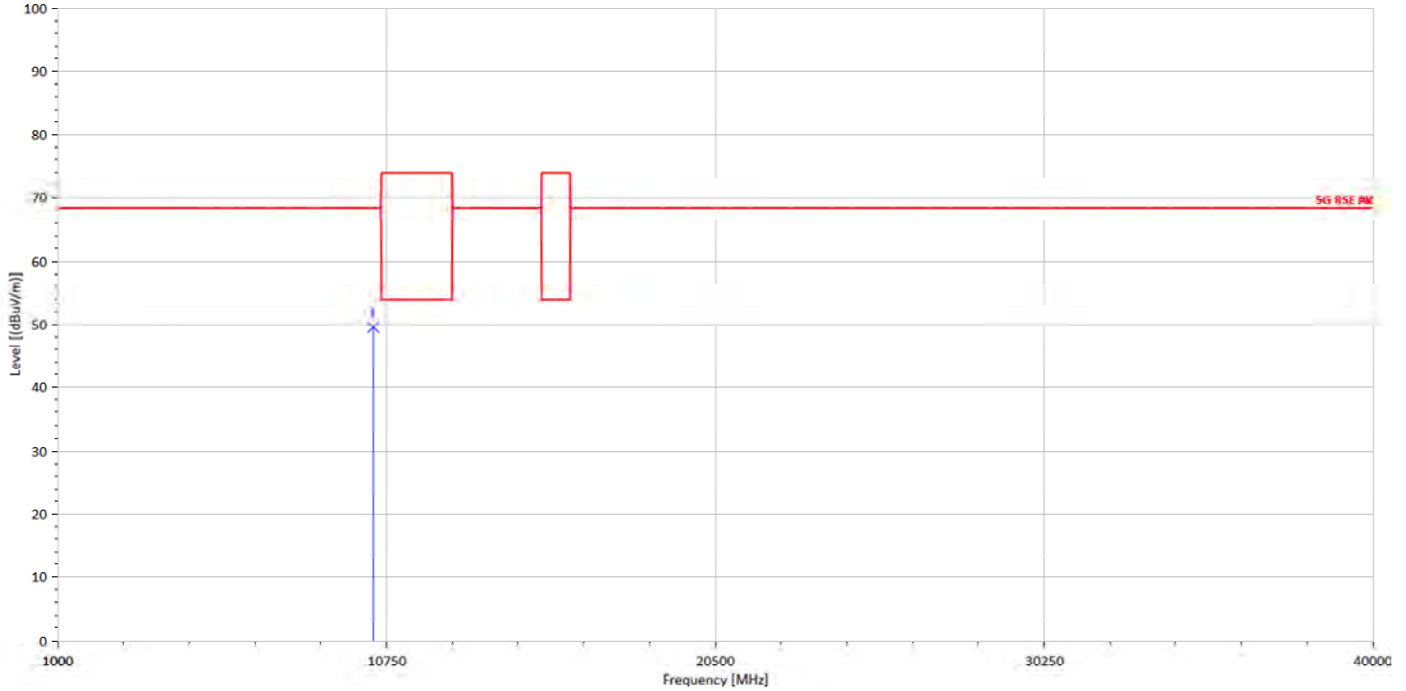
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**Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz**

Operation Mode :	802.11n20B1	Test Date :	2018/1/29
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10360.00	H	Peak	29.39	20.18	49.56	68.3	-18.74

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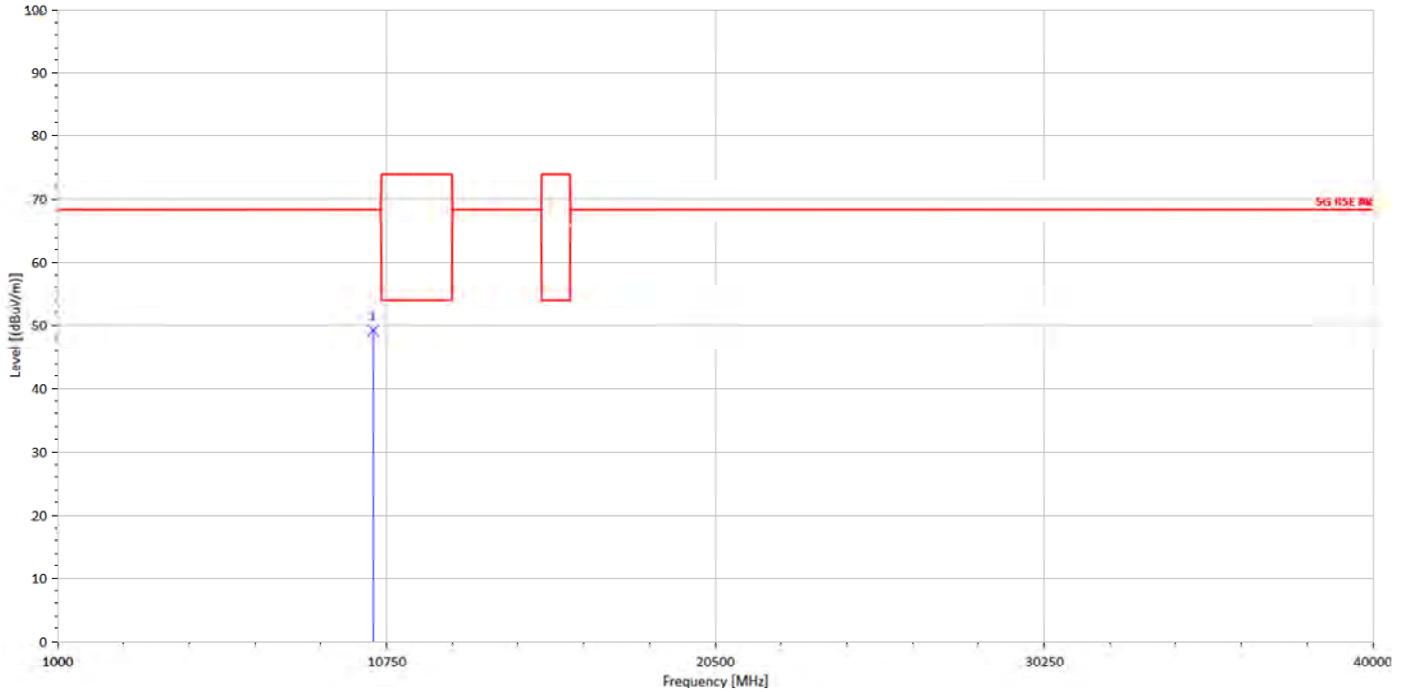
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Operation Mode : 802.11n20B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH LOW Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10360.00	H	Peak	28.94	20.18	49.11	68.3	-19.19

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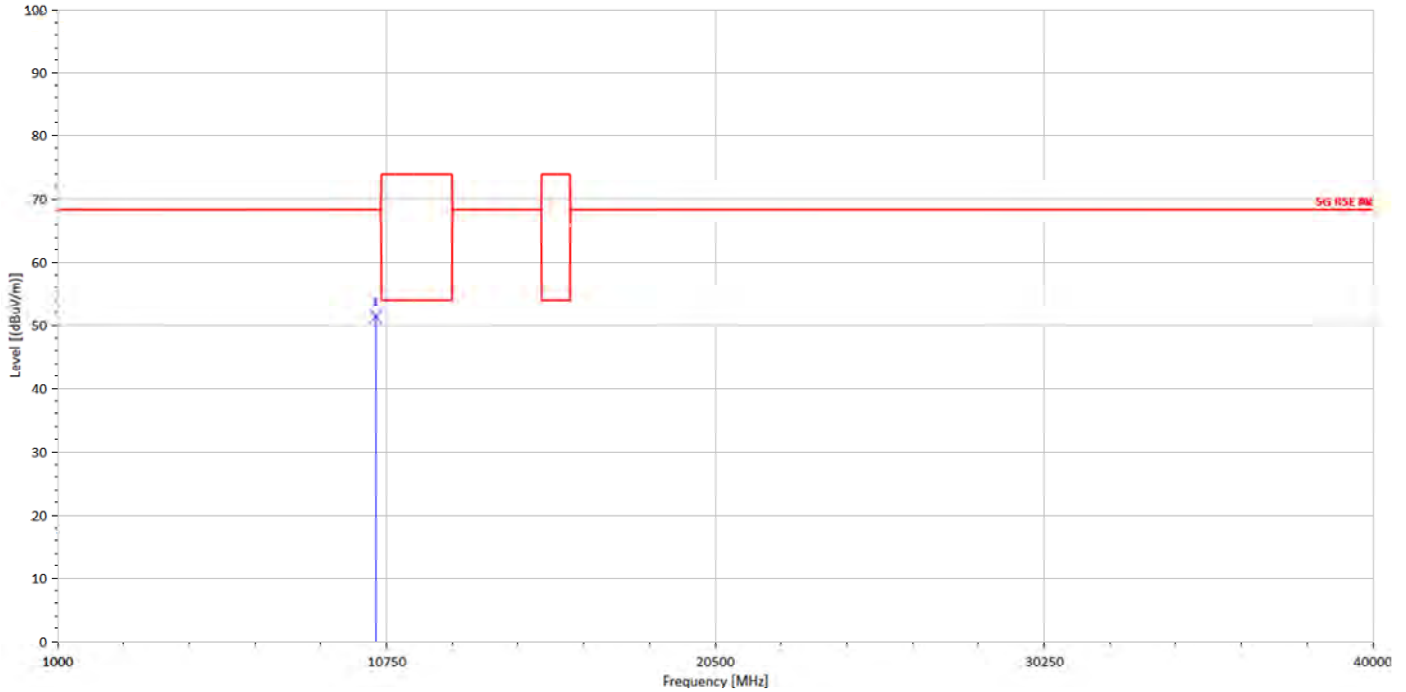
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Operation Mode : 802.11n20B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH MID Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
10440.00	H	Peak	31.14	20.29	51.43	68.3	-16.87

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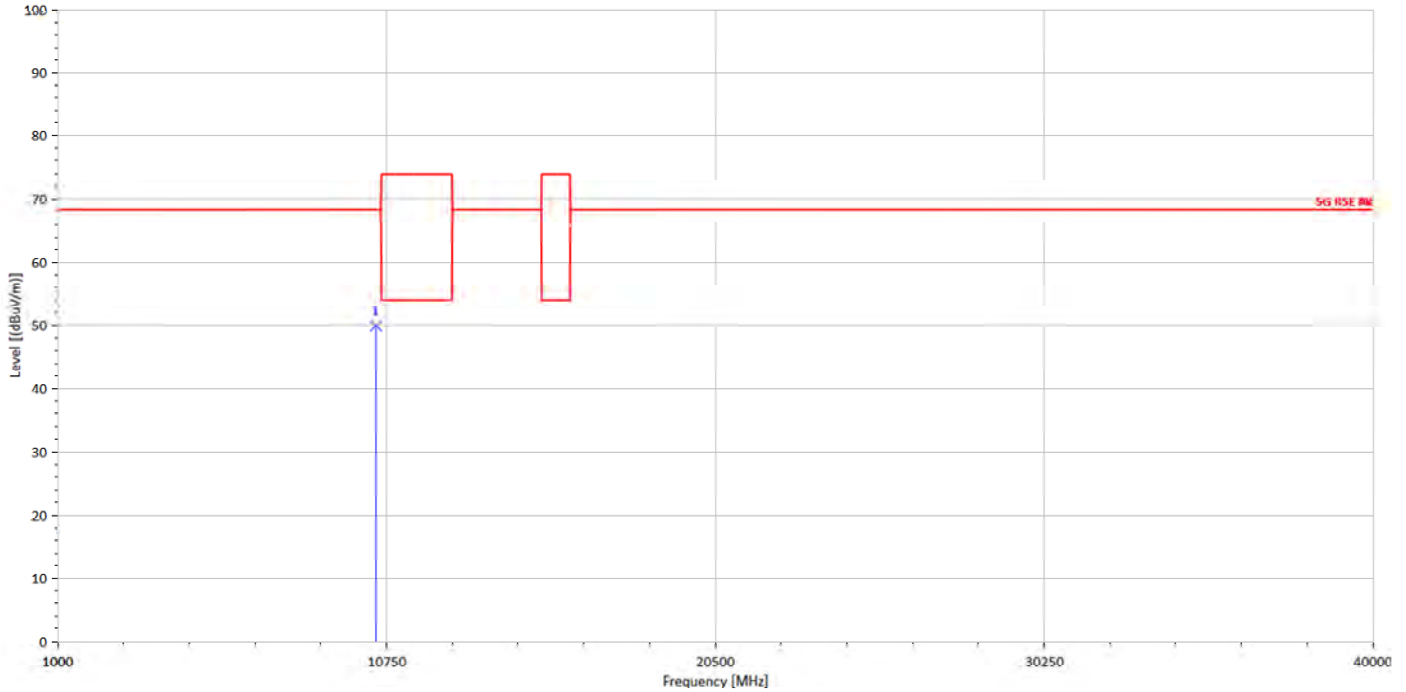
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Operation Mode : 802.11n20B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH MID Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
10440.00	H	Peak	29.61	20.29	49.90	68.3	-18.40

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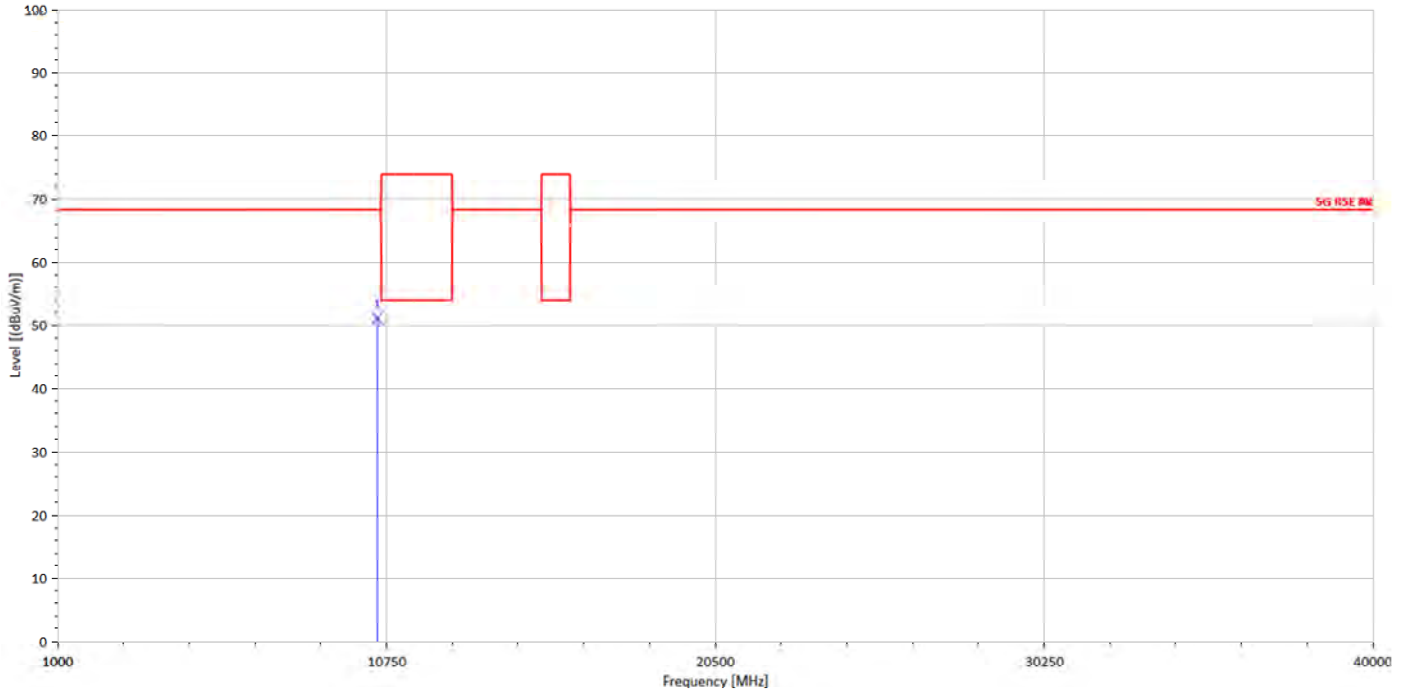
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Operation Mode : 802.11n20B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
10480.00	H	Peak	30.44	20.68	51.12	68.3	-17.18

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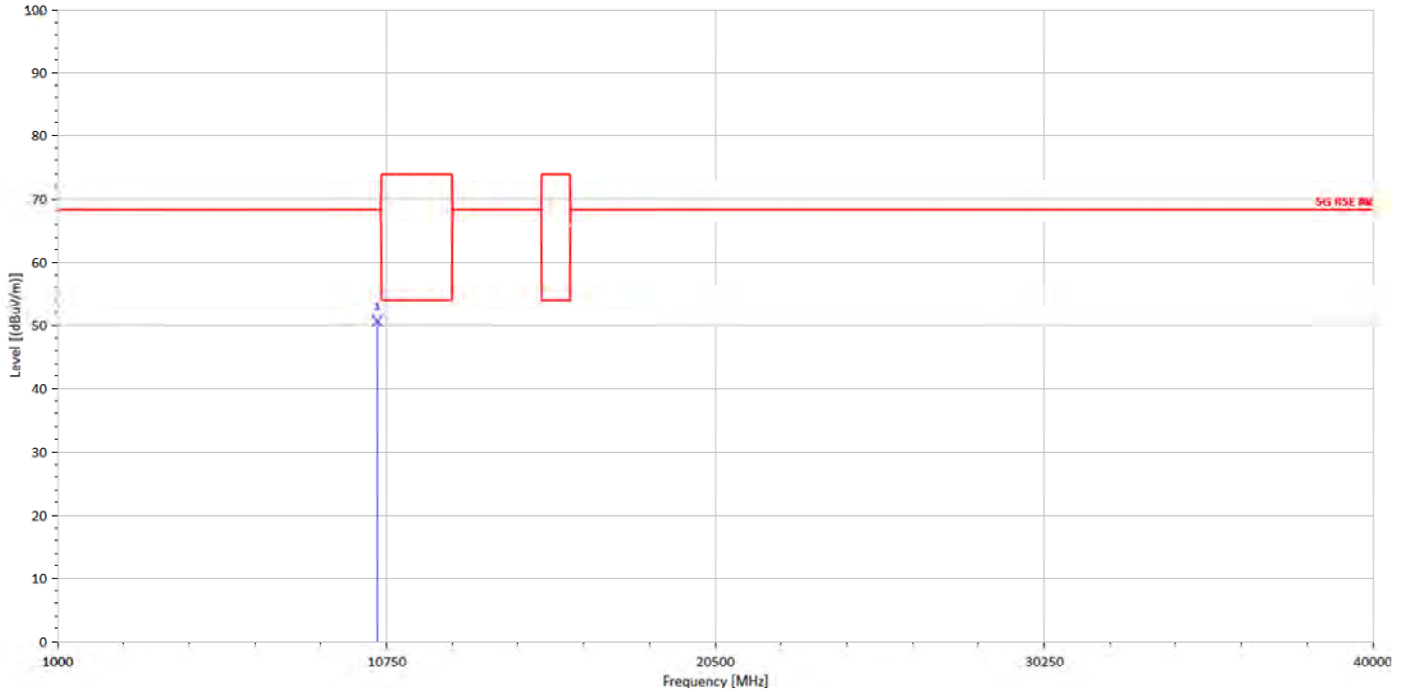
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Operation Mode : 802.11n20B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10480.00	H	Peak	30.02	20.68	50.70	68.3	-17.60

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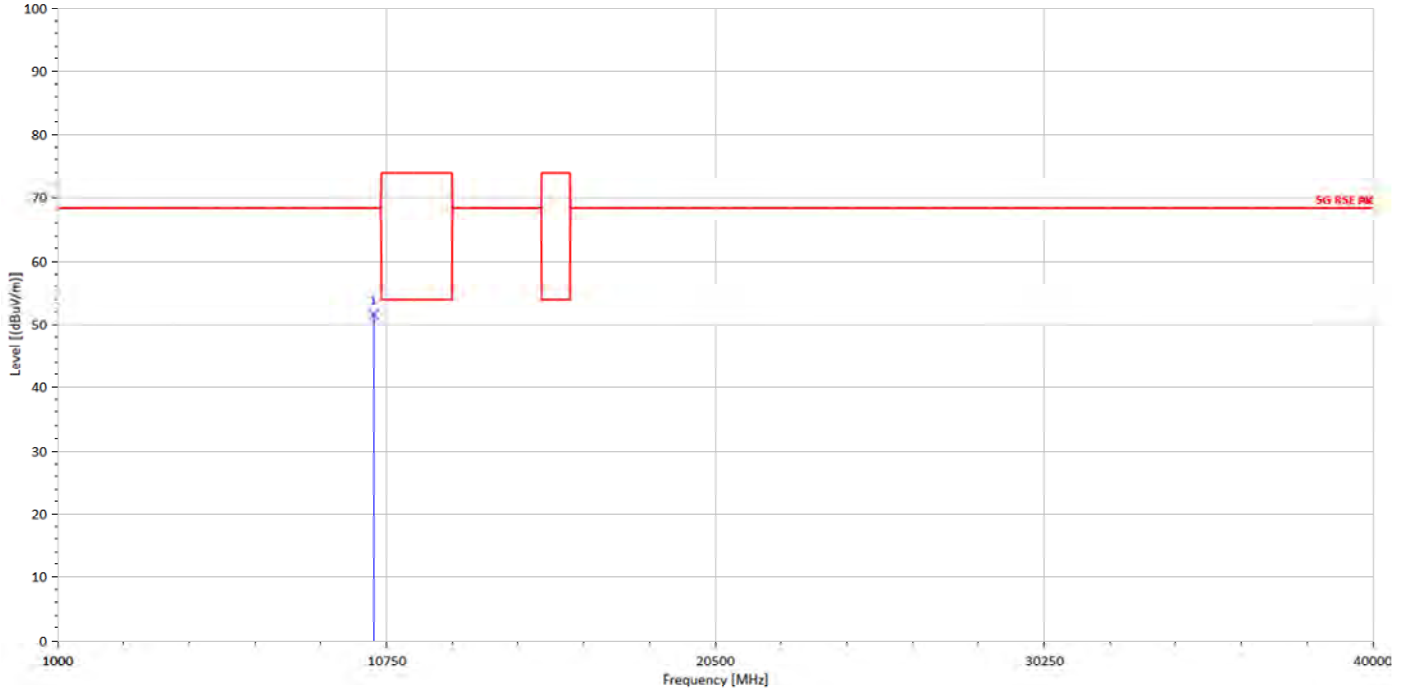
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### Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Mode :	802.11n40B1	Test Date :	2018/1/29
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	23.5deg_C/50RH
Operation Band :	TX CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10380.00	H	Peak	30.61	20.95	51.56	68.3	-16.74

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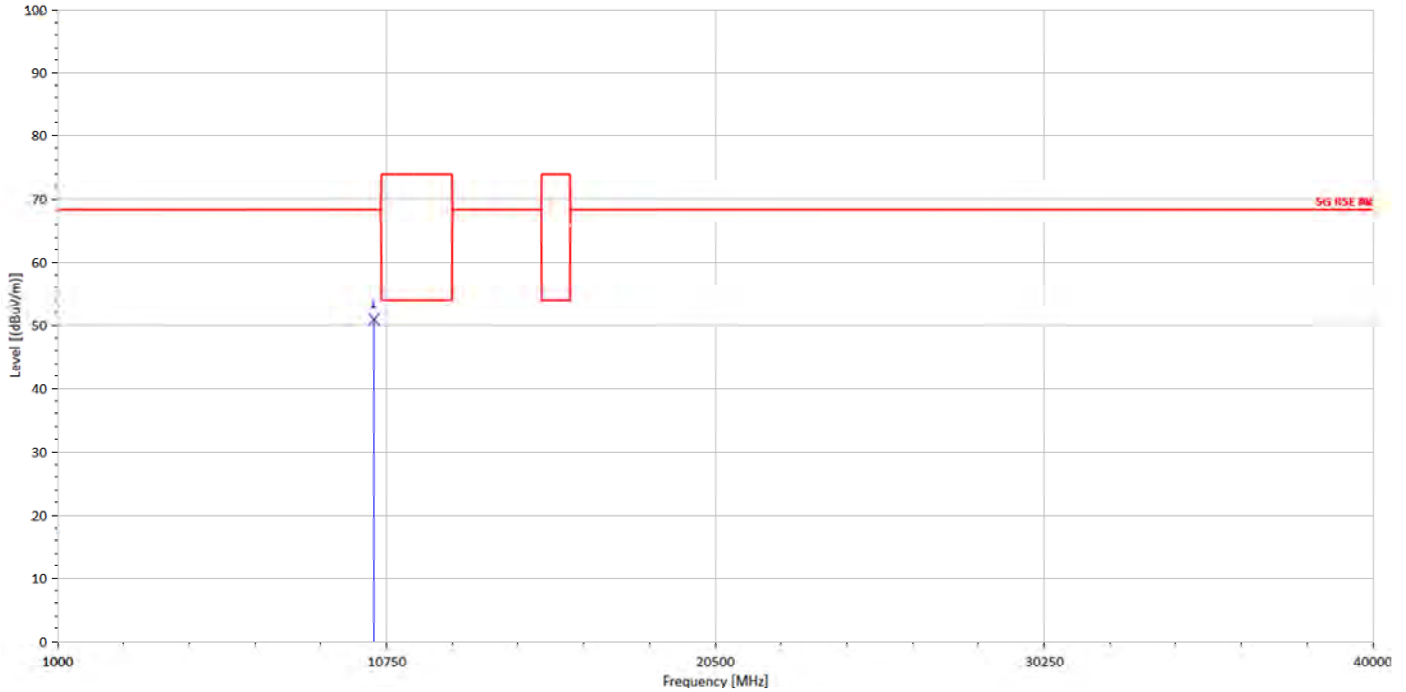
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Operation Mode : 802.11n40B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH LOW Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10380.00	H	Peak	29.99	20.95	50.95	68.3	-17.35

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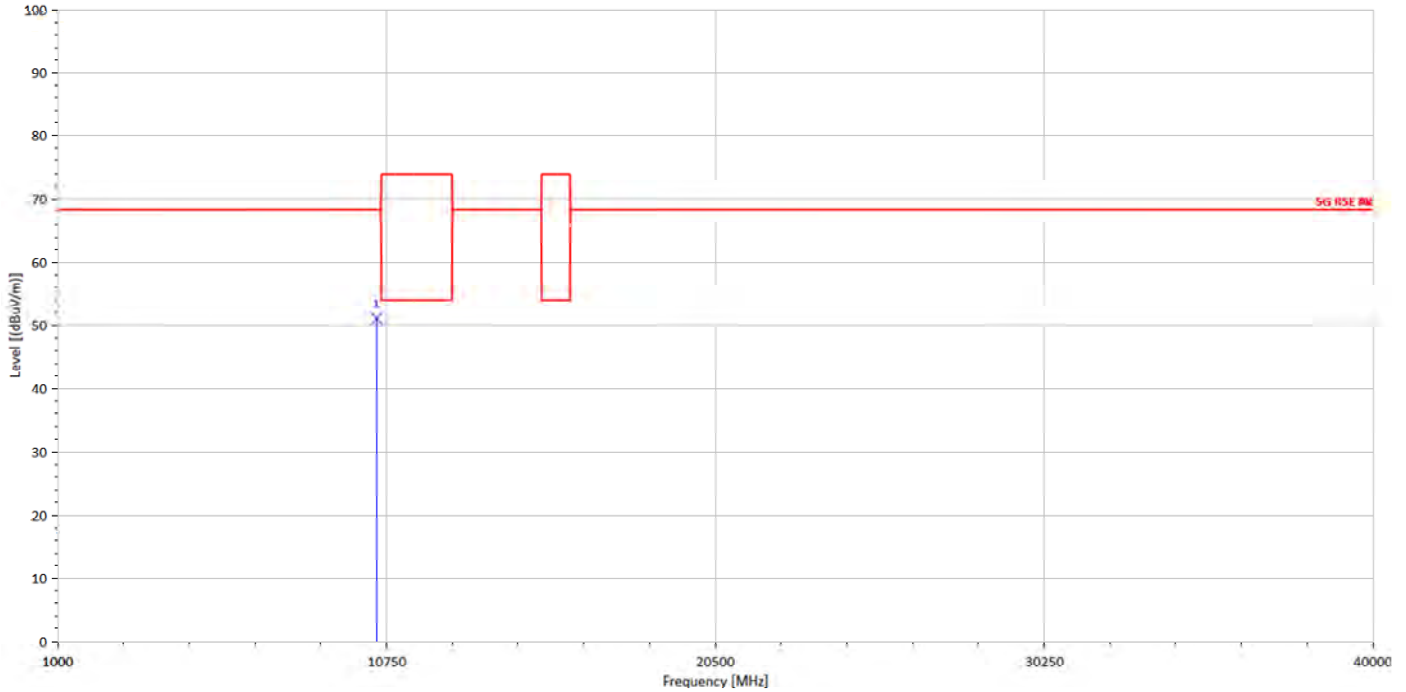
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Operation Mode : 802.11n40B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10460.00	H	Peak	30.13	20.95	51.08	68.3	-17.22

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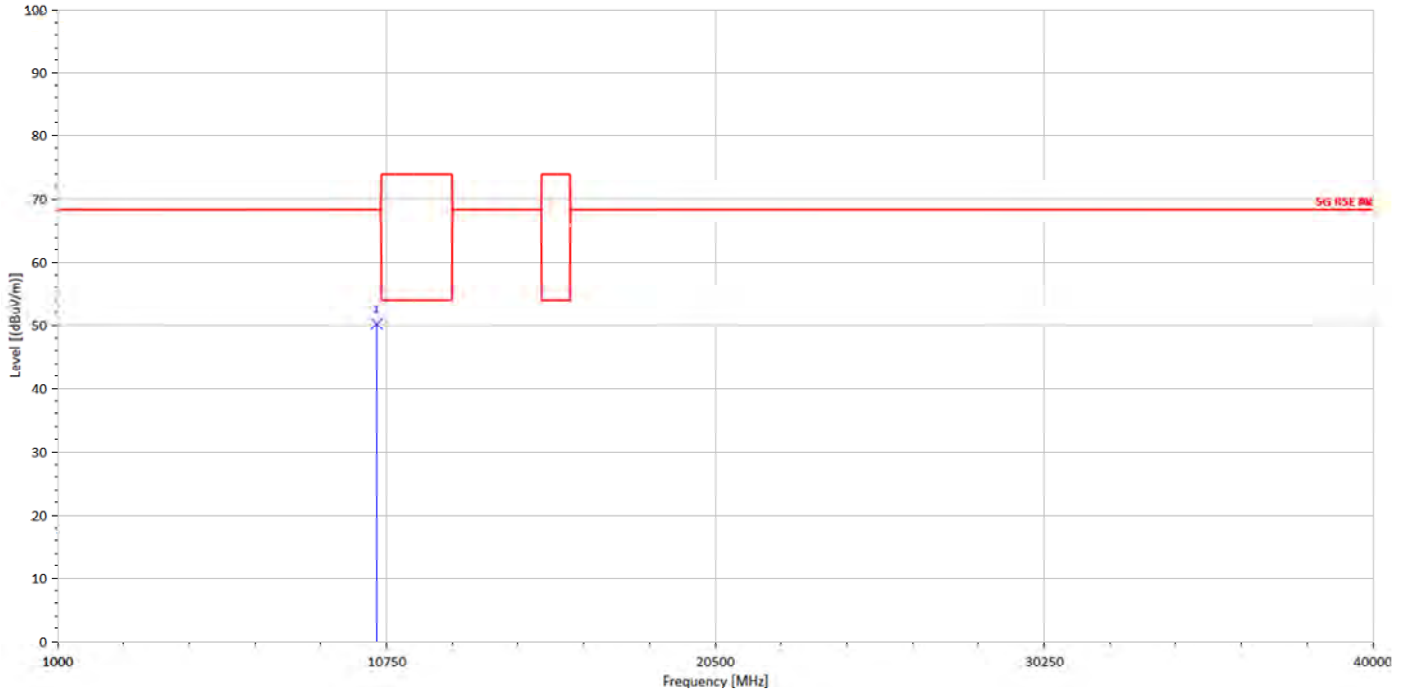
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Operation Mode : 802.11n40B1 Test Date : 2018/1/29  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 23.5deg\_C/50RH  
 Operation Band : TX CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10460.00	H	Peak	29.24	20.95	50.19	68.3	-18.11

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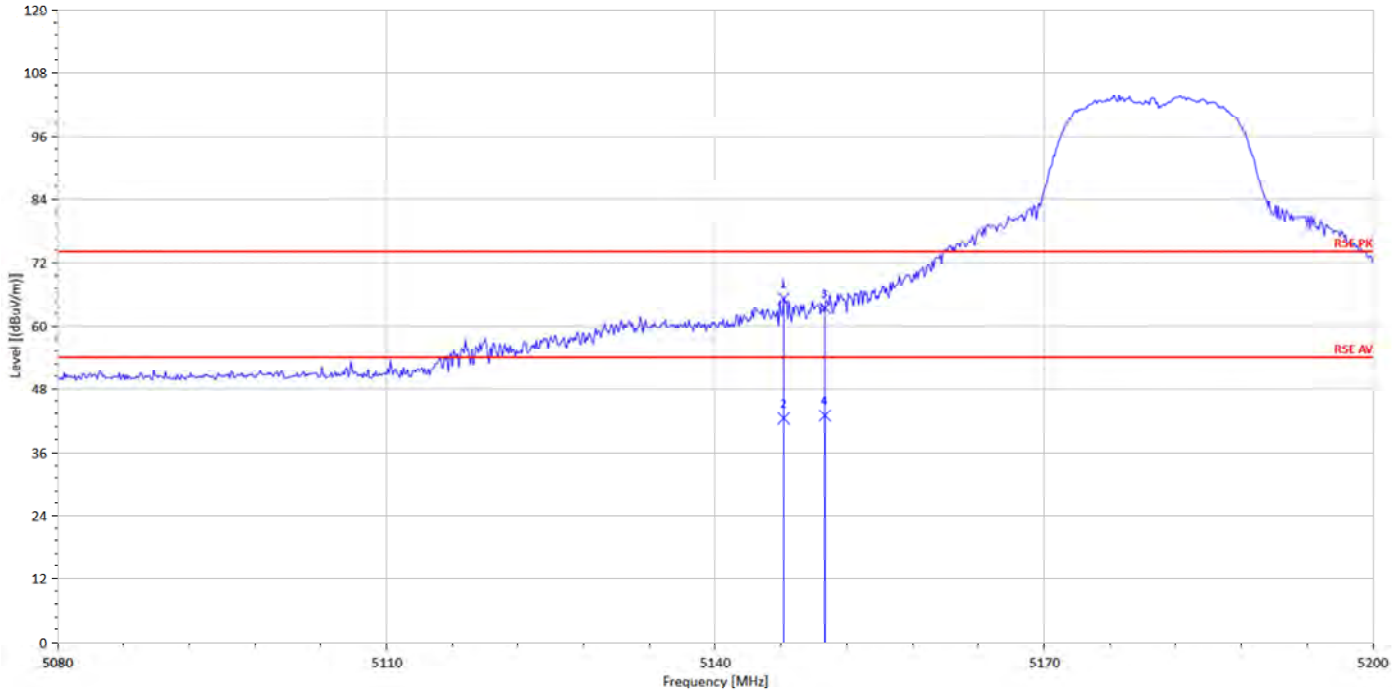
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**Band edge falling to restricted band  
802.11a mode**

Operation Mode :	802.11aB1	Test Date :	2018/1/26
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5146.24	S	Peak	57.09	8.17	65.25	74	-8.75
5146.24	S	Average	34.21	8.17	42.38	54	-11.62
5150.00	E	Peak	55.28	8.19	63.47	74	-10.53
5150.00	E	Average	34.72	8.19	42.91	54	-11.09

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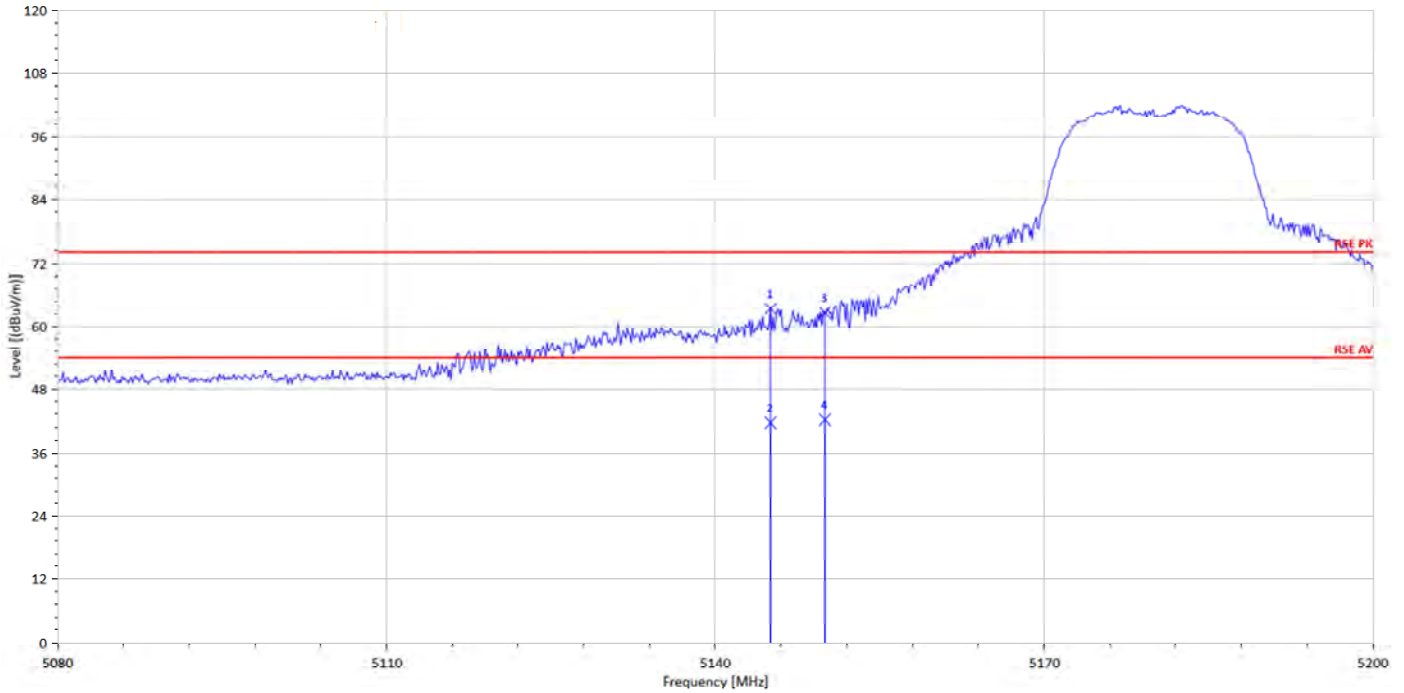
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Operation Mode :	802.11aB1	Test Date :	2018/1/26
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



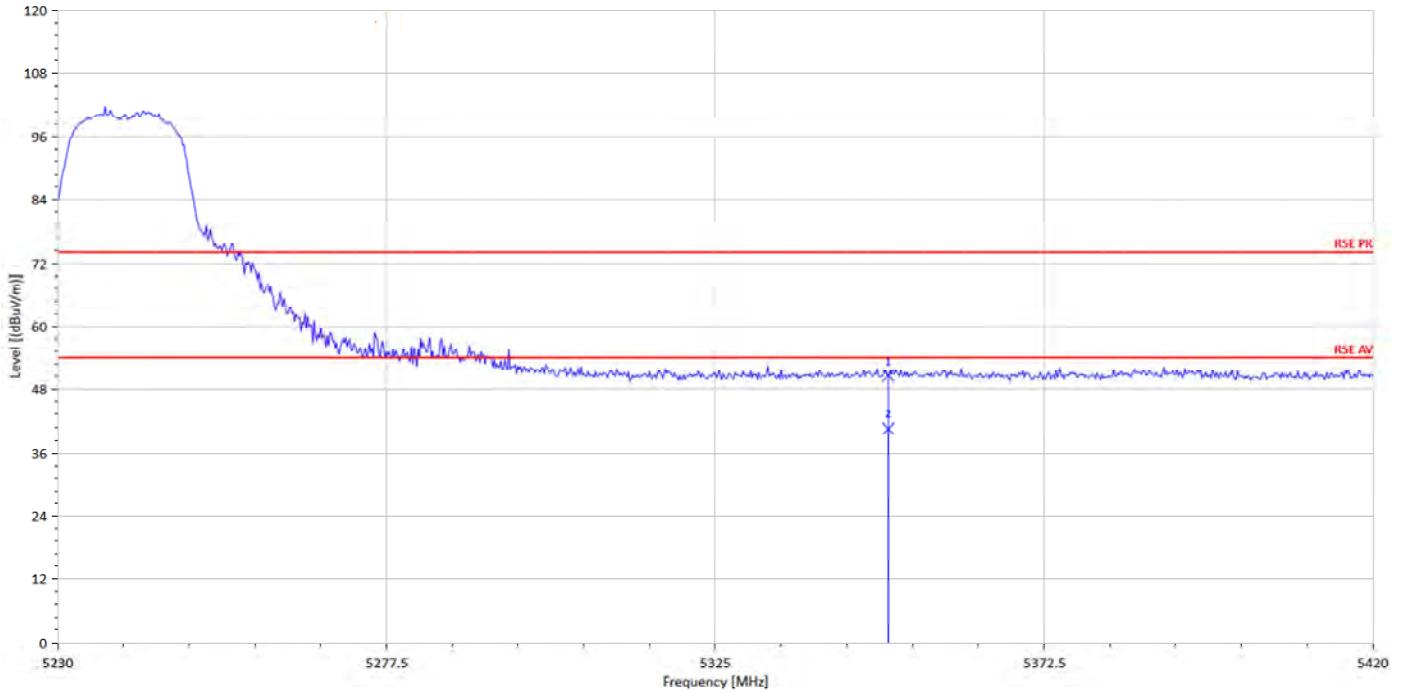
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5145.04	S	Peak	55.20	8.16	63.36	74	-10.64
5145.04	S	Average	33.55	8.16	41.71	54	-12.29
5150.00	E	Peak	54.41	8.19	62.61	74	-11.39
5150.00	E	Average	34.05	8.19	42.24	54	-11.76

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Operation Mode :	802.11aB1	Test Date :	2018/1/26
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH HIGH	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Peak	41.65	8.96	50.61	74	-23.39
5350.00	E	Average	31.66	8.96	40.62	54	-13.38

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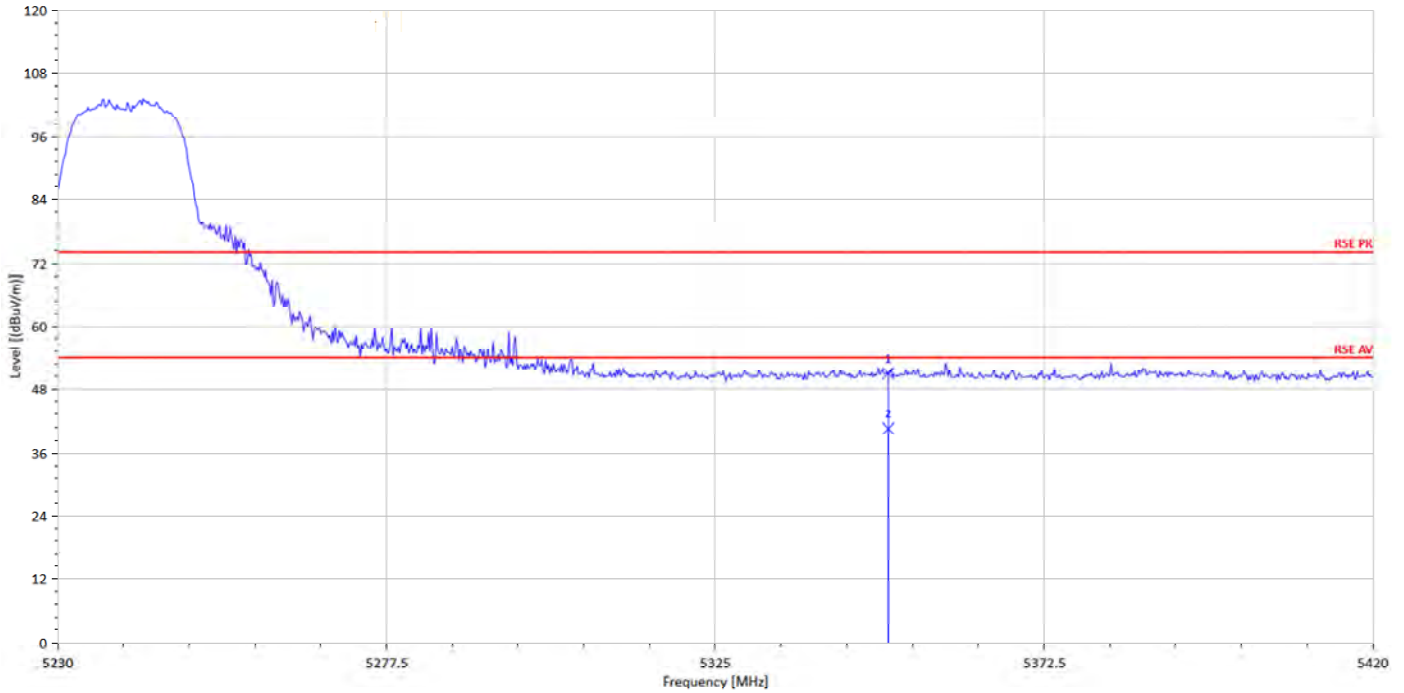
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Operation Mode :	802.11aB1	Test Date :	2018/1/26
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH HIGH	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5350.00	E	Peak	42.10	8.96	51.07	74	-22.93
5350.00	E	Average	31.69	8.96	40.65	54	-13.35

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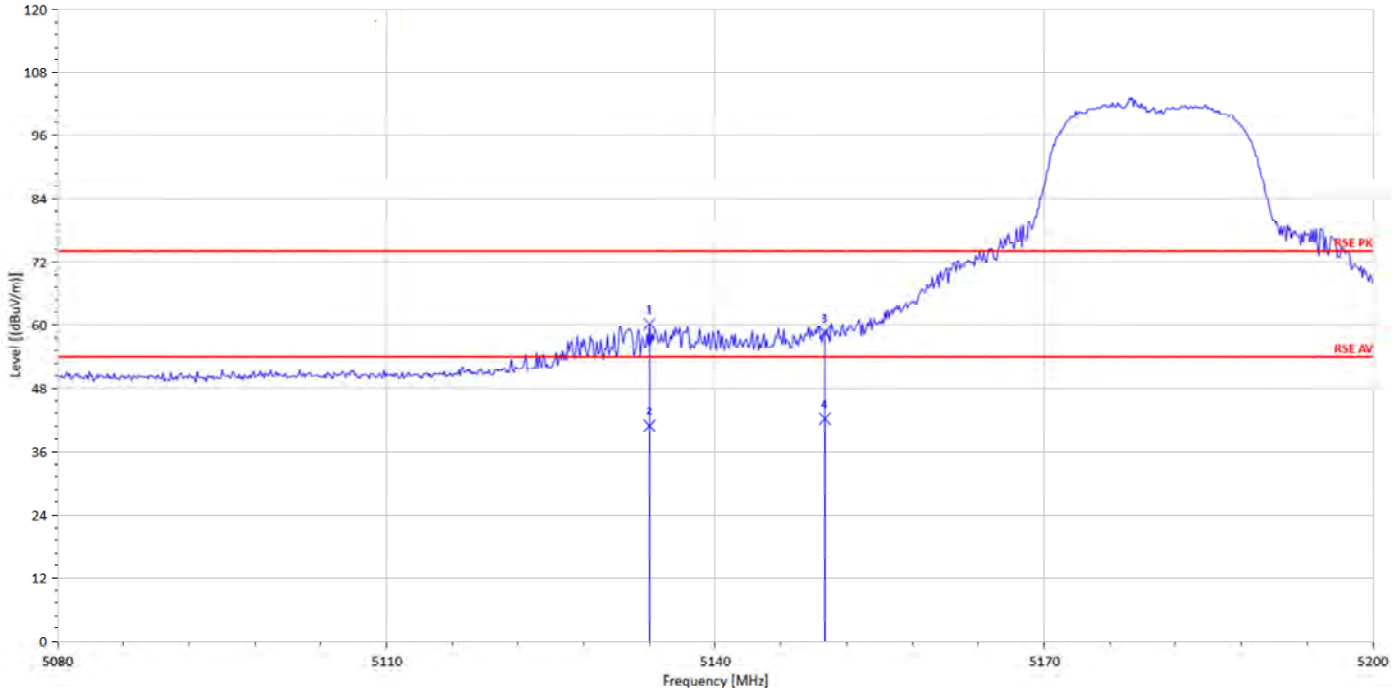
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### 802.11n20 HT mode

Operation Mode :	802.11n20B1	Test Date :	2018/1/26
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



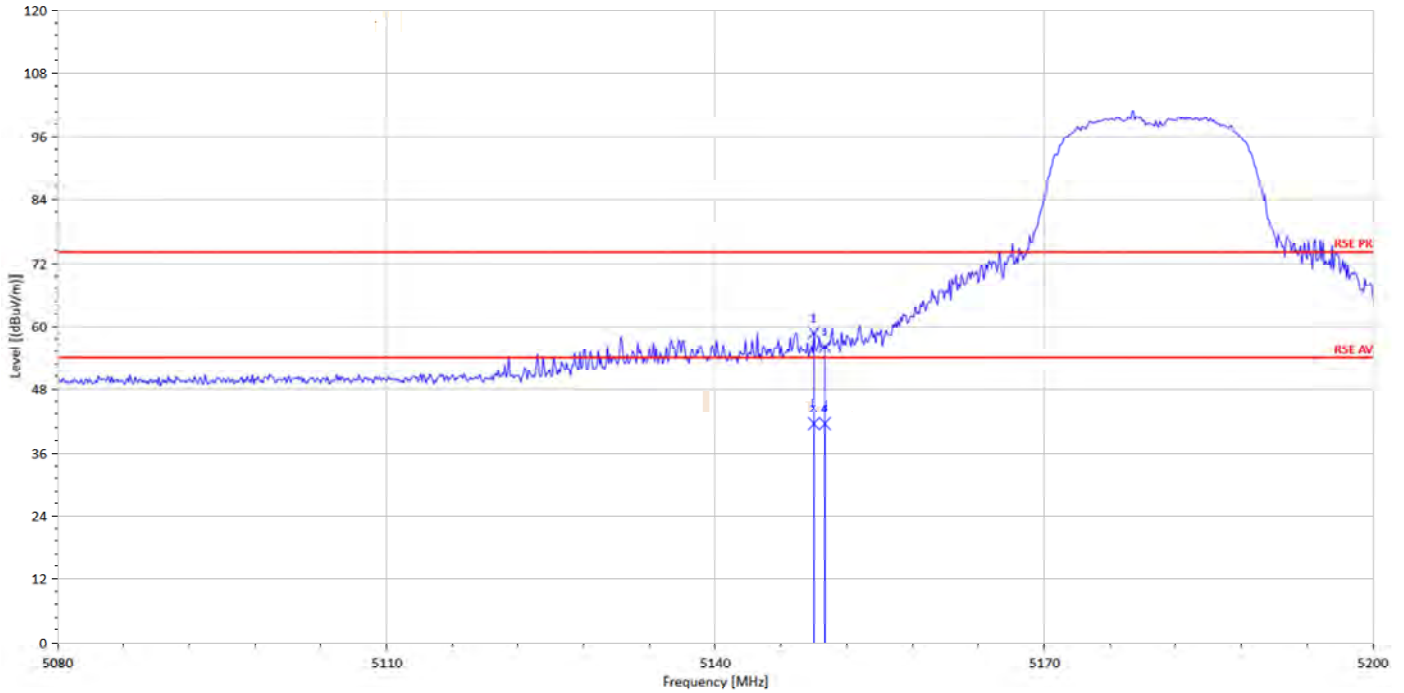
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5134.00	S	Peak	52.06	8.10	60.15	74	-13.85
5134.00	S	Average	32.85	8.10	40.95	54	-13.05
5150.00	E	Peak	50.32	8.19	58.51	74	-15.49
5150.00	E	Average	34.04	8.19	42.23	54	-11.77

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Operation Mode :	802.11n20B1	Test Date :	2018/1/26
Fundamental Frequency :	5180 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5149.00	S	Peak	50.54	8.19	58.73	74	-15.27
5149.00	S	Average	33.37	8.19	41.56	54	-12.44
5150.00	E	Peak	47.95	8.19	56.14	74	-17.86
5150.00	E	Average	33.38	8.19	41.57	54	-12.43

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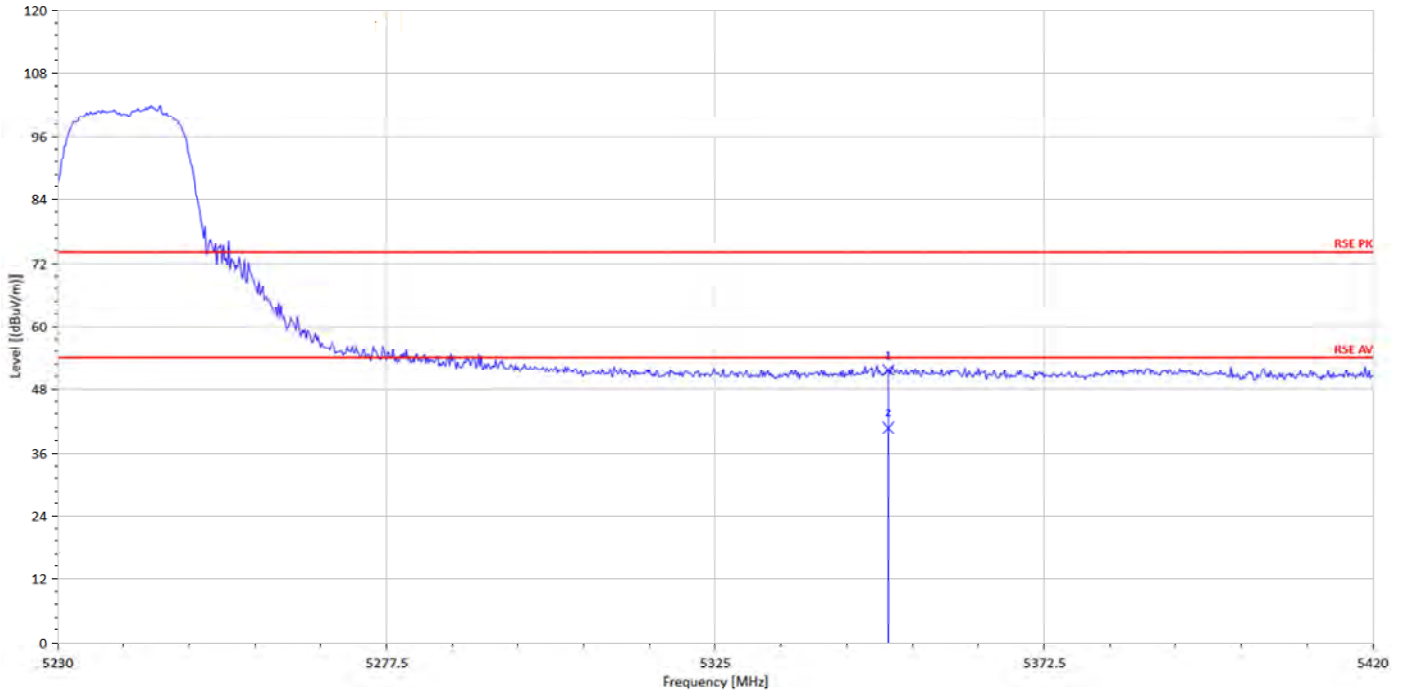
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Operation Mode : 802.11n20B1 Test Date : 2018/1/26  
 Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Peak	42.73	8.96	51.70	74	-22.30
5350.00	E	Average	31.83	8.96	40.79	54	-13.21

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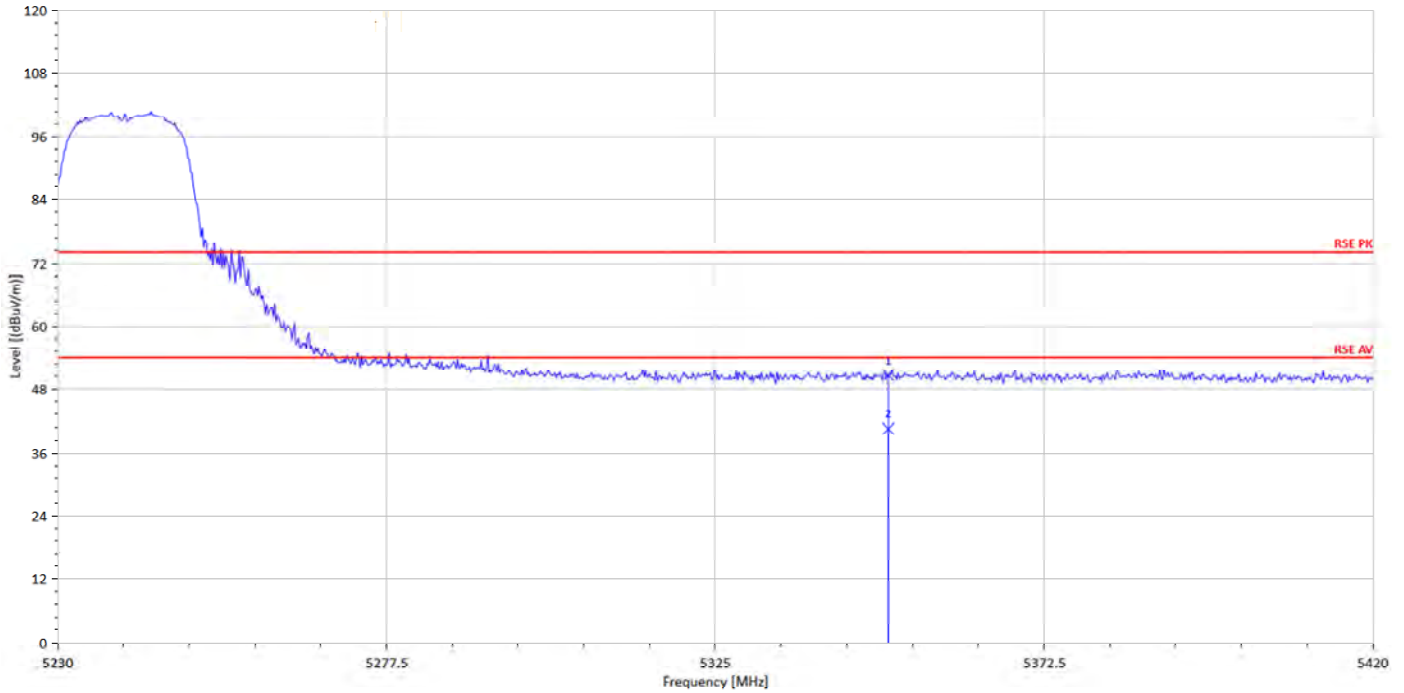
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Operation Mode :	802.11n20B1	Test Date :	2018/1/26
Fundamental Frequency :	5240 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH HIGH	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5350.00	E	Peak	41.74	8.96	50.70	74	-23.30
5350.00	E	Average	31.65	8.96	40.61	54	-13.39

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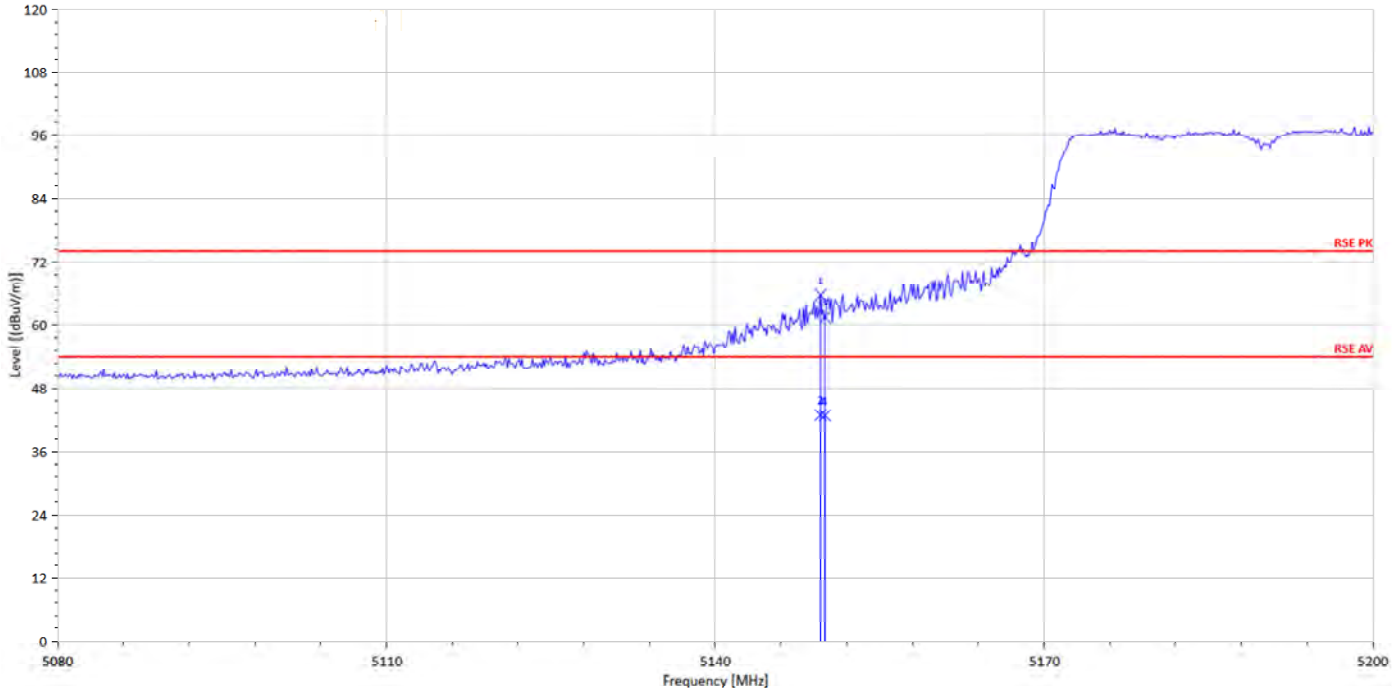
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### 802.11n40 HT mode

Operation Mode :	802.11n40B1	Test Date :	2018/1/26
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
5149.60	S	Peak	57.46	8.19	65.65	74	-8.35
5149.60	S	Average	34.75	8.19	42.94	54	-11.06
5150.00	E	Peak	53.28	8.19	61.48	74	-12.52
5150.00	E	Average	34.66	8.19	42.85	54	-11.15

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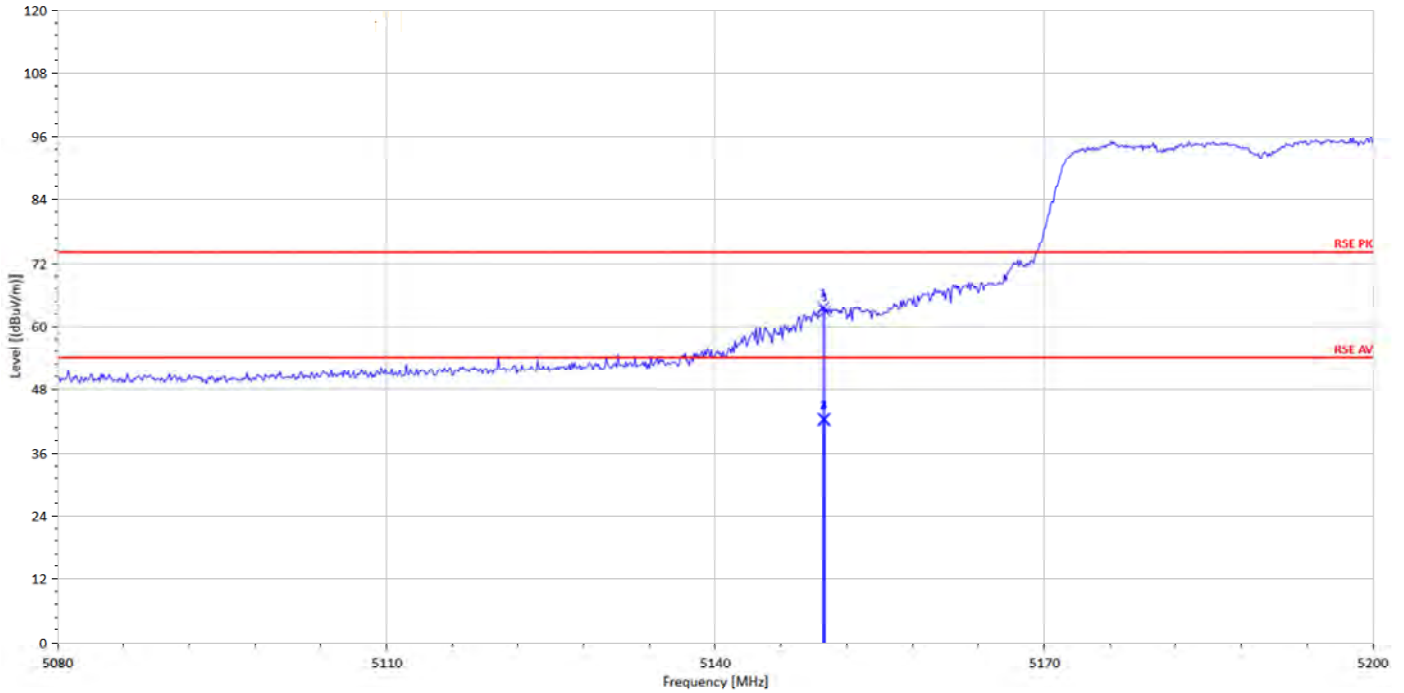
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Operation Mode :	802.11n40B1	Test Date :	2018/1/26
Fundamental Frequency :	5190 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH LOW	Test Engineer :	Enzo
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5149.84	S	Peak	55.45	8.19	63.64	74	-10.36
5149.84	S	Average	34.09	8.19	42.28	54	-11.72
5150.00	E	Peak	54.72	8.19	62.91	74	-11.09
5150.00	E	Average	34.08	8.19	42.27	54	-11.73

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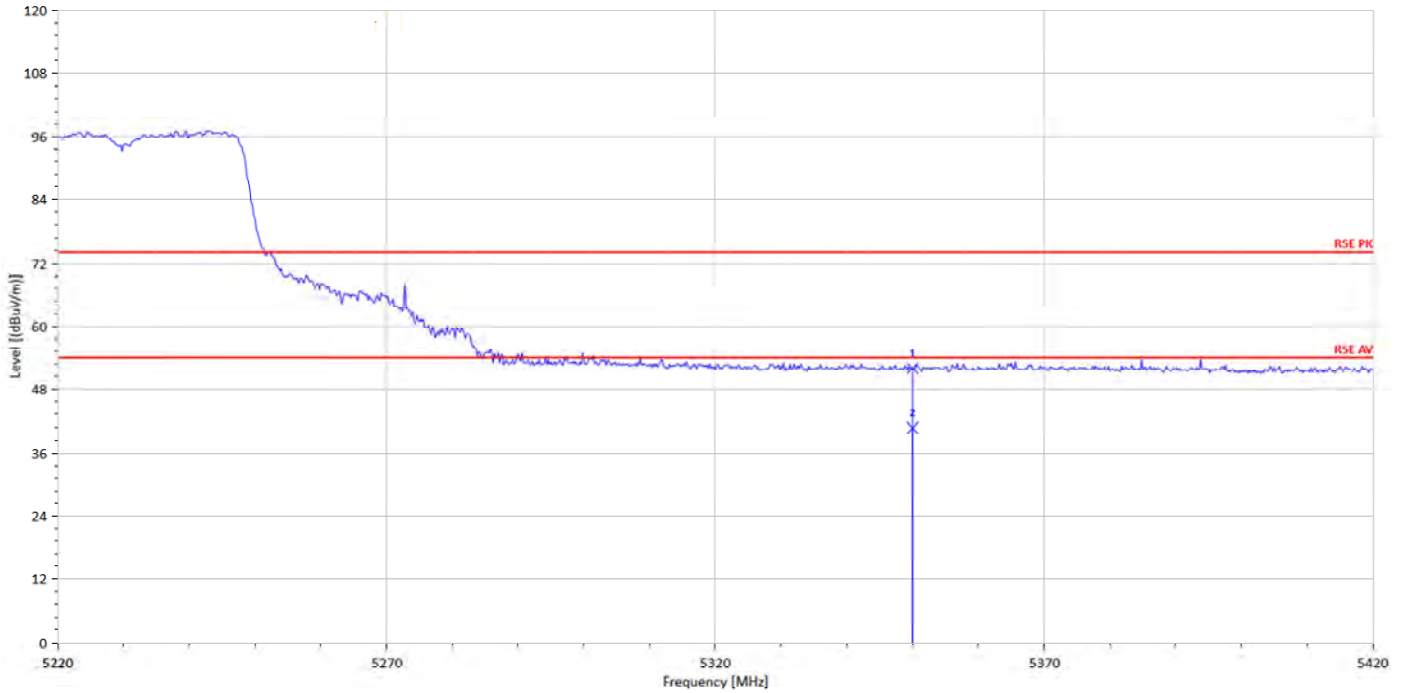
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Operation Mode : 802.11n40B1 Test Date : 2018/1/26  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Peak	43.04	8.96	52.01	74	-21.99
5350.00	E	Average	31.81	8.96	40.77	54	-13.23

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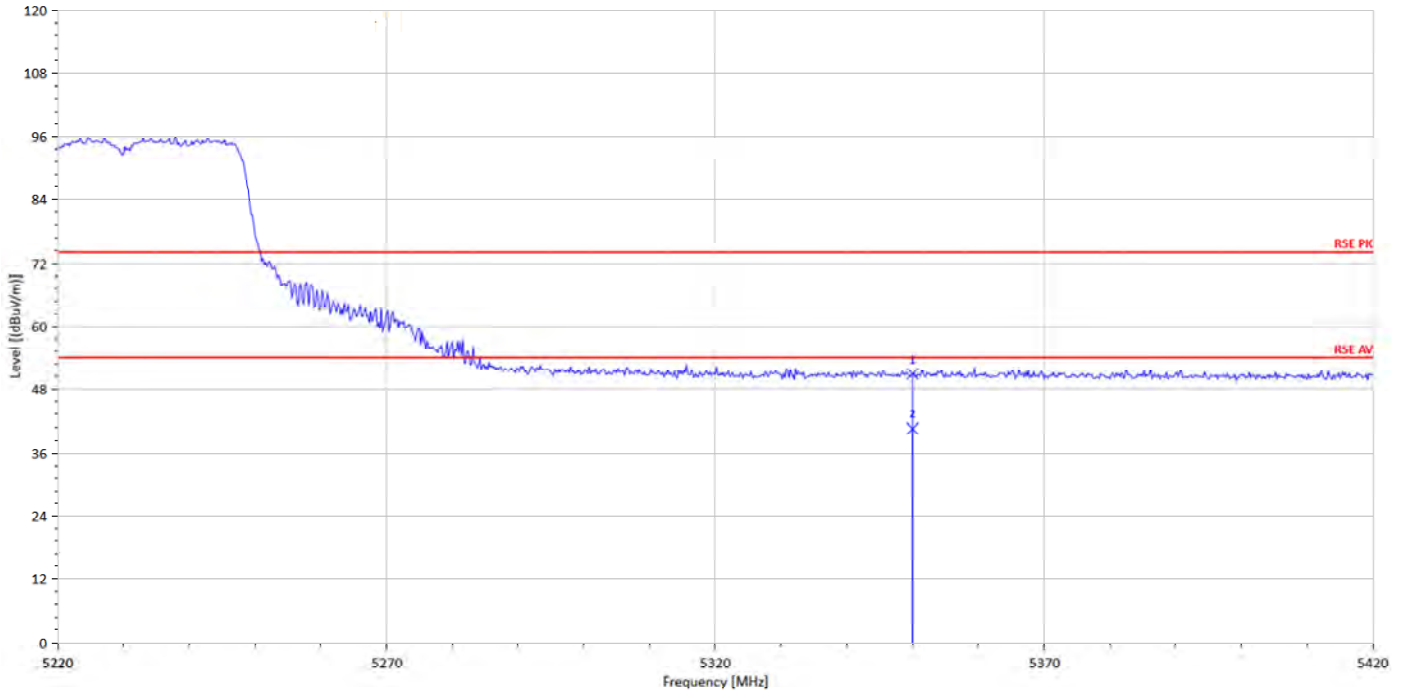
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Operation Mode : 802.11n40B1 Test Date : 2018/1/26  
 Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : BE CH HIGH Test Engineer : Enzo  
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
5350.00	E	Peak	41.97	8.96	50.94	74	-23.06
5350.00	E	Average	31.67	8.96	40.63	54	-13.37

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## 12 TRANSMISSION IN THE ABSENCE OF DATA

### 12.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

### 12.2 Result

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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### 13 FREQUENCY STABILITY

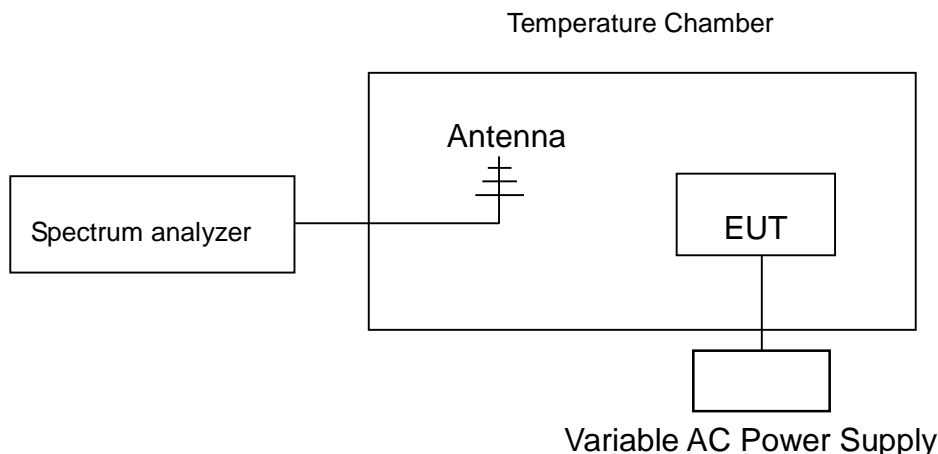
#### 13.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user’s manual.

#### 13.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

#### 13.3 Test SET-UP



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### 13.4 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/24/2017	12/23/2018
DC Block	PASTERNAK	PE8210	RF29	12/24/2017	12/23/2018
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2017	05/01/2018

### 13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	36	5180	5,179.92174	0.00001511
		44	5220	5,219.91367	0.00001654
		48	5240	5,239.91878	0.00001550
	11.4V	36	5180	5,179.96631	0.00000650
		44	5220	5,219.92838	0.00001372
		48	5240	5,239.91951	0.00001536
25 °C	12V	36	5180	5,179.92481	0.00001452
		44	5220	5,219.92481	0.00001441
		48	5240	5,239.92481	0.00001435
35 °C	12.6V	36	5180	5,179.91670	0.00001608
		44	5220	5,219.96042	0.00000758
		48	5240	5,239.91229	0.00001674
	11.4V	36	5180	5,179.91293	0.00001681
		44	5220	5,219.95743	0.00000816
		48	5240	5,239.98610	0.00000265

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Operation Mode	802.11 a	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	36	5180	5,179.90498	0.00001834
		44	5220	5,219.92646	0.00001409
		48	5240	5,239.94169	0.00001113
	11.4V	36	5180	5,179.98707	0.00000250
		44	5220	5,219.99407	0.00000114
		48	5240	5,239.98619	0.00000264
25°C	12V	36	5180	5,179.93876	0.00001182
		44	5220	5,219.98270	0.00000331
		48	5240	5,239.93235	0.00001291
35 °C	12.6V	36	5180	5,179.93400	0.00001274
		44	5220	5,219.92837	0.00001372
		48	5240	5,239.90447	0.00001823
	11.4V	36	5180	5,179.91118	0.00001715
		44	5220	5,219.97314	0.00000515
		48	5240	5,239.94114	0.00001123

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Operation Mode	802.11 a	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	36	5180	5,179.98637	0.00000263
		44	5220	5,219.97549	0.00000470
		48	5240	5,239.93862	0.00001171
	11.4V	36	5180	5,179.97254	0.00000530
		44	5220	5,219.90593	0.00001802
		48	5240	5,239.99965	0.00000007
25°C	12V	36	5180	5,179.90505	0.00001833
		44	5220	5,219.91131	0.00001699
		48	5240	5,239.91498	0.00001623
35 °C	12.6V	36	5180	5,179.94277	0.00001105
		44	5220	5,219.96755	0.00000622
		48	5240	5,239.92947	0.00001346
	11.4V	36	5180	5,179.97024	0.00000575
		44	5220	5,219.99732	0.00000051
		48	5240	5,239.98583	0.00000270

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Operation Mode	802.11 a	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	36	5180	5,179.94323	0.00001096
		44	5220	5,219.93637	0.00001219
		48	5240	5,239.96414	0.00000684
	11.4V	36	5180	5,179.97744	0.00000436
		44	5220	5,219.92045	0.00001524
		48	5240	5,239.98038	0.00000374
25°C	12V	36	5180	5,179.99397	0.00000116
		44	5220	5,219.93591	0.00001228
		48	5240	5,239.97955	0.00000390
35 °C	12.6V	36	5180	5,179.98012	0.00000384
		44	5220	5,219.96624	0.00000647
		48	5240	5,239.92489	0.00001433
	11.4V	36	5180	5,179.95485	0.00000872
		44	5220	5,219.98048	0.00000374
		48	5240	5,239.98121	0.00000359

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Operation Mode	802.11 n_HT40	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	38	5190	5,189.98604	0.00000269
		46	5230	5,229.94686	0.00001016
	11.4V	38	5190	5,189.92516	0.00001442
		46	5230	5,229.91464	0.00001632
25 °C	12V	38	5190	5,189.94995	0.00000964
		46	5230	5,229.92505	0.00001433
35 °C	12.6V	38	5190	5,189.94822	0.00000998
		46	5230	5,229.98392	0.00000307
	11.4V	38	5190	5,189.97869	0.00000411
		46	5230	5,229.97421	0.00000493

Operation Mode	802.11 n_HT40	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	38	5190	5,189.93072	0.00001335
		46	5230	5,229.95050	0.00000946
	11.4V	38	5190	5,189.93983	0.00001159
		46	5230	5,229.91348	0.00001654
25 °C	12V	38	5190	5,189.90368	0.00001856
		46	5230	5,229.91788	0.00001570
35 °C	12.6V	38	5190	5,189.97411	0.00000499
		46	5230	5,229.97385	0.00000500
	11.4V	38	5190	5,189.93033	0.00001342
		46	5230	5,229.97737	0.00000433

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Operation Mode	802.11 n_HT40	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	38	5190	5,189.96262	0.00000720
		46	5230	5,229.96638	0.00000643
	11.4V	38	5190	5,189.91507	0.00001636
		46	5230	5,229.96292	0.00000709
25 °C	12V	38	5190	5,189.93358	0.00001280
		46	5230	5,229.94854	0.00000984
35 °C	12.6V	38	5190	5,189.95163	0.00000932
		46	5230	5,229.99621	0.00000072
	11.4V	38	5190	5,189.92912	0.00001366
		46	5230	5,229.96747	0.00000622

Operation Mode	802.11 n_HT40	Test Date	2018.02.07
Temperature	:14 °C	Test By	Anthony
Humidity	:72 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
5 °C	12.6V	38	5190	5,189.95538	0.00000860
		46	5230	5,229.96677	0.00000635
	11.4V	38	5190	5,189.96595	0.00000656
		46	5230	5,229.94821	0.00000990
25 °C	12V	38	5190	5,189.94080	0.00001141
		46	5230	5,229.97540	0.00000470
35 °C	12.6V	38	5190	5,189.97112	0.00000556
		46	5230	5,229.90346	0.00001846
	11.4V	38	5190	5,189.95437	0.00000879
		46	5230	5,229.98224	0.00000340

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## 14 ANTENNA REQUIREMENT

### 14.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 14.2 Antenna Connected Construction

PCB antenna designs are used.

The antenna is designed with permanent attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

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