

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Product Name: Diagnostic Ultrasound System

Brand Name: N/A

Model No.: T3300

Model Difference: N/A

FCC ID: VRST3300

Report No.: E2/2016/C0036

Issue Date: Jan. 11, 2017

FCC Rule Part: §15.407

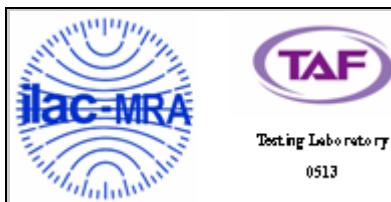
Prepared for: QISDA CORPORATION

No.157, Shanying Rd., Guishan Dist.,
Taoyuan City 333, Taiwan (R.O.C.)

Prepared by: SGS Taiwan Ltd.

Electronics & Communication Laboratory

No.2, Keji 1st Rd., Guishan District,
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VERIFICATION OF COMPLIANCE

Applicant: QISDA CORPORATION
No.157, Shanying Rd., Guishan Dist., Taoyuan City 333, Taiwan
(R.O.C.)

Product Name: Diagnostic Ultrasound System

Brand Name: N/A

Model No.: T3300

Model Difference: N/A.

FCC ID: VRST3300

Report Number: E2/2016/C0036

Date of test: Dec. 22, 2016 ~ Jan. 04, 2017

Date of EUT Received: Dec. 22, 2016

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.

Test By:

Date:

Jan. 11, 2017

Jerry Lu / Sr. Engineer

Prepared By:

Date:

Jan. 11, 2017

Tiffany Kao / Clerk

Approved By:

Date:

Jan. 11, 2017

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2016/C0036	Rev.00	Initial creation of document	Jan. 11, 2017

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Diagnostic Ultrasound System
Brand Name:	N/A
Model No.:	T3300
Model Difference:	N/A.
Software version:	N/A
Hardware version:	N/A
Transducer:	<ol style="list-style-type: none">1. Model No.: C62B, Supplier: Qisda Corporation2. Model No.: LI54BH, Supplier: Qisda Corporation3. Model No.: P42B6, Supplier: Qisda Corporation
USB Cable:	Model No.: N/A; Supplier: I-Sheng Electric Wire & Cable, Co., Ltd.
Power Supply:	10.8Vdc from Rechargeable Battery or 19V from AC/DC Adapter
	Battery: Model No.: APP00201; Supplier: APACK
	Adapter: Model No.: ATM065-P190, Supplier: Medical Power Supply

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology	
11a	5150~5250	4	12.36 dBm	OFDM	
	5725-5850	5	11.93 dBm		
11n	HT20 5150~5250	4	HT: 12.34 dBm	OFDM	
	HT20 5725-5850	5	HT: 11.89 dBm		
11n	HT40 5150~5250	2	HT: 10.24 dBm	OFDM	
	HT40 5725-5850	2	HT: 8.72 dBm		
Antenna Designation:		PIFA Antenna, Peak Gain: 1.98 dBi (5150~5250MHz) 5.20 dBi (5725~5850MHz)			
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300Mbps			

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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 644545 D03 Guidance for IEEE 802.11ac v01

ANSI C63.10:2013

Note: 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 Numbers are: 735305

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 plane. 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.

$$\text{Offset} = \text{RF cable loss (0.8dB)} + \text{attenuation factor(10dB)} = 10.8(\text{dB})$$

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2.5 Configuration of Tested System

Fig. 2-1 Conducted Emission

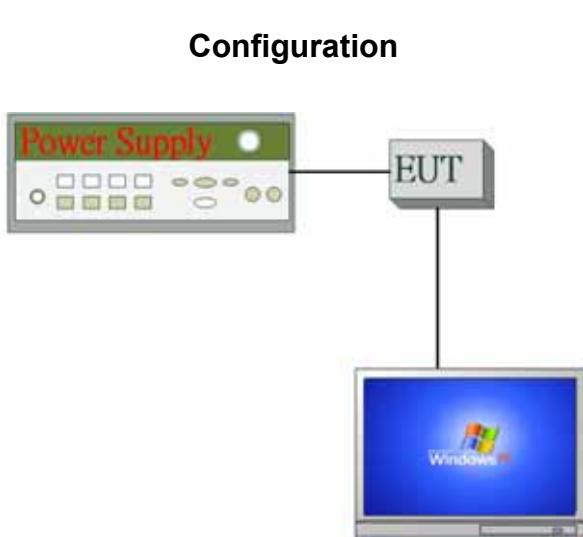


Fig 2-2 Radiated Emission

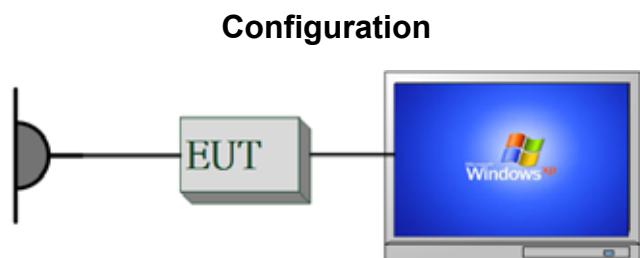


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Notebook	Qisda	DHR700	9HK7101T02616 00025DHR700	Shielded	Unshielded
2	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY53140006	N/A	Unshielded

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3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	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	
Channel	Frequency
36	5180
40	5200
44	5220
48	5240

802.11 n HT40 Mode	
channel	Frequency
38	5190
46	5230

Operated band in 5725 MHz ~5850 MHz:

802.11a / n HT20 Mode	
Channel	Frequency
149	5745
153	5765
157	5785
161	5805
165	5825

802.11 n HT40 Mode	
channel	Frequency
151	5755
159	5795

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.

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RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)

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
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main

RADIATED EMISSION TEST (ABOVE 1 GHz)

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	MCS0	Main
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Main
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Main

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 channel Low, Mid and High, the worst case H position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST

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	MCS0	Main
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Main
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Main
802.11n_HT20				OFDM	MCS0	Main
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Main

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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 : Vertical)	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 : Horizontal)	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	12/12/2016	12/11/2017
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	02/07/2016	02/06/2017
LISN	Schwarzbeck	NSLK 8127	8127-648	03/11/2016	03/10/2017
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

6.3 EUT Setup

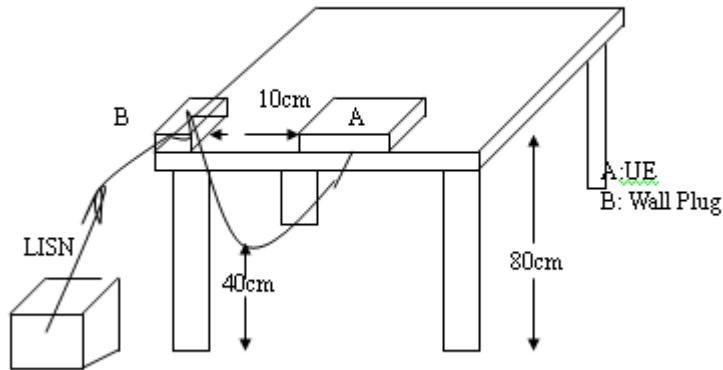
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz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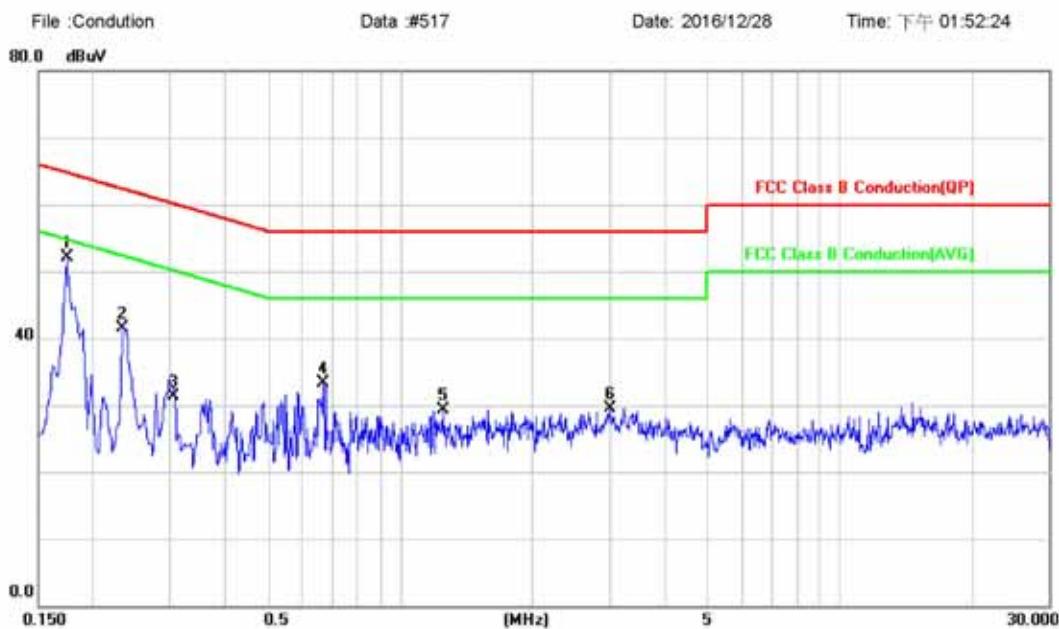
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Operation Mode:	operation mode	Test By:	Jerry
-----------------	----------------	----------	-------

Site : Conduction Room Phase: **L1** Temperature: 23 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 65 %
 Mode: 佳世達
 Note:

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector Comment
1 *		0.1740	32.48	19.72	52.20	64.77	-12.57	peak
2		0.2340	21.81	19.73	41.54	62.31	-20.77	peak
3		0.3067	11.58	19.77	31.35	60.06	-28.71	peak
4		0.6700	13.44	19.90	33.34	56.00	-22.66	peak
5		1.2500	9.34	19.91	29.25	56.00	-26.75	peak
6		3.0220	9.57	19.95	29.52	56.00	-26.48	peak

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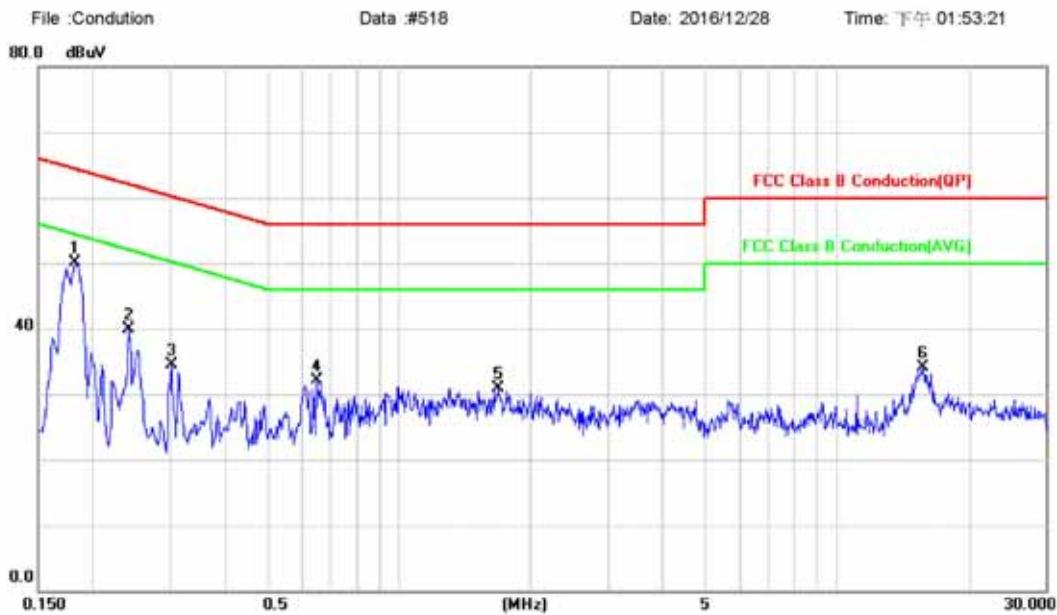
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Site : Conduction Room
 Limit: FCC Class B Conduction(QP)
 Mode: 雷世達
 Note:

Phase: **N**
 Power: AC 120V/60Hz
 Temperature: 23 °C
 Humidity: 65 %

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector Comment
1 *		0.1820	30.30	19.72	50.02	64.39	-14.37	peak
2		0.2420	20.18	19.75	39.93	62.03	-22.10	peak
3		0.3020	14.63	19.78	34.41	60.19	-25.78	peak
4		0.6500	12.10	19.91	32.01	56.00	-23.99	peak
5		1.6980	11.01	19.93	30.94	56.00	-25.06	peak
6		15.7260	13.66	20.39	34.05	60.00	-25.95	peak

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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) $=10 \cdot \log(1/\text{Duty})$
802.11a	87.44	0.58
802.11n_20	86.64	0.62
802.11n_40	76.02	1.19

Duty Cycle Factor: $10 \cdot \log(1/0.8744) = 0.58$

Duty Cycle Factor: $10 \cdot \log(1/0.8664) = 0.62$

Duty Cycle Factor: $10 \cdot \log(1/0.7602) = 1.19$

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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



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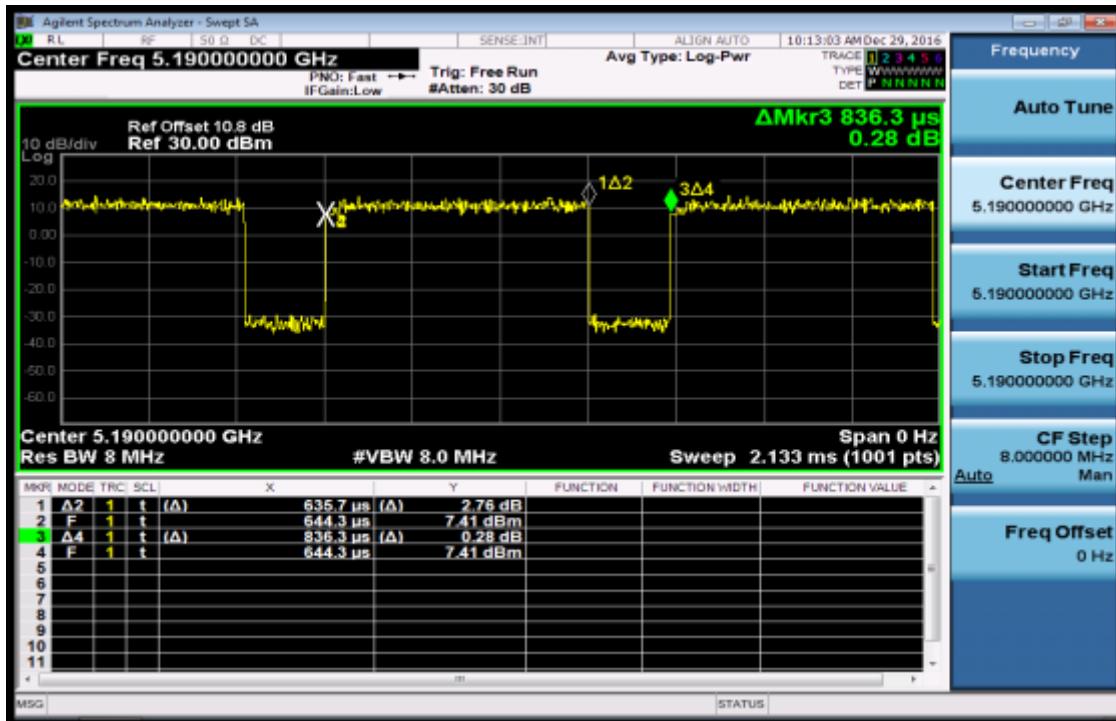
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802.11n HT 40



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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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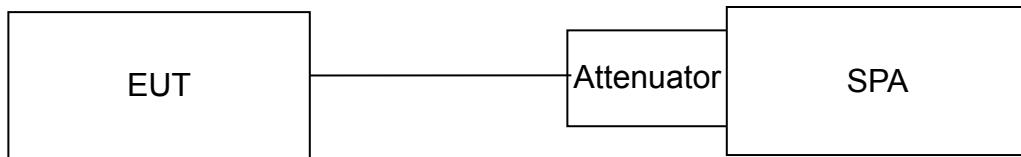
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8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNAK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

8.4 Test Set-up



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8.5 Measurement Result

26dB and 6dB Bandwidth

802.11a_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.36	13.296
5220	25.00	13.979
5240	22.89	13.596

802.11a_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.49	12.172
5785	16.42	12.153
5825	16.40	12.149

802.11n_HT20_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.26	13.475
5220	25.09	13.995
5240	22.26	13.475

802.11n_HT20_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.62	12.460
5785	17.63	12.462
5825	17.63	12.462

802.11n_HT40_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	43.44	16.379
5230	42.61	16.295

802.11n_HT40_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.18	15.463
5795	35.32	15.480

99% Bandwidth

802.11a

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.46	< 5250
5745	5736.00	> 5725

802.11n HT20

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5249.03	< 5250
5745	5735.82	> 5725

802.11n HT40

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.15	< 5250
5755	5736.70	> 5725

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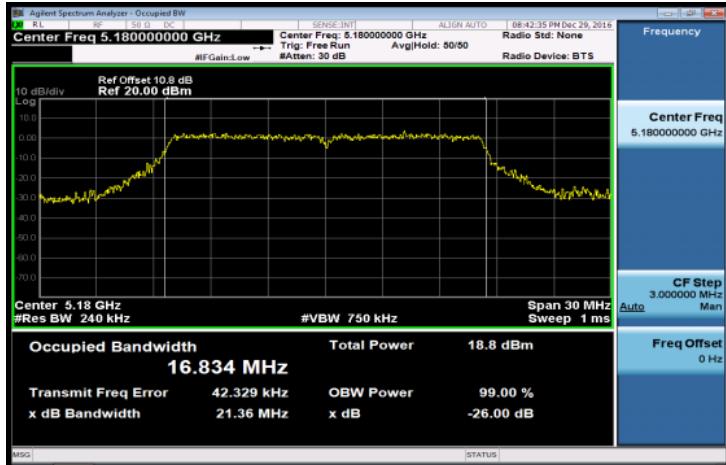
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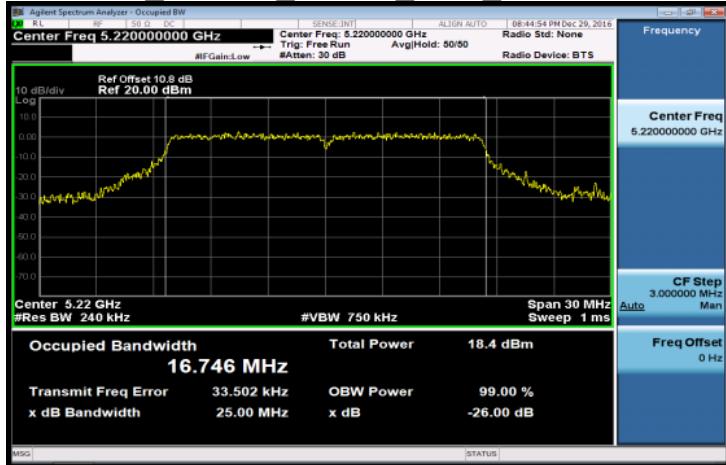
FCC_802.11a_20MHz_Main_5180MHz



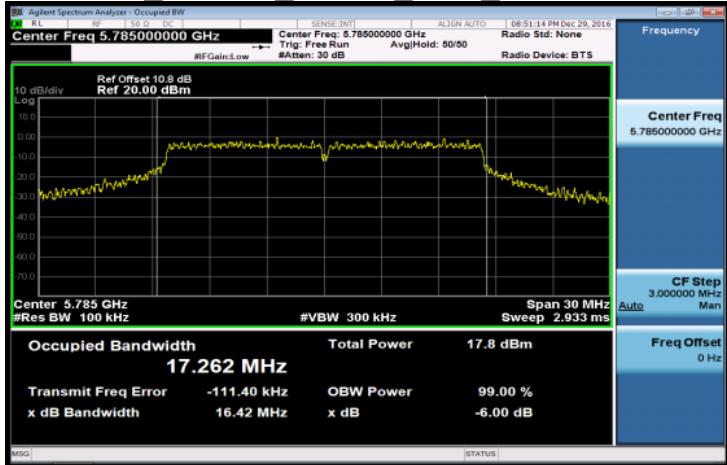
FCC_802.11a_20MHz_Main_5745MHz



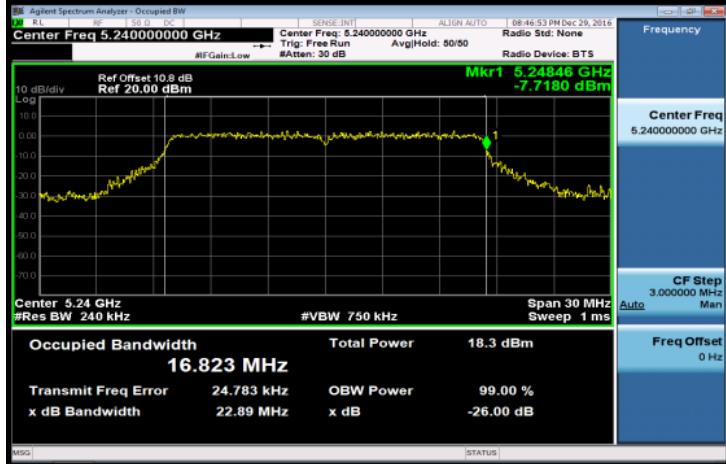
FCC_802.11a_20MHz_Main_5220MHz



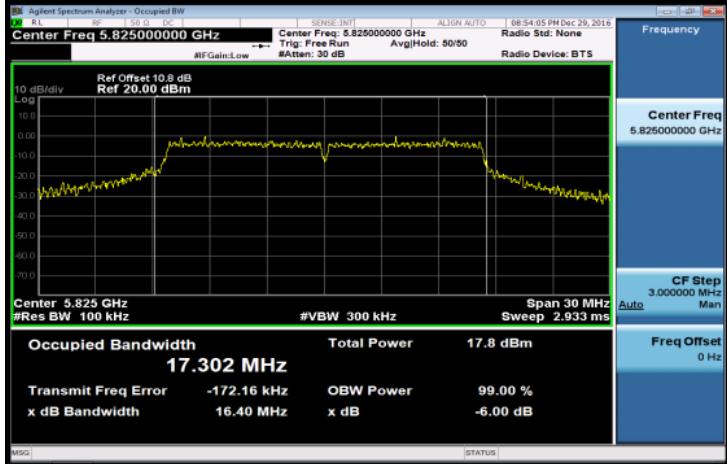
FCC_802.11a_20MHz_Main_5785MHz



FCC_802.11a_20MHz_Main_5240MHz



FCC_802.11a_20MHz_Main_5825MHz



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FCC_802.11n_20MHz_Main_5180MHz



FCC_802.11n_20MHz_Main_5745MHz



FCC_802.11n_20MHz_Main_5220MHz



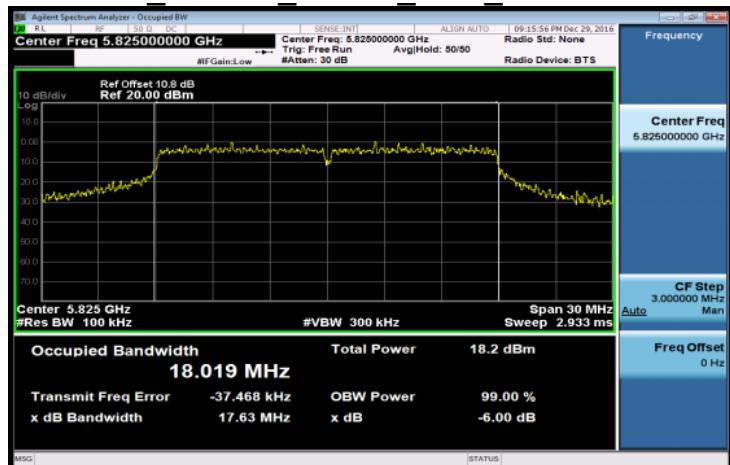
FCC_802.11n_20MHz_Main_5785MHz



FCC_802.11n_20MHz_Main_5240MHz



FCC_802.11n_20MHz_Main_5825MHz



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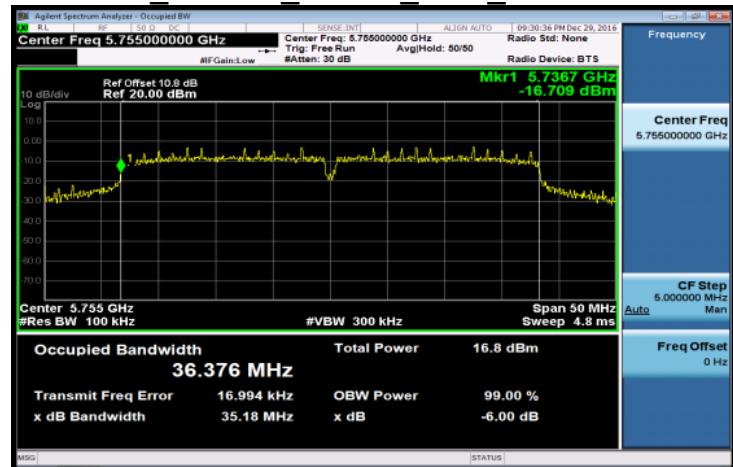
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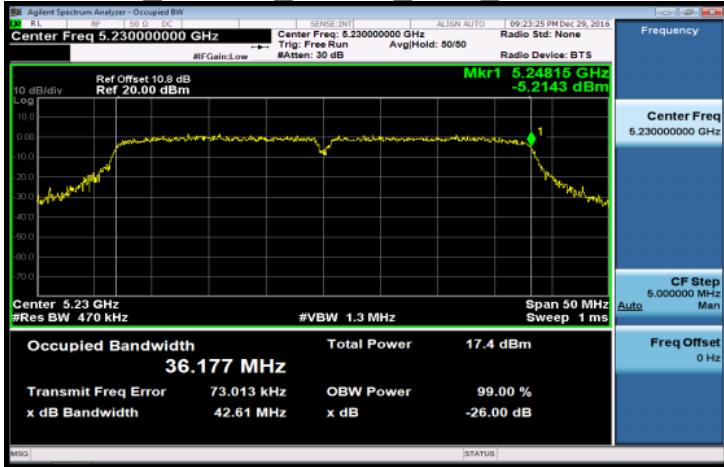
FCC_802.11n_40MHz_Main_5190MHz



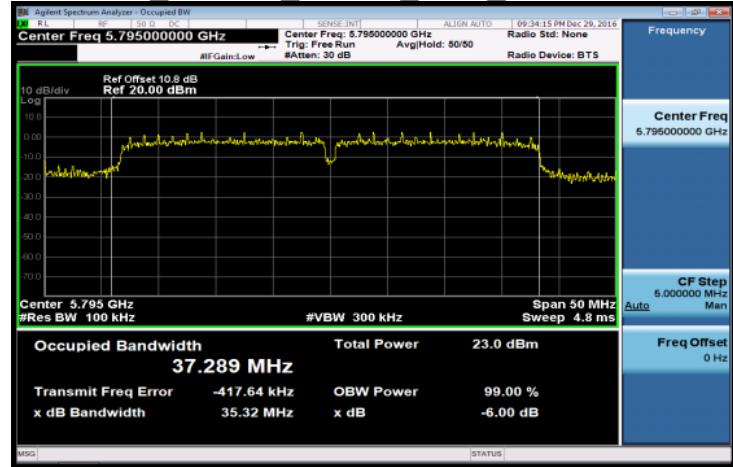
FCC_802.11n_40MHz_Main_5755MHz



FCC_802.11n_40MHz_Main_5230MHz



FCC_802.11n_40MHz_Main_5795MHz



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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)

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.

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 v01r01.
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.

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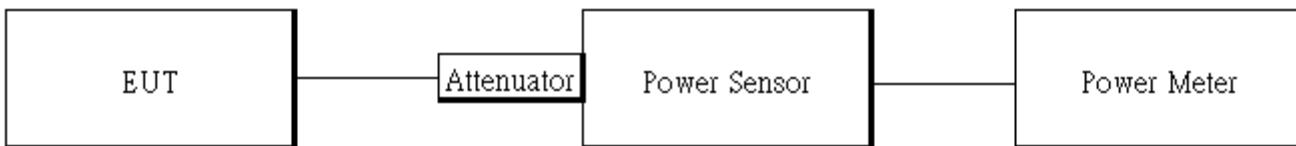
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9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
Power Meter	Anritsu	ML2496A	1326001	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315048	06/23/2016	06/22/2017
Power Sensor	Anritsu	MA2411B	1315049	06/23/2016	06/22/2017
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	05/04/2016	05/03/2017

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.29	16.943	23.98	PASS
44	5220	MCS0	12.27	16.866	23.98	PASS
48	5240	MCS0	12.36	17.219	23.98	PASS
149	5745	MCS0	11.93	15.596	30	PASS
157	5785	MCS0	11.44	13.932	30	PASS
165	5825	MCS0	11.62	14.521	30	PASS

802.11n_HT20_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.08	16.144	23.98	PASS
44	5220	MCS0	12.22	16.672	23.98	PASS
48	5240	MCS0	12.34	17.140	23.98	PASS
149	5745	MCS0	11.89	15.453	30	PASS
157	5785	MCS0	11.41	13.836	30	PASS
165	5825	MCS0	11.72	14.859	30	PASS

802.11n_HT40_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	10.23	10.544	23.98	PASS
46	5230	MCS0	10.24	10.568	23.98	PASS
151	5755	MCS0	8.72	7.447	30	PASS
159	5795	MCS0	8.25	6.683	30	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 Acess Ponit		
	✓	Mobile and portable clinet device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	✓		30dBm/ 500kHz

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.

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 v01r01.
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. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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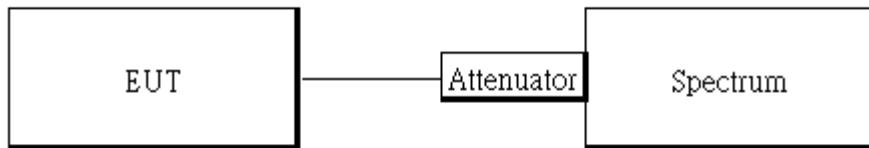
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10.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNACK	PE8210	RF29	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

10.4 Test Set-up



10.5 Measurement Result

POWER DENSITY 802.11a MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-2.96	17	-19.96
5220	-2.15	17	-19.15
5240	-5.10	17	-22.10
5745	6.21	30	-23.79
5785	5.72	30	-24.28
5825	5.84	30	-24.16

POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-0.90	17	-17.90
5220	-4.22	17	-21.22
5240	-5.48	17	-22.48
5745	5.28	30	-24.72
5785	5.33	30	-24.67
5825	5.61	30	-24.39

POWER DENSITY 802.11n HT40 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-12.4	17	-29.40
5230	-12.66	17	-29.66
5755	-0.13	30	-30.13
5795	6.55	30	-23.45

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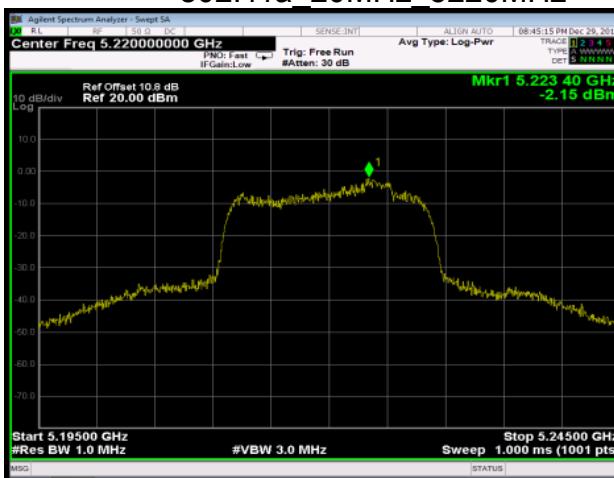
802.11a 20MHz 5180MHz



802.11a 20MHz 5745MHz



802.11a 20MHz 5220MHz



802.11a 20MHz 5785MHz



802.11a 20MHz 5240MHz



802.11a 20MHz 5825MHz



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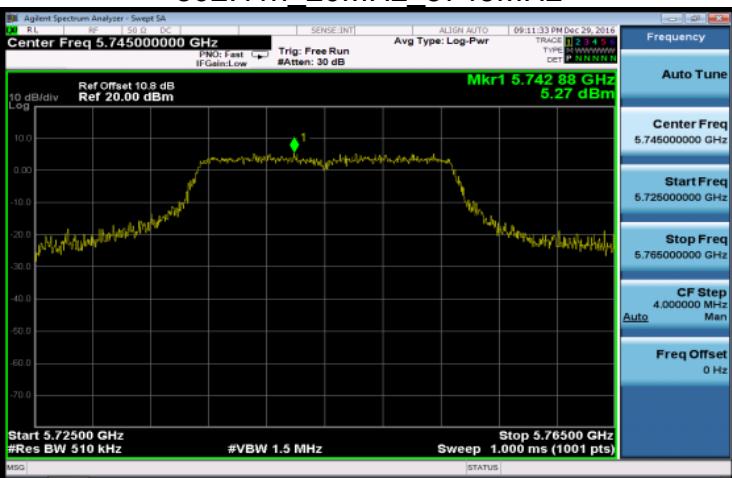
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802.11n 20MHz 5180MHz



802.11n 20MHz 5745MHz



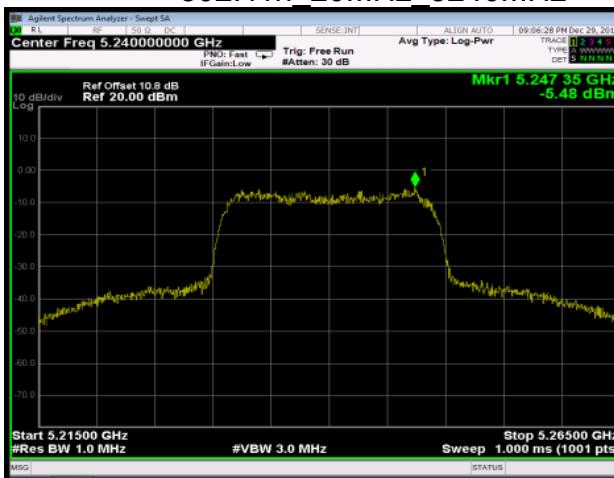
802.11n 20MHz 5220MHz



802.11n 20MHz 5785MHz



802.11n 20MHz 5240MHz



802.11n 20MHz 5825MHz



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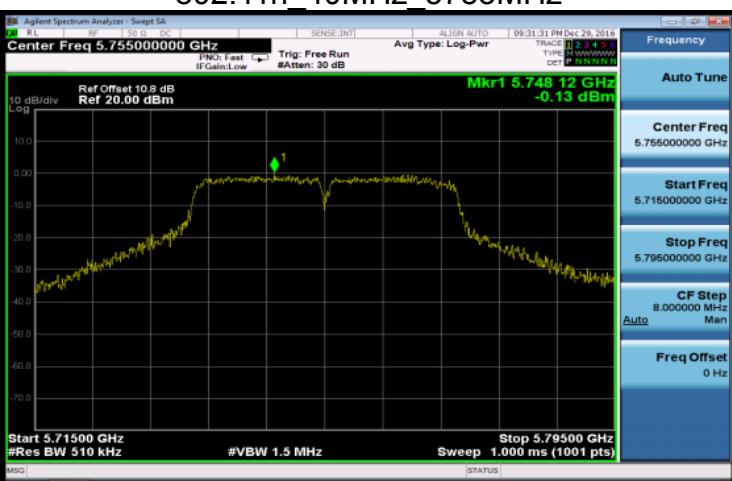
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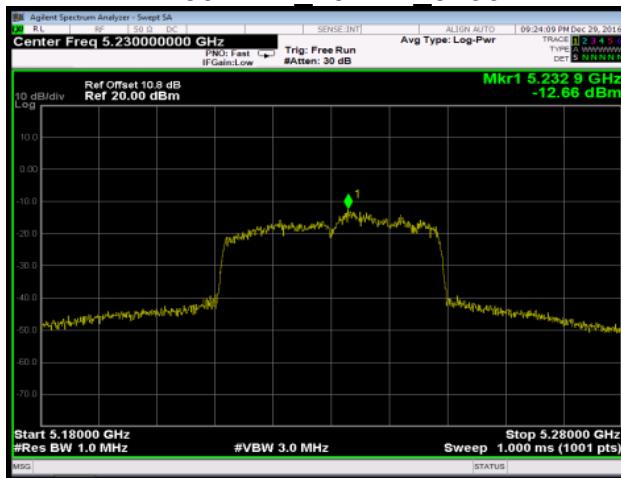
802.11n 40MHz 5190MHz



802.11n 40MHz 5755MHz



802.11n 40MHz 5230MHz



802.11n 40MHz 5795MHz



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT1

11.1 Standard Applicable

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

- 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.
- 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 (dB μ V/m)	AV 54 (dB μ V/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dB μ V/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(dB μ V/m) *1 PK:105.2 (dB μ V/m) *2 PK: 110.8(dB μ V/m) *3 PK:122.2 (dB μ V/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*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 (dB μ V/m) = 20 log Emission level (dB μ V/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	04/12/2016	04/11/2017
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2016	12/22/2017
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2016	12/16/2017
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2016	07/23/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-18	10204	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF27	12/12/2016	12/11/2017
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017
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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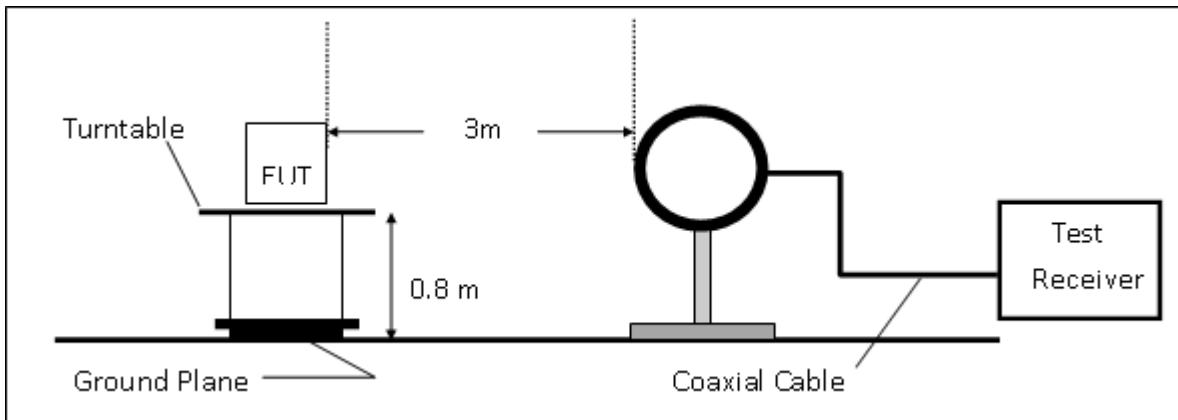
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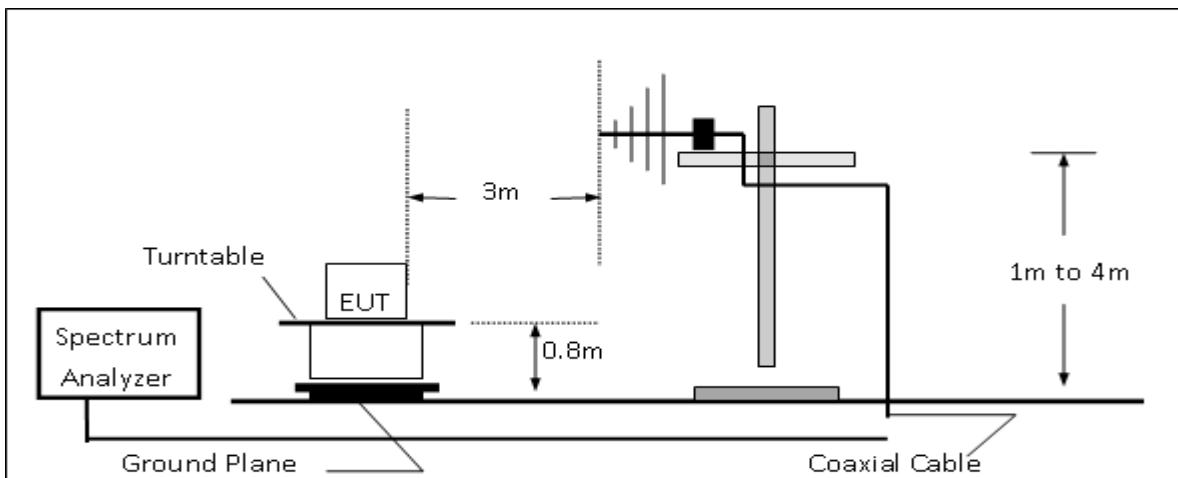
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11.3 Test SET-UP

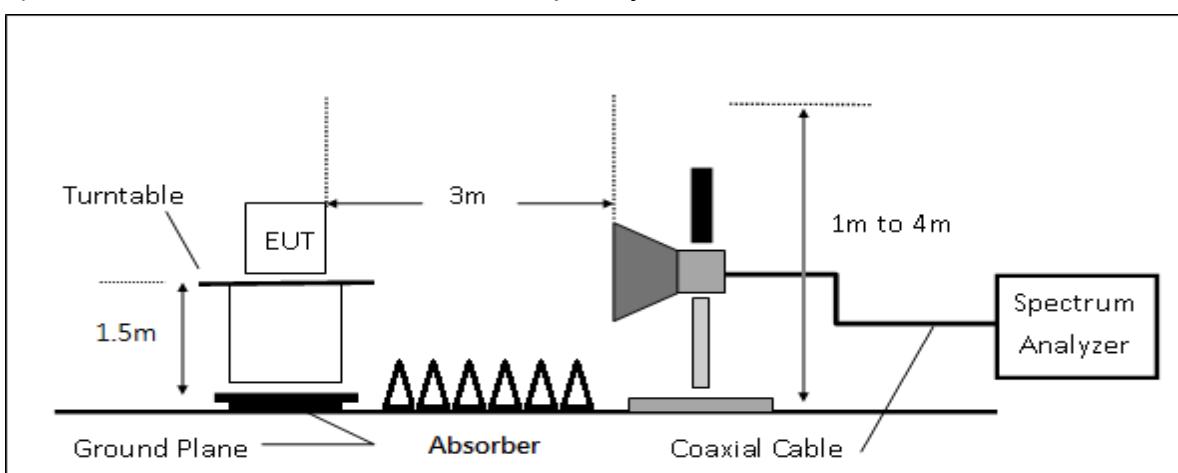
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 v01r01.
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.
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:

$$\text{FS} = \text{RA} + \text{AF} - \text{AG}$$

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

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – 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 from 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 attach tabular data sheets.

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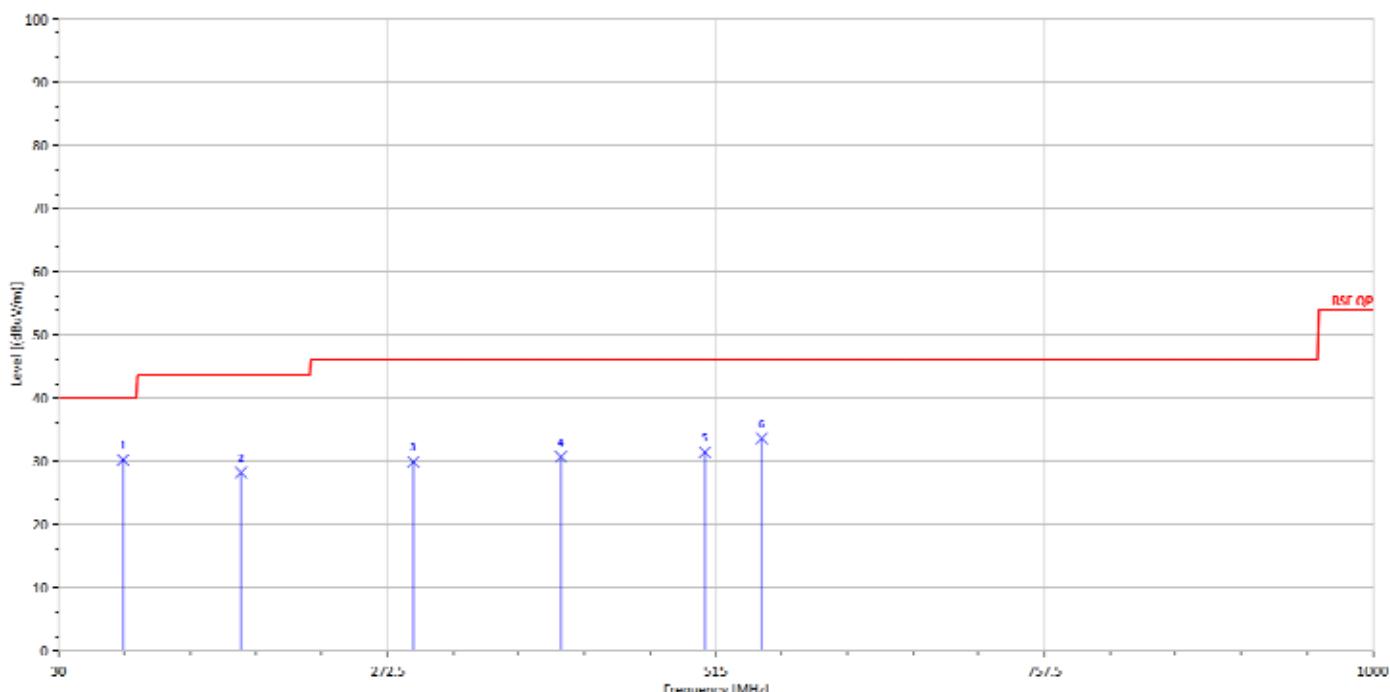
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Radiated Spurious Emission Measurement Result**Below 1GHz Worst-Case Data:****802.11a 5150~5250 MHz**

Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
77.53	S	Peak	51.30	-21.17	30.13	40	-9.87
164.83	S	Peak	45.89	-17.78	28.11	43.5	-15.39
291.90	S	Peak	43.07	-13.26	29.82	46	-16.18
400.54	S	Peak	40.39	-9.76	30.62	46	-15.38
507.24	S	Peak	39.29	-7.94	31.35	46	-14.65
548.95	S	Peak	40.84	-7.24	33.59	46	-12.41

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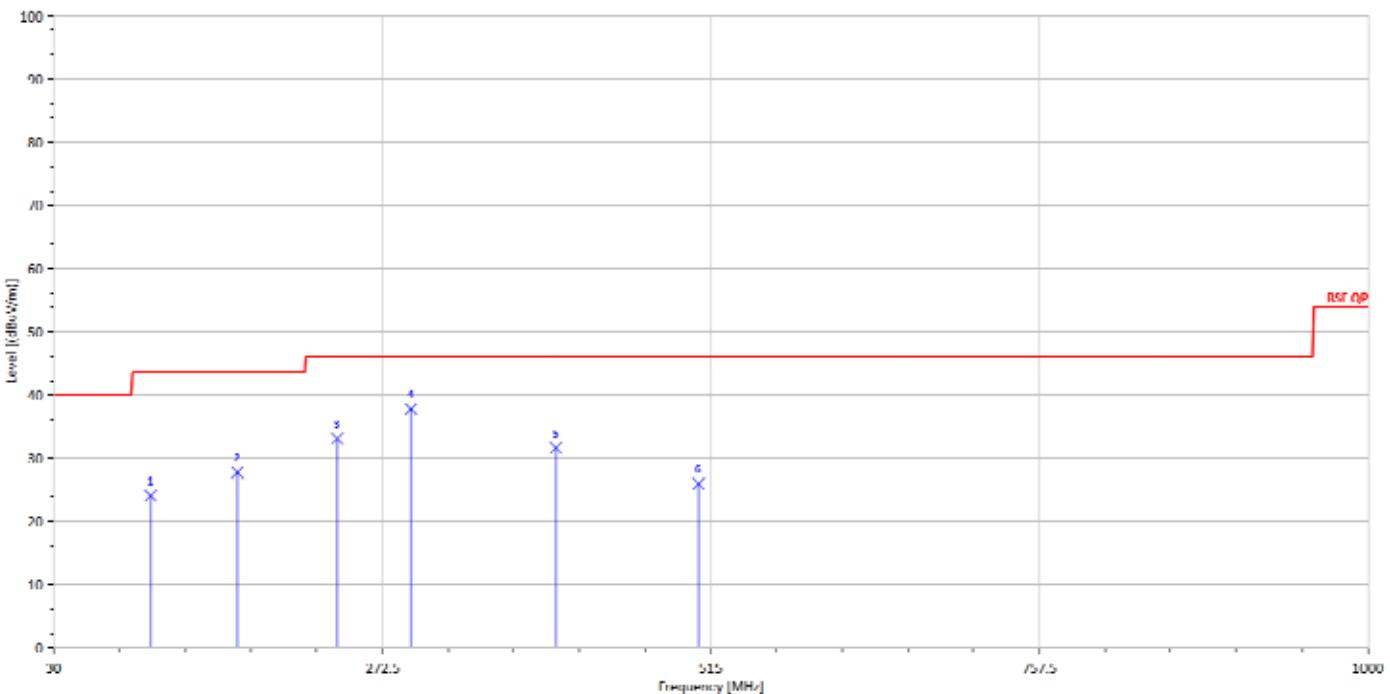
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Operation Mode : 802.11a Test Date : 2016/12/28
 Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Mid Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
101.78	S	Peak	41.59	-17.52	24.07	43.5	-19.43
165.80	S	Peak	45.60	-17.92	27.68	43.5	-15.82
239.52	S	Peak	48.33	-15.28	33.05	46	-12.95
293.84	S	Peak	51.02	-13.23	37.80	46	-8.20
400.54	S	Peak	41.34	-9.76	31.57	46	-14.43
506.27	S	Peak	34.03	-8.08	25.95	46	-20.05

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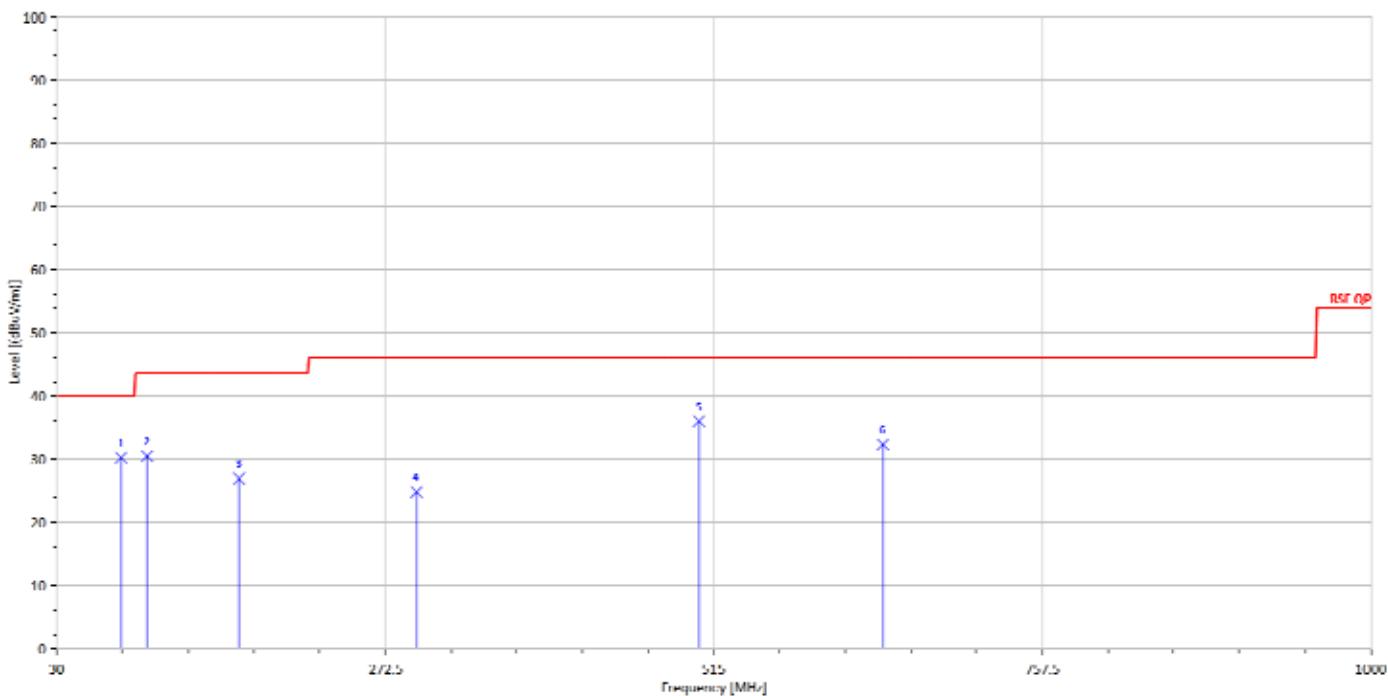
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802.11a, 5725~5850 MHz

Operation Mode : 802.11a Test Date : 2016/12/28
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 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
77.53	S	Peak	51.35	-21.17	30.18	40	-9.82
96.93	S	Peak	48.69	-18.27	30.42	43.5	-13.08
164.83	S	Peak	44.67	-17.78	26.89	43.5	-16.61
295.78	S	Peak	37.99	-13.16	24.83	46	-21.17
504.33	S	Peak	43.88	-7.86	36.02	46	-9.98
640.13	S	Peak	37.64	-5.37	32.27	46	-13.73

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台灣檢驗科技股份有限公司

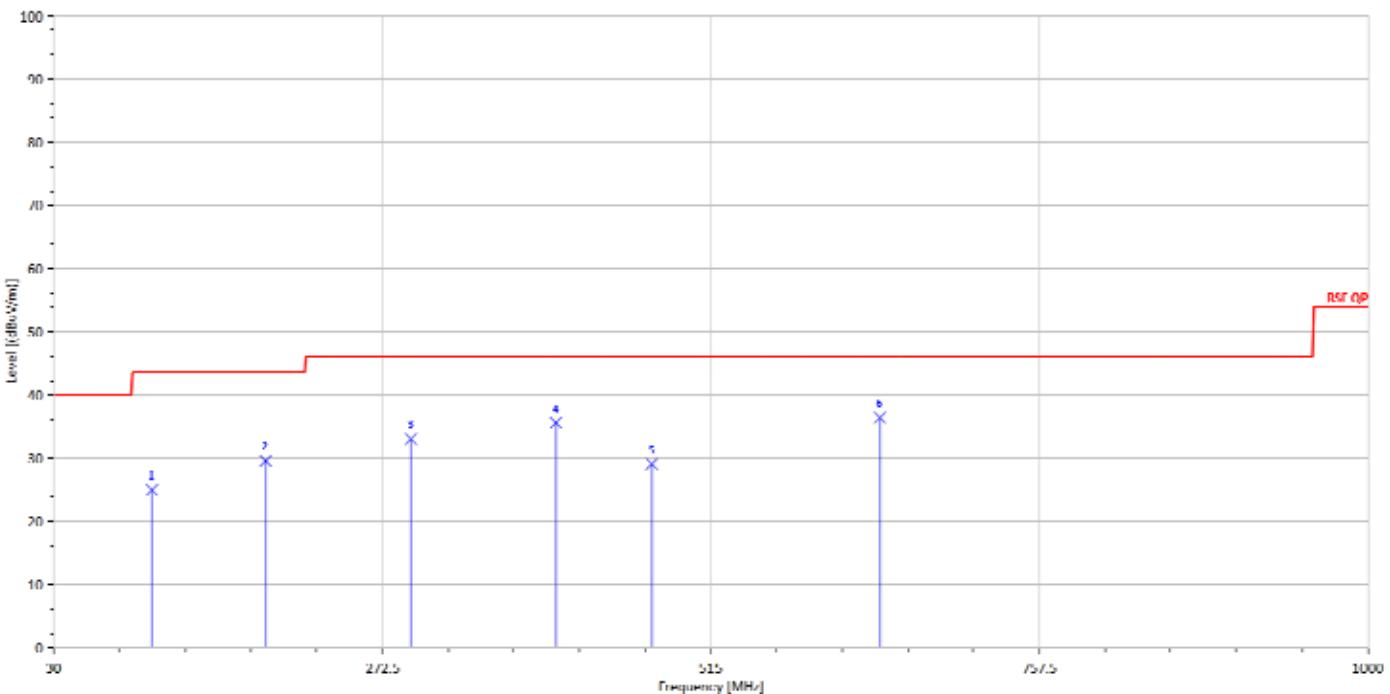
t (886-2) 2299-3279

f (886-2) 2298-0488

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Operation Mode : 802.11a Test Date : 2016/12/28
 Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
102.75	S	Peak	42.39	-17.40	24.99	43.5	-18.51
186.17	S	Peak	47.90	-18.41	29.49	43.5	-14.01
293.84	S	Peak	46.24	-13.23	33.01	46	-12.99
400.54	S	Peak	45.35	-9.76	35.58	46	-10.42
471.35	S	Peak	36.80	-7.81	29.00	46	-17.00
640.13	S	Peak	41.77	-5.37	36.40	46	-9.60

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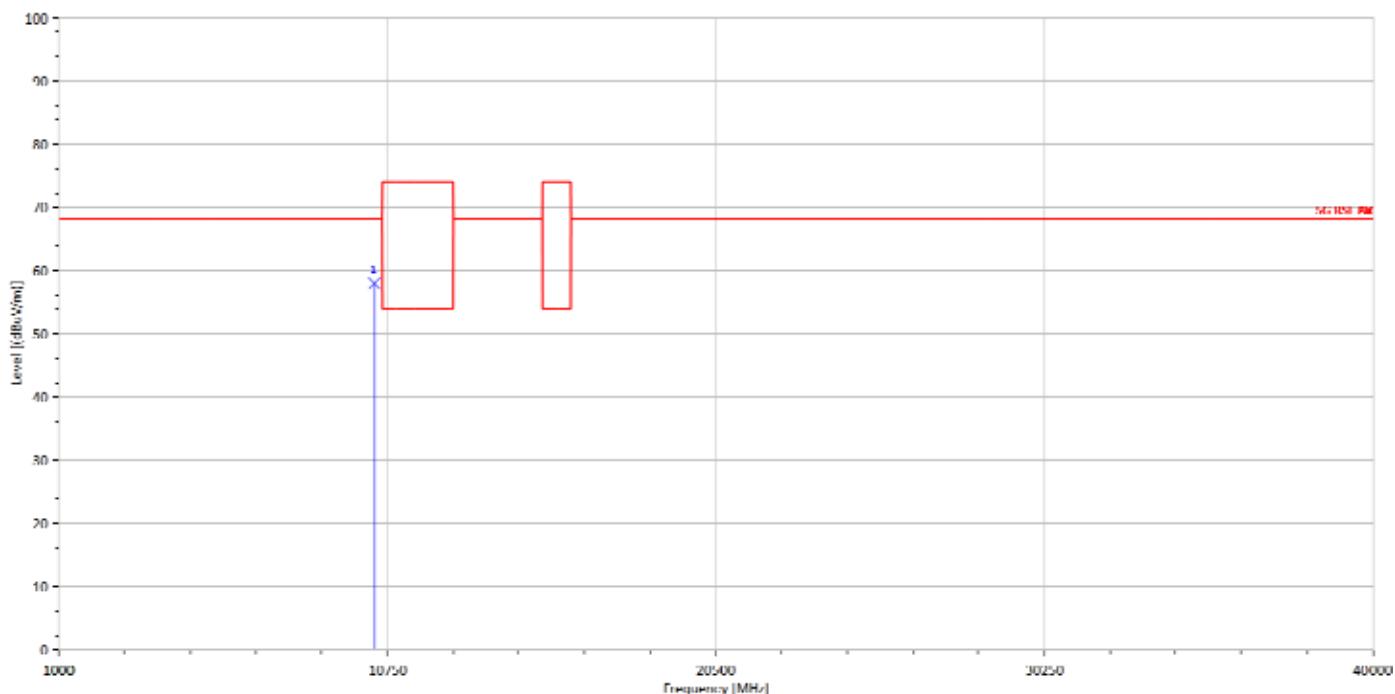
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Above 1GHz Worst-Case Data:**Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz**

Operation Mode : 802.11a Test Date : 2016/12/28
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



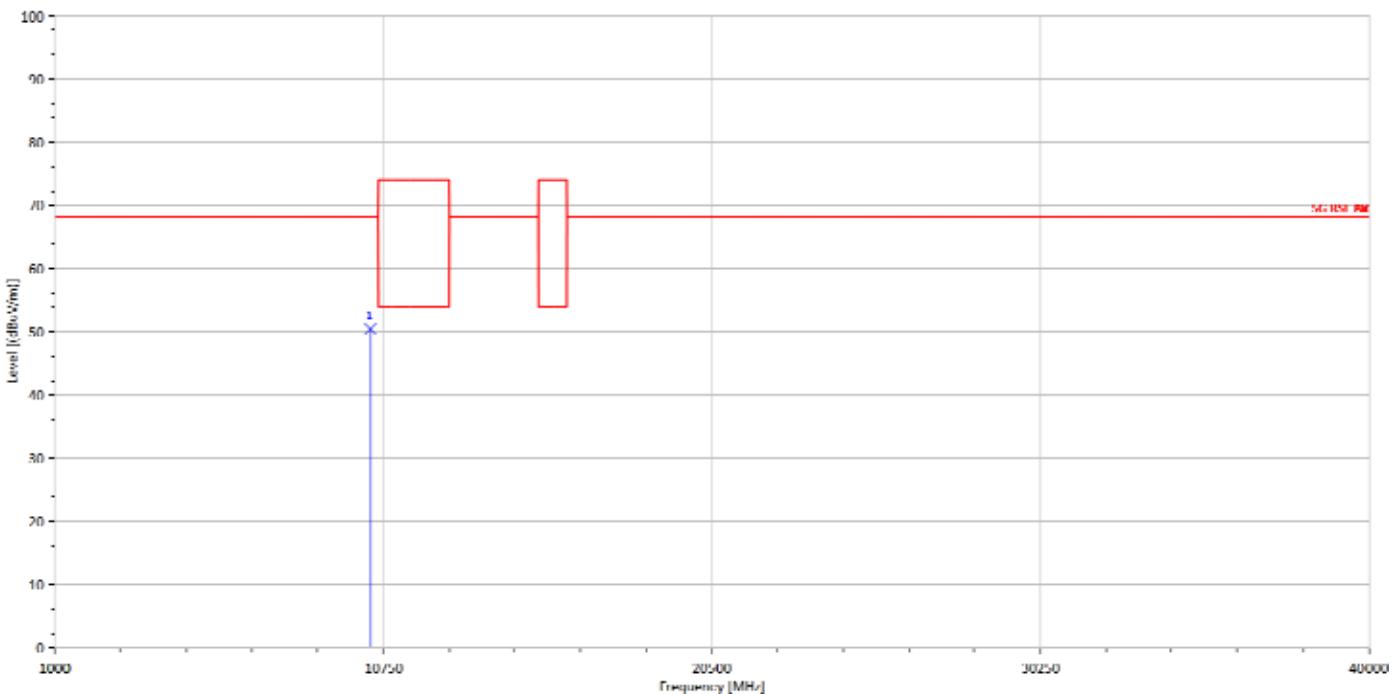
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
10360.00	H	Peak	37.72	20.18	57.90	68.3	-10.40

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



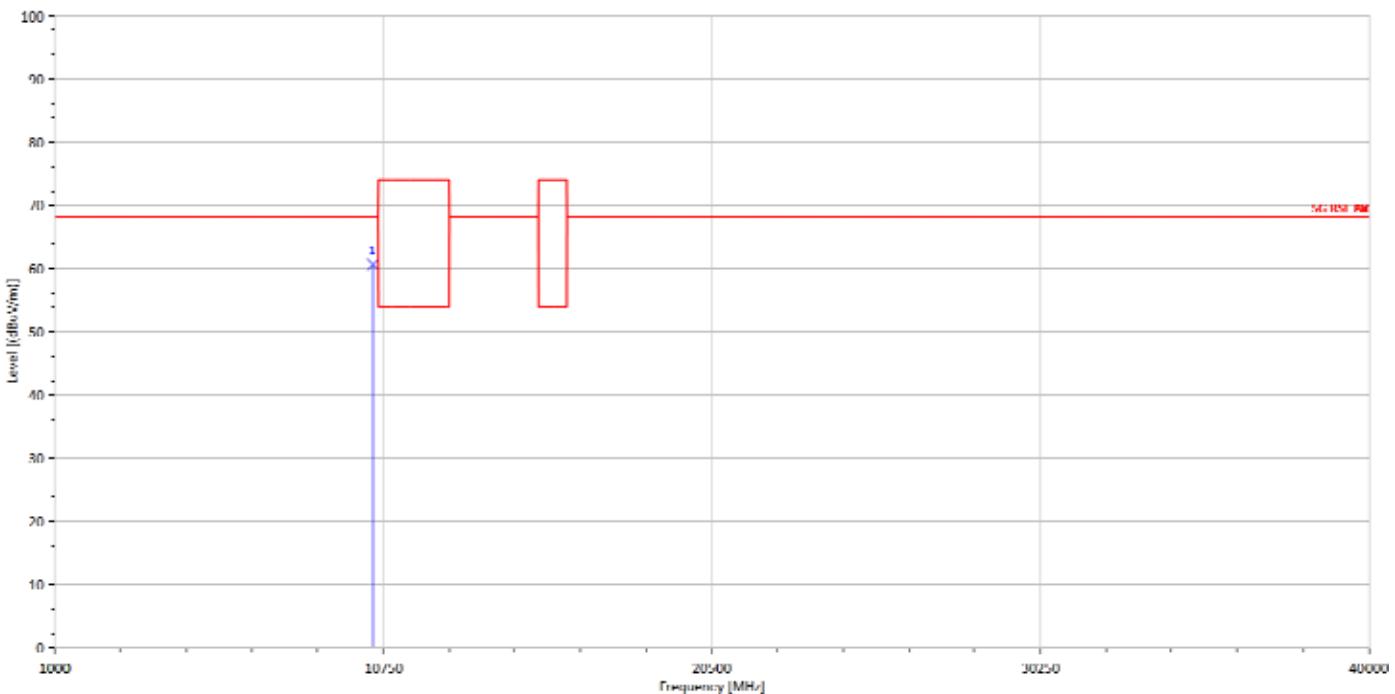
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10360.00	H	Peak	30.25	20.18	50.43	68.3	-17.87

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



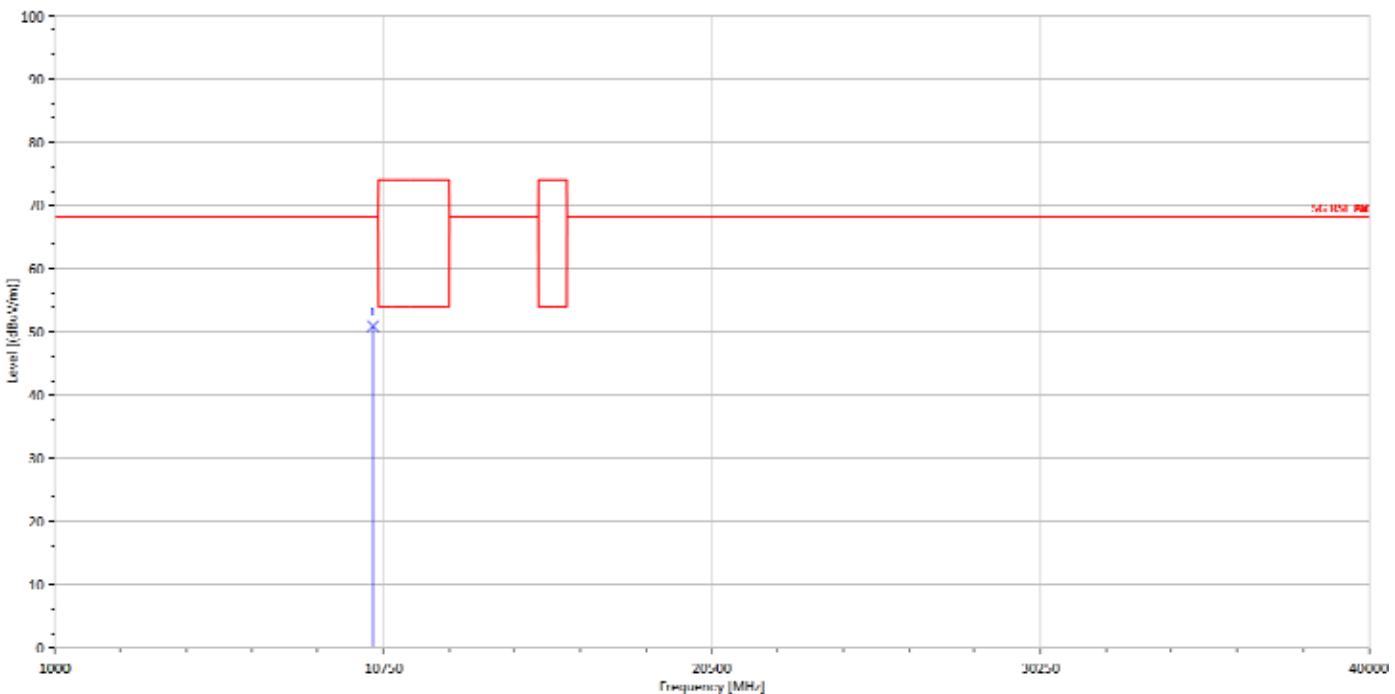
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10440.00	H	Peak	40.31	20.29	60.60	68.3	-7.70

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



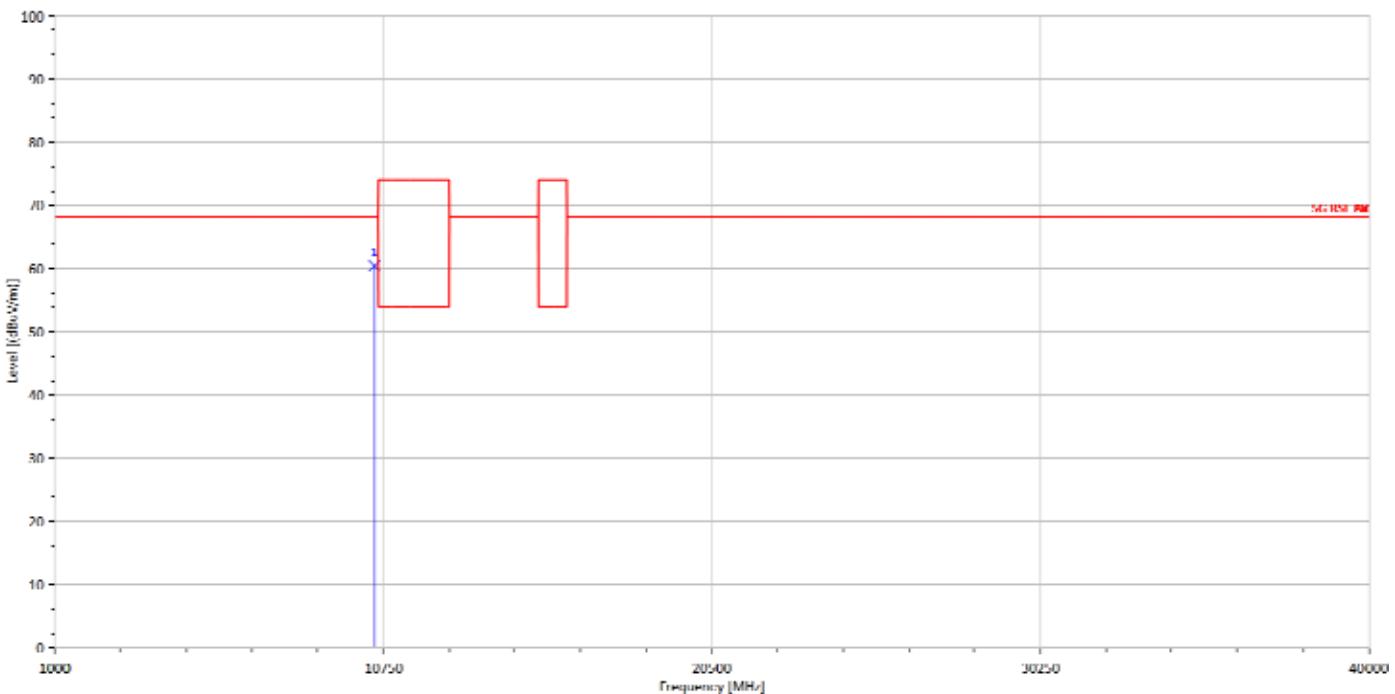
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10440.00	H	Peak	30.59	20.29	50.88	68.3	-17.42

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



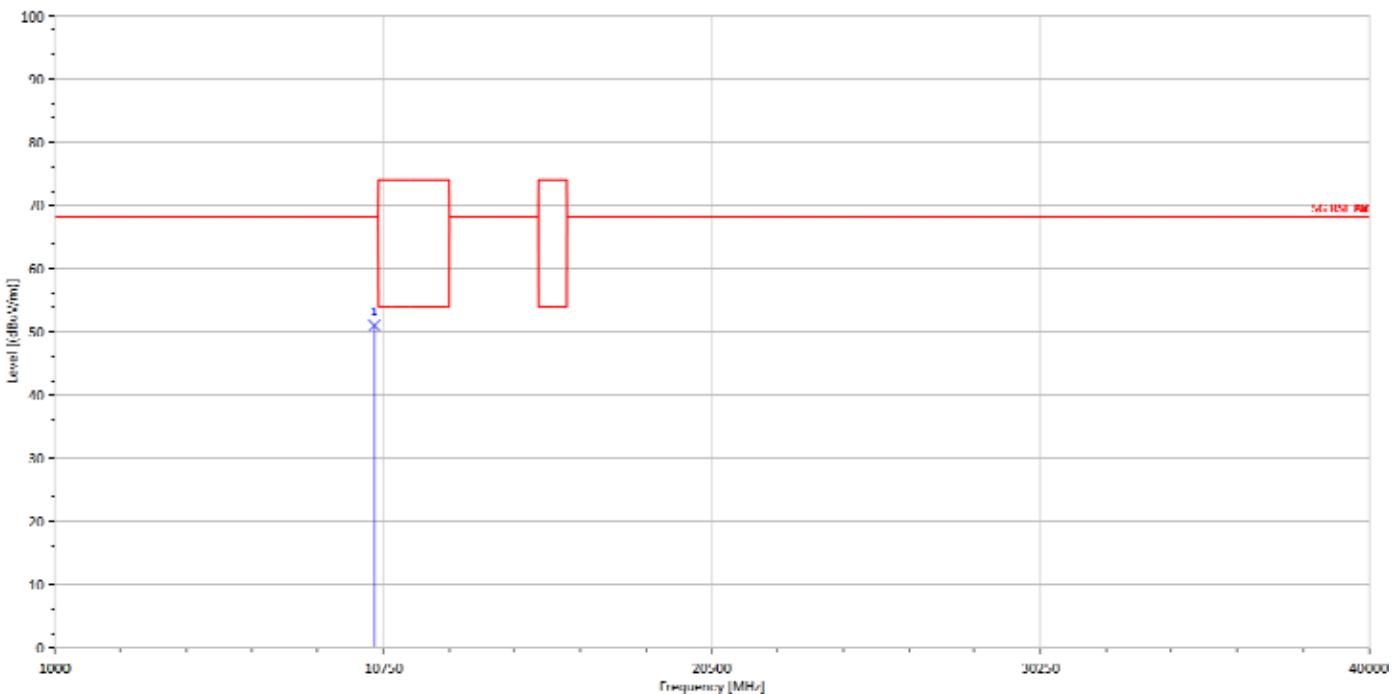
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10480.00	H	Peak	39.71	20.68	60.38	68.3	-7.92

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10480.00	H	Peak	30.31	20.68	50.99	68.3	-17.31

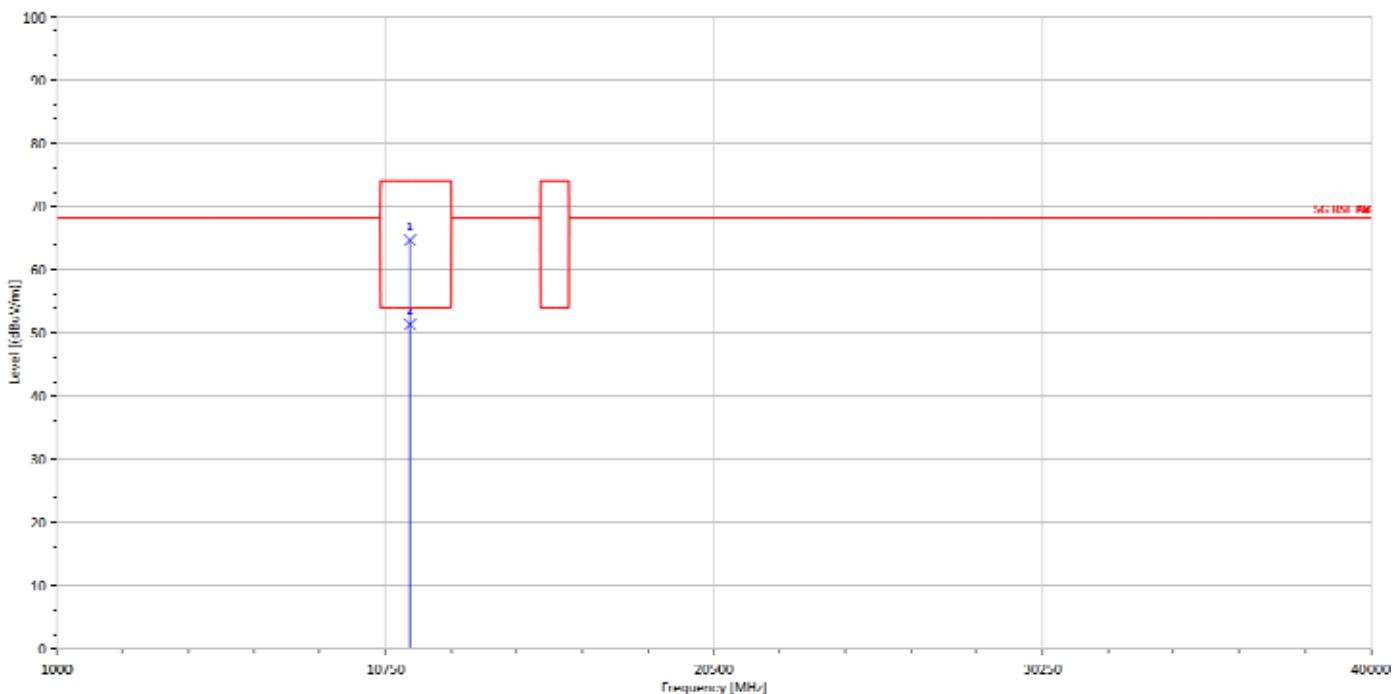
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Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

Operation Mode : 802.11a Test Date : 2016/12/28
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



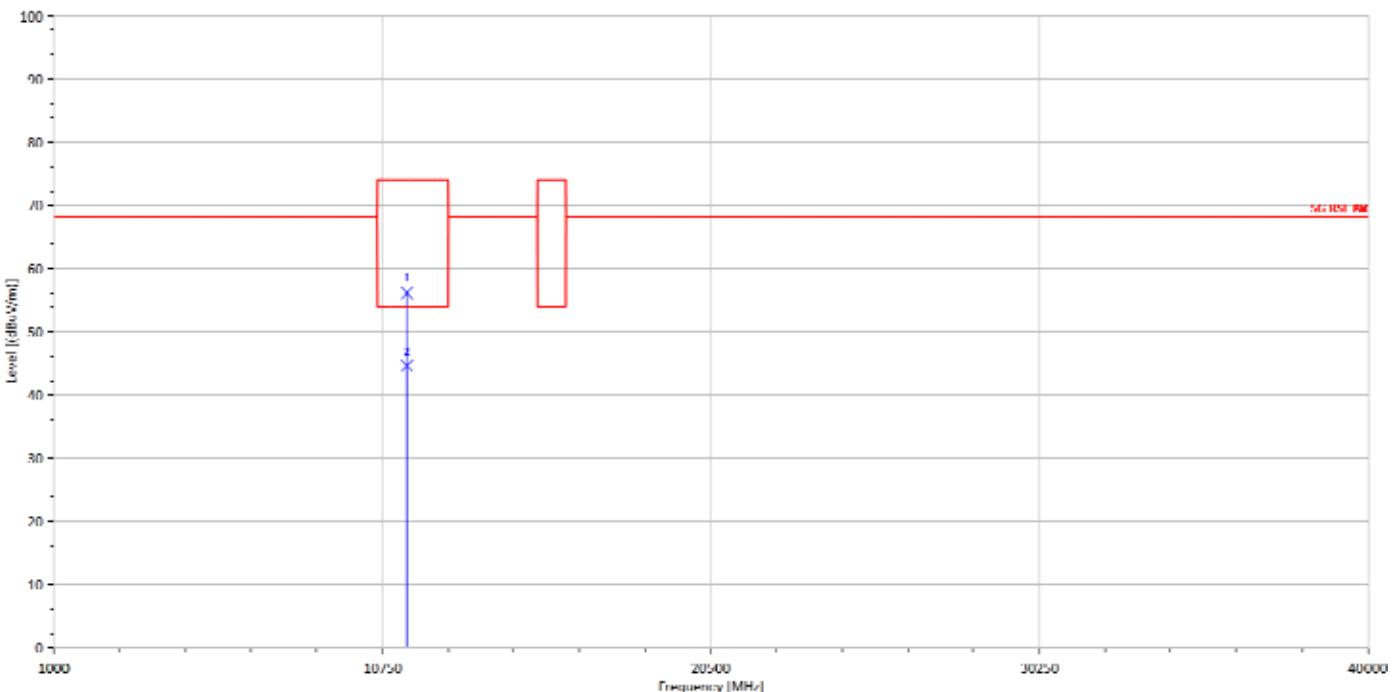
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
11490.00	H	Peak	43.93	20.70	64.64	74	-9.36
11490.00	H	Average	30.61	20.70	51.31	54	-2.69

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



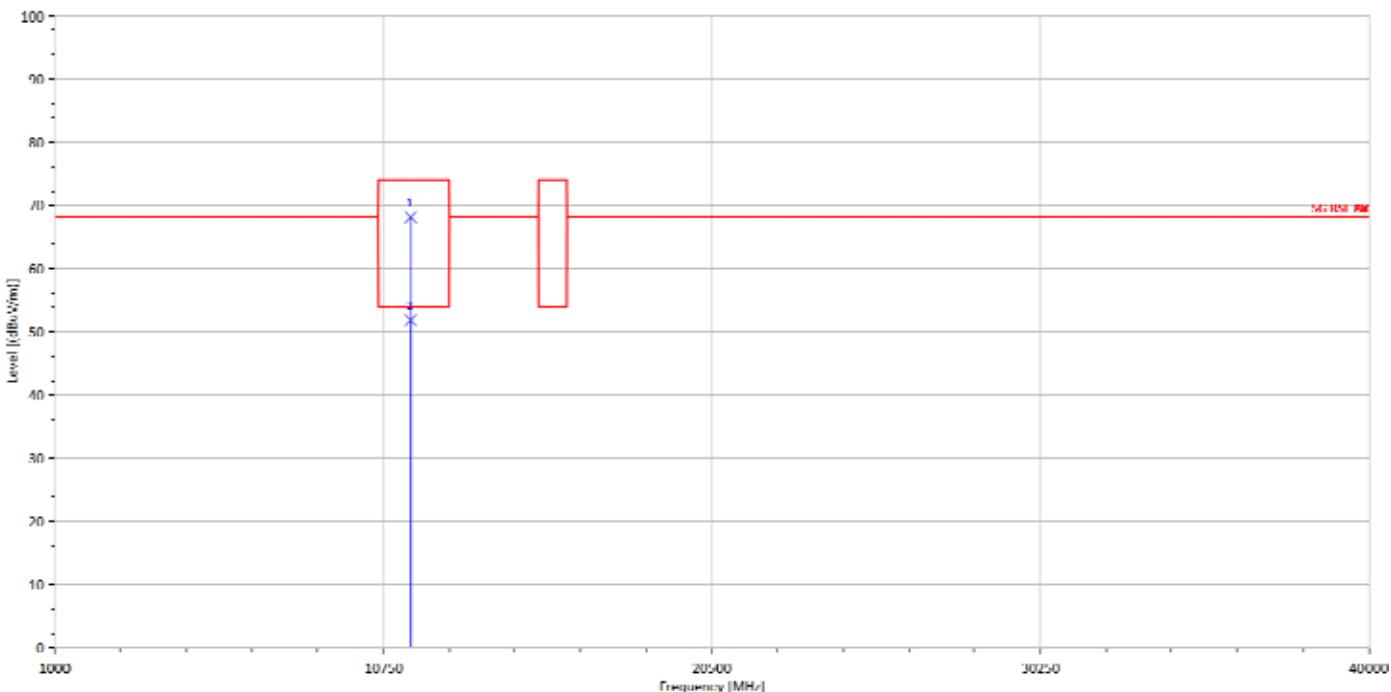
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11490.00	H	Peak	35.43	20.70	56.13	74	-17.87
11490.00	H	Average	23.85	20.70	44.55	54	-9.45

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



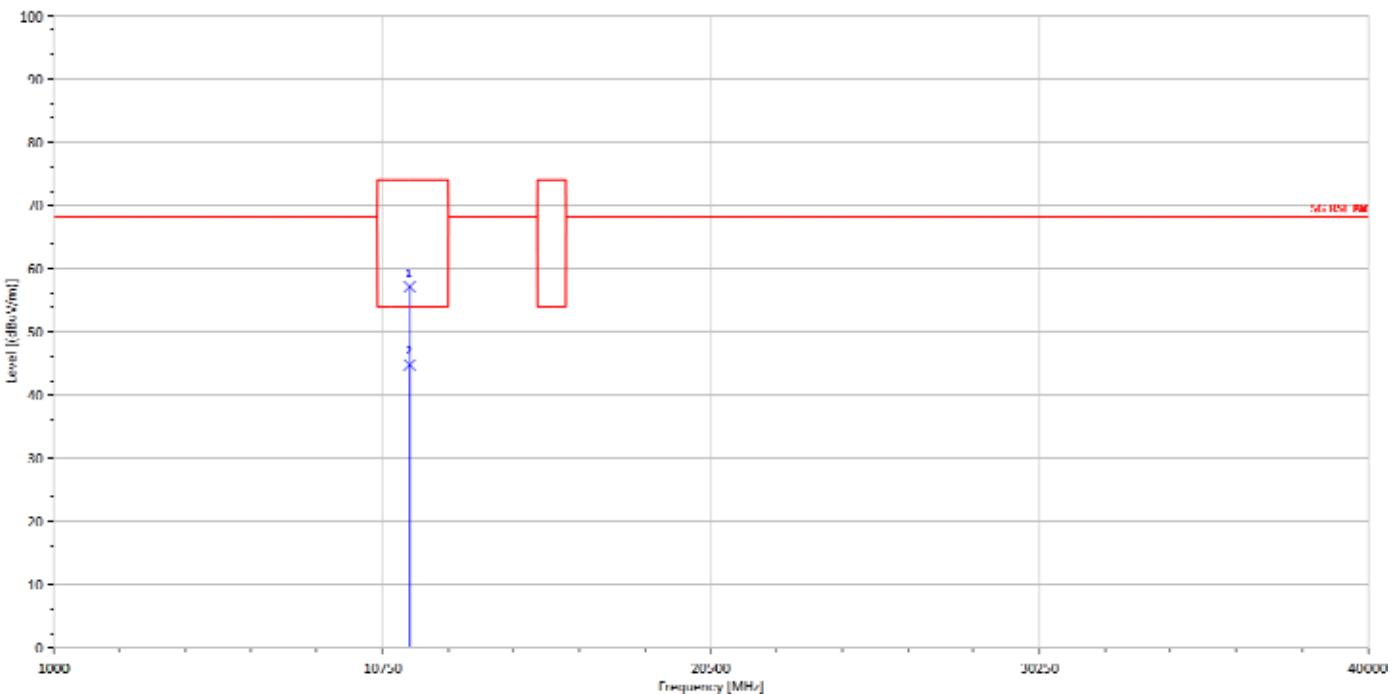
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11570.00	H	Peak	46.74	21.44	68.18	74	-5.82
11570.00	H	Average	30.41	21.44	51.85	54	-2.15

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



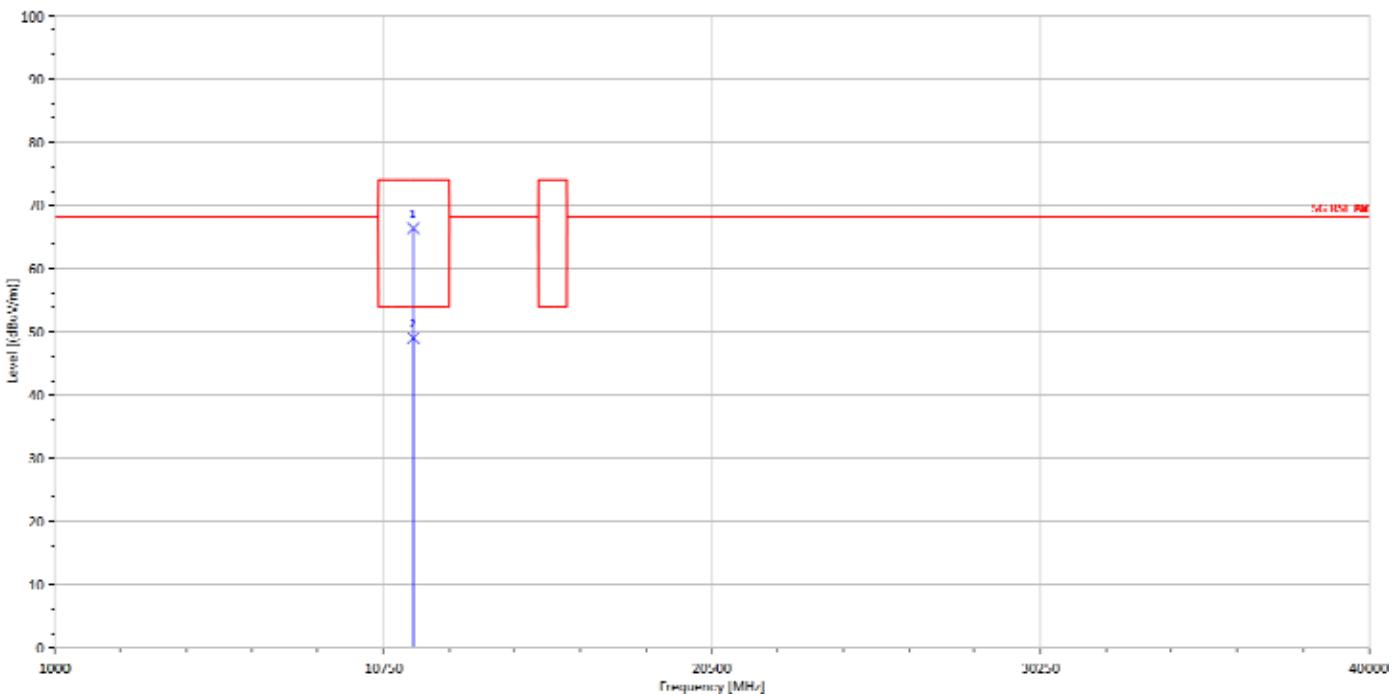
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11570.00	H	Peak	35.59	21.44	57.04	74	-16.96
11570.00	H	Average	23.27	21.44	44.71	54	-9.29

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



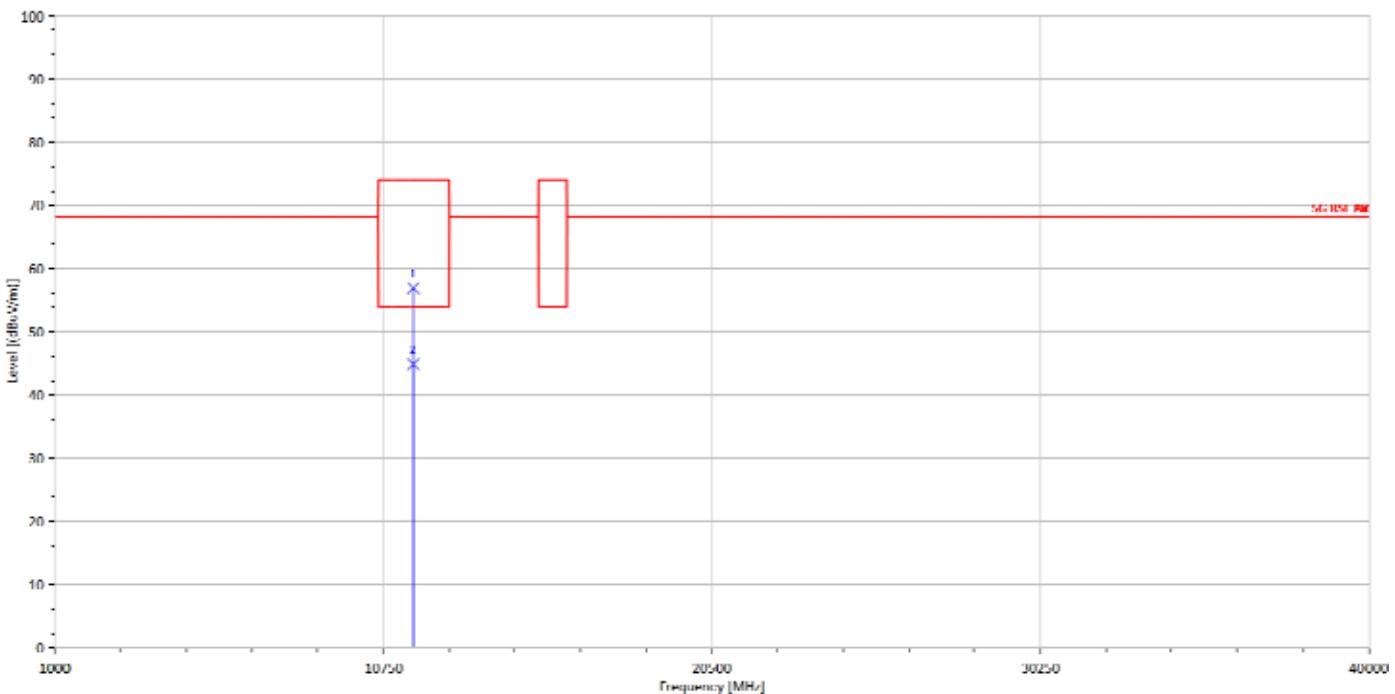
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11650.00	H	Peak	44.38	22.02	66.40	74	-7.60
11650.00	H	Average	26.98	22.02	49.00	54	-5.00

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Operation Mode : 802.11a Test Date : 2016/12/28
Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11650.00	H	Peak	34.82	22.02	56.84	74	-17.16
11650.00	H	Average	22.79	22.02	44.81	54	-9.19

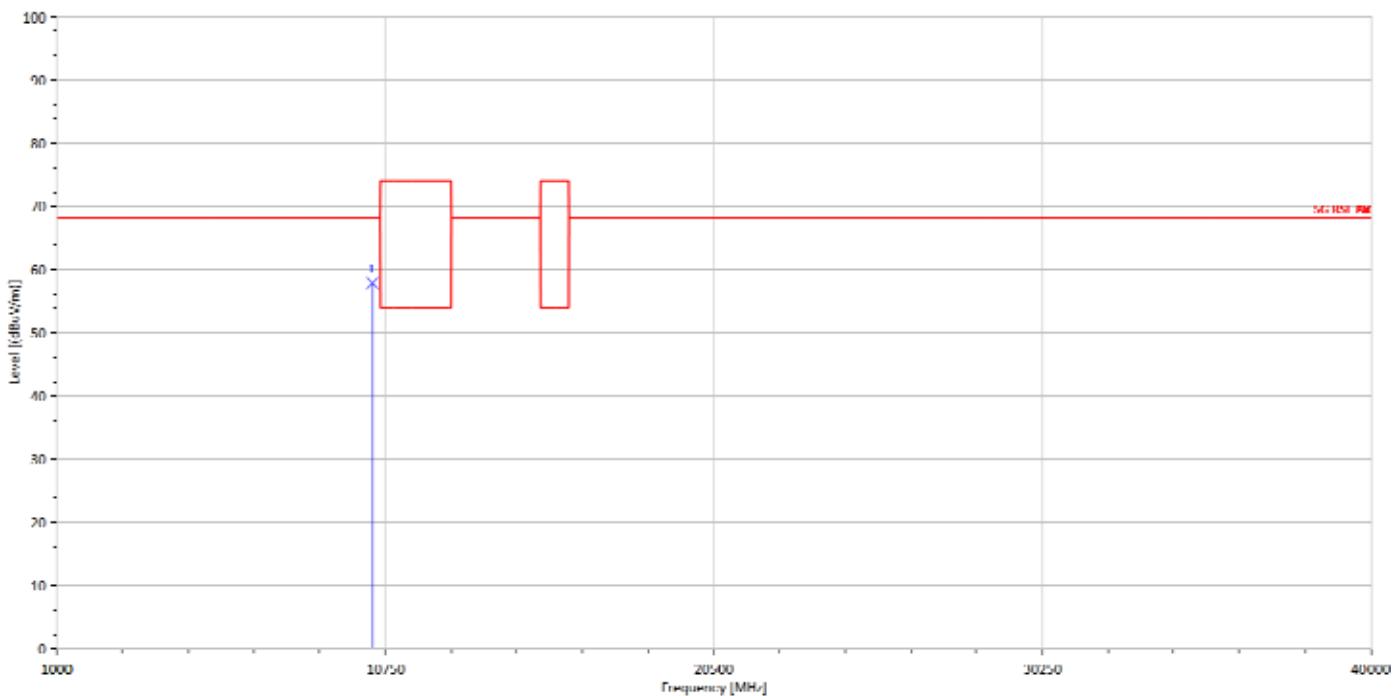
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz

Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



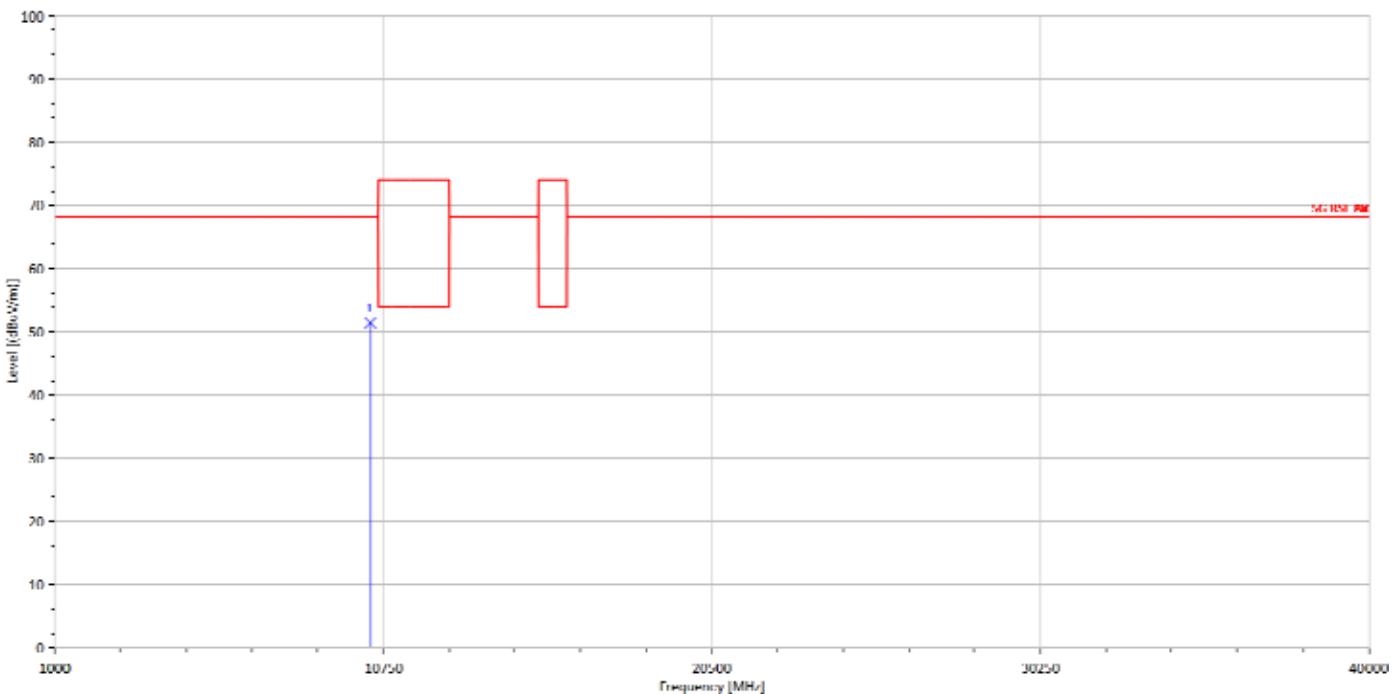
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10360.00	H	Peak	37.63	20.18	57.81	68.3	-10.49

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



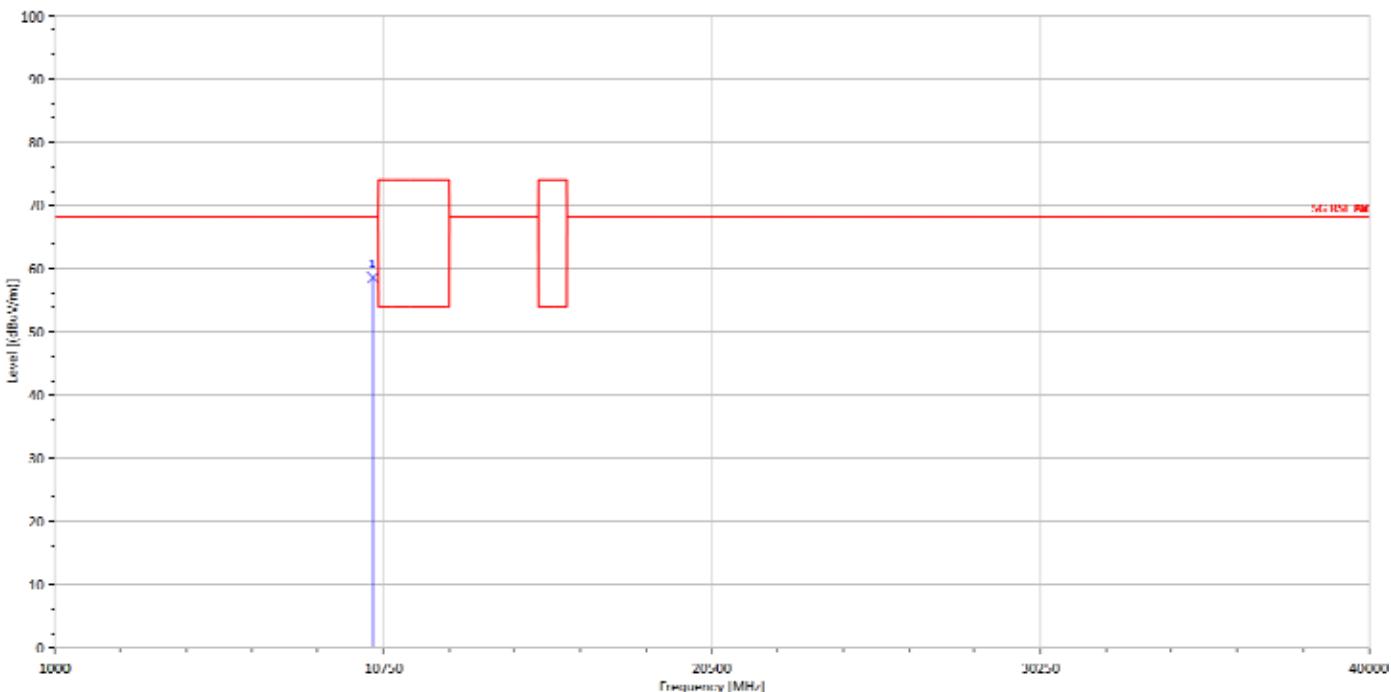
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10360.00	H	Peak	31.25	20.18	51.42	68.3	-16.88

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



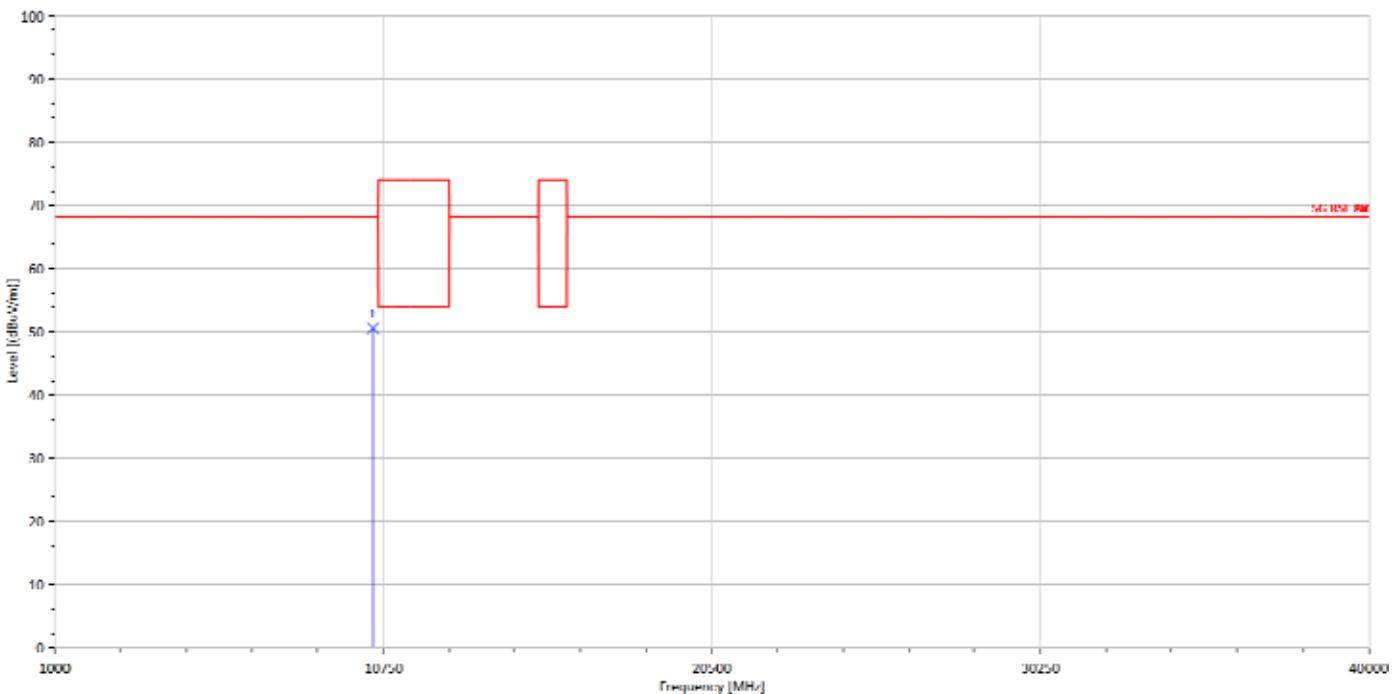
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10440.00	H	Peak	38.22	20.29	58.51	68.3	-9.79

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5220 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



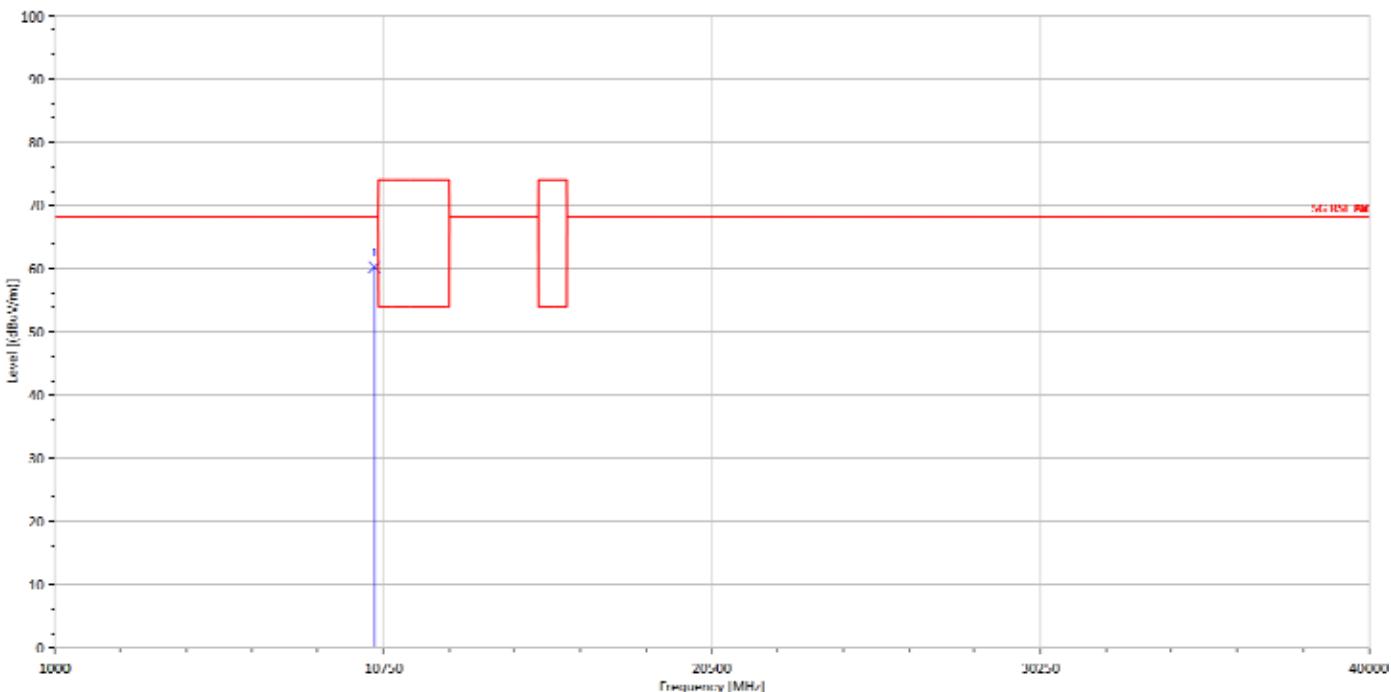
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10440.00	H	Peak	30.30	20.29	50.59	68.3	-17.71

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



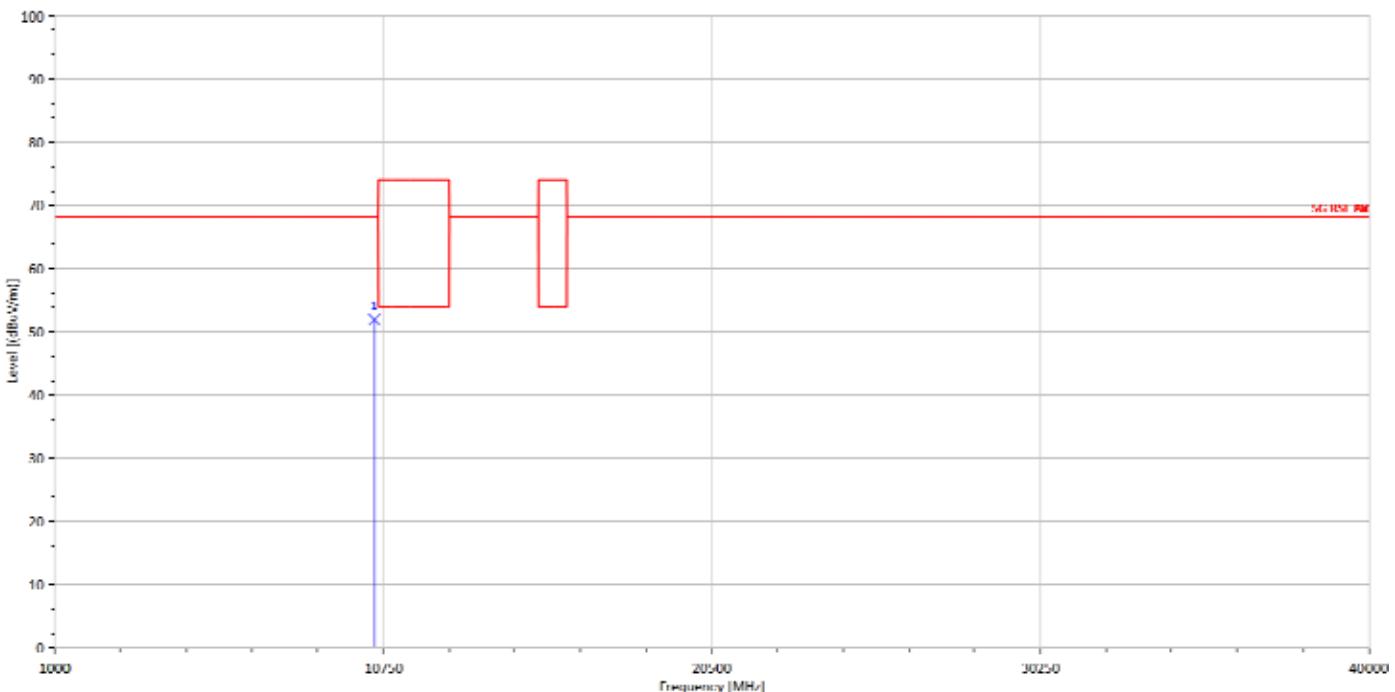
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10480.00	H	Peak	39.53	20.68	60.21	68.3	-8.09

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5240 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10480.00	H	Peak	31.25	20.68	51.93	68.3	-16.37

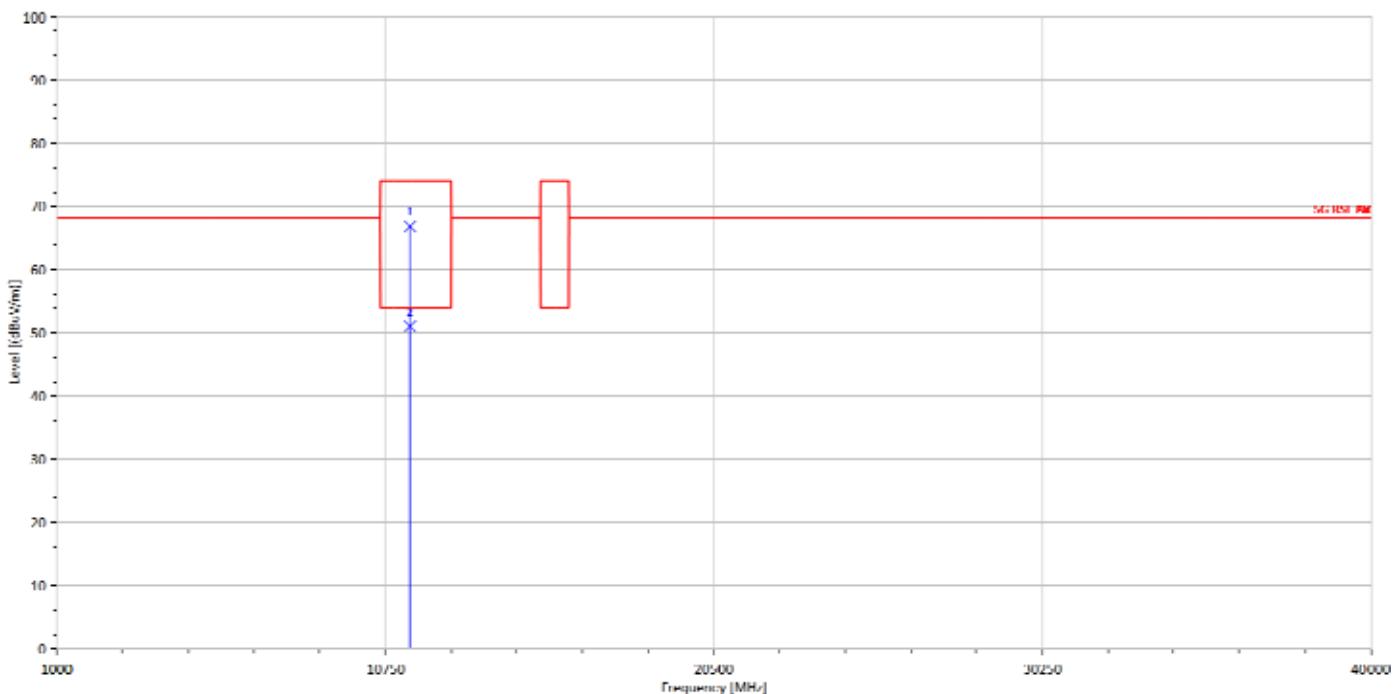
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz

Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



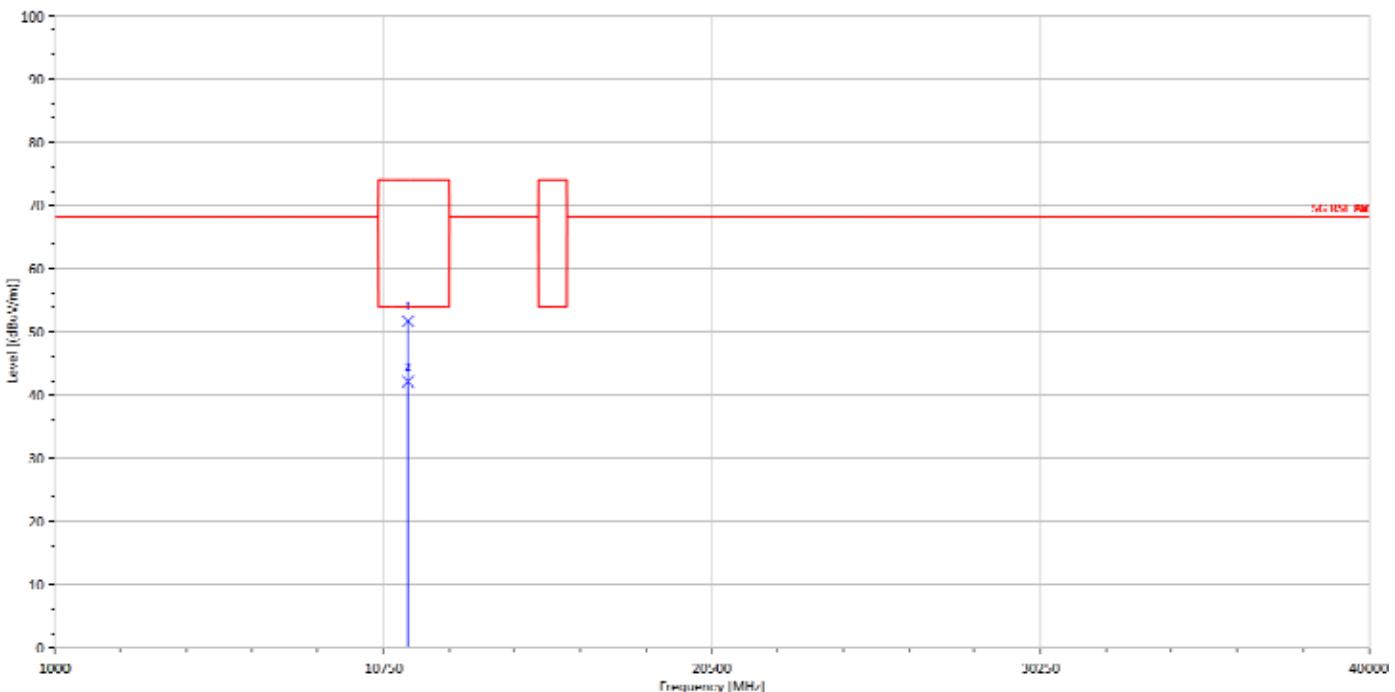
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11490.00	H	Peak	46.15	20.70	66.86	74	-7.14
11490.00	H	Average	30.32	20.70	51.02	54	-2.98

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



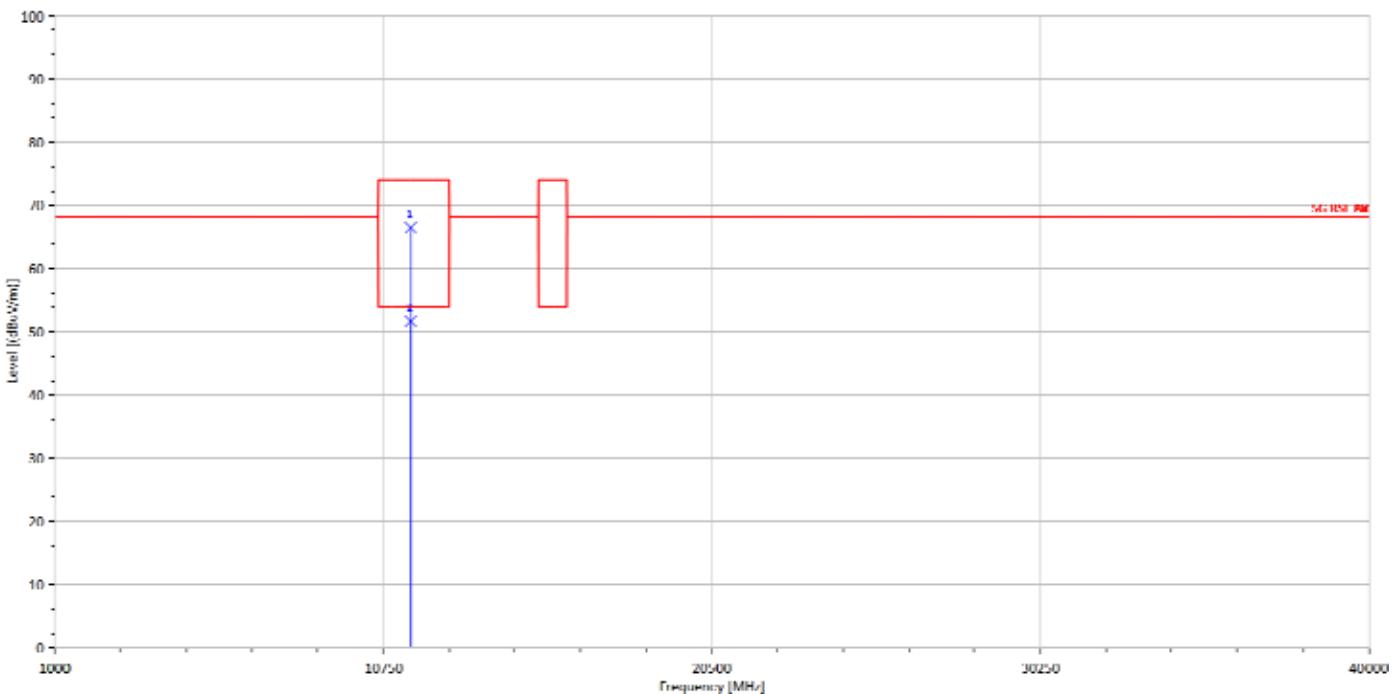
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11490.00	H	Peak	30.99	20.70	51.69	74	-22.31
11490.00	H	Average	21.35	20.70	42.05	54	-11.95

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



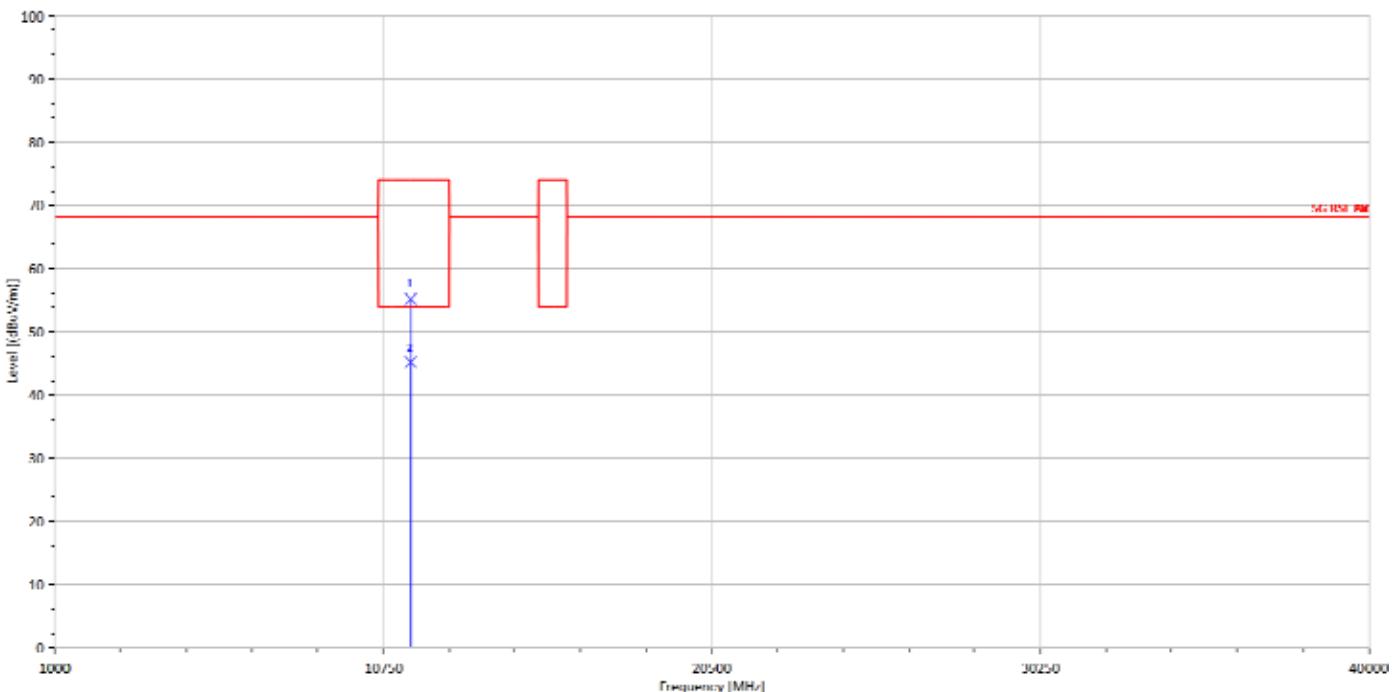
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11570.00	H	Peak	45.04	21.44	66.49	74	-7.51
11570.00	H	Average	30.23	21.44	51.67	54	-2.33

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5785 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Mid Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



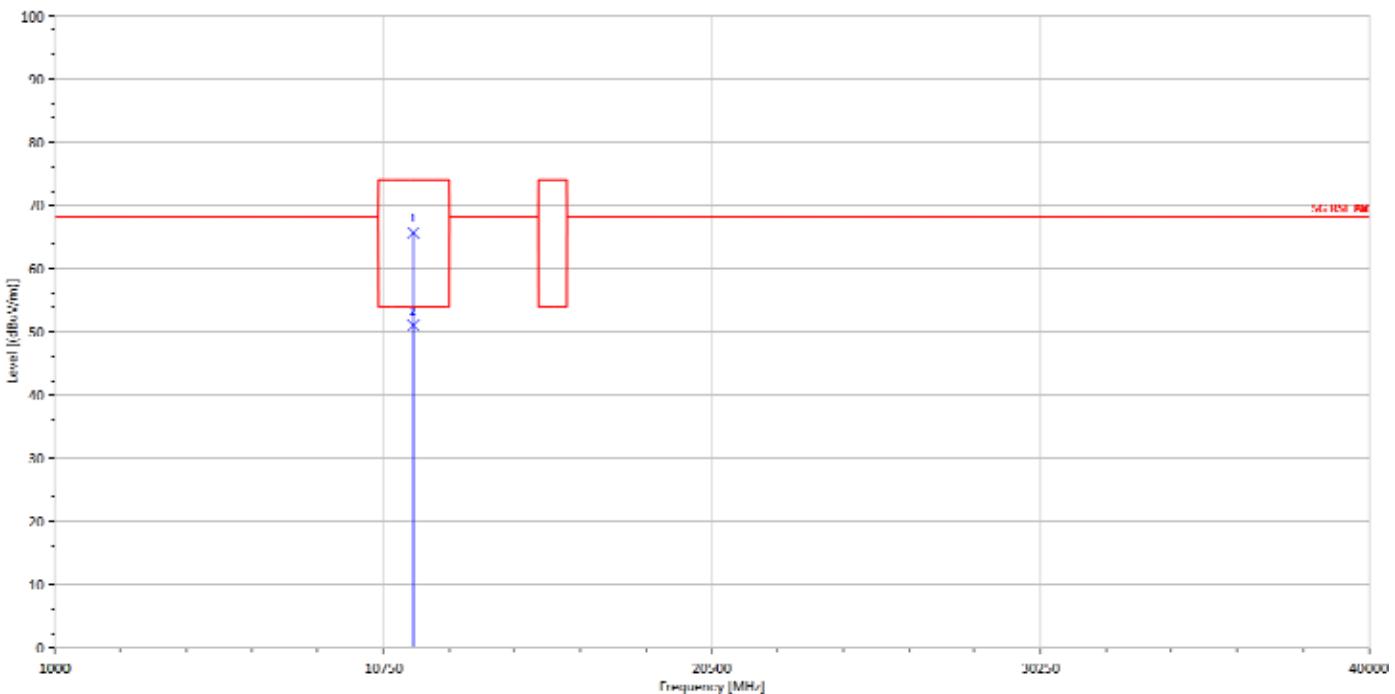
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11570.00	H	Peak	33.77	21.44	55.22	74	-18.78
11570.00	H	Average	23.70	21.44	45.14	54	-8.86

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



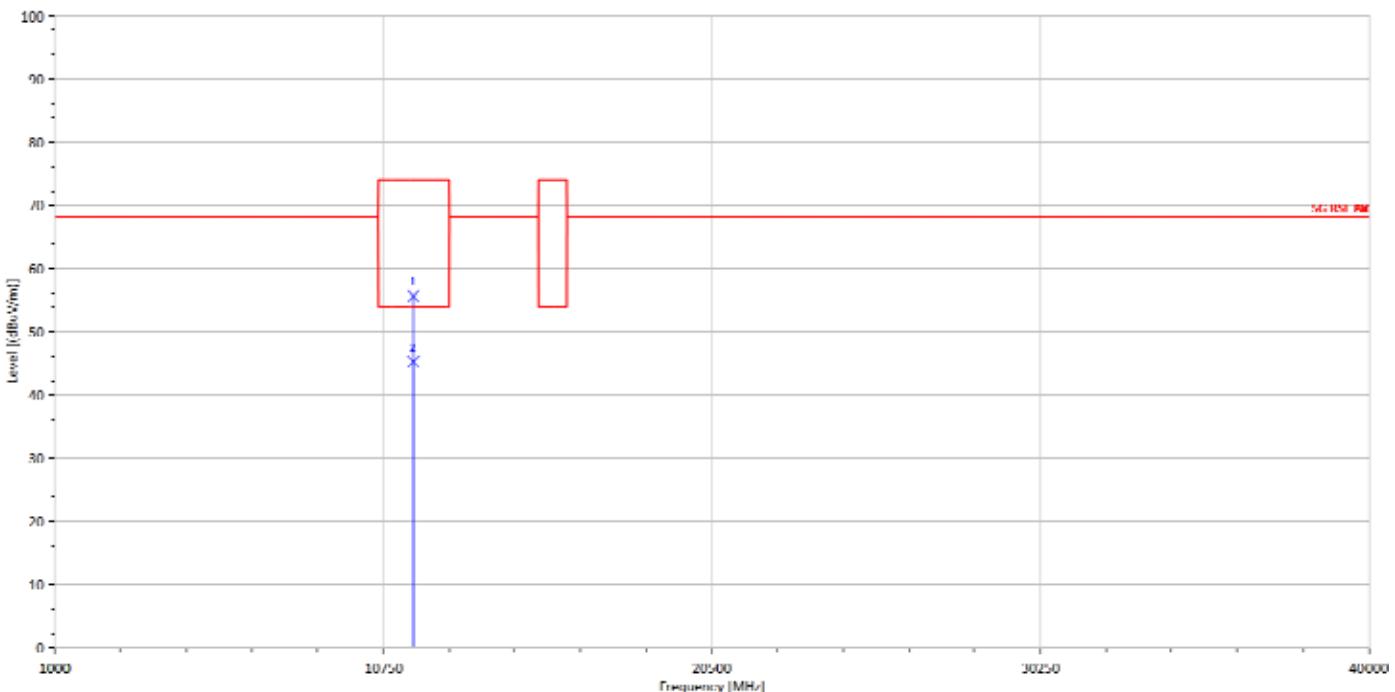
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11650.00	H	Peak	43.65	22.02	65.67	74	-8.33
11650.00	H	Average	29.01	22.02	51.03	54	-2.97

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Operation Mode : 802.11n20 Test Date : 2016/12/28
Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11650.00	H	Peak	33.60	22.02	55.62	74	-18.38
11650.00	H	Average	23.18	22.02	45.20	54	-8.80

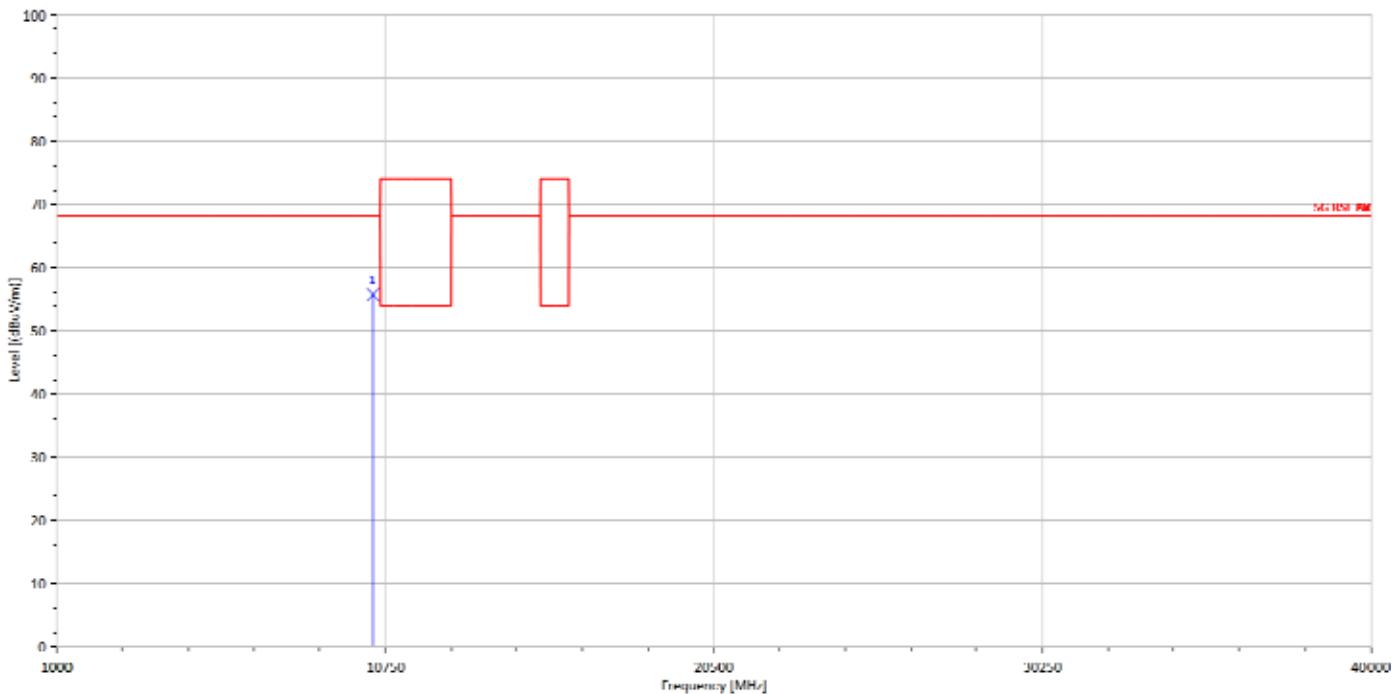
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz

Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



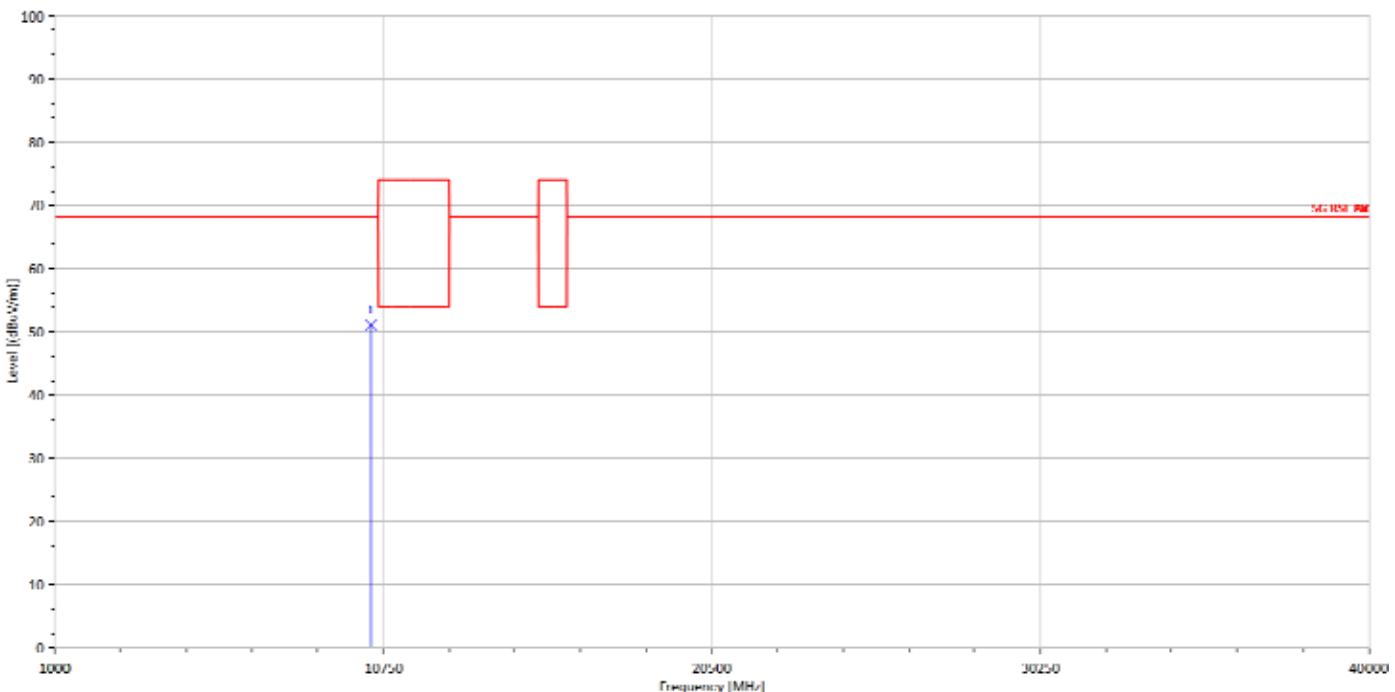
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10380.00	H	Peak	34.76	20.95	55.71	68.3	-12.59

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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



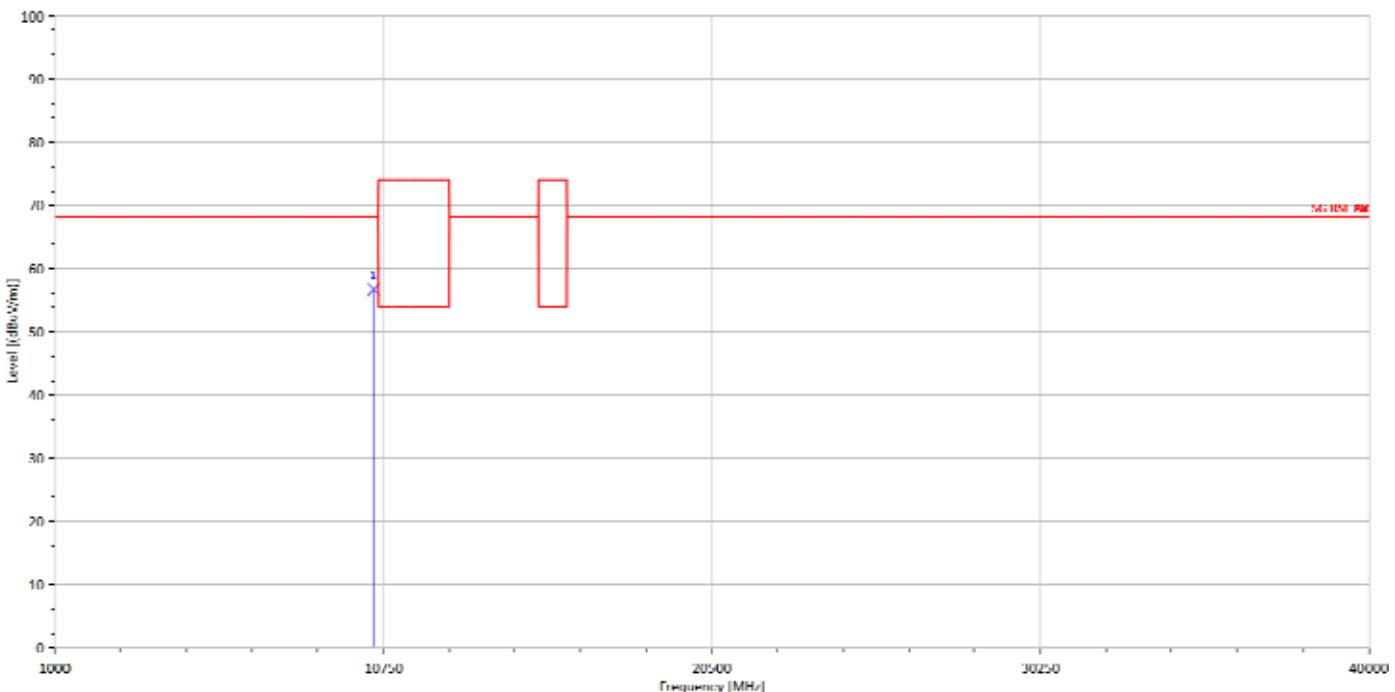
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10380.00	H	Peak	30.12	20.95	51.07	68.3	-17.23

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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10460.00	H	Peak	35.69	20.95	56.64	68.3	-11.66

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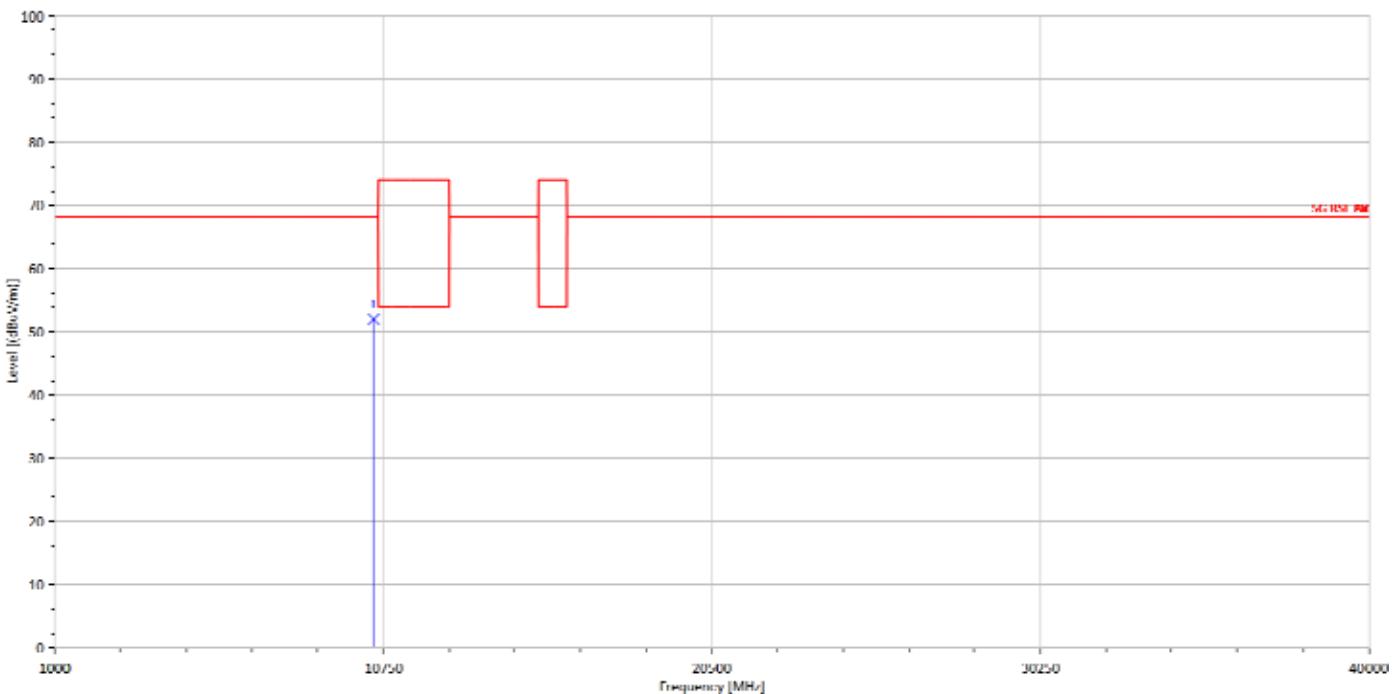
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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5230 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
10460.00	H	Peak	31.05	20.95	52.00	68.3	-16.30

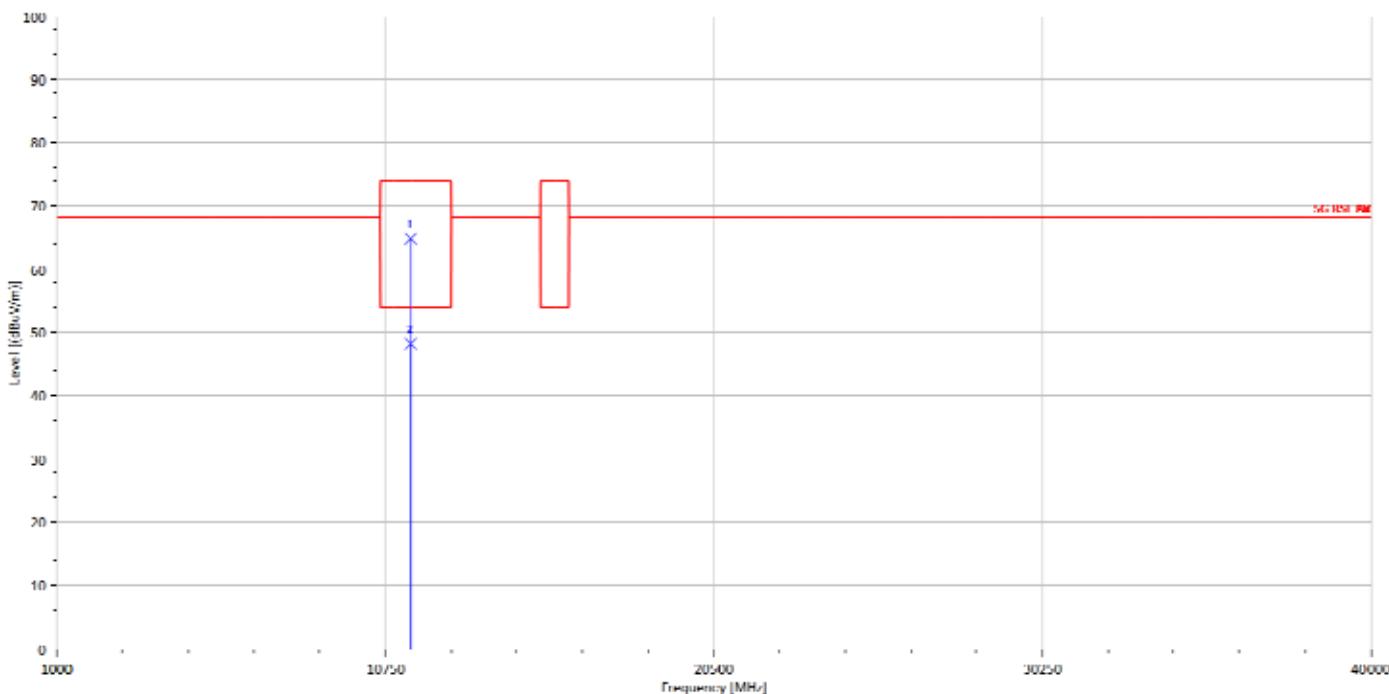
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz

Operation Mode : 802.11n40 Test Date : 2016/12/28
 Fundamental Frequency : 5755 MHz Temp. / Humi. : 22.7 deg_C/57RH
 Operation Band : Tx CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



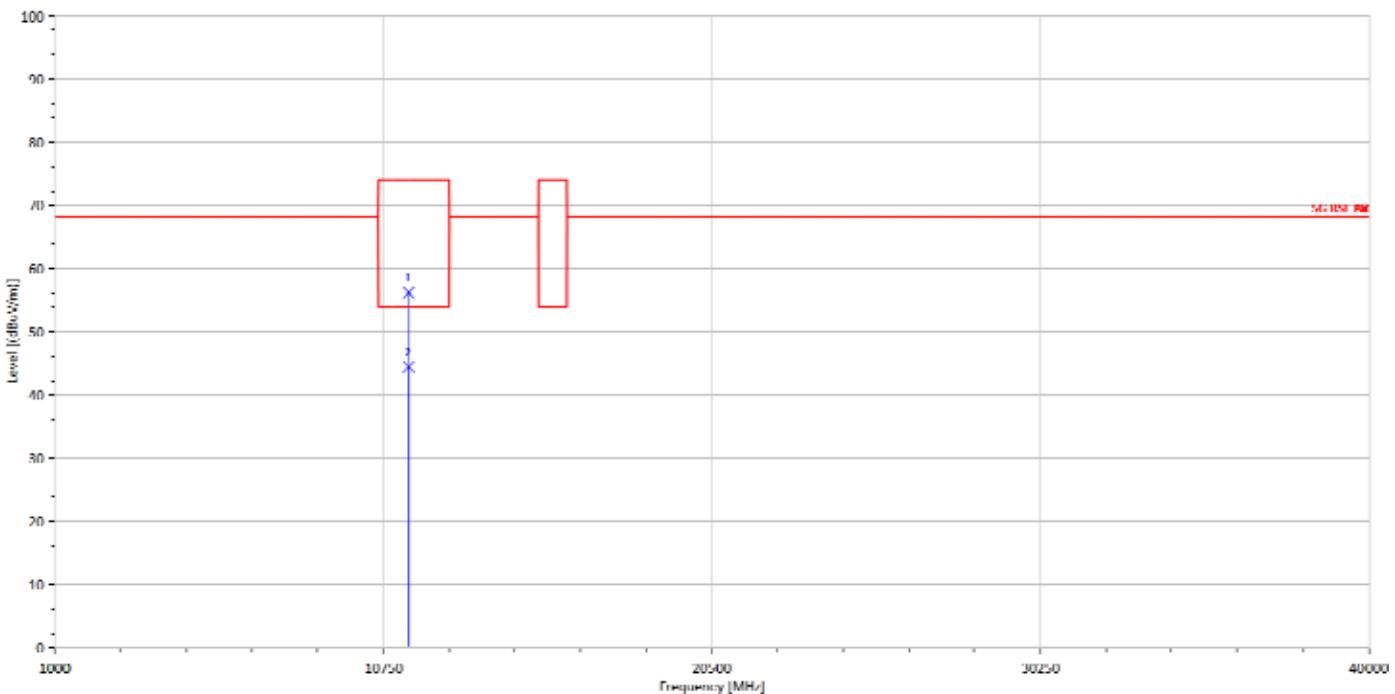
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11510.00	H	Peak	42.65	22.17	64.81	74	-9.19
11510.00	H	Average	26.00	22.17	48.17	54	-5.83

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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5755 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



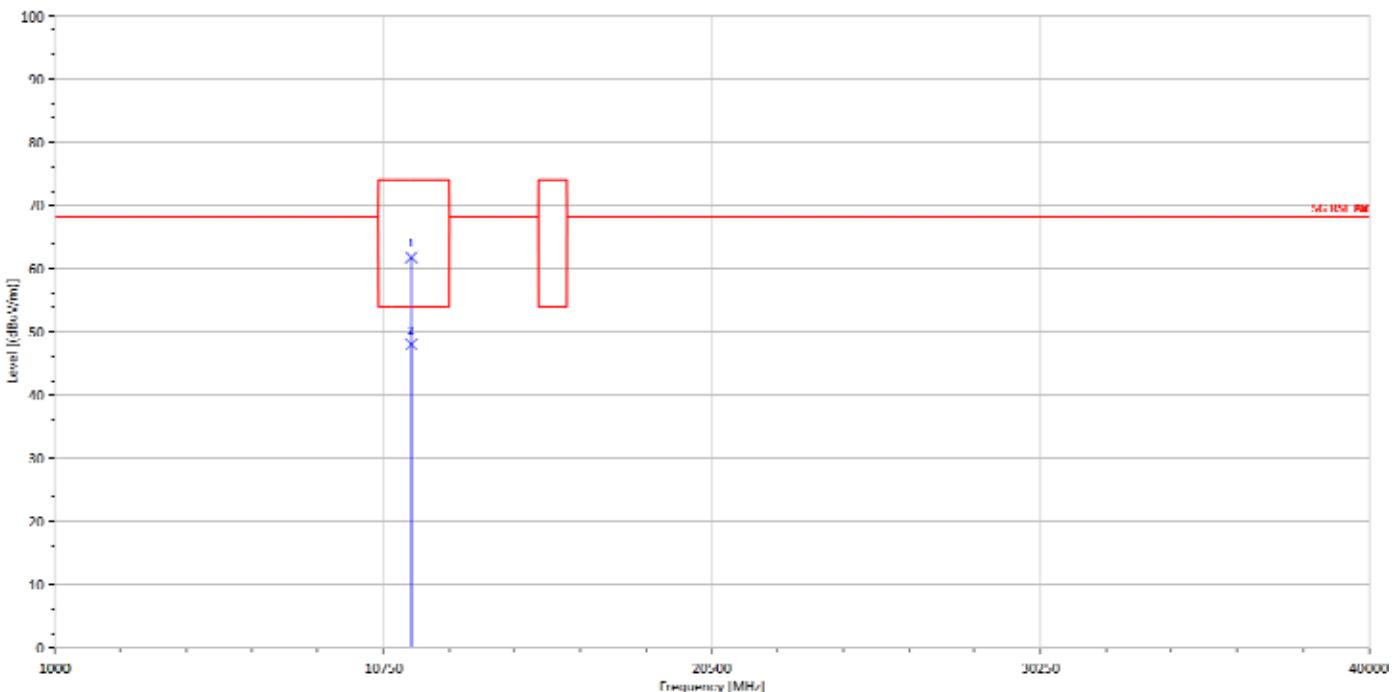
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11510.00	H	Peak	34.01	22.17	56.17	74	-17.83
11510.00	H	Average	22.22	22.17	44.39	54	-9.61

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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



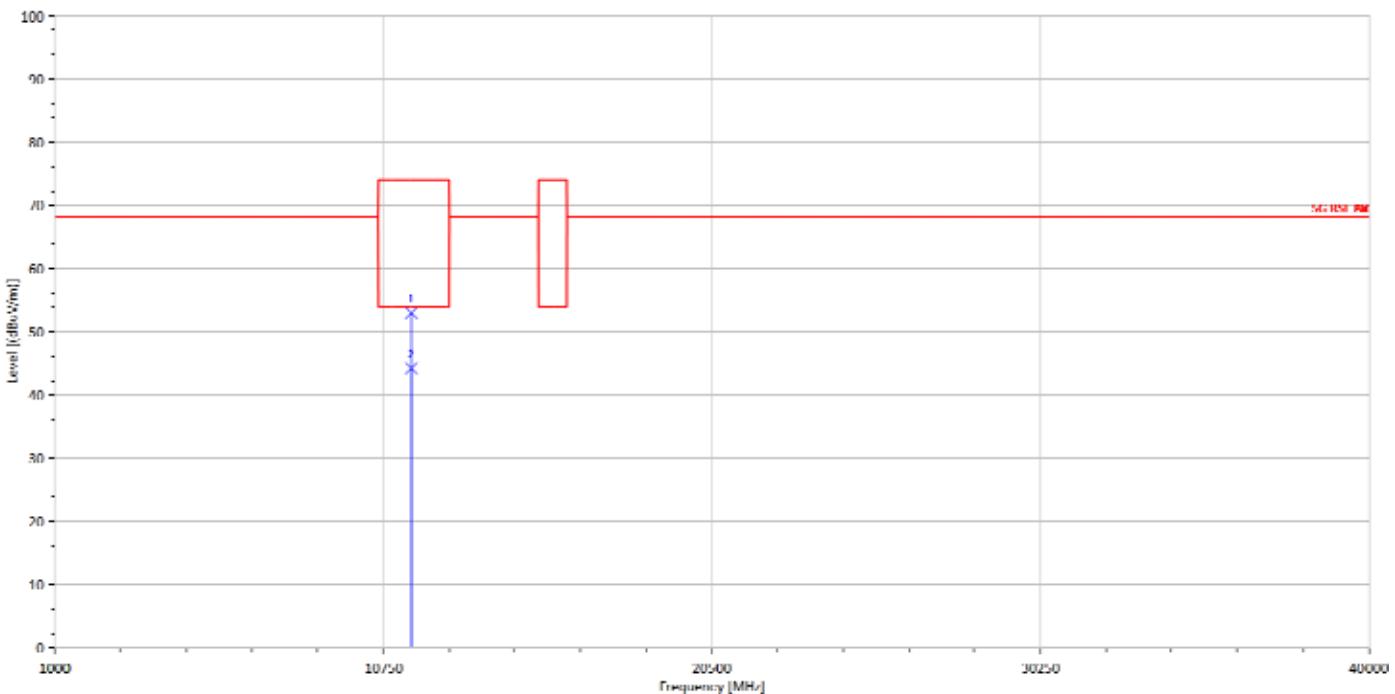
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11590.00	H	Peak	39.90	21.84	61.74	74	-12.26
11590.00	H	Average	26.12	21.84	47.96	54	-6.04

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Operation Mode : 802.11n40 Test Date : 2016/12/28
Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7 deg_C/57RH
Operation Band : Tx CH High 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
11590.00	H	Peak	31.17	21.84	53.01	74	-20.99
11590.00	H	Average	22.32	21.84	44.16	54	-9.84

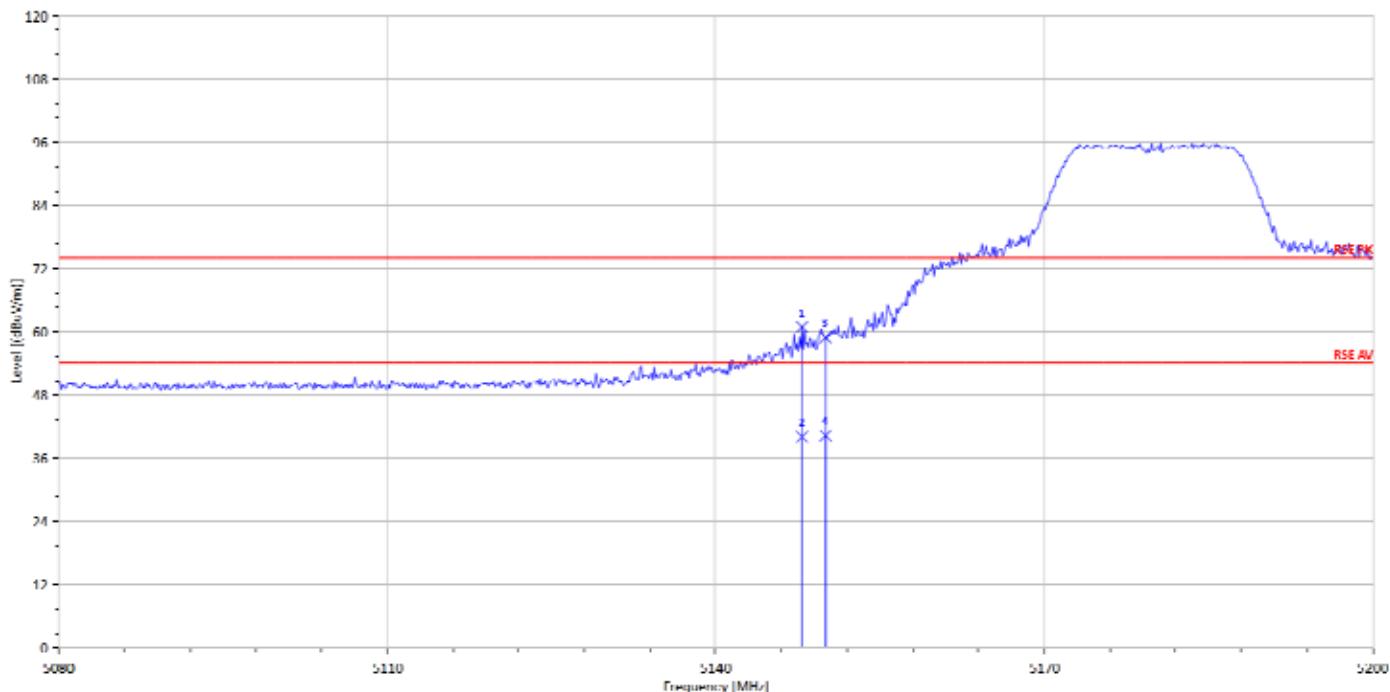
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Band edge falling to restricted band**802.11a mode**

Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5147.92	S	Peak	52.74	8.18	60.91	74	-13.09
5147.92	S	Average	31.83	8.18	40.01	54	-13.99
5150.00	E	Peak	50.71	8.19	58.90	74	-15.10
5150.00	E	Average	32.06	8.19	40.25	54	-13.75

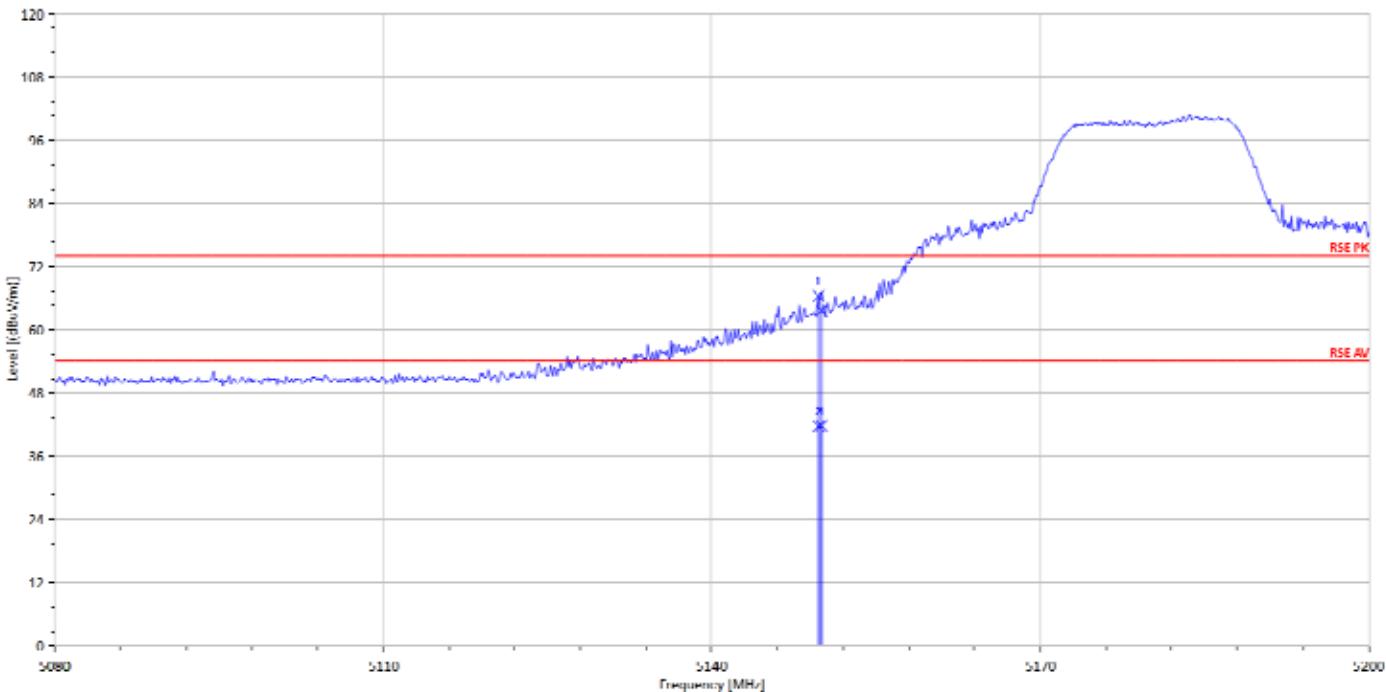
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Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5149.72	S	Peak	58.21	8.19	66.40	74	-7.60
5149.72	S	Average	33.51	8.19	41.70	54	-12.30
5150.00	E	Peak	55.44	8.19	63.63	74	-10.37
5150.00	E	Average	33.58	8.19	41.77	54	-12.23

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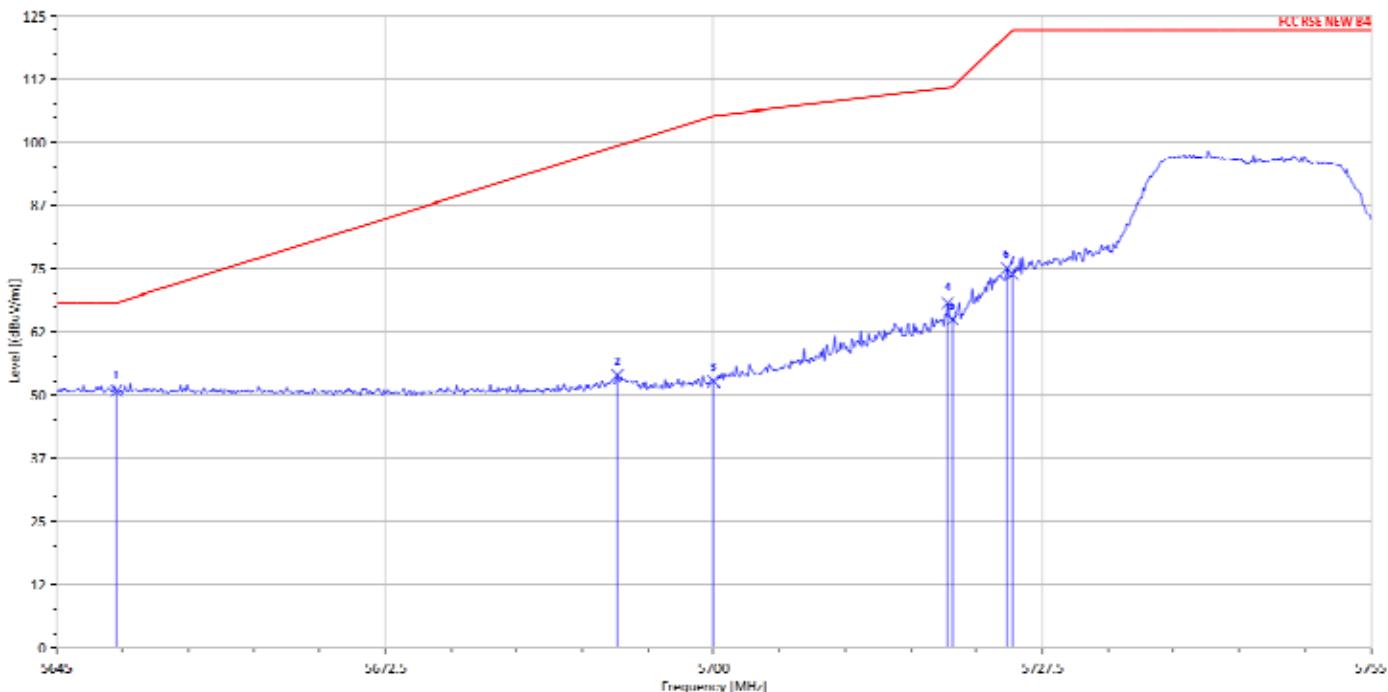
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Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



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
5650.00	S	Peak	41.55	9.33	50.88	68.23	-17.35
5691.97	S	Peak	44.21	9.62	53.83	99.28796	-45.46
5700.00	S	Peak	43.19	9.44	52.63	105.23	-52.60
5719.58	S	Peak	58.97	9.28	68.25	110.7124	-42.46
5720.00	S	Peak	55.67	9.28	64.95	110.83	-45.88
5724.53	S	Peak	65.71	9.30	75.01	121.1579	-46.15
5725.00	E	Peak	64.54	9.30	73.84	122.23	-48.39

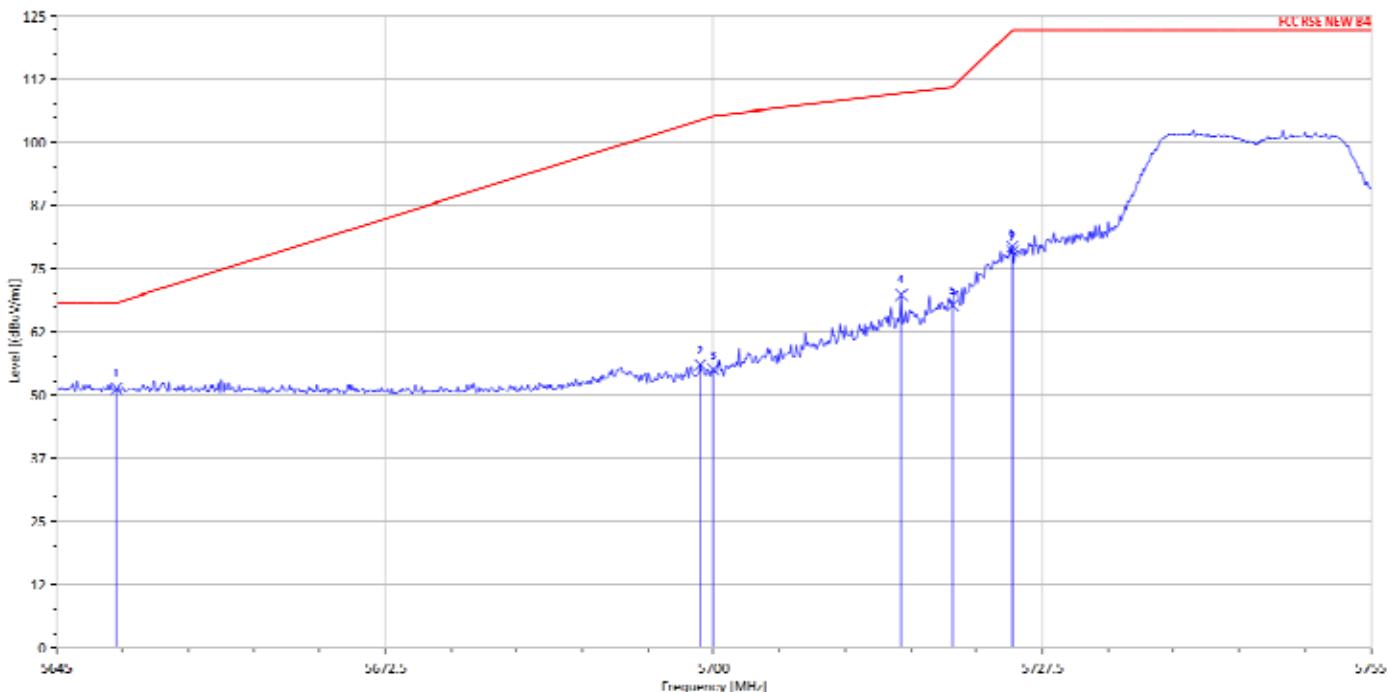
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Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
5650.00	S	Peak	41.91	9.33	51.24	68.23	-16.99
5698.90	S	Peak	46.43	9.46	55.90	104.4159	-48.52
5700.00	S	Peak	45.50	9.44	54.94	105.23	-50.29
5715.73	S	Peak	60.52	9.26	69.78	109.6344	-39.85
5720.00	S	Peak	58.51	9.28	67.79	110.83	-43.04
5724.97	S	Peak	70.03	9.30	79.33	122.1621	-42.83
5725.00	E	Peak	69.11	9.30	78.41	122.23	-43.82

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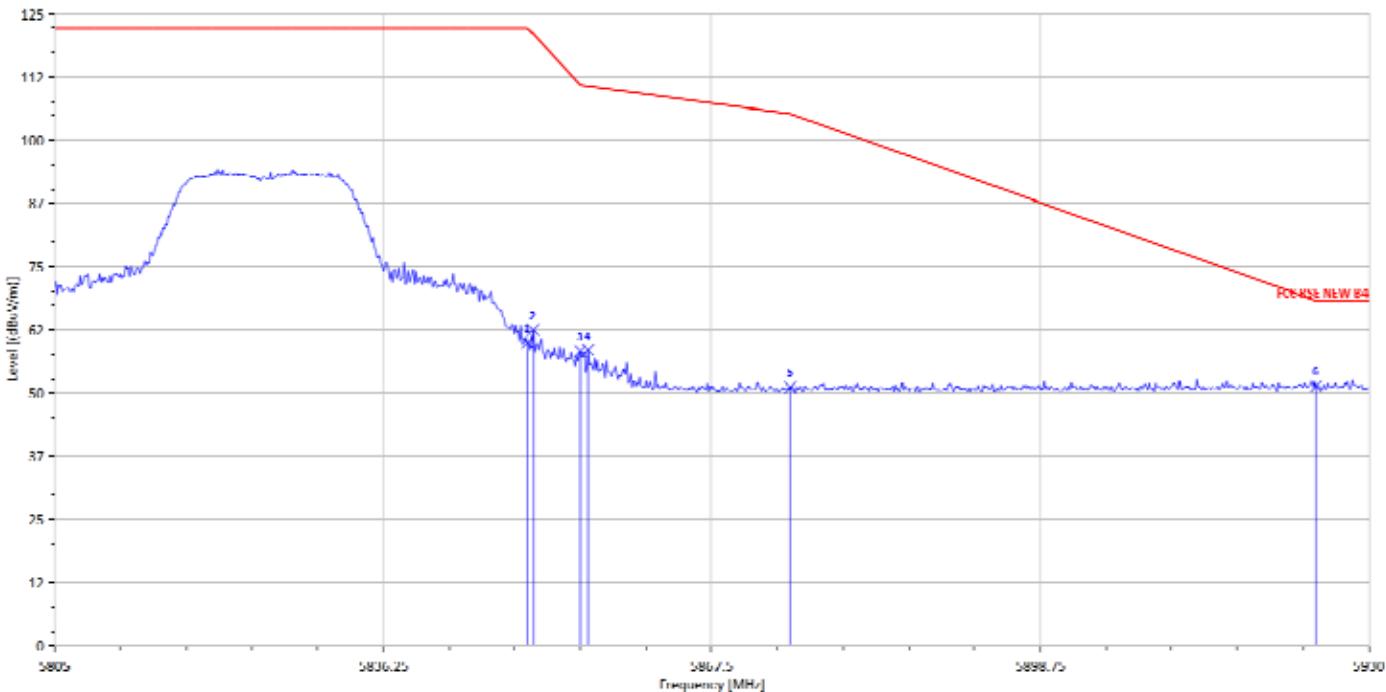
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Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



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
5850.00	E	Peak	50.38	9.49	59.87	122.23	-62.36
5850.50	S	Peak	53.00	9.50	62.50	121.09	-58.59
5855.00	S	Peak	48.67	9.58	58.25	110.83	-52.58
5855.75	S	Peak	48.85	9.59	58.45	110.62	-52.17
5875.00	S	Peak	41.41	9.63	51.04	105.23	-54.19
5925.00	S	Peak	41.29	10.01	51.31	68.23	-16.92

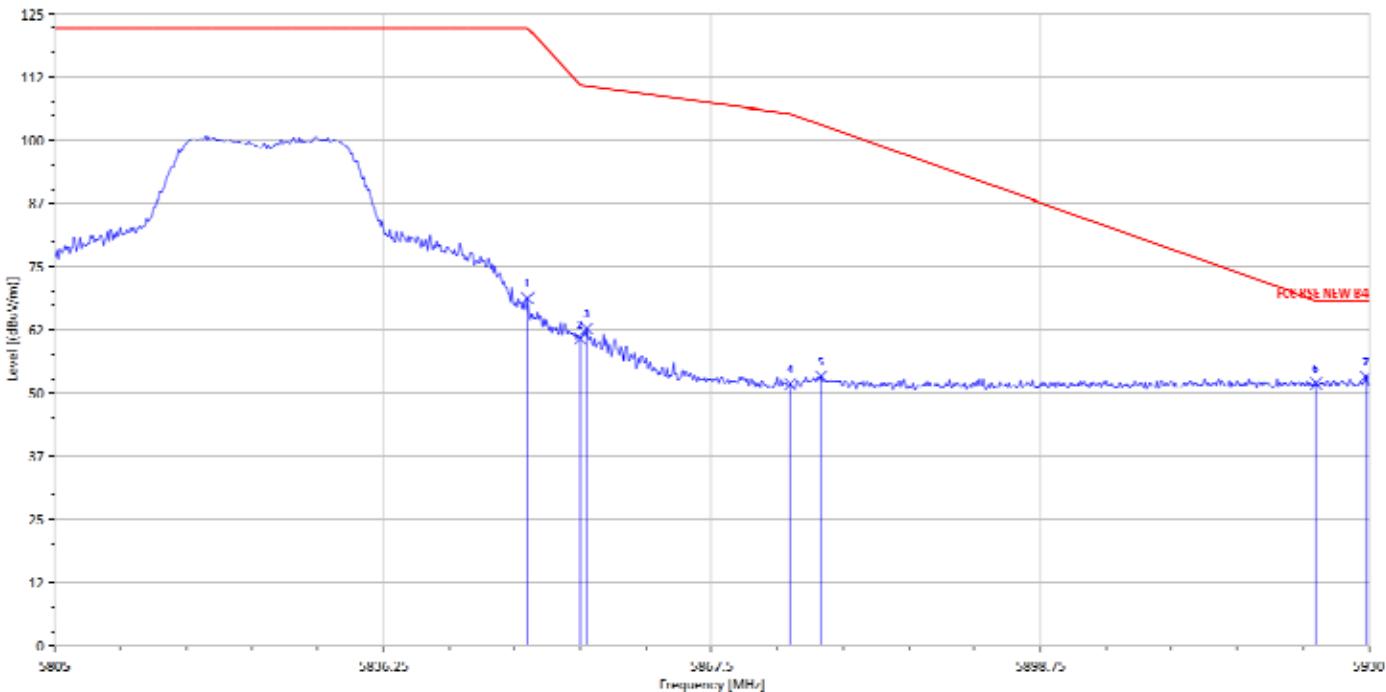
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Operation Mode : 802.11a Test Date : 2016/12/27
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
5850.00	E	Peak	59.27	9.49	68.76	122.23	-53.47
5855.00	S	Peak	51.11	9.58	60.69	110.83	-50.14
5855.63	S	Peak	53.12	9.59	62.71	110.655	-47.94
5875.00	S	Peak	42.08	9.63	51.71	105.23	-53.52
5877.88	S	Peak	43.58	9.62	53.19	103.1025	-49.91
5925.00	S	Peak	41.82	10.01	51.84	68.23	-16.39
5929.75	S	Peak	43.10	10.07	53.17	68.23	-15.06

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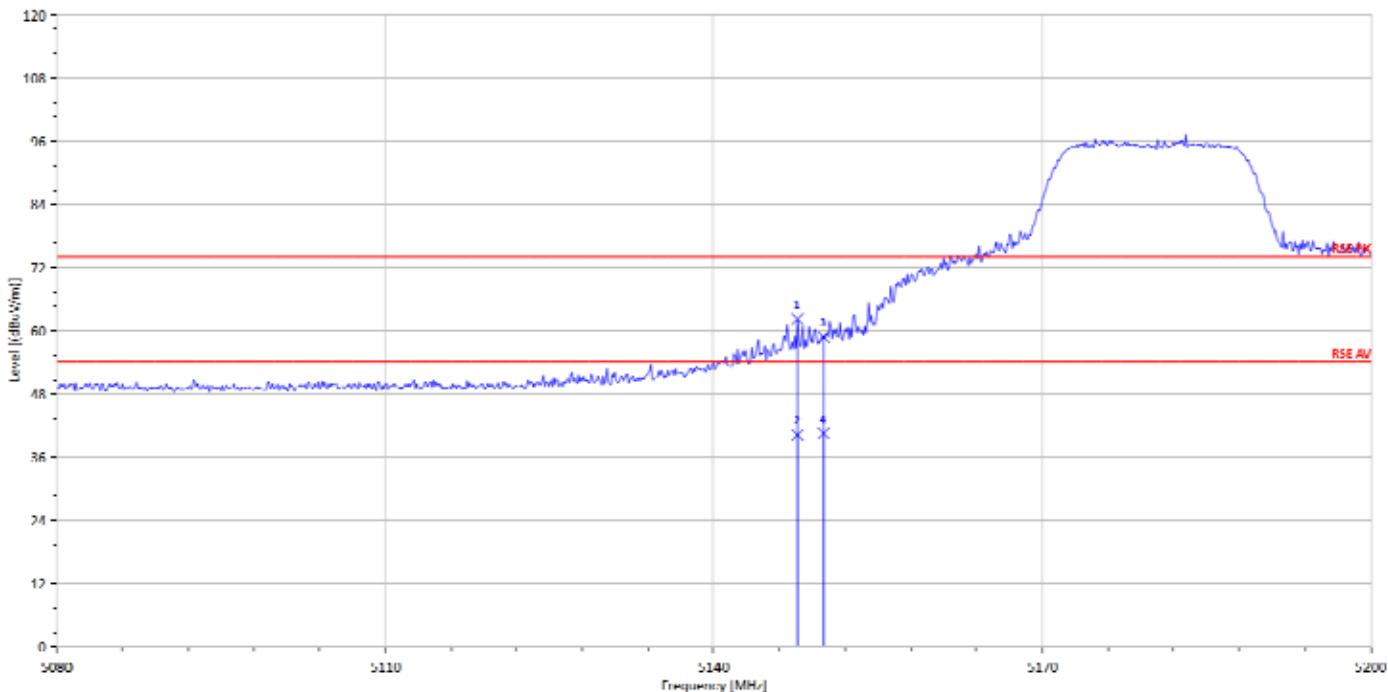
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802.11n20 HT mode

Operation Mode : 802.11n20 Test Date : 2016/12/27
Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Vertical



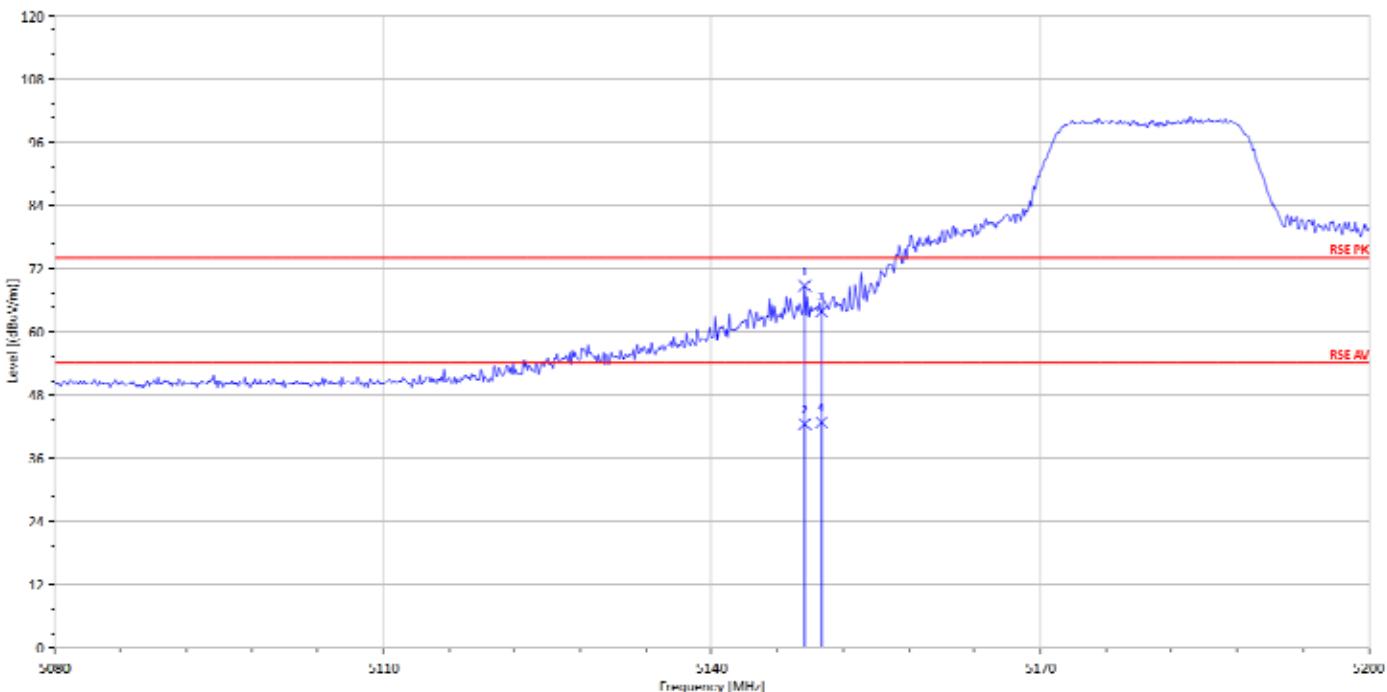
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5147.68	S	Peak	54.05	8.18	62.23	74	-11.77
5147.68	S	Average	32.01	8.18	40.19	54	-13.81
5150.00	E	Peak	50.62	8.19	58.81	74	-15.19
5150.00	E	Average	32.30	8.19	40.49	54	-13.51

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Operation Mode : 802.11n20 Test Date : 2016/12/27
Fundamental Frequency : 5180 MHz Temp. / Humi. : 22.7deg_C/57RH
Operation Band : BE CH Low Test Engineer : Ashton
EUT Pol. : H Measurement Antenna Pol. : Horizontal



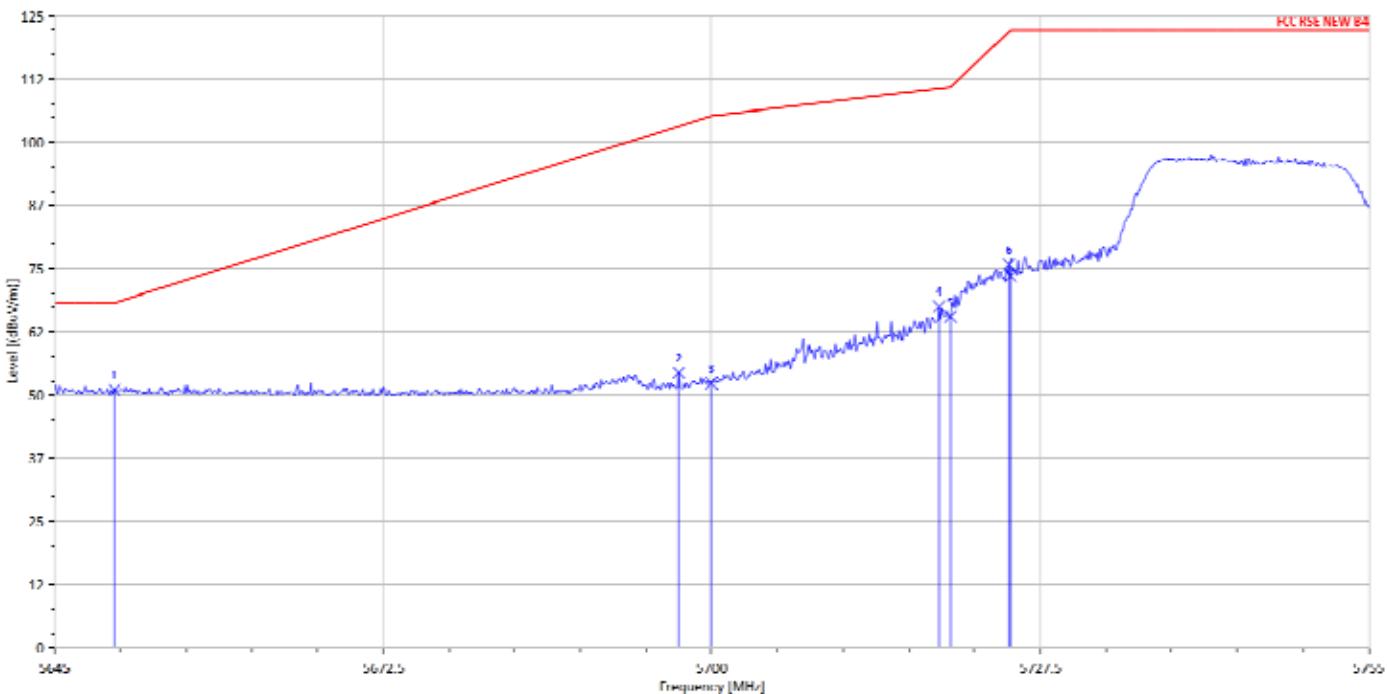
Freq. MHz	Note	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
F/H/E/S							
5148.52	S	Peak	60.45	8.18	68.64	74	-5.36
5148.52	S	Average	34.28	8.18	42.46	54	-11.54
5150.00	E	Peak	55.69	8.19	63.88	74	-10.12
5150.00	E	Average	34.59	8.19	42.78	54	-11.22

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Operation Mode : 802.11n20 Test Date : 2016/12/27
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low 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
5650.00	S	Peak	41.63	9.33	50.97	68.23	-17.26
5697.25	S	Peak	44.80	9.50	54.30	103.195	-48.89
5700.00	S	Peak	42.85	9.44	52.29	105.23	-52.94
5719.03	S	Peak	58.24	9.28	67.52	110.5583	-43.04
5720.00	S	Peak	56.25	9.28	65.54	110.83	-45.29
5724.86	S	Peak	66.45	9.30	75.75	121.9105	-46.16
5725.00	E	Peak	64.15	9.30	73.45	122.23	-48.78

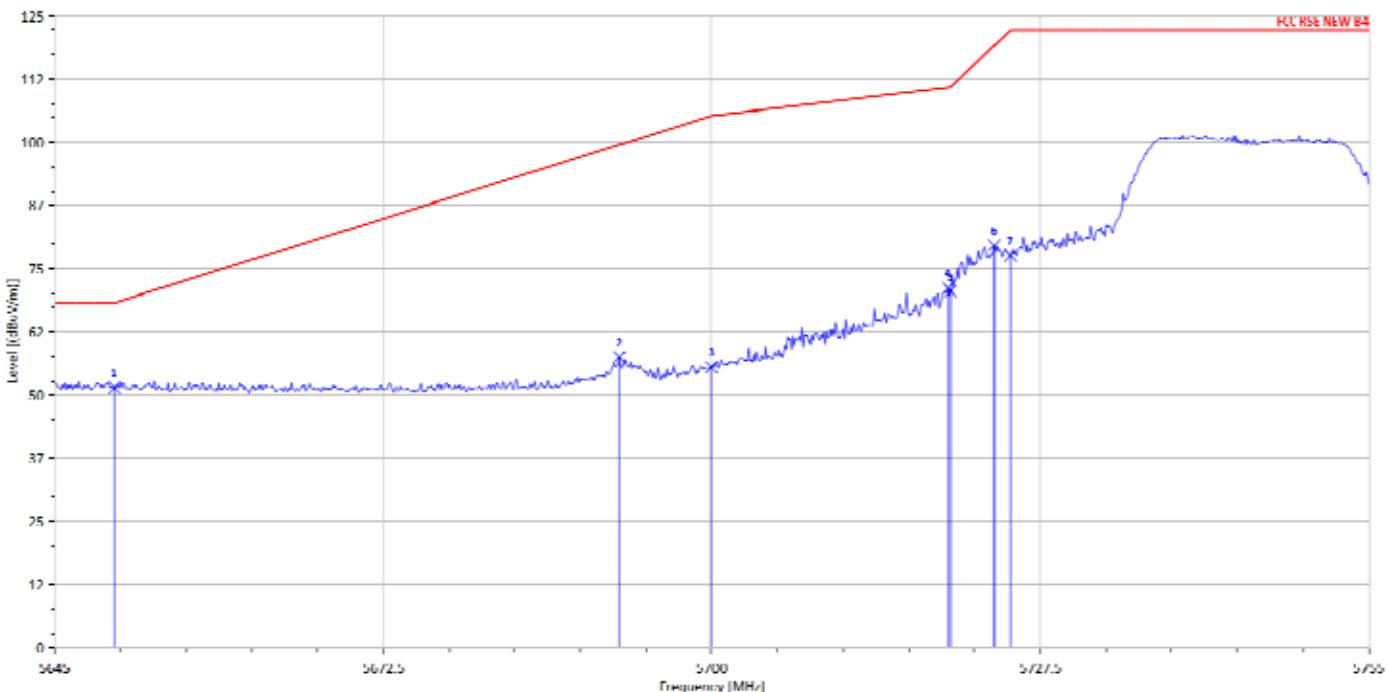
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Operation Mode : 802.11n20 Test Date : 2016/12/27
 Fundamental Frequency : 5745 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
5650.00	S	Peak	42.13	9.33	51.46	68.23	-16.77
5692.30	S	Peak	47.84	9.61	57.45	99.53186	-42.08
5700.00	S	Peak	45.98	9.44	55.42	105.23	-49.81
5719.80	S	Peak	61.84	9.28	71.12	110.7739	-39.66
5720.00	S	Peak	61.24	9.28	70.52	110.83	-40.31
5723.65	S	Peak	70.30	9.30	79.59	119.1518	-39.56
5725.00	E	Peak	68.27	9.30	77.57	122.23	-44.66

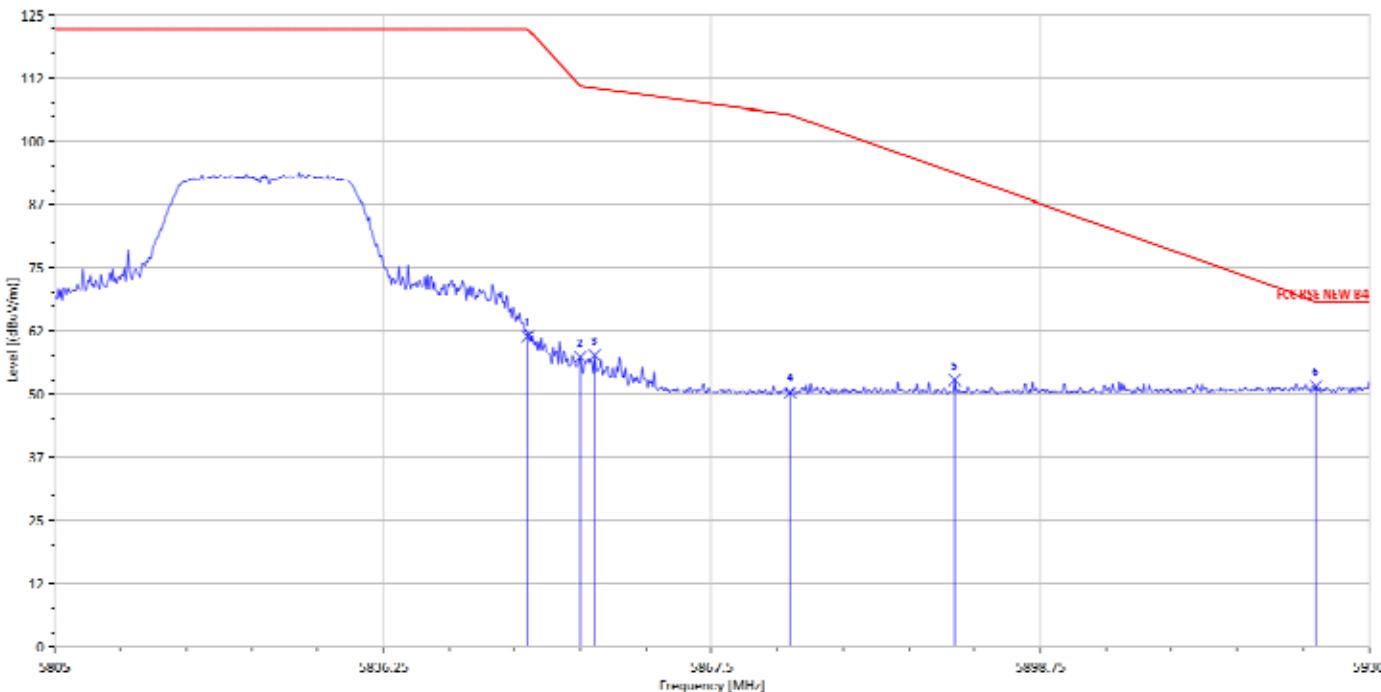
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Operation Mode : 802.11n20 Test Date : 2016/12/27
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



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
5850.00	E	Peak	51.86	9.49	61.35	122.23	-60.88
5855.00	S	Peak	47.66	9.58	57.25	110.83	-53.58
5856.38	S	Peak	47.98	9.61	57.59	110.445	-52.86
5875.00	S	Peak	40.70	9.63	50.33	105.23	-54.90
5890.63	S	Peak	43.05	9.66	52.70	93.6675	-40.96
5925.00	S	Peak	41.39	10.01	51.40	68.23	-16.83

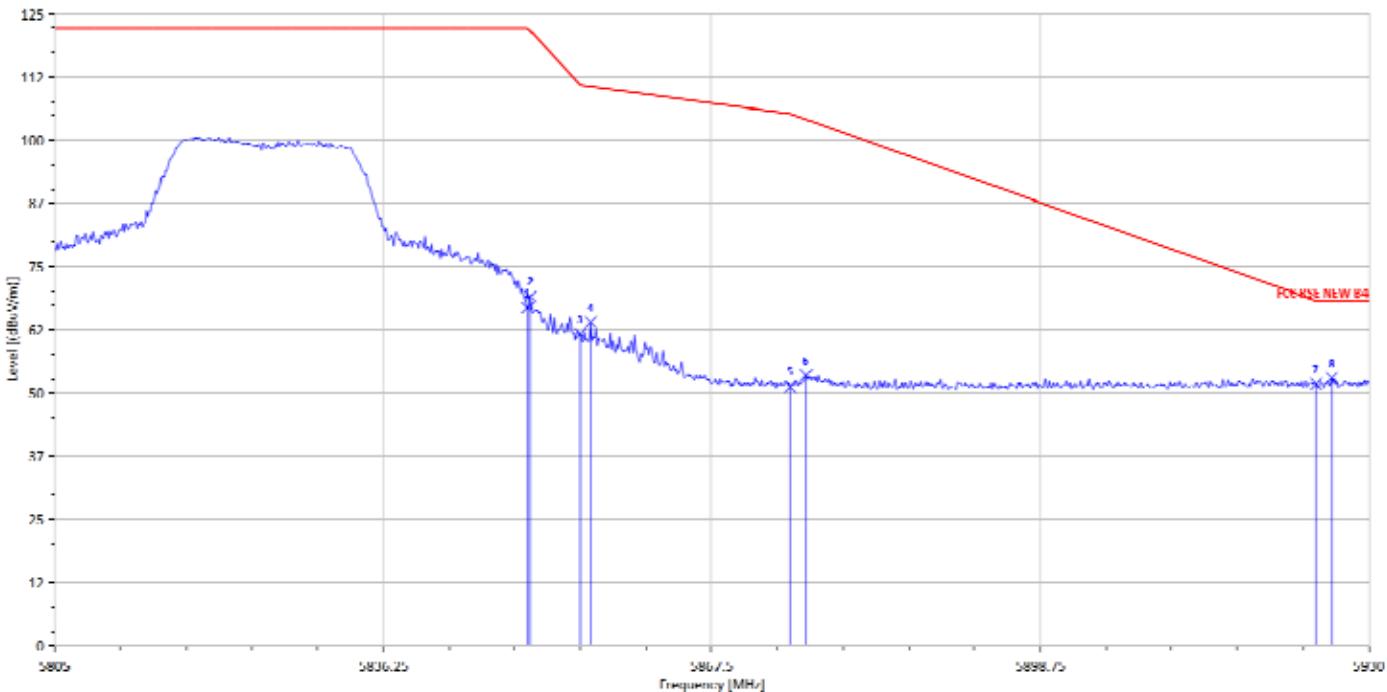
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Operation Mode : 802.11n20 Test Date : 2016/12/27
 Fundamental Frequency : 5825 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	57.41	9.49	66.90	122.23	-55.33
5850.25	S	Peak	59.59	9.49	69.08	121.66	-52.58
5855.00	S	Peak	52.10	9.58	61.68	110.83	-49.15
5856.00	S	Peak	54.42	9.60	64.02	110.55	-46.53
5875.00	S	Peak	41.60	9.63	51.23	105.23	-54.00
5876.50	S	Peak	43.79	9.62	53.41	104.12	-50.71
5925.00	S	Peak	41.75	10.01	51.77	68.23	-16.46
5926.50	S	Peak	42.86	10.03	52.89	68.23	-15.34

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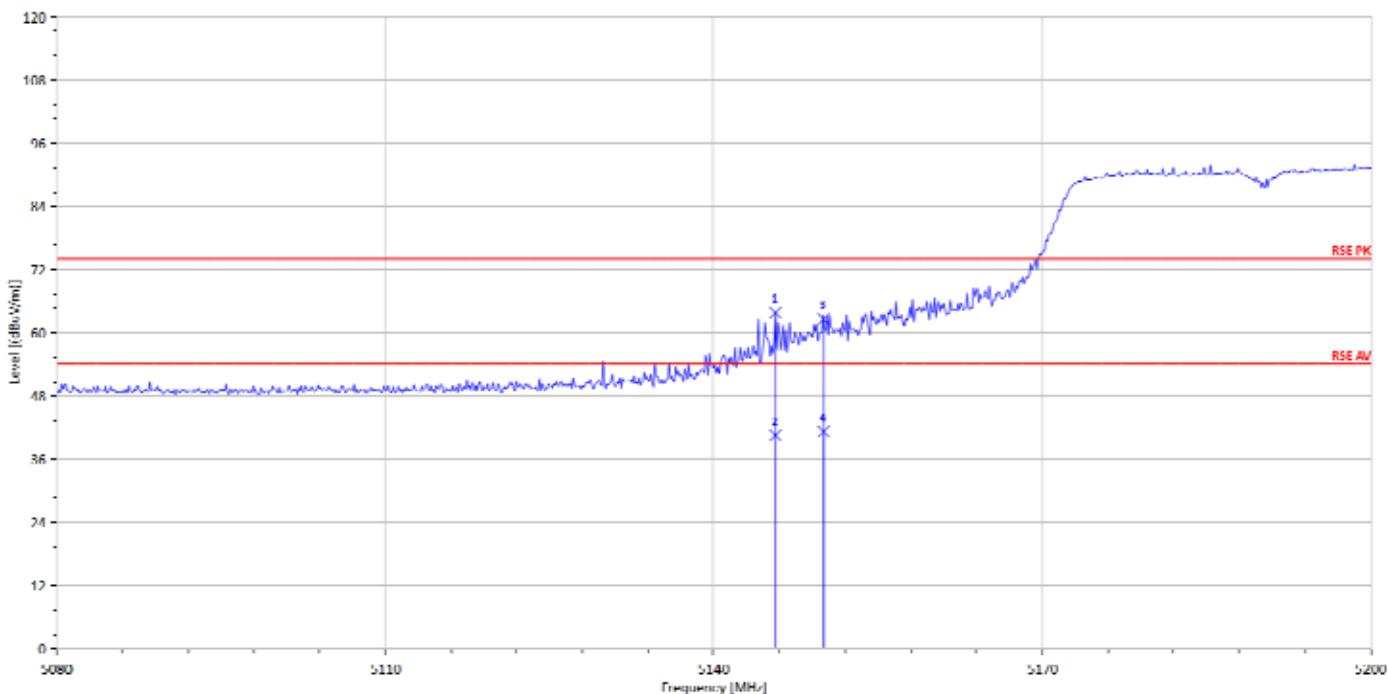
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802.11n40 HT mode

Operation Mode : 802.11n40 Test Date : 2016/12/27
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



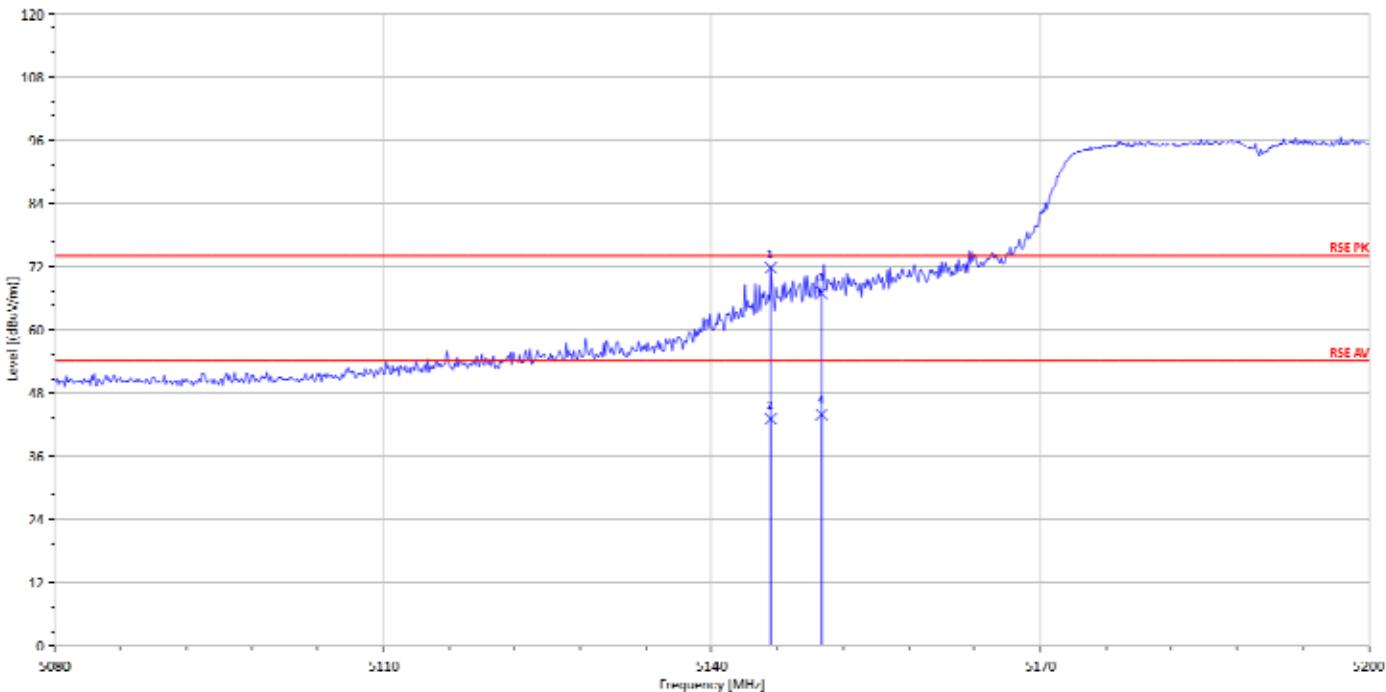
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5145.64	S	Peak	55.67	8.17	63.84	74	-10.16
5145.64	S	Average	32.33	8.17	40.50	54	-13.50
5150.00	E	Peak	54.42	8.19	62.61	74	-11.39
5150.00	E	Average	33.01	8.19	41.20	54	-12.80

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Operation Mode : 802.11n40 Test Date : 2016/12/27
 Fundamental Frequency : 5190 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low 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 dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5145.40	S	Peak	63.56	8.16	71.72	74	-2.28
5145.40	S	Average	34.91	8.16	43.07	54	-10.93
5150.00	E	Peak	58.80	8.19	66.99	74	-7.01
5150.00	E	Average	35.71	8.19	43.90	54	-10.10

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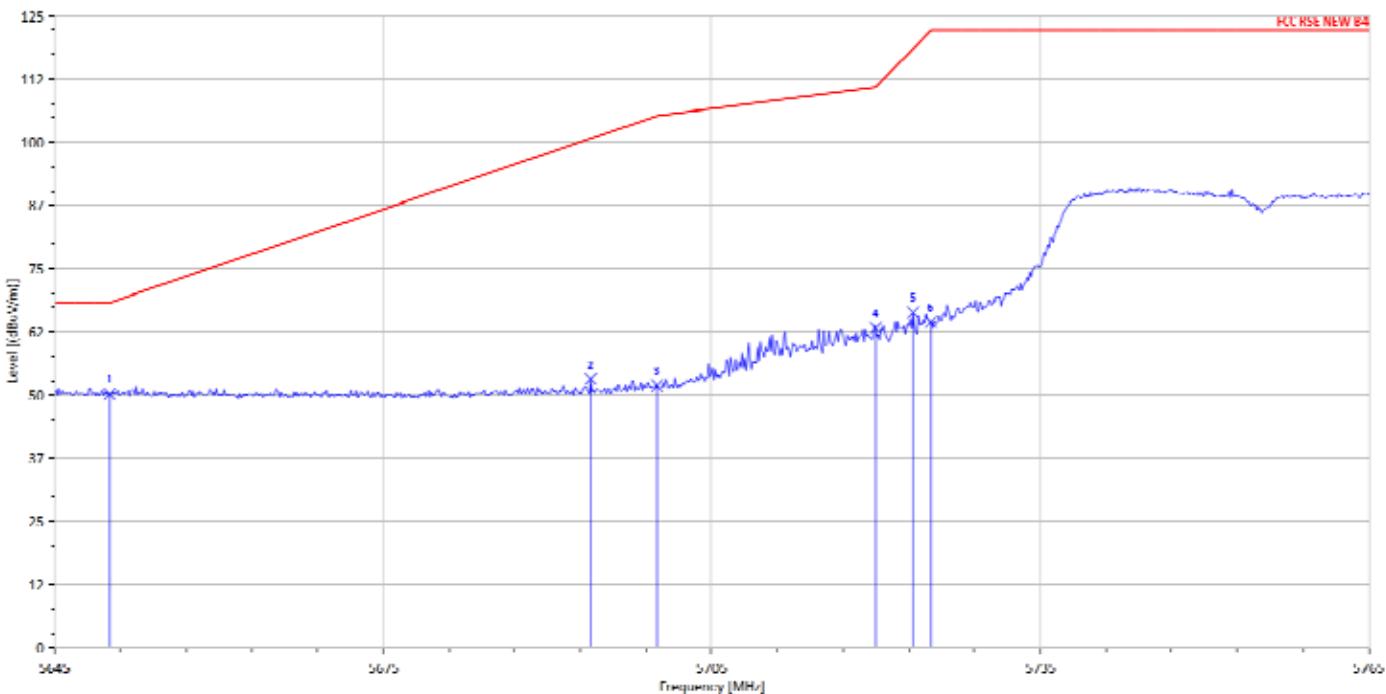
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Operation Mode : 802.11n40 Test Date : 2016/12/27
 Fundamental Frequency : 5755 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



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
5650.00	S	Peak	40.86	9.33	50.19	68.23	-18.04
5693.96	S	Peak	43.47	9.57	53.04	100.7604	-47.72
5700.00	S	Peak	42.35	9.44	51.79	105.23	-53.44
5720.00	S	Peak	53.99	9.28	63.27	110.83	-47.56
5723.36	S	Peak	57.06	9.29	66.35	118.4905	-52.14
5725.00	E	Peak	55.17	9.30	64.47	122.23	-57.76

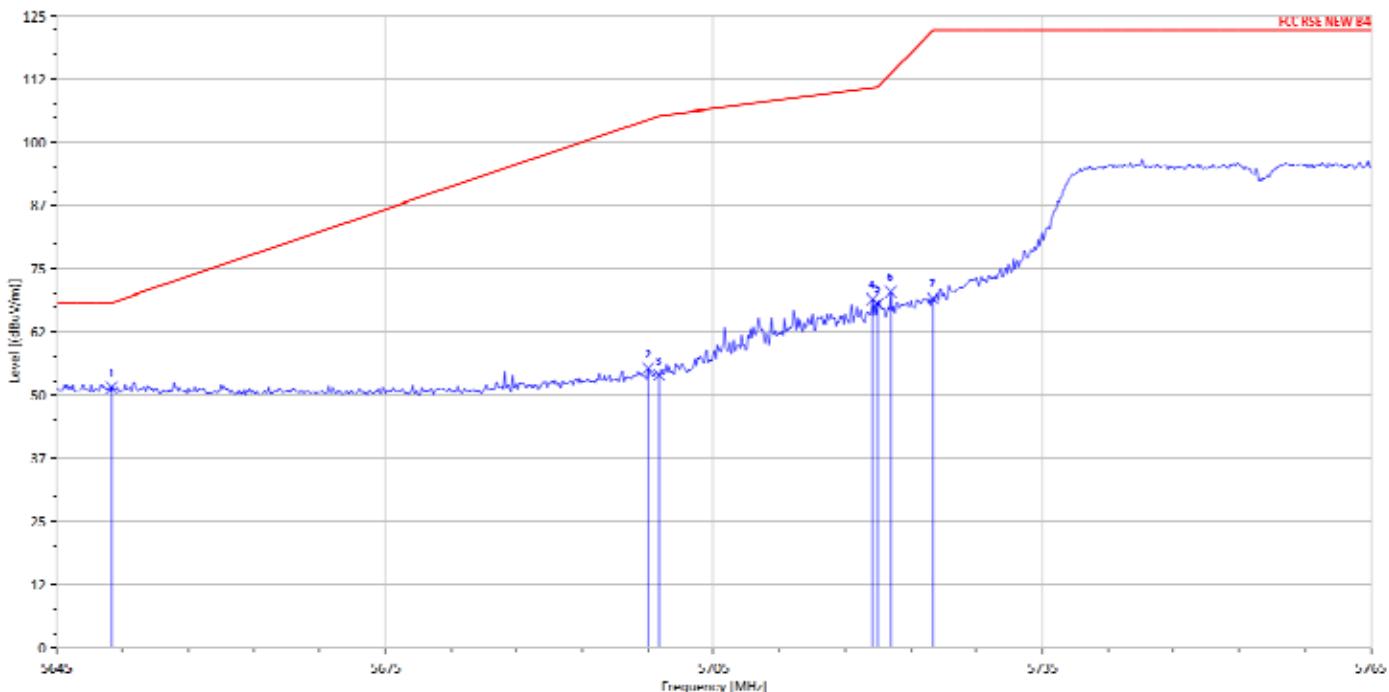
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Operation Mode : 802.11n40 Test Date : 2016/12/27
 Fundamental Frequency : 5755 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH Low Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Horizontal



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
5650.00	S	Peak	42.06	9.33	51.39	68.23	-16.84
5699.00	S	Peak	45.74	9.46	55.20	104.49	-49.29
5700.00	S	Peak	44.40	9.44	53.84	105.23	-51.39
5719.52	S	Peak	59.67	9.28	68.95	110.6956	-41.75
5720.00	S	Peak	58.82	9.28	68.10	110.83	-42.73
5721.20	S	Peak	61.07	9.29	70.36	113.5664	-43.21
5725.00	E	Peak	59.83	9.30	69.13	122.23	-53.10

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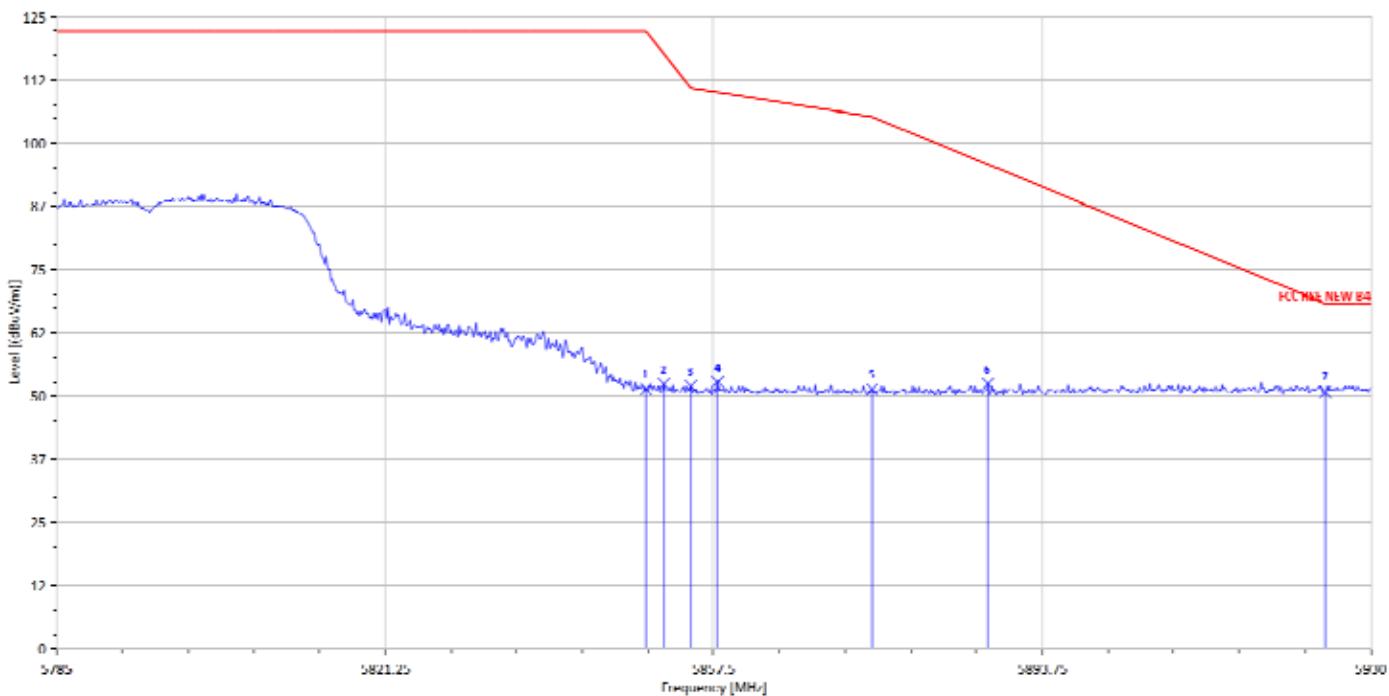
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Operation Mode : 802.11n40 Test Date : 2016/12/27
 Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High Test Engineer : Ashton
 EUT Pol. : H Measurement Antenna Pol. : Vertical



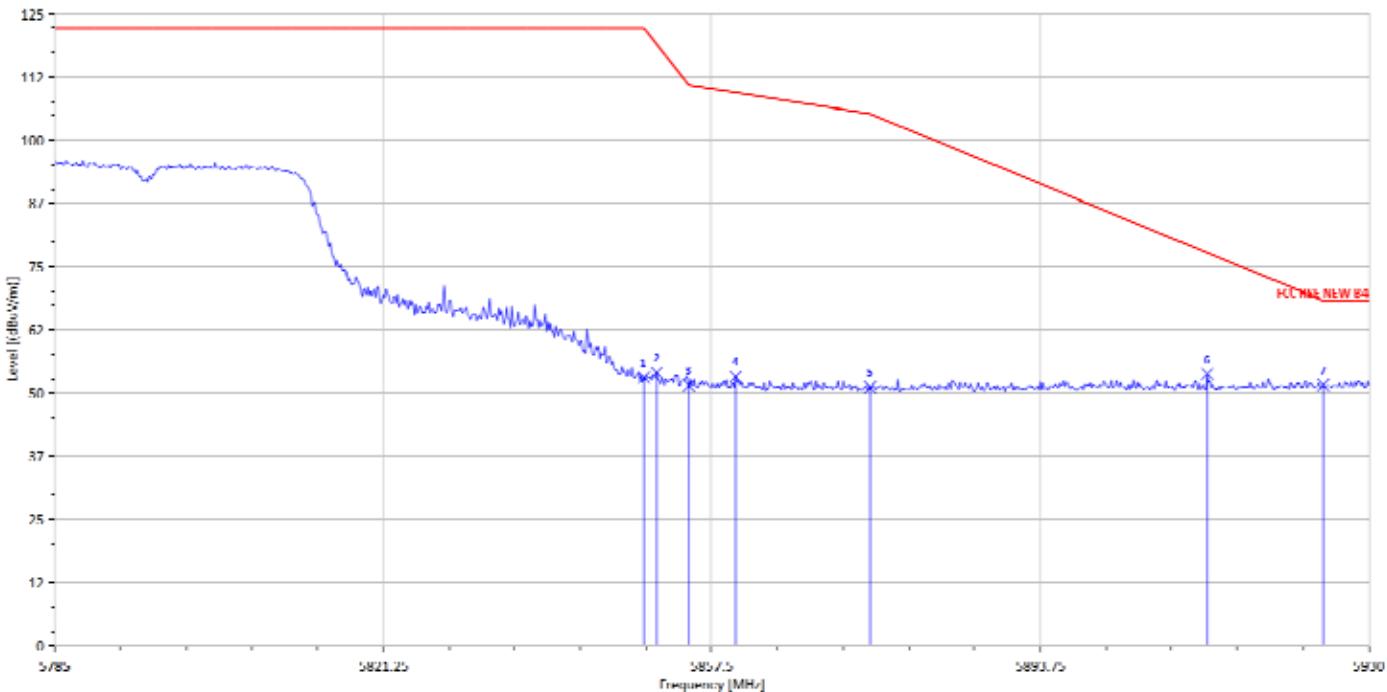
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
5850.00	E	Peak	41.87	9.49	51.35	122.23	-70.88
5851.99	S	Peak	42.76	9.53	52.28	117.6923	-65.41
5855.00	S	Peak	42.30	9.58	51.88	110.83	-58.95
5857.94	S	Peak	43.07	9.63	52.71	110.0082	-57.30
5875.00	S	Peak	41.65	9.63	51.28	105.23	-53.95
5887.81	S	Peak	42.70	9.64	52.34	95.75417	-43.41
5925.00	S	Peak	40.82	10.01	50.83	68.23	-17.40

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 Fundamental Frequency : 5795 MHz Temp. / Humi. : 22.7deg_C/57RH
 Operation Band : BE CH High 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
5850.00	E	Peak	43.49	9.49	52.97	122.23	-69.26
5851.41	S	Peak	44.42	9.51	53.93	119.0148	-65.08
5855.00	S	Peak	41.88	9.58	51.46	110.83	-59.37
5860.11	S	Peak	43.45	9.67	53.13	109.3992	-56.27
5875.00	S	Peak	41.47	9.63	51.10	105.23	-54.13
5912.17	S	Peak	43.81	9.87	53.68	77.72787	-24.05
5925.00	S	Peak	41.54	10.01	51.56	68.23	-16.67

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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

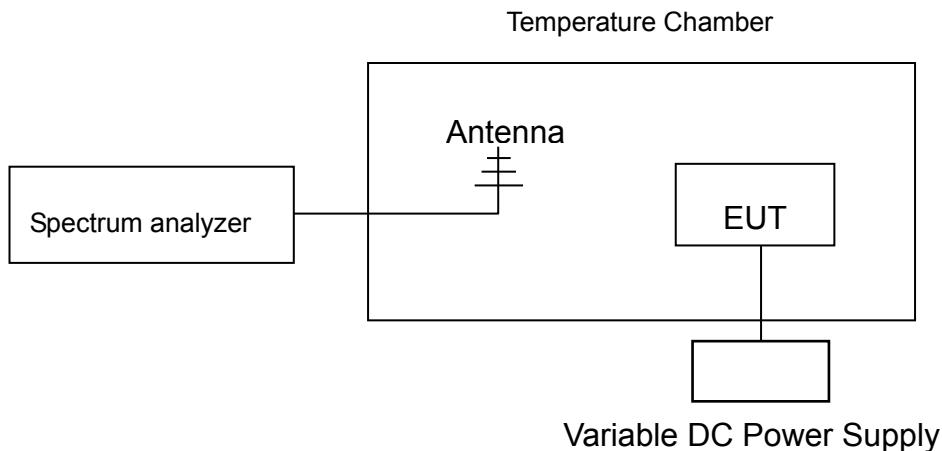
13.1 Standard Applicable

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



13.4 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/16/2016	06/15/2017

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13.5 Measurement Result

Operation Mode	802.11 a	Test Date	2016.12.29
Temperature	:22	Test By	Enzo
Humidity	:61 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	12.6V	36	5180	5,180.00097	-0.00000019
		44	5220	5,220.00071	-0.00000014
		48	5240	5,220.00244	0.00381633
		149	5745	5,745.00094	-0.00000016
		157	5785	5,785.00080	-0.00000014
		165	5825	5,825.00308	-0.00000053
	9.6V	36	5180	5,179.99982	0.00000003
		44	5220	5,220.00161	-0.00000031
		48	5240	5,220.00267	0.00381628
		149	5745	5,745.00080	-0.00000014
		157	5785	5,785.00246	-0.00000043
		165	5825	5,825.00163	-0.00000028

25	10.8V	36	5180	5,179.99947	0.00000010
		44	5220	5,220.00062	-0.00000012
		48	5240	5,220.00156	0.00381650
		149	5745	5,745.00010	-0.00000002
		157	5785	5,785.00067	-0.00000012
		165	5825	5,825.00126	-0.00000022

50	12.6V	36	5180	5,179.99785	0.00000042
		44	5220	5,219.99903	0.00000019
		48	5240	5,220.00154	0.00381650
		149	5745	5,744.99823	0.00000031
		157	5785	5,784.99927	0.00000013
		165	5825	5,825.00018	-0.00000003
	9.6V	36	5180	5,179.99869	0.00000025
		44	5220	5,219.99983	0.00000003
		48	5240	5,220.00022	0.00381675
		149	5745	5,744.99811	0.00000033
		157	5785	5,784.99950	0.00000009
		165	5825	5,824.99955	0.00000008

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Operation Mode	802.11 n_HT40	Test Date	2016.12.29
Temperature	:22	Test By	Enzo
Humidity	:61 %		

Test Temp.	Test Voltage	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	12.6V	38	5190	#####	0.00000013
		46	5230	#####	-0.00000029
		151	5755	#####	-0.00000018
		159	5795	#####	-0.00000028
	9.6V	38	5190	#####	0.00000031
		46	5230	#####	-0.00000039
		151	5755	#####	-0.00000013
		159	5795	#####	-0.00000001

25	10.8V	38	5190	#####	0.00000032
		46	5230	#####	-0.00000015
		151	5755	#####	0.00000011
		159	5795	#####	0.00000006
50	12.6V	38	5190	#####	0.00000044
		46	5230	#####	-0.00000006
		151	5755	#####	0.00000014
		159	5795	#####	0.00000013
	9.6V	38	5190	#####	0.00000066
		46	5230	#####	0.00000009
		151	5755	#####	0.00000021
		159	5795	#####	0.00000015

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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

An embedded-in antenna design is used.

The antenna is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

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15 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

15.1 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

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

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Worst Case

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.29	16.943	23.98	PASS
44	5220	MCS0	12.27	16.866	23.98	PASS
48	5240	MCS0	12.36	17.219	23.98	PASS
149	5745	MCS0	11.93	15.596	30	PASS
157	5785	MCS0	11.44	13.932	30	PASS
165	5825	MCS0	11.62	14.521	30	PASS

MPE Prediction (802.11a 5150~5250)

Max. output power including tune-up tolerance:	12.36	(dBm)
Max. output power including tune-up tolerance:	17.218686	(mW)
Duty cycle:	87.44	(%)
Maximum Pav :	15.056019	(mW)
Peak Antenna gain (Maximum):	1.98	(dBi)
Peak Antenna gain (linear):	1.5776113	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5240	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.005	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.005 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5240MHz.

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MPE Prediction (802.11a 572~5850)

Max. output power including tune-up tolerance:	11.93	(dBm)
Max. output power including tune-up tolerance:	15.595525	(mW)
Duty cycle:	87.44	(%)
Maximum Pav :	13.636727	(mW)
Peak Antenna gain (Maximum):	5.2	(dBi)
Peak Antenna gain (linear):	3.3113112	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5745	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.009	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.009 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5745MHz.

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