

Prüfbericht-Nr.: Test report no.:	IN228PS8 001 ULR-TC568822300000101F	Auftrags-Nr.: Order no.:	146701433 010	Seite 1 von 97 Page 1 of 97
Kunden-Referenz-Nr.: Client reference no.:	2141358	Auftragsdatum: Order date:	2022-07-19	
Auftraggeber: Client:	GE Vingmed Ultrasound AS Strandpromenaden 45, N-3183, Horten, Norway			
Prüfgegenstand: Test item:	Vscan Air SL	Serien-Nr.: serial no.:	VA020000065 VA020000068	
Bezeichnung.: Identification.:	Vscan Air SL			
Auftrags-Inhalt: Order content:	Testing and issue of Test report with Grant Certificate			
Prüfgrundlage: Test specification:	FCC Part 15 Subpart E 15.247,15.407,15.207, 15.205 & 15.209 RSS 247 Issue 2 and RSS GEN Issue 5			
Wareneingangsdatum: Date of sample receipt:	2022-07-26			
Prüfmuster-Nr & Test sample no &	A003307764-003 A003307764-004			
Prüfzeitraum: Testing period:	2022-08-09 - 2022-09-20			
Ort der Prüfung: Place of testing:	Wireless laboratory, Bangalore			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (India) Pvt.Ltd., 27/B, 2nd Cross, Electronic City Phase1 Bangalore -560 100, India FCC Test site registration number: 496599 ISED Test site registration number: 3466E-1			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	genehmigt von: authorized by:			
Datum: Date: 2022-09-29		Ausstellatum: Issue date: 2023-04-11		
Stellung / Position:	Yogesh V Engineer	Stellung / Position:	Madhu K.N Senior Engineer	
Sonstiges / Other:	FCC ID: YOM-VSCANAIRSL IC: 9136A-VSCANAIRSL			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut 3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good 3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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- | | |
|---|---|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
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| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird.</p> <p><i>The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.</i></p> |

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TEST SUMMARY

Test Item	Applicable Standard		Result
	FCC	ISED	
Emission Bandwidth	15.407 (a) & (e)	RSS Gen Issue 5 Section 6.7 RSS 247 Issue 2 Section 6.2.4.1	Pass
Frequency Stability	15.407 (g)	RSS Gen Issue 5 Section 8.11	Pass
Maximum conducted output power	15.407 (a)	RSS 247 Issue 2 Section 6.2.1; 6.2.2; 6.2.3; & Section 6.2.4	Pass
Maximum Power spectral density	15.407 (a)	RSS 247 Issue 2 Section 6.2.1; 6.2.2; 6.2.3; & Section 6.2.4	Pass
Spurious Radiated Emissions & Restricted Bands of Operation	15.407 (b) / (15.205 & 15.209)	RSS 247 Issue 2 Section 6.2.1; 6.2.2; 6.2.3; & Section 6.2.4 RSS Gen Issue 5 Section 8.9 & 8.10	Pass
Conducted AC Power Lines	15.207	RSS Gen Issue 5 Section 8.8	Pass

Note:

Product Category: Electronics Testing
Test Discipline : EMC Test Facility

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REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
IN228PS8 001 ULR-TC568822300000101F	01	Initial issue of report	2023-03-29
IN228PS8 001 ULR-TC568822300000101F	02	Reviewer comments updated	2023-04-11

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1 GENERAL REMARKS

1.1 Attachments

All attachments are part of this test report and are issued in separate document

1. TEST SETUP PHOTOS
- 2: EUT EXTERNAL PHOTOS
- 3: EUT INTERNAL PHOTOS
- 4: FCC LABEL AND LABEL LOCATION
- 5: BLOCK DIAGRAM
- 6: SPECIFICATION OF EUT
- 7: SCHEMATIC DIAGRAM
- 8: BILL OF MATERIAL
- 9: USER MANUAL
- 10: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

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2 TEST SITES

2.1 Testing Facilities

1. TÜV Rheinland (India) Pvt.Ltd.,
27/B, 2nd Cross,
ElectronicCityPhase1
Bangalore – 560 100,
India

2. TUV Rheinland (India) Pvt.Ltd.,
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.
India

Radiated Measurement site type :
Fully anechoic chamber (used for above 1 GHz
measurements)

Radiated Measurement site type :
Semi anechoic chamber (used for below 1 GHz
measurements)

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Facility
EMI Receiver	Rohde & Schwarz	ESW 44	101732	4.73 SP5	04.08.2023	Yearly	Radiated Spurious Emission
EMI Receiver	Rohde & Schwarz	ESW 44	101733	1.72SP1	12.02.2023	Yearly	
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	31.01.2023	Yearly	
Balloon and Biconical Antenna	Schwarzbeck	VHBB-9124 / BBA-9106	1028	-	03.02.2023	Yearly	
Log - Periodical Antenna	Schwarzbeck	VUSLP-9111B	9111B-111	-	04.02.2023	Yearly	
Horn Antenna	Frankonia	HAX-18	HAX18-802	-	20.05.2023	Yearly	
Horn Antenna	ETS	3117	00133355	-	06.02.2023	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	-	Antenna-Port Conducted test
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	A.14.06	15.12.2022	Yearly	
EMI Receiver	Rohde & Schwarz	ESR7	101133	3.48 SP3	22.07.2023	Yearly	Conducted AC Power line Test
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	12.07.2023	Yearly	
LISN	Rohde & Schwarz	ENV216	100022	-	07.10.2022	Yearly	

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Table 2: Instrument application Software versions

SL. No.	Test Type	Application software	Version
1	Radiated spurious emission measurement in 10mtr-SAC	BAT EMC	3.20.0.17
2	Radiated spurious emission measurement in FAC	EMC 32	10.60.20

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Vscan Air SL consists of a dual headed probe which integrates both, Sector and linear array transducers, and an app which can be installed on Android or iOS mobile devices.

Vscan Air SL is a battery-operated software-based general-purpose ultrasound imaging system for use by qualified and trained healthcare professionals or practitioners that are legally authorized or licensed by law in the country, state or other local municipality in which he or she practices. The users may or may not be working under supervision or authority of a physician. Users may also include Medical Students working under the supervision or authority of a physician during their education / training. The device is enabling visualization and measurement of anatomical structures and fluid including blood flow.

3.2 Ratings and System Details of Equipment under Test

Table 3: Ratings and System Details as declared by the Client*

Radio Protocol		WI-FI 5GHz
Operating Frequency Range		UNII-1 _ 5150MHz to 5250MHz UNII-3 _ 5725MHz to 5825MHz
No. of Channels		(Refer Table 5)
Channel Spacing		20 MHz, 40MHz,
Maimum measured power (e.i.r.p)		17.07dBm at 802.11n HT20 MCS4 UNII-1 5240MHz
Modulation		802.11a/n: OFDM with BPSK, QPSK, 16-QAM, 64-QAM
Number of antennas		1
Frequency range of Antenna Gain		UNII-1 = 4.00 dBi UNII-3 = 4.68 dBi
Antenna Type		PCB Antenna
Supply Voltage to Product		3.6V Li-Ion battery
Environmental Conditions	Storage	5°C to +60°C Relative Humidity 5% < to <95%
	Operating	0°C to +35°C Relative Humidity 10%< to <90%
EUT Dimension(L x Wx H)		141 x 67 x 33 mm

***Disclaimer:** The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results. Refer the products user manual for more details.

3.3 Measurement Uncertainty:

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 4: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 5 \%$
RF output power, conducted	$\pm 1.5 \text{ dB}$
Power Spectral Density, conducted	$\pm 3 \text{ dB}$
Unwanted Emissions, conducted	$\pm 3 \text{ dB}$
SAC, radiated measurement	$\pm 6 \text{ dB}$
FAC, radiated measurement	$\pm 6 \text{ dB}$
Temperature	$\pm 3 \text{ }^{\circ}\text{C}$
Supply Voltages	$\pm 3 \%$
Time	$\pm 5 \%$

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle on low, mid and high channels.

This product operates in 2 mode (Linear and Sector) as described in operational description under clause 5 of this test report, these mode of operations are related to analog circuitry and do not affect the RF characteristics.

4.1.1 EUT Mode of operation

Mode	Description
Sector	Deep scanning uses Sector transducer, with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Linear	Shallow scanning uses Linear transducer with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Charging mode	Scanning is paused and probe stays connected to display device via Wi-Fi.

4.1.2 Following configurations are used for testing

Test cases	Mode of operation
All conducted RF test cases	Special configuration tool is used to enable the Wi-Fi and BLE continuous transmission as needed
All radiated test cases < 1 GHz	Linear mode, Sector mode and charging mode as defined in 4.1.1
All radiated test cases > 1 GHz	Special configuration tool is used to enable the Wi-Fi and BLE continuous transmission as needed

4.2 UUT Operation and Software

Hardware Version of Vscan Air SL: GP000170 Rev01

Hardware Version of Digital board: GP200400 Rev15

Hardware Version of HV board: GP200401 Rev11

Hardware Version of Analog board: GP200402 Rev10

Probe FW Version :1.1.23.355

Vscan Air Application software:

- Vscan Air R2 for iOS
- Vscan Air R2 for Android

Note: Both Probe FW and App SW version has R2 features included.

APP Software Version: 1.1.26.18955

EUT can be configured for different test conditions using calibrator tool commands

Calibrator tool version = 0.80

Medical Device name of the probe: Vscan Air SL

Medical Device name of the application SW (app): Vscan Air

GlobTek Power adapter - GTM46101-1005-USB

Vscan Air Charger - GP200304

XP Power - VEU10US050

Anker wireless charger - A2503

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4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Simultaneous Transmission

This product doesn't supports Simultaneous transmission

4.5 Countermeasures to achieve EMC Compliance

- None

4.6 List of frequencies

Frequency Band	Channel No.	Frequency (MHz)
5150–5250 MHz	36	5180
	38	5190
	46	5230
	48	5240
5725-5825 MHz	149	5745
	151	5755
	159	5795
	165	5825

Table 5: List of Wi-Fi center Frequencies

Channel used for Wi-Fi Testing

Channel Bandwidth (20MHz)	Channel Bandwidth (40MHz)
5180	5190
5240	5230
5745	5755
5825	5795

Note:

TUV Sample Identification number : A003307764-003– Radiated test Sample
A003307764-004– Conducted test Sample

4.7 Report Reference

Note: Product **Vscan Air SL** has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF test report for Wi-Fi (2.4GHz) and BLE	ULR-TC568822300000100F
RF test report for Wi-Fi (5GHz UNII-1 & UNII-3) – (This report)	ULR-TC568822300000101F
SAR test report for Wi-Fi (2.4GHz and 5GHz)	ULR-TC568822300000105F

5 OPERATIONAL DESCRIPTION

Vscan Air SL is a handheld, pocket sized, battery powered general purpose diagnostic ultrasound system. The system consists of a probe with two heads. One for deep scanning (Sector) and another one for shallow scanning (Linear). The probe can be paired with a mobile device through WiFi, to see the ultrasound image. Mobile device needs an app (available in iOS & android) to enable pairing and ultrasound imaging. The internal battery operation is designed for providing approximately one hour of active scanning capacity with a fully charged battery. The probe supports Qi wireless charging to charge the battery. Probe will automatically turn off during charging.

Mode	Description
Sector / Curved	Deep scanning uses Sector transducer, with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Linear	Shallow scanning uses Linear transducer with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Charging mode	Probe will automatically turn off during charging, i.e. Wi-Fi and BLE are turned off

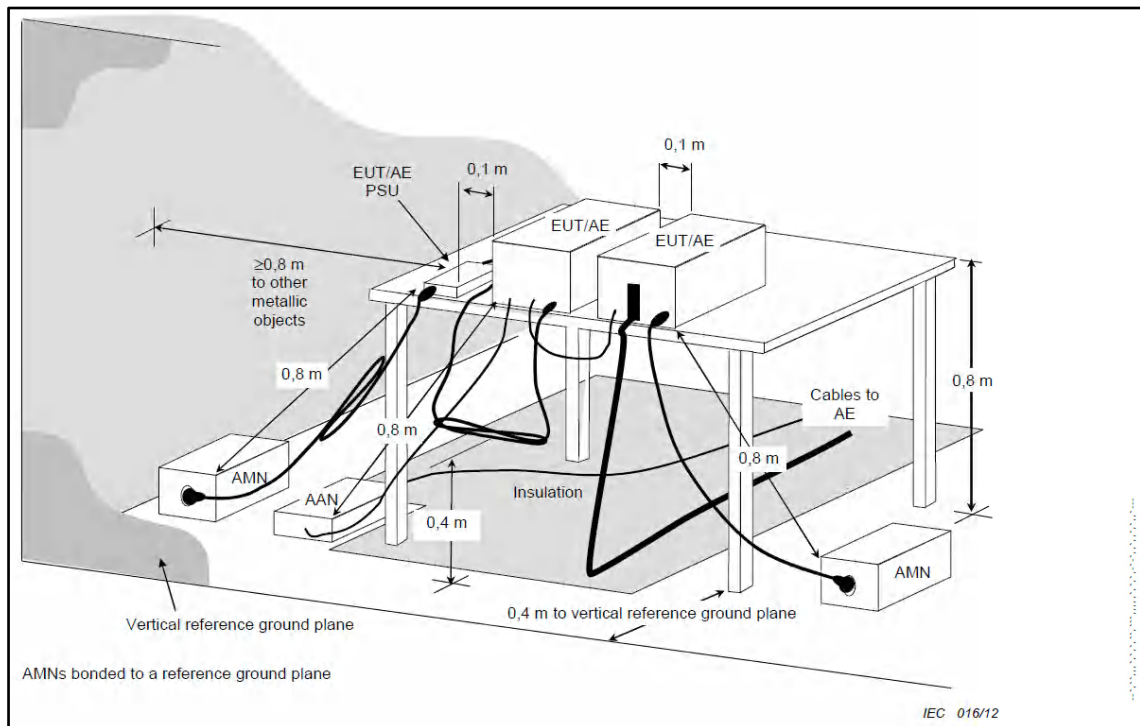
6 TEST METHODOLOGY

6.1 Conducted Spurious Emission AC Power line Test

Measured levels of ac power-line conducted emission across the 50Ω LISN port (to which the EUT is connected). All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer.

The device is placed on the test table, raised 80cm above the reference ground plane. The vertical conducting plane is located 40cm to the rear of the device. AC Conducted emission measurement is made over frequency range from 150kHz to 30MHz, this measurement was performed with EUT powered by 2 methods and both methods are tested individually, one with an AC adaptor with 110V AC 60Hz supply and second with Wireless charger with supply 110V AC 60Hz.

6.1.1 Test Setup Configuration



6.2 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and measurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded

6.2.1 Test Setup Configuration

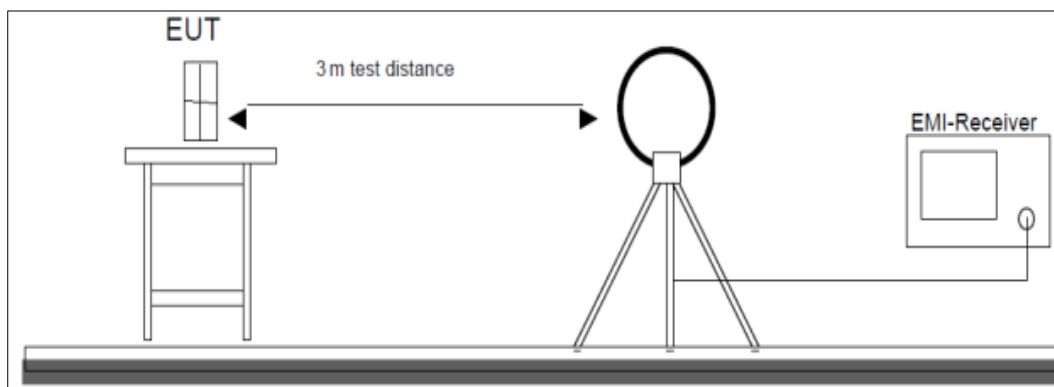


Figure 1: Frequency Range 9 kHz- 30 MHz

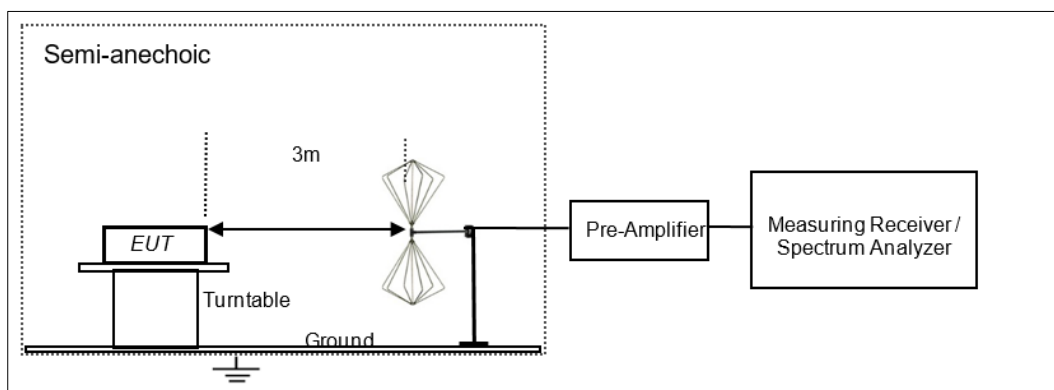


Figure 2: Frequency Range 30 MHz – 200 MHz

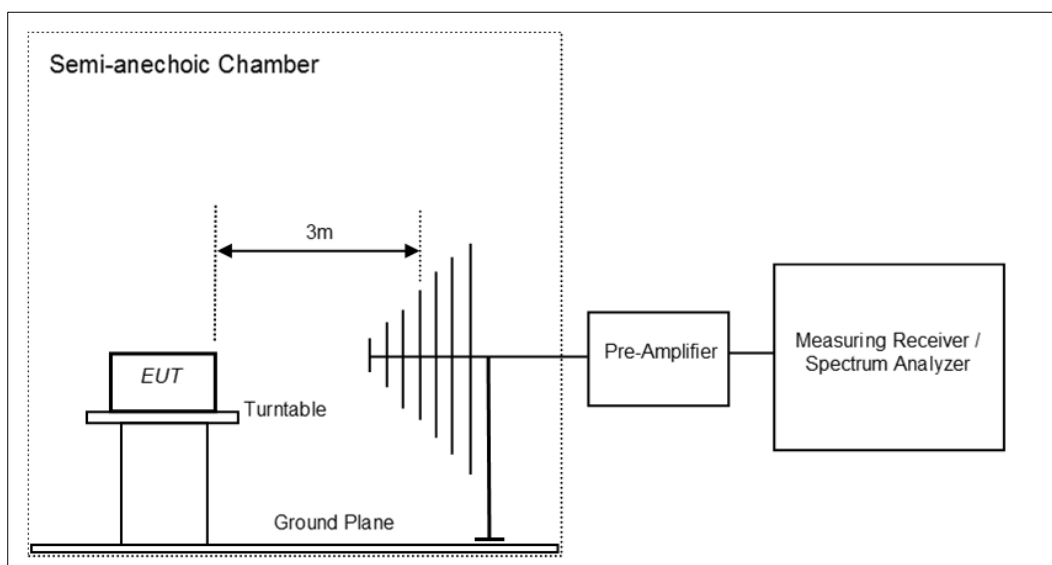


Figure 3: Frequency Range 200 MHz - 1GHz

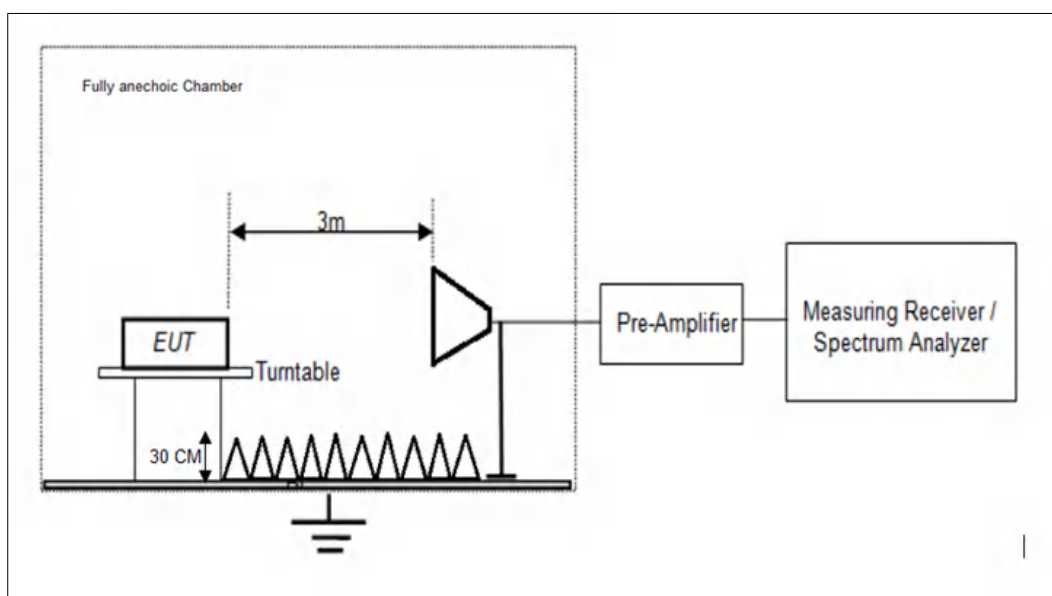


Figure 4: Frequency Range above 1 GHz

7 TEST RESULTS

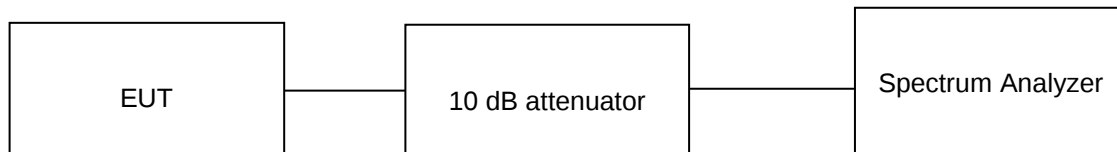
7.1 Emission Bandwidth

Result

Pass

Test Specification	FCC part 15 Subpart C 15.407 (a) & (e) / RSS 247 Issue 2, Section 6.2.4.1 & RSS Gen Issue 5, Section 6.7
Test Method	Subclause 6.9.3 of ANSI C63.10
Measurement Bandwidth	Refer Test Method below
Detector	Refer Test Method below
Port of testing	Antenna port
Requirement	1. 99% emission band width measurement for reporting purpose only in the band 5150-5250 MHz 2. For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Method:



The following procedure shall be used for measuring (99%) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency
2. Set span = 1.5 times to 5.0 times the OBW
3. Set RBW = 1% to 5% of the OBW
4. Set VBW $\geq 3 \times$ RBW
5. Use the 99% power bandwidth function of the instrument
6. Use sample detector with single sweep mode, or use Peak detector and Max Hold mode (until the trace is stabilized)

The following procedure shall be used for measuring 6dB or 26dB emission bandwidth:

1. Set center frequency to the nominal EUT channel center frequency
2. Set span = 1.5 times to 5.0 times the OBW
3. Set RBW = 1% to 5% of the OBW (for 26 dB BW) & 100 kHz (for 6dB BW)
4. Set VBW $\geq 3 \times$ RBW
5. Determine the “-xx dB down amplitude” using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

Note : All the steps in measurement method of KDB 789033 D02, ANSI C63.10 section 6.9.2 & 6.9.3, RSS GEN section 6.9 are followed

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Test Condition:

Normal Test Condition:

Temperature (Norm) = + 25 °C

Voltage = 3.6V Li-Ion battery

Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section C & D in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report.
10 dB attenuator + 0.8 dB Cable loss = 10.8 dB total offset

Modulation: 802.11a

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
6Mbps	5180	28.45	17.07
	5240	27.76	17.05

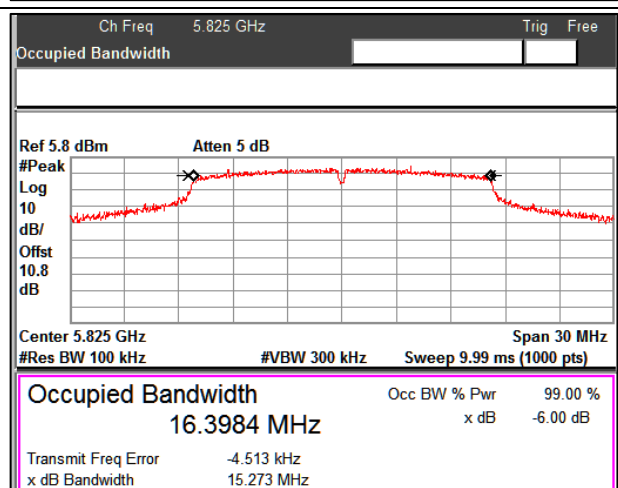
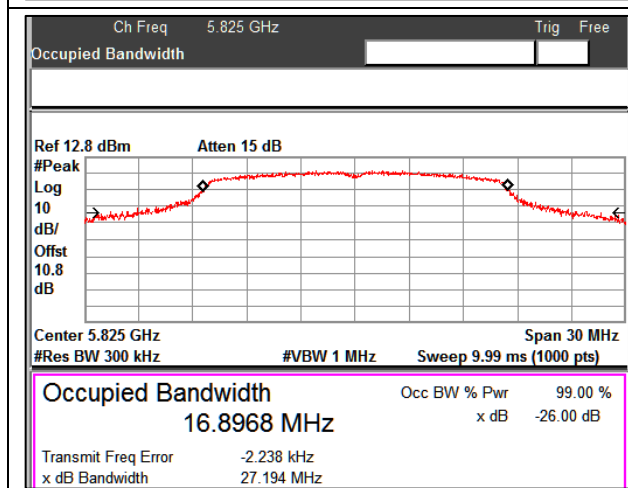
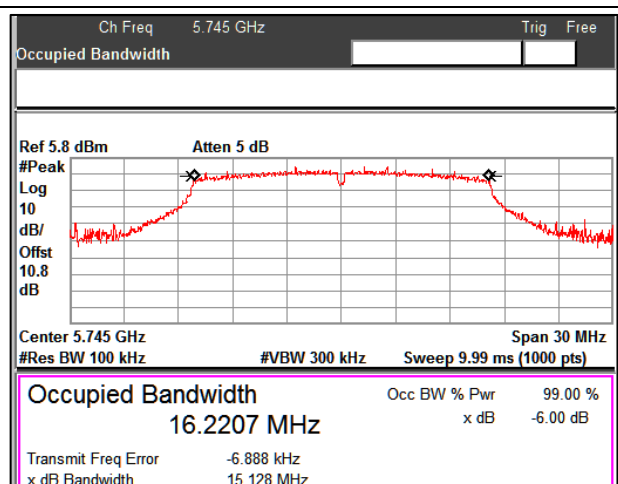
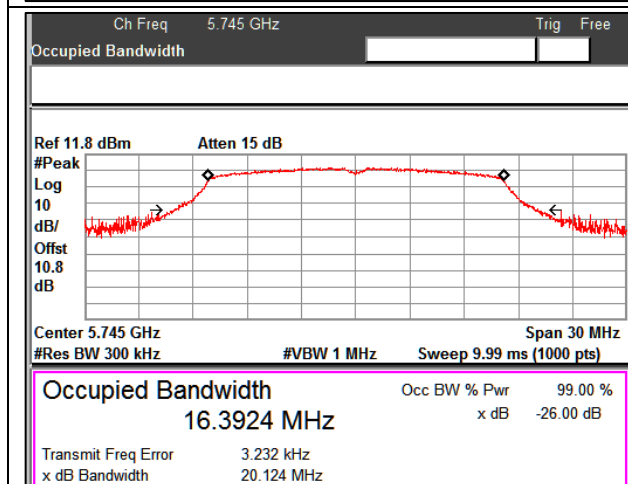
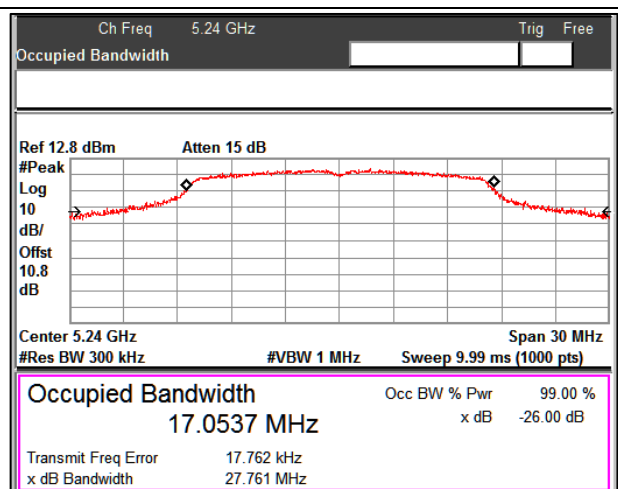
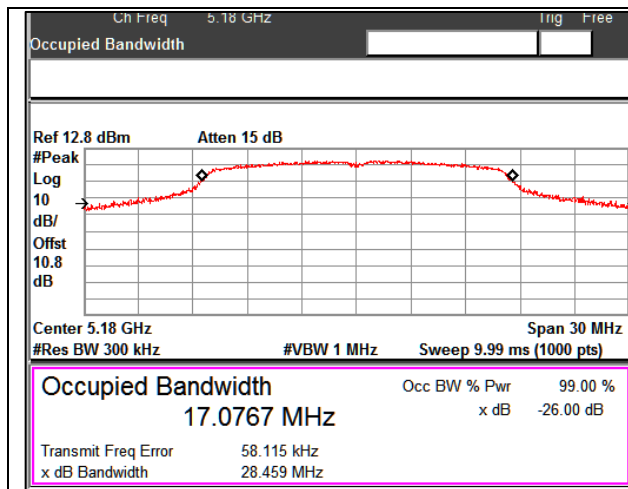
Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
6Mbps	5745	15.12	16.39
	5825	15.27	16.89

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Data rate: 6Mbps



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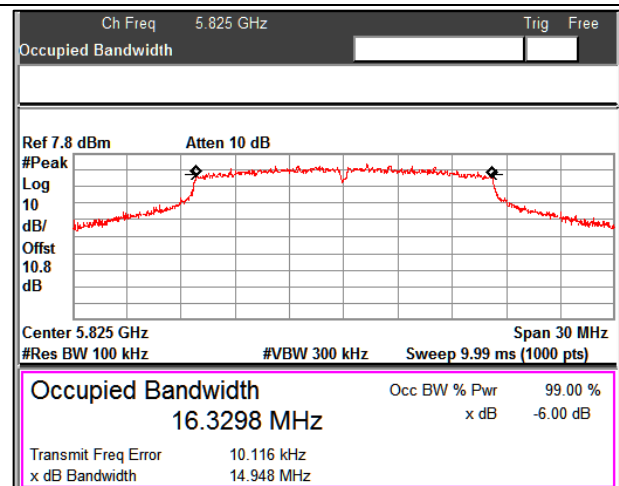
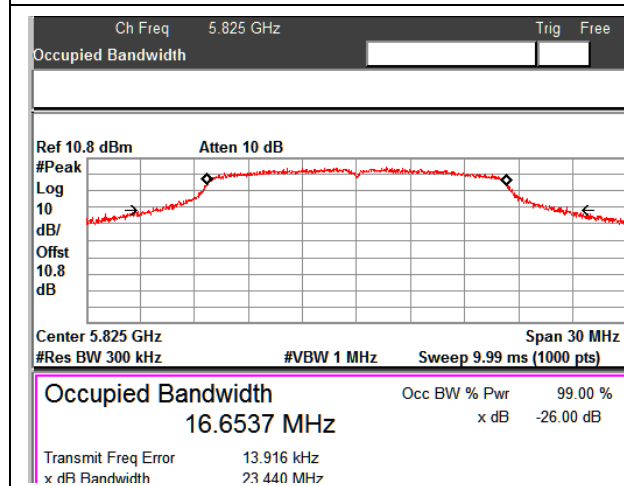
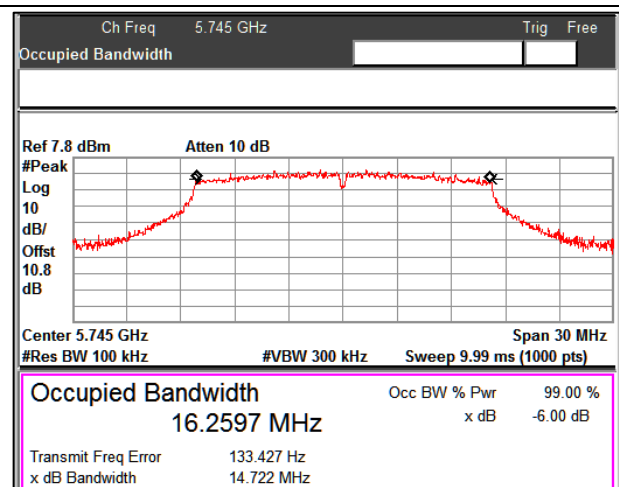
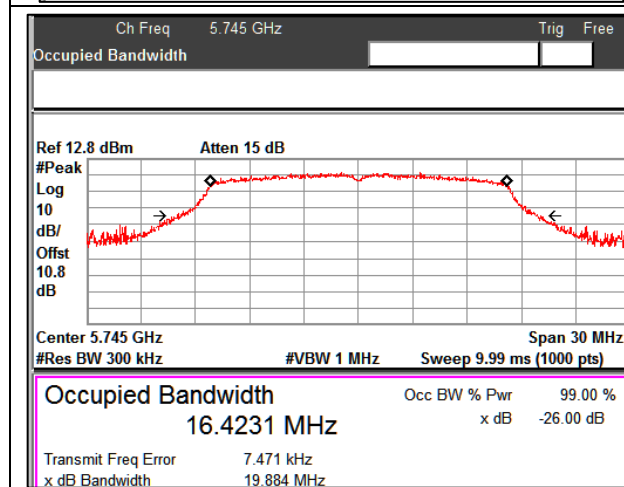
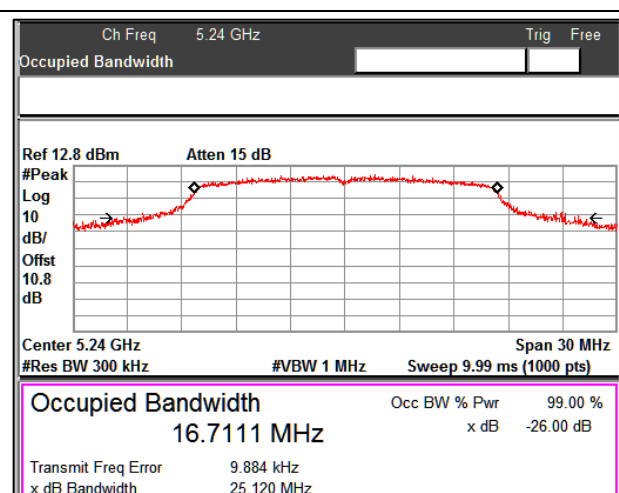
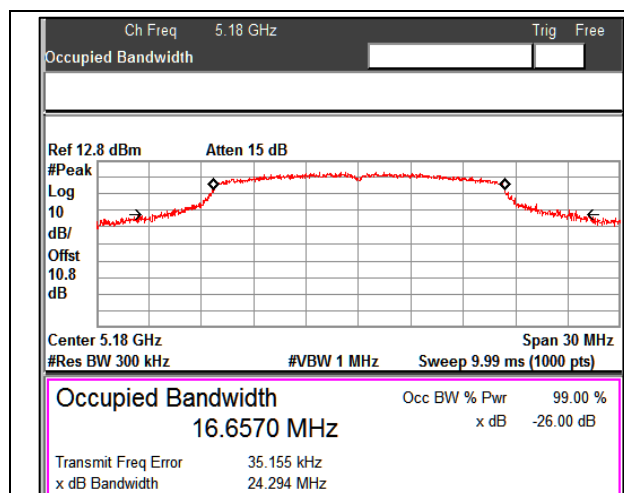
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Data rate: 24Mbps

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
24Mbps	5180	24.29	16.65
	5240	25.12	16.71

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
24Mbps	5745	14.72	16.42
	5825	14.94	16.65



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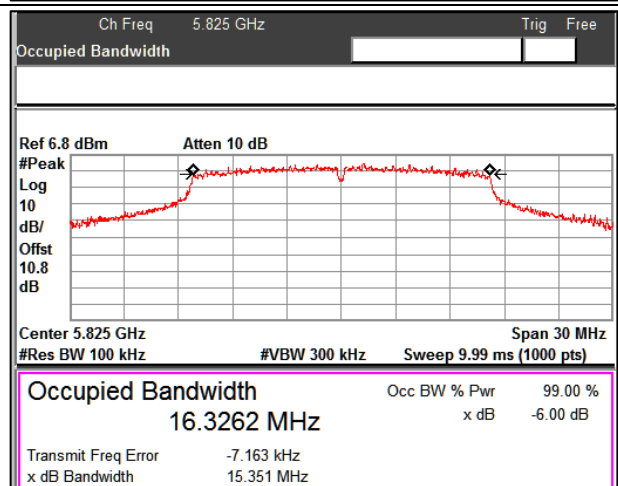
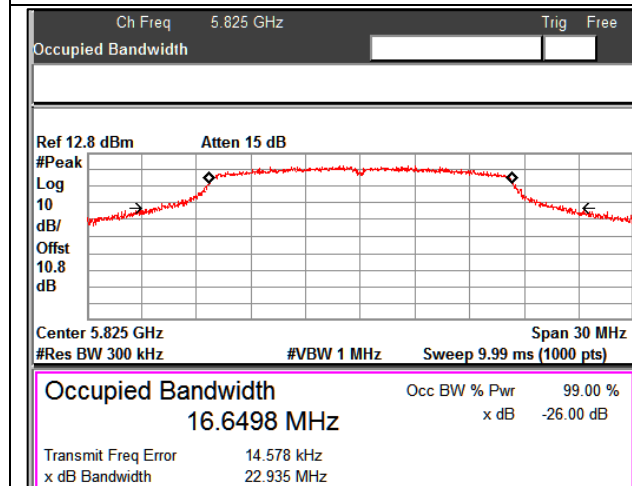
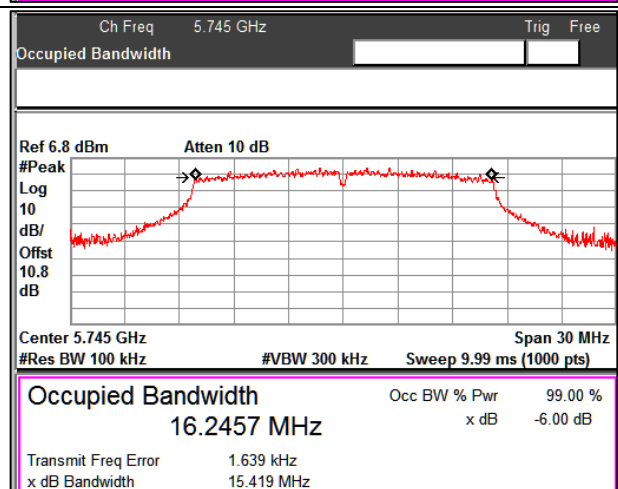
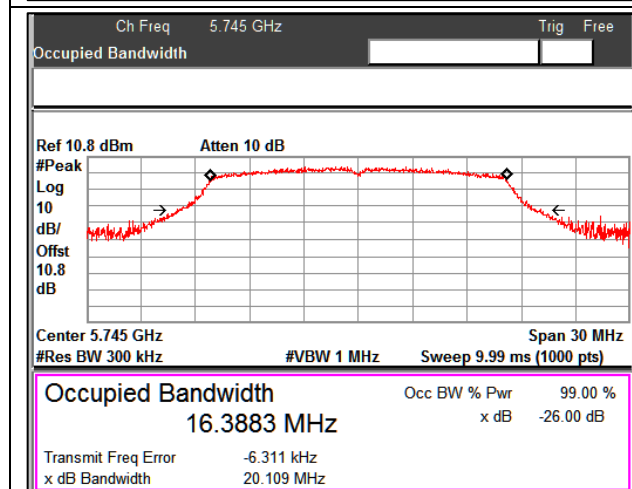
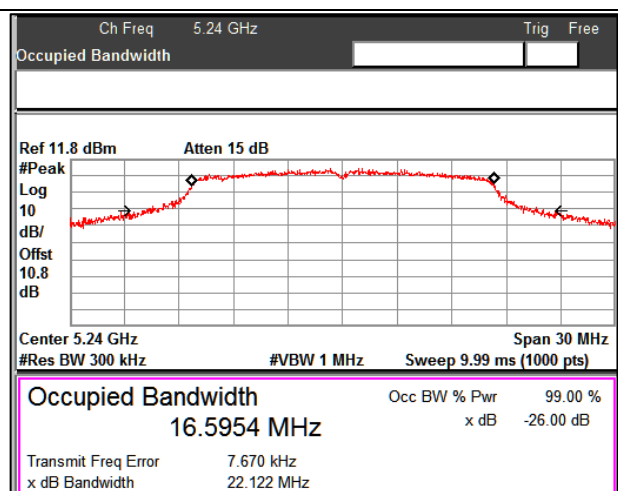
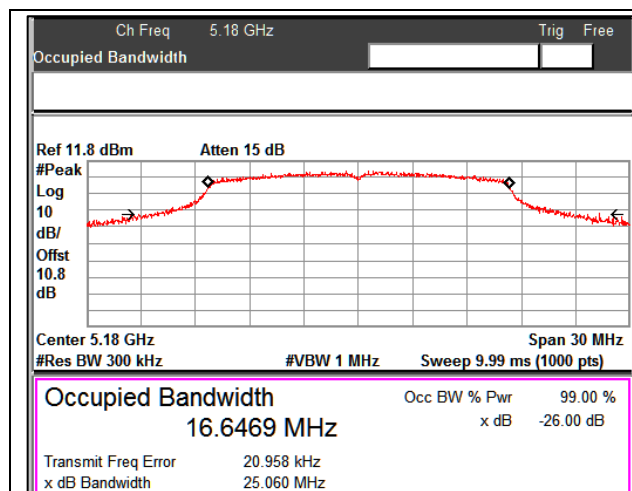
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Data rate: 54Mbps

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
54Mbps	5180	25.06	16.64
	5240	22.12	16.59

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
54Mbps	5745	15.41	16.38
	5825	15.35	16.64



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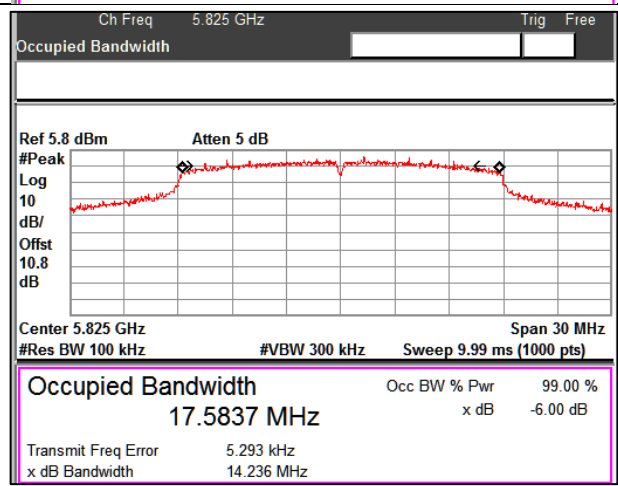
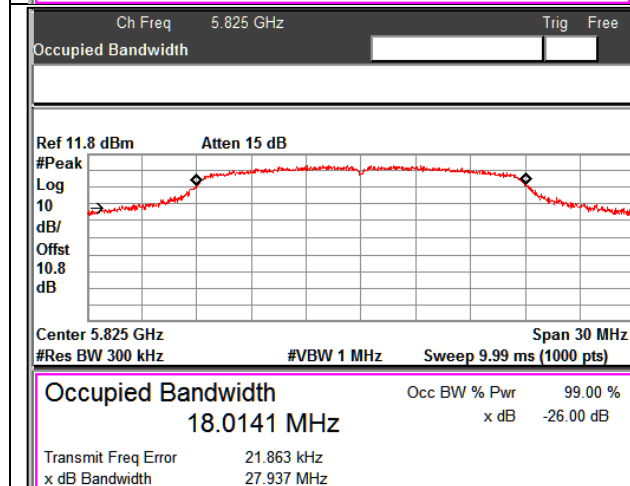
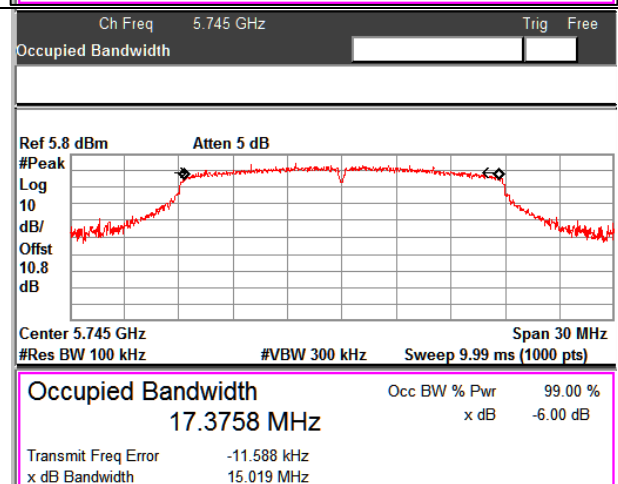
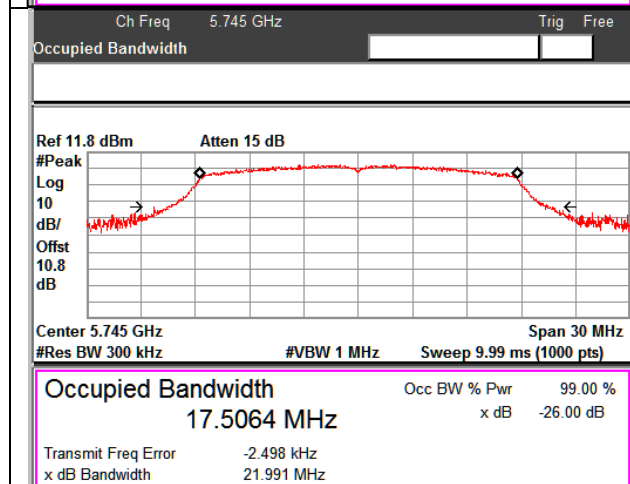
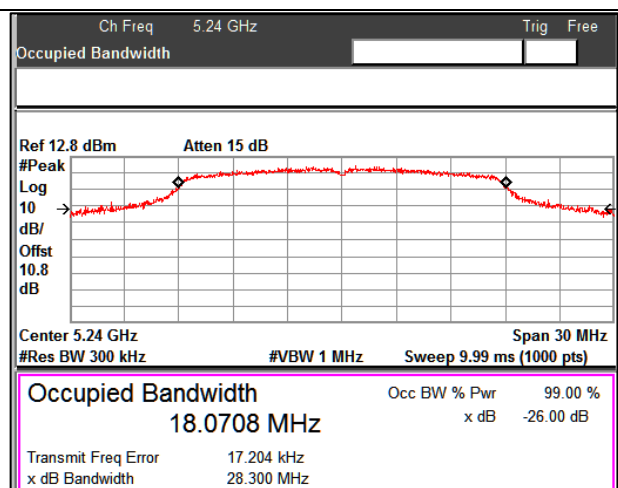
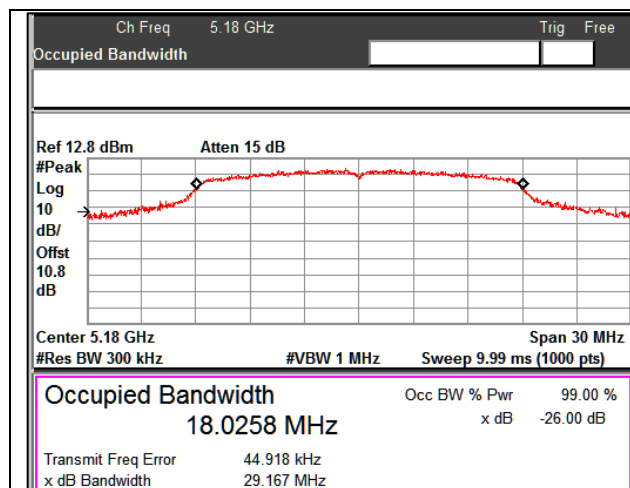
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Modulation: 802.11n HT20

Data rate: MCS0

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS0	5180	29.16	18.02
	5240	28.30	18.07

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS0	5745	15.01	17.50
	5825	14.23	18.01



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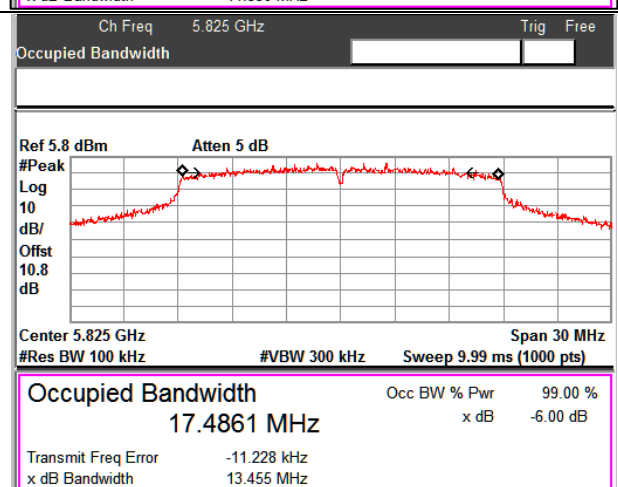
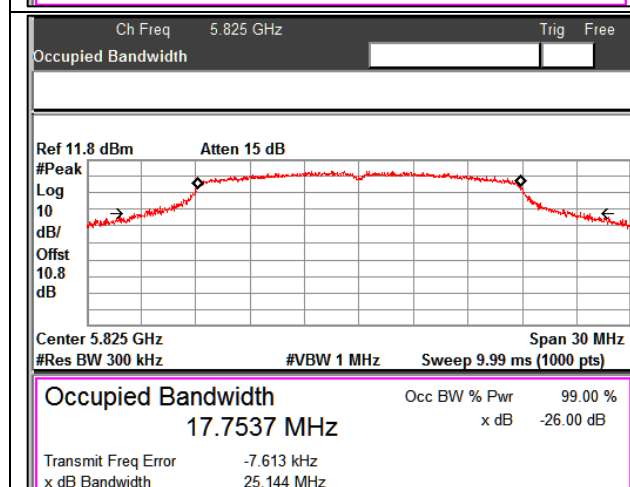
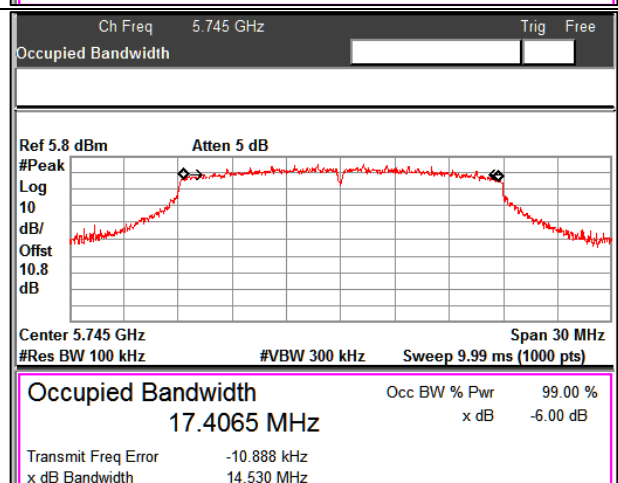
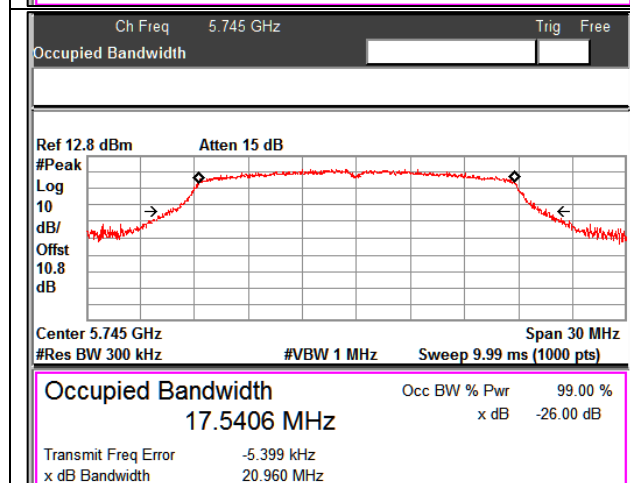
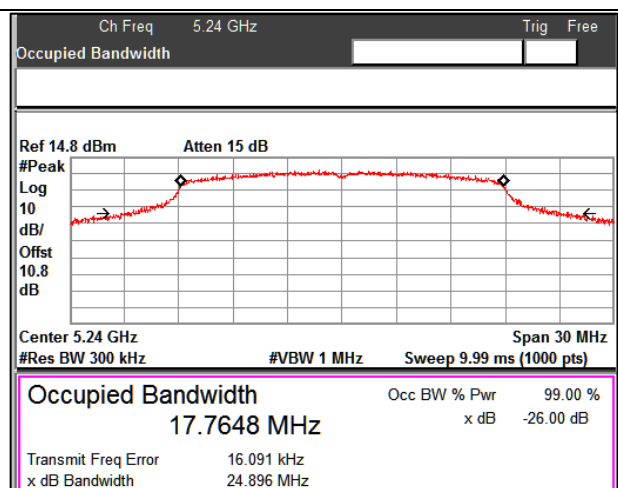
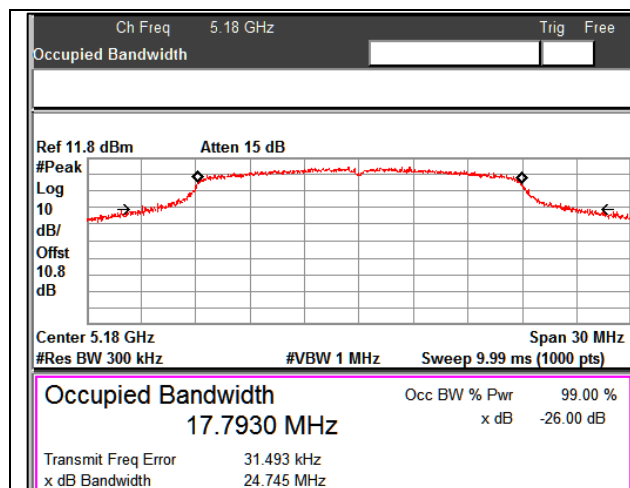
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Data rate: MCS4

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS4	5180	24.74	17.79
	5240	24.89	17.76

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS4	5745	14.53	17.54
	5825	13.45	17.75



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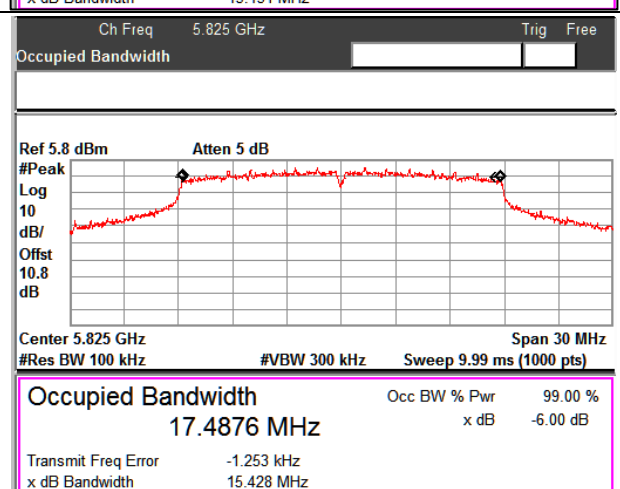
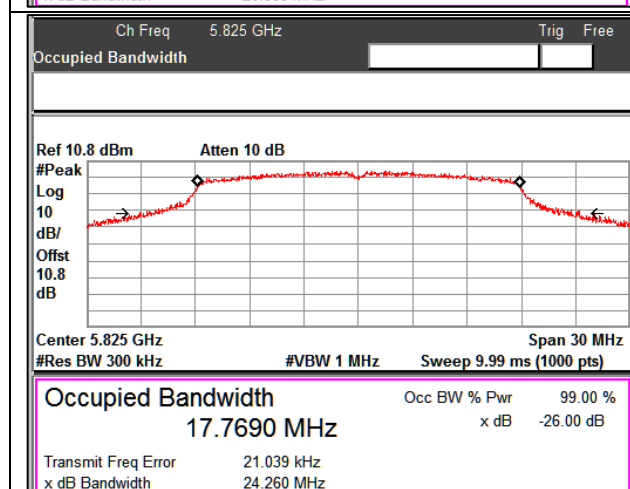
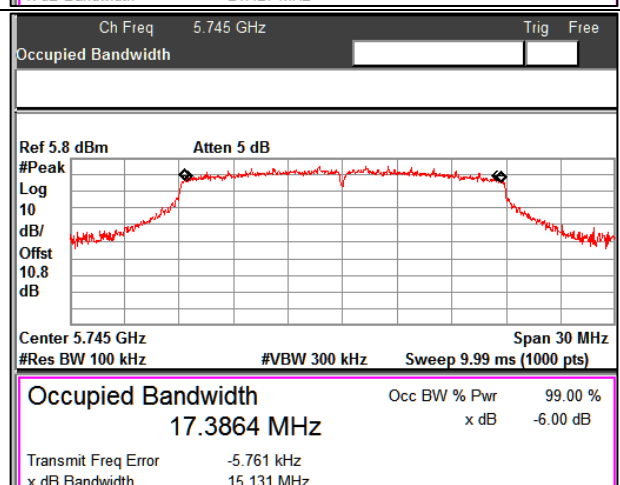
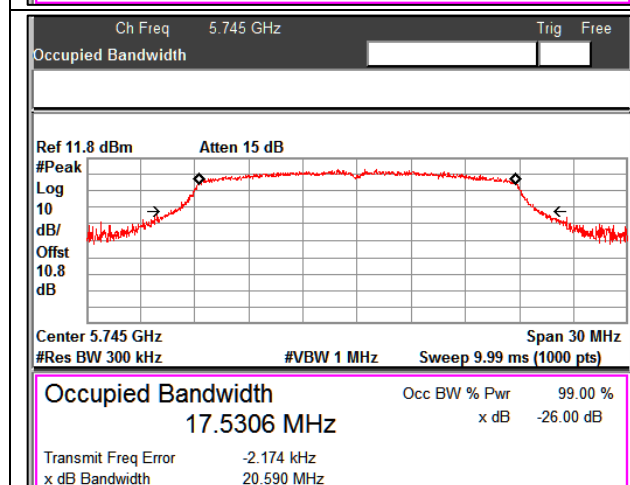
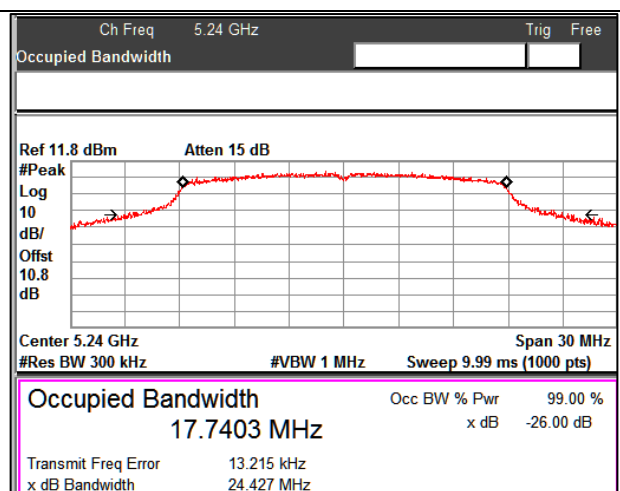
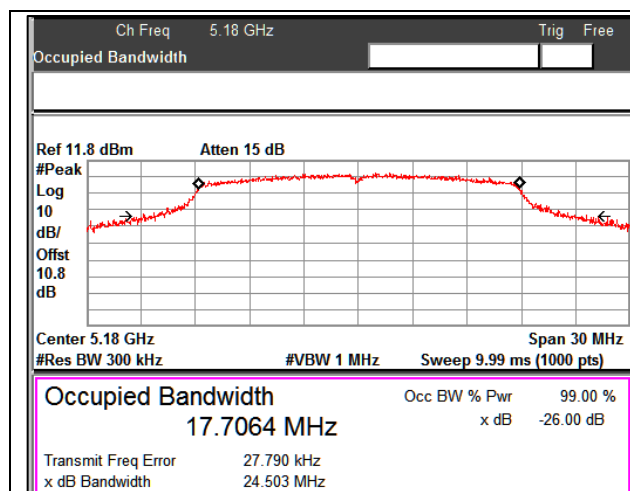
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Data rate: MCS7

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS7	5180	24.50	17.70
	5240	24.42	17.74

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS7	5745	15.13	17.53
	5825	15.42	17.76



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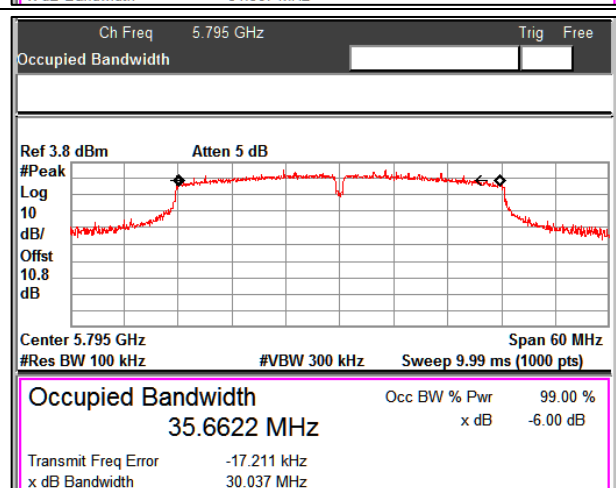
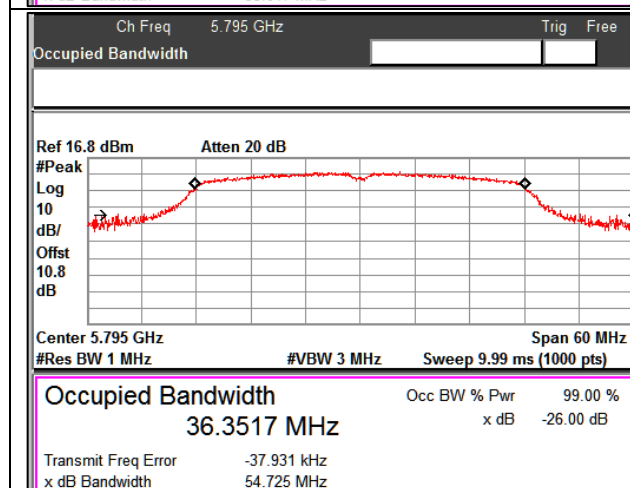
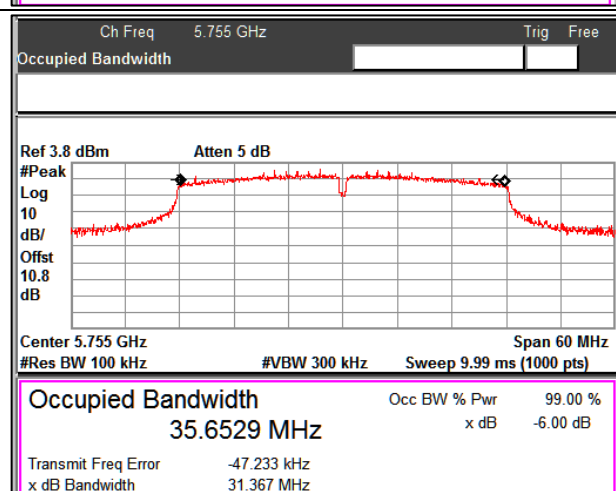
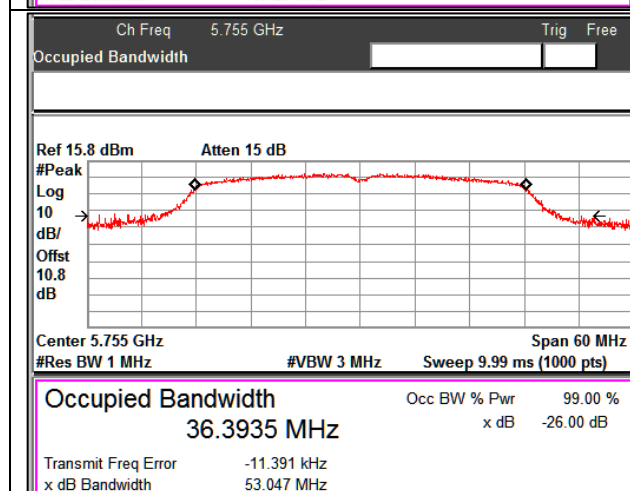
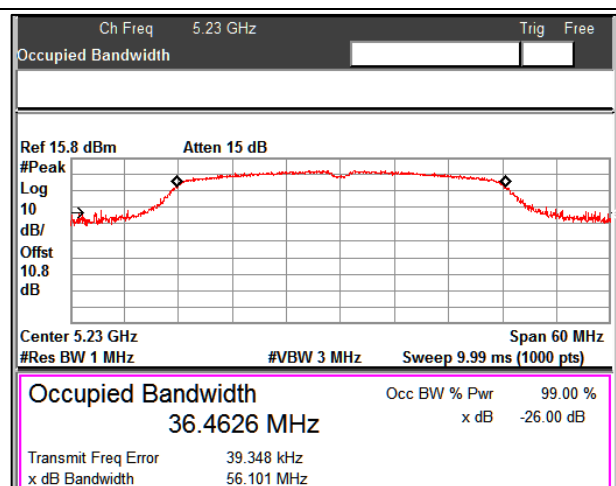
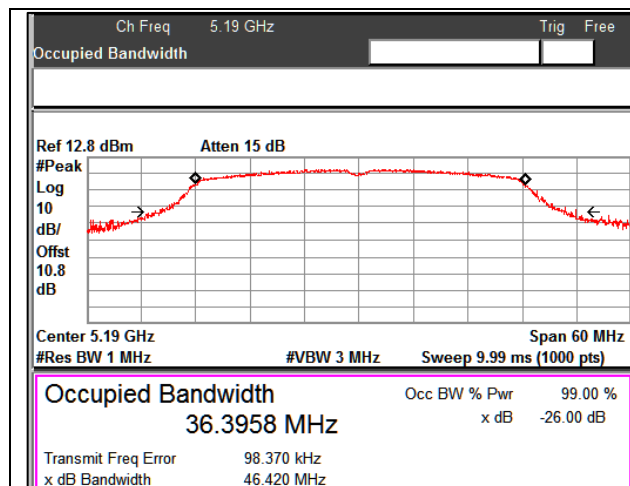
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Modulation: 802.11n HT40

Data rate: MCS0

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS0	5190	46.42	36.39
	5230	56.10	36.46

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS0	5755	31.36	36.39
	5795	30.03	36.35



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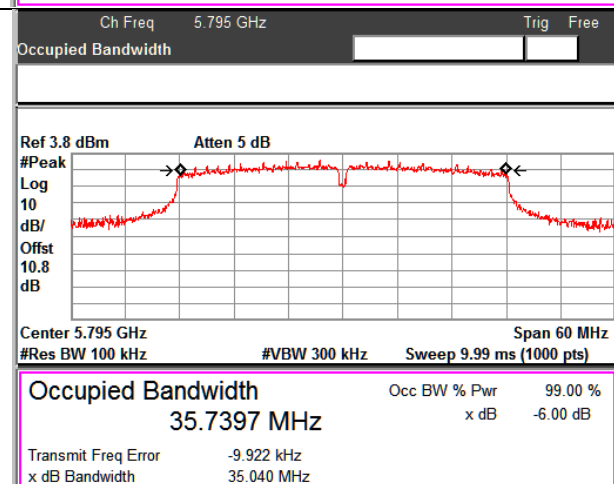
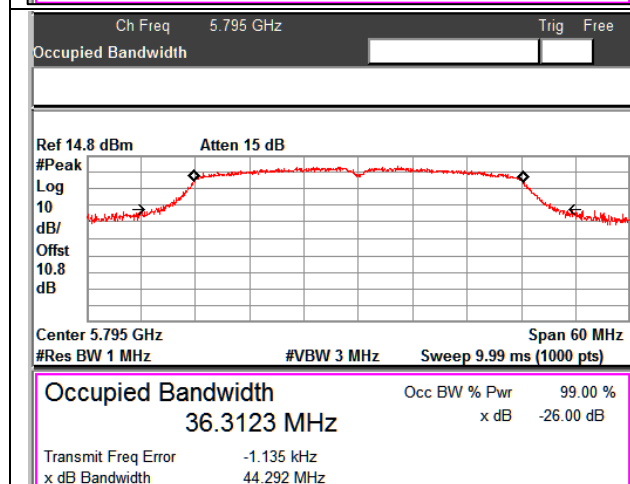
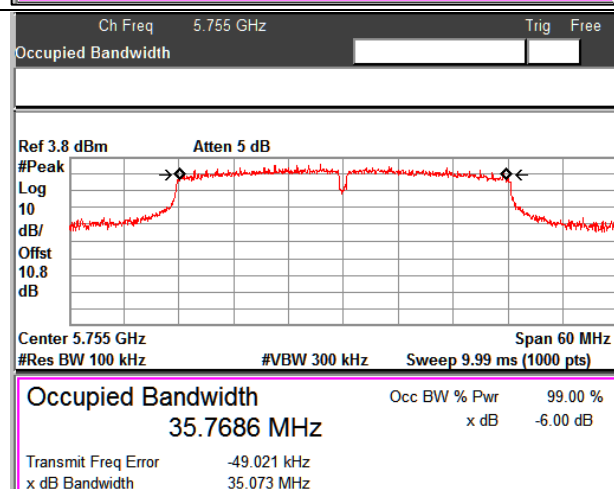
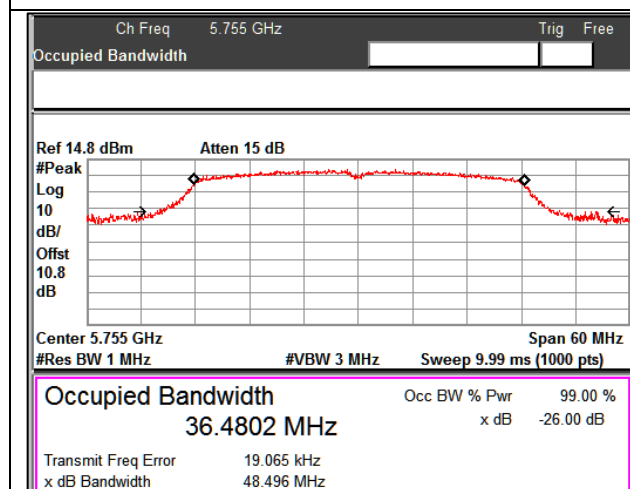
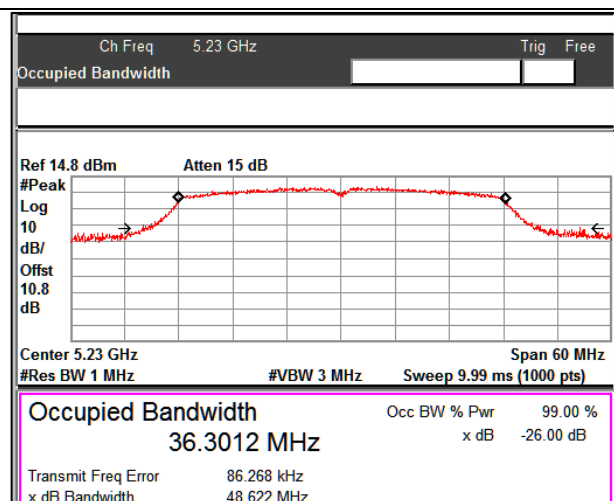
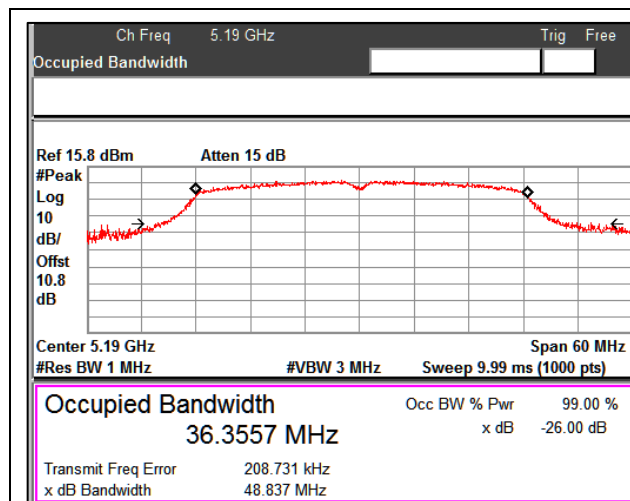
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Data rate: MCS4

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS4	5190	48.83	36.35
	5230	48.62	36.30

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS4	5755	35.07	36.48
	5795	35.04	36.31



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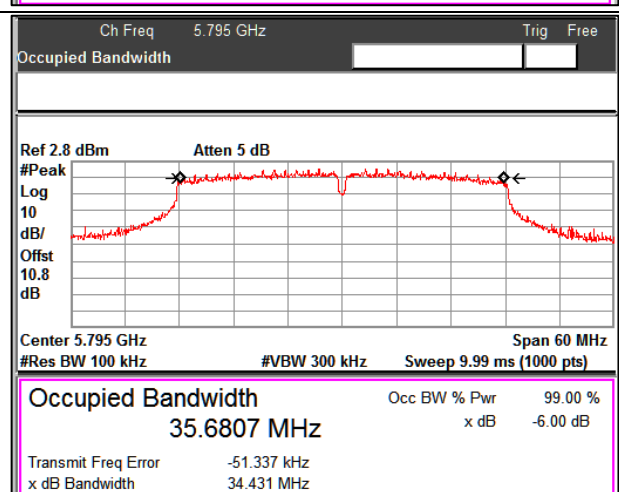
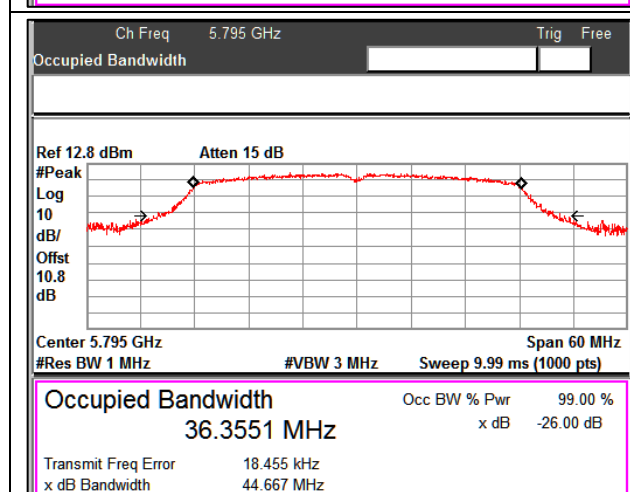
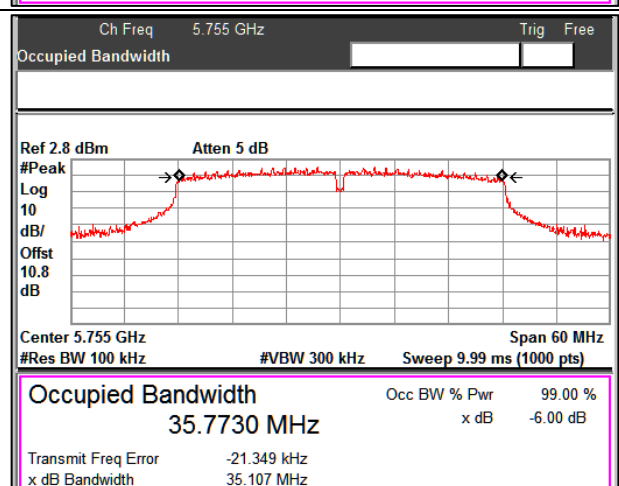
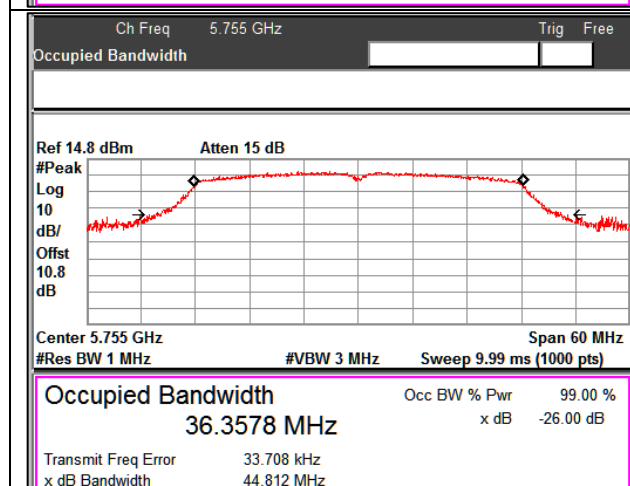
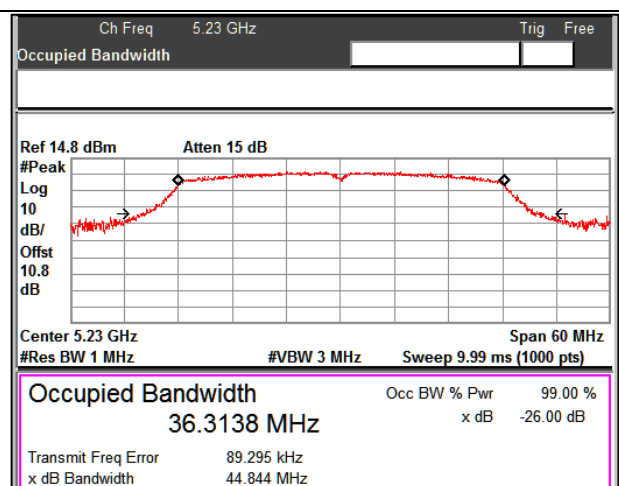
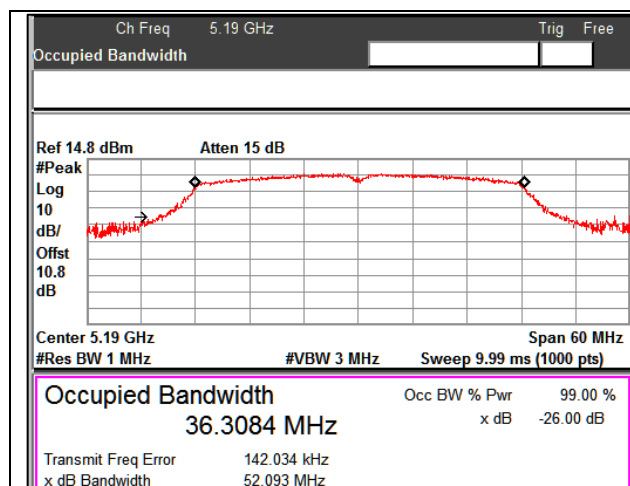
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Data rate: MCS7

Data rate	Measured Frequency (MHz)	26 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS7	5190	52.09	36.30
	5230	44.84	36.31

Data rate	Measured Frequency (MHz)	6 dB emission bandwidth (MHz)	99% Occupied Bandwidth (MHz)
MCS7	5755	35.10	36.35
	5795	34.43	36.35



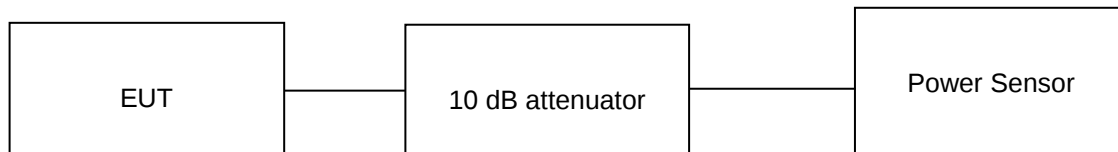
7.2 Maximum Conducted Output Power

Result

Pass

Test Specification	FCC part 15 Subpart C 15.407 (a)(1)(iv) & (a)(3) / RSS 247 Issue 2, Section 6.2.1.1 & Section 6.2.4.1
Test Method	Subclause 12.3.2.6 of ANSI C63.10
Measurement Bandwidth	Refer the remarks below
Detector	Average sample detector mode
Port of testing	Antenna port
Requirement for FCC	1. For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW 2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz 3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

Test Method



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Test Condition:

Normal Test Condition:

Temperature (Norm) = + 22.6 °C

Voltage = 3.6V Li-Ion battery

Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section E (2) sub-section (d) in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report

10 dB attenuator + 0.8 dB Cable loss = 10.8 dB total offset

2. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is (For UNII 1 - 4dBi and for UNII 3 – 4.68 dBi.)

Modulation: 802.11a

Data Rate (Mbps)	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty Cycle	Duty cycle correction factor (dB)	Maximum Average output power (dBm)	Final Average output power (e.i.r.p) (dBm)	FCC Power Limit (dBm)	IC Power Limit (e.i.r.p) (dBm)
6	5180	12.12	94.54	0.24	12.36	16.36	24	22.32
	5240	12.67	94.54	0.24	12.91	16.91	24	22.32
	5745	8.70	94.88	0.23	8.93	13.61	30	30.00
	5825	9.52	95.36	0.21	9.73	14.41	30	30.00
24	5180	11.60	85.00	0.71	12.31	16.31	24	22.25
	5240	12.06	83.97	0.76	12.82	16.82	24	22.25
	5745	7.99	84.38	0.74	8.73	13.41	30	30.00
	5825	8.92	84.91	0.71	9.63	14.31	30	30.00
54	5180	10.04	71.76	1.44	11.48	15.48	24	22.22
	5240	10.43	67.06	1.74	12.17	16.17	24	22.22
	5745	7.47	72.62	1.39	8.86	13.54	30	30.00
	5825	8.48	70.24	1.53	10.01	14.69	30	30.00

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Modulation: 802.11n HT20

Data Rate	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty Cycle	Duty cycle correction factor (dB)	Maximum Average output power (dBm)	Final Average output power (e.i.r.p) (dBm)	FCC Power Limit (dBm)	IC Power Limit (e.i.r.p) (dBm)
MCS0	5180	12.36	94.93	0.23	12.59	16.59	24	22.57
	5240	12.57	94.71	0.24	12.81	16.81	24	22.58
	5745	8.78	94.50	0.25	9.03	13.71	30	30.00
	5825	9.71	95.14	0.22	9.93	14.61	30	30.00
MCS4	5180	11.36	75.25	1.24	12.60	16.60	24	22.50
	5240	11.93	77.00	1.14	13.07	17.07	24	22.50
	5745	7.98	76.24	1.18	9.16	13.84	30	30.00
	5825	8.82	76.24	1.18	10.00	14.68	30	30.00
MCS7	5180	7.86	64.79	1.89	9.75	13.75	24	22.40
	5240	8.38	67.61	1.70	10.08	14.08	24	22.40
	5745	7.44	66.20	1.79	9.23	13.91	30	30.00
	5825	7.83	64.38	1.91	9.74	14.42	30	30.00

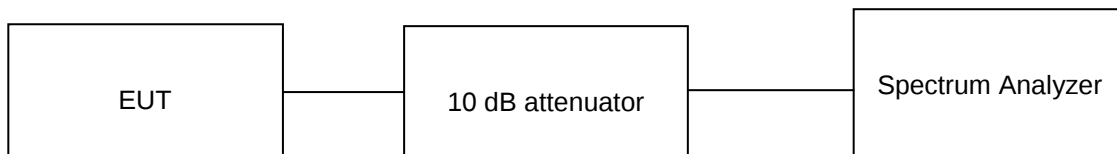
Modulation: 802.11n HT40

Data Rate	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty Cycle	Duty cycle correction factor (dB)	Maximum Average output power (dBm)	Final Average output power (e.i.r.p) (dBm)	FCC Power Limit (dBm)	IC Power Limit (e.i.r.p) (dBm)
MCS0	5190	8.49	88.80	0.52	9.01	13.01	24	25.54
	5230	11.19	88.80	0.52	11.71	15.71	24	25.54
	5755	10.11	87.92	0.56	10.67	15.35	30	30.00
	5795	9.46	89.26	0.49	9.95	14.63	30	30.00
MCS4	5190	9.05	58.06	2.36	11.41	15.41	24	22.55
	5230	10.02	58.06	2.36	12.38	16.38	24	22.55
	5755	8.65	57.14	2.43	11.08	15.76	30	30.00
	5795	8.21	58.06	2.36	10.57	15.25	30	30.00
MCS7	5190	7.06	45.83	3.39	10.45	14.45	24	25.55
	5230	6.41	44.68	3.50	9.91	13.91	24	25.55
	5755	5.23	44.00	3.57	8.80	13.48	30	30.00
	5795	6.05	44.68	3.50	9.55	14.23	30	30.00

7.3 Maximum Power Spectral Density

<i>Result</i>	<i>Pass</i>
Test Specification	FCC part 15 Subpart C 15.407 (a) / RSS 247 Issue 2 Section 6.2.1; 6.2.2; 6.2.3; & Section 6.2.4
Test Method	Subclause 12.5 of ANSI C63.10
Measurement Bandwidth	1MHz & 500kHz
Detector	Average sample detector
Port of testing	Antenna port
Requirement for FCC	1. For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band 2. For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band
Requirement for IC	1. For the band 5.15-5.25 GHz, The e.i.r.p. spectral density shall not exceed 10 dBm in any 1 MHz band 2. For the band 5.725-5.85 GHz, The output power spectral density shall not exceed 30 dBm in any 500 kHz band

Test Method:



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The following procedure shall be used:

1. Set center frequency to the nominal EUT channel center frequency
2. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal
3. Set RBW = 1MHz (5.15-5.25 GHz band) / 500kHz (5.725-5.85 GHz band)
4. Set VBW $\geq 3 \times$ RBW
5. Number of points in sweep $\geq 2 \times$ span / RBW. (This ensures that bin-to-bin spacing is $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
6. Sweep time = auto
7. Detector = power averaging (rms), if available. Otherwise, use sample detector mode
8. Do not use sweep triggering. Allow the sweep to "free run."
9. Trace average at least 100 traces and Compute power by integrating the spectrum across the EBW
10. Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission)
11. If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
 - a. Set RBW = 300 kHz
 - b. Set VBW ≥ 3 RBW
 - c. If measurement bandwidth of Maximum PSD is specified in 500 kHz

$$\text{PSD bandwidth correction Factor} = 10 * \log(500 \text{ kHz} / \text{RBW})$$

Test Condition:

Normal Test Condition:

Temperature (Norm) = + 25 °C

Voltage = 3.6V Li-Ion battery

Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section F in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test results:

Note:

1. All the losses are included during measurement and final values are mentioned in the test report
 $10 \text{ dB attenuator} + 0.8 \text{ dB Cable loss} = 10.8 \text{ dB total offset}$
2. Duty cycle correction factor is considered in Final Average power
 $\text{Duty cycle Correction factor} = 10 * \text{LOG}(1/X)$ Where X is Duty Cycle
3. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is (For UNII 1 - 4dBi and for UNII 3 – 4.68 dBi.)
4. e.i.r.p = Maximum Average PSD (dBm) + Antenna gain in dBi

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Modulation: 802.11a

Band: UNII 1

Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/1MHz)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/1MHz)	PSD (e.i.r.p) (dBm/1MHz)	FCC PSD Limit (dBm/1MHz)	IC e.i.r.p PSD (dBm/1MHz)
6	5180	1.24	0.24	1.48	5.48	11	10
	5240	2.39	0.24	2.63	6.63	11	10
24	5180	1.41	0.71	2.12	6.12	11	10
	5240	1.72	0.76	2.48	6.48	11	10
54	5180	-0.01	1.44	1.43	5.43	11	10
	5240	0.74	1.74	2.48	6.48	11	10

Band: UNII 3

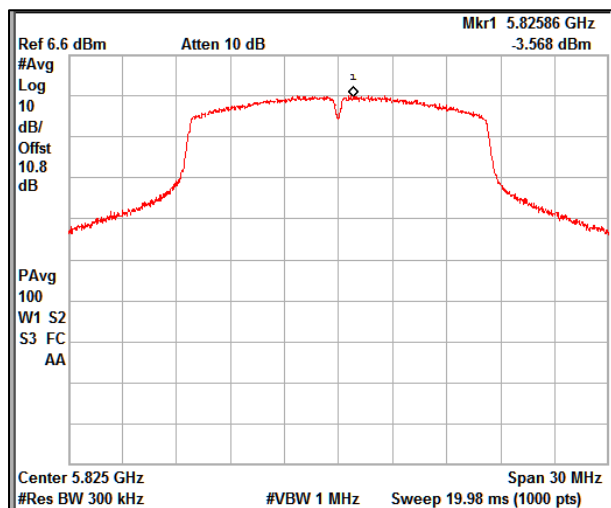
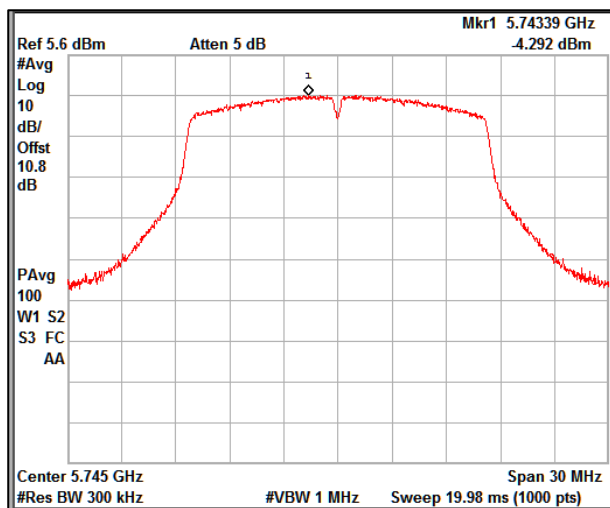
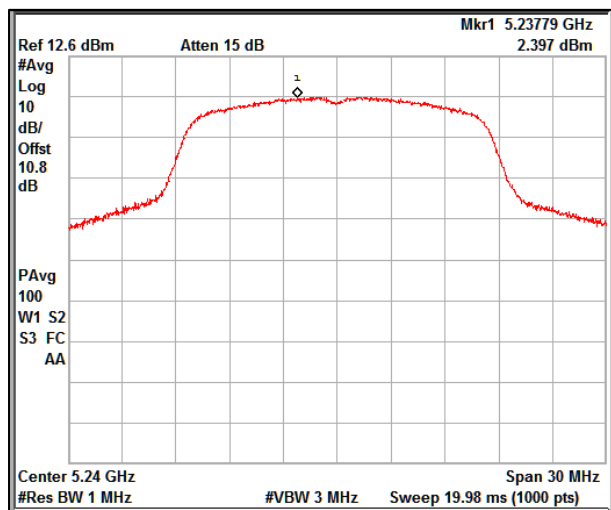
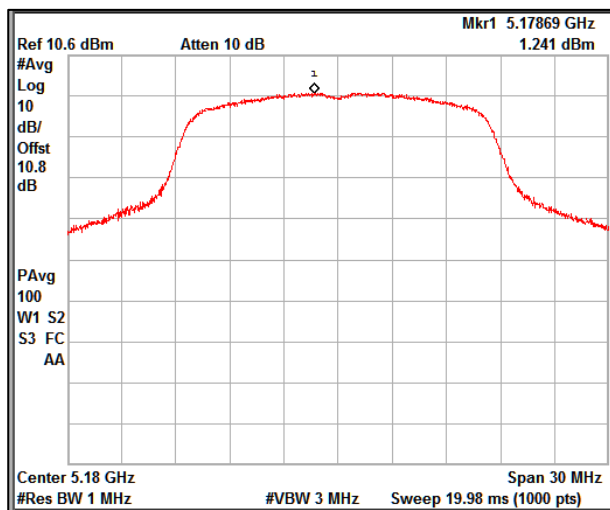
Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/300kHz)	RBW Correction factor (dB)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/500kHz)	FCC PSD Limit (dBm/500kHz)	IC PSD Limit (dBm/500kHz)
6	5745	-4.29	2.22	0.23	-1.84	30	30
	5825	-3.56	2.22	0.21	-1.14	30	30
24	5745	-4.89	2.22	0.74	-1.93	30	30
	5825	-3.87	2.22	0.71	-0.94	30	30
54	5745	-5.41	2.22	1.39	-1.80	30	30
	5825	-4.42	2.22	1.53	-0.67	30	30

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Data Rate: 6 Mbps



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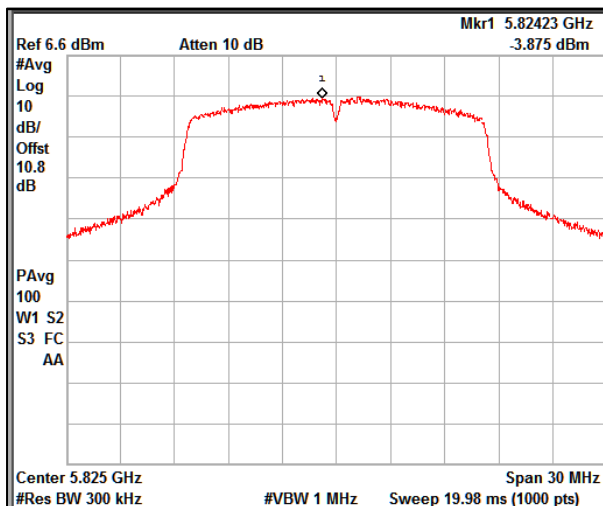
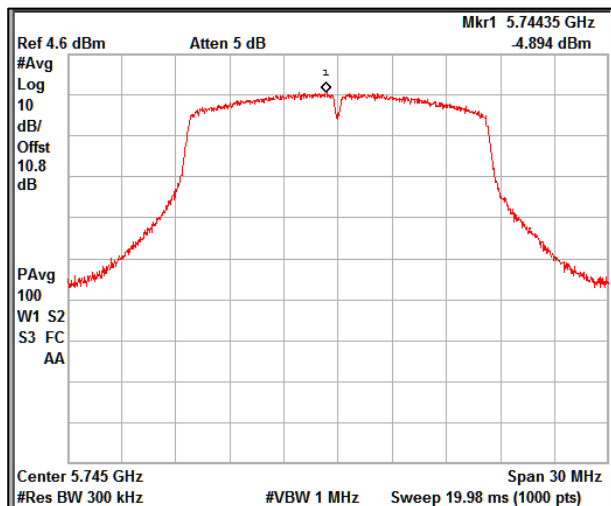
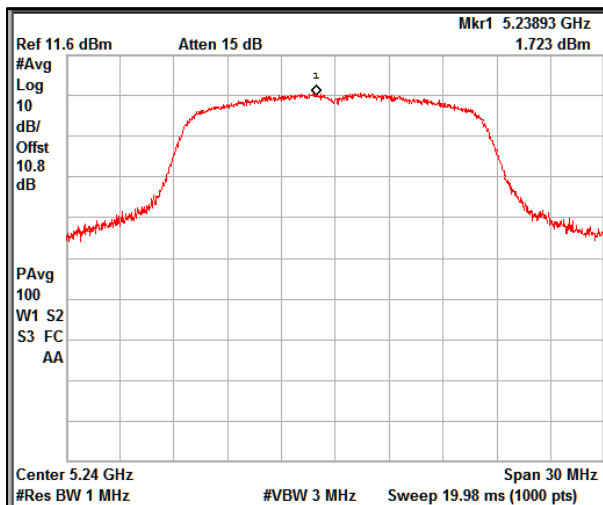
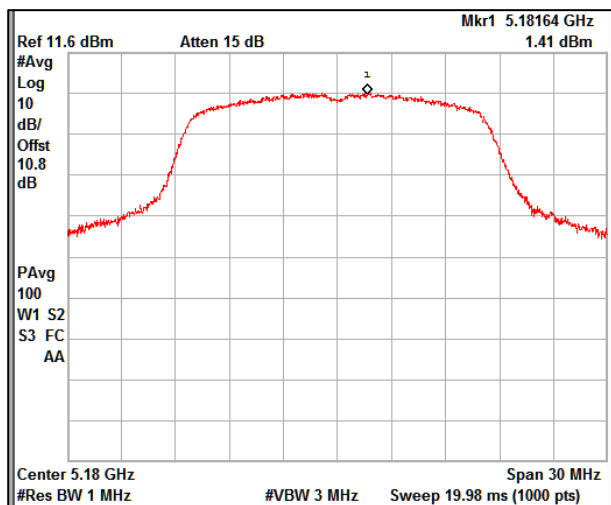
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Data Rate: 24Mbps



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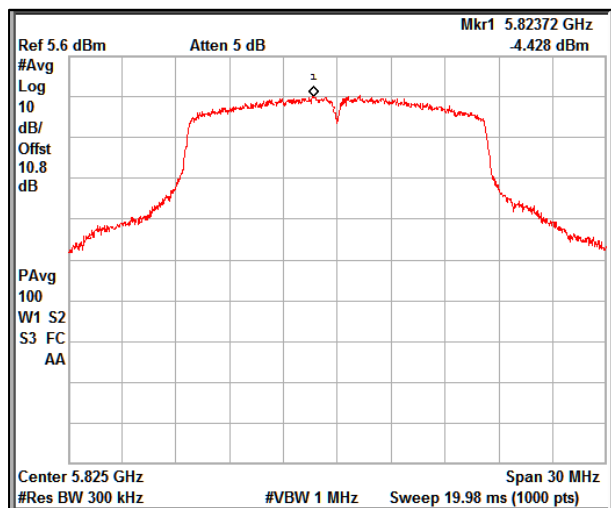
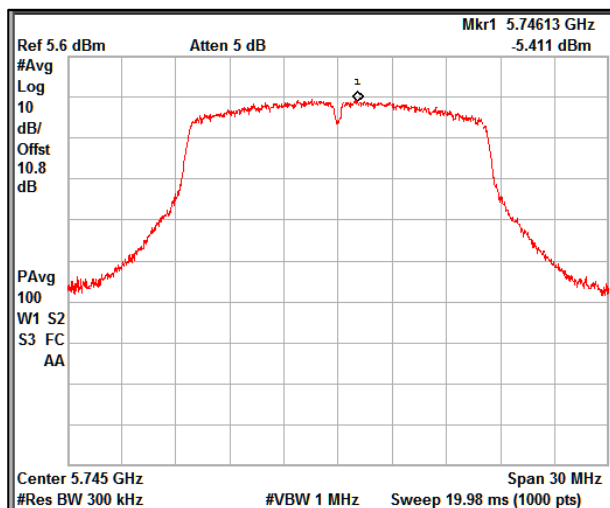
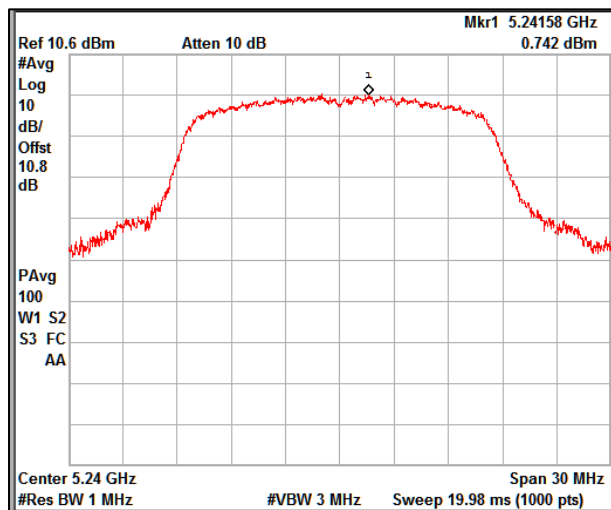
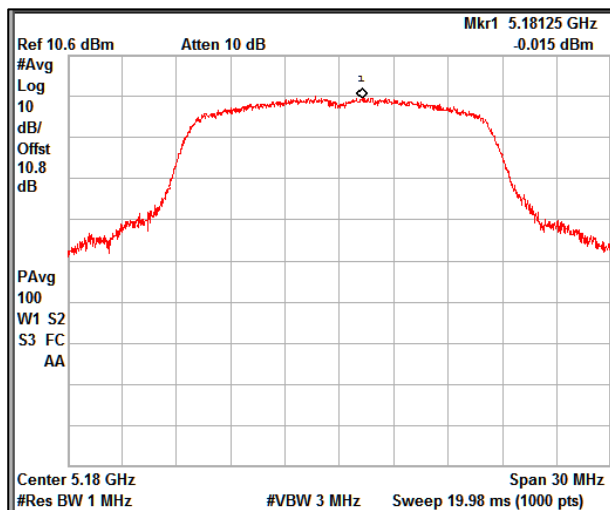
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Data Rate: 54Mbps



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Modulation: 802.1n HT20

Band: UNII 1

Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/1MHz)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/1MHz)	PSD (e.i.r.p) (dBm/1MHz)	FCC PSD Limit (dBm/1MHz)	IC e.i.r.p PSD (dBm/1MHz)
MCS0	5180	2.12	0.23	2.35	6.35	11	10
	5240	2.57	0.24	2.81	6.81	11	10
MCS4	5180	1.41	1.23	2.64	6.64	11	10
	5240	1.25	1.14	2.39	6.39	11	10
MCS7	5180	-0.56	1.88	1.32	5.32	11	10
	5240	-0.79	1.70	0.91	4.91	11	10

Band: UNII 3

Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/300kHz)	RBW Correction factor (dB)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/500kHz)	FCC PSD Limit (dBm/500kHz)	IC PSD Limit (dBm/500kHz)
MCS0	5745	-4.44	2.22	0.25	-1.98	30	30
	5825	-3.86	2.22	0.22	-1.43	30	30
MCS4	5745	-4.93	2.22	1.18	-1.53	30	30
	5825	-4.41	2.22	1.18	-1.01	30	30
MCS7	5745	-5.52	2.22	1.79	-1.51	30	30
	5825	-5.23	2.22	1.91	-1.10	30	30

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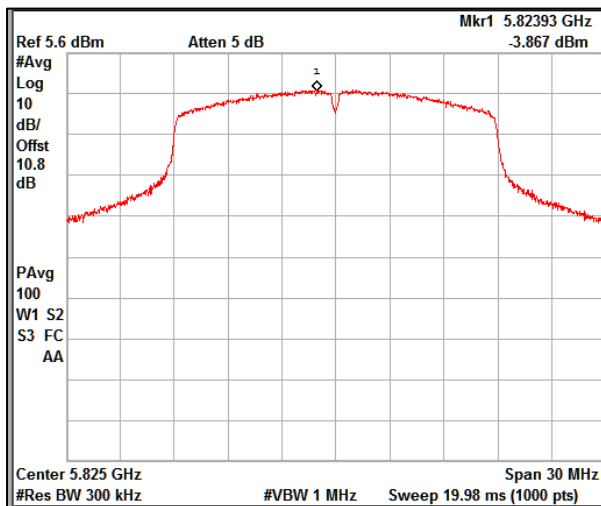
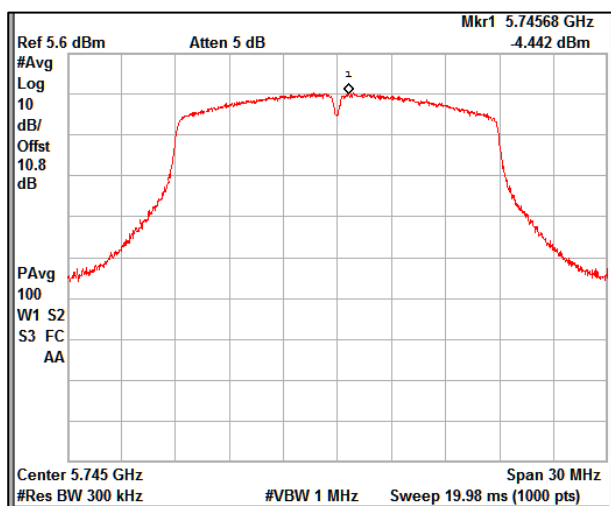
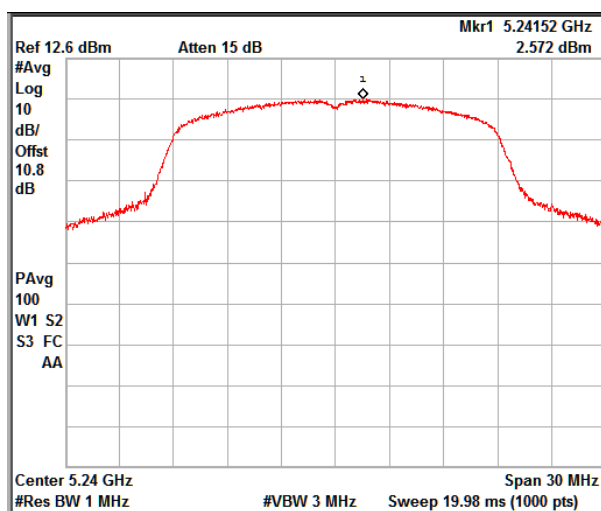
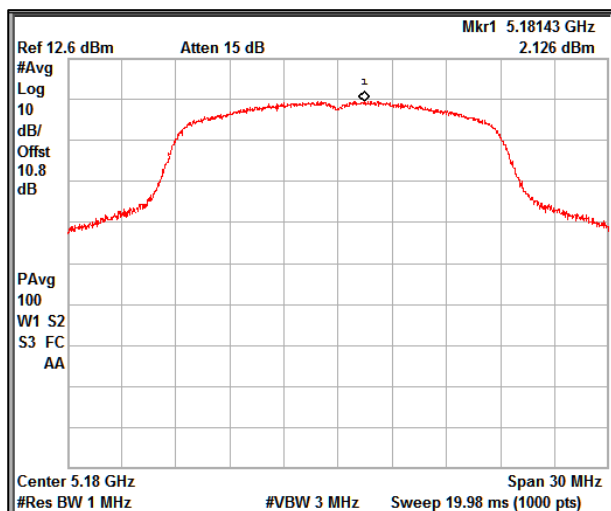
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Data Rate: MCS0



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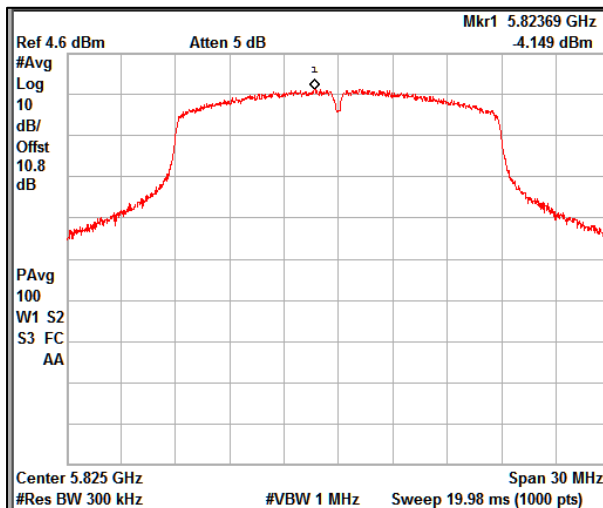
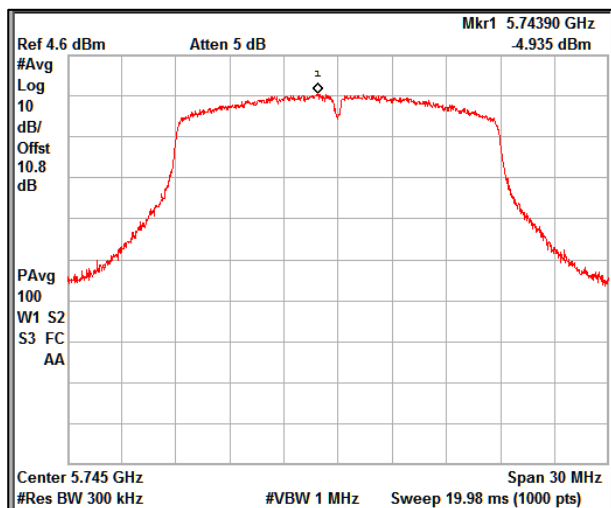
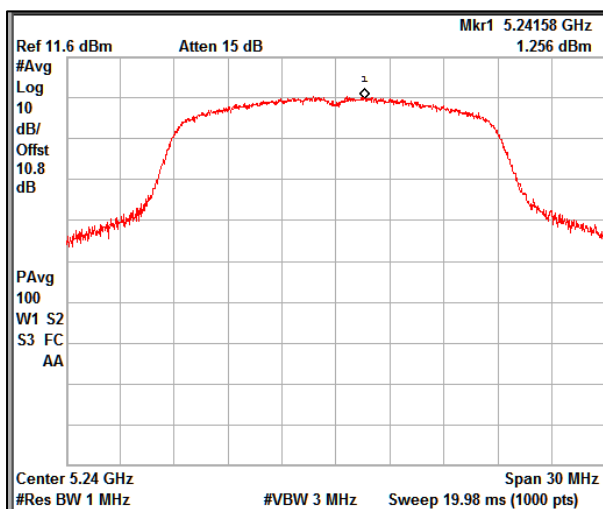
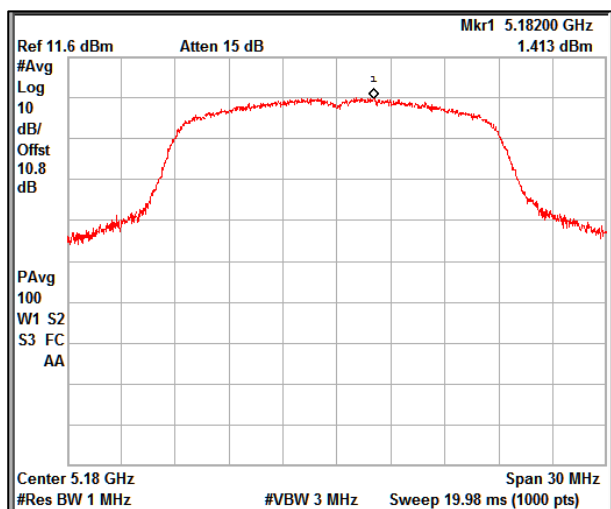
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Data Rate: MCS4



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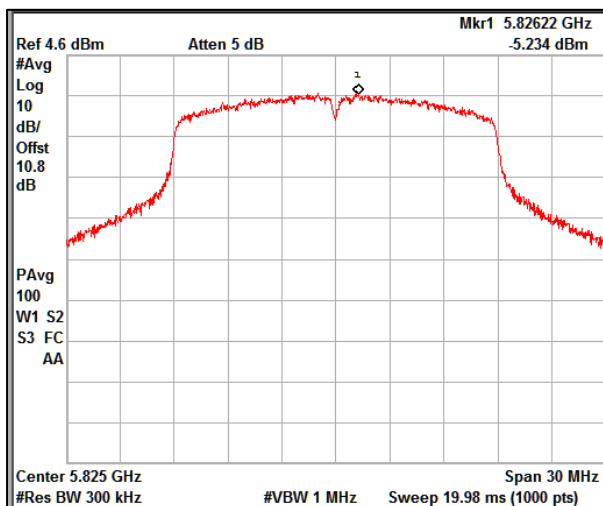
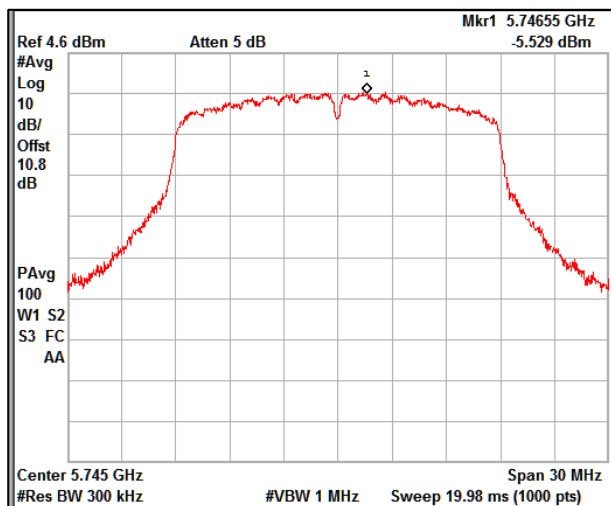
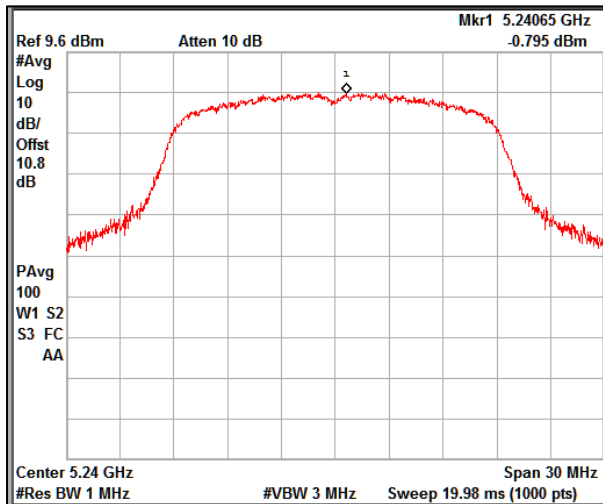
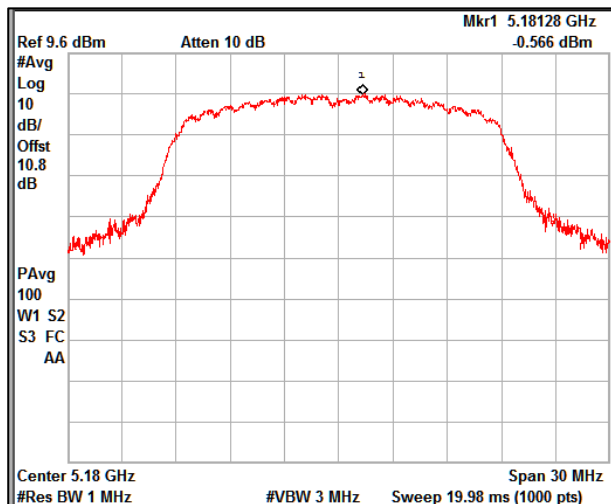
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Data Rate: MCS7



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Modulation: 802.1n HT40

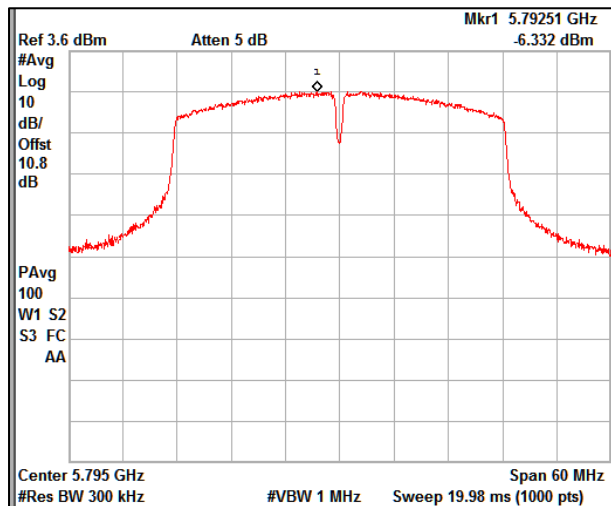
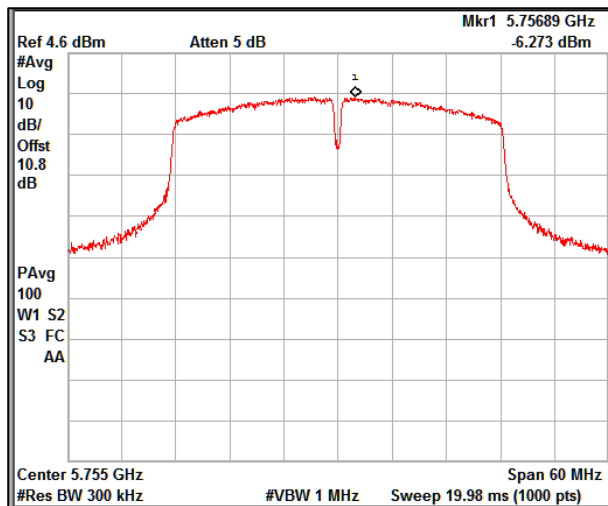
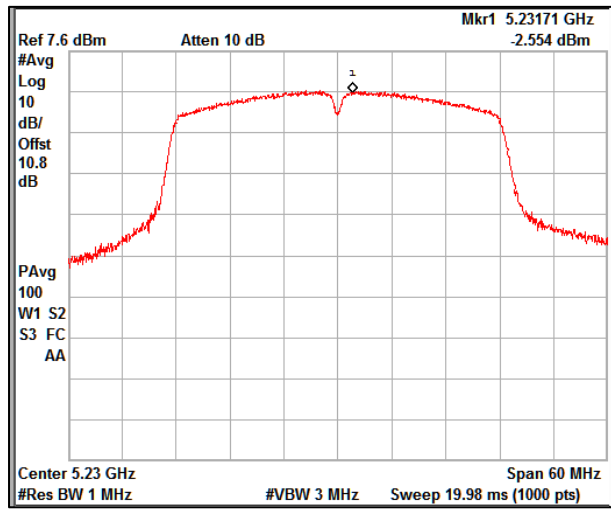
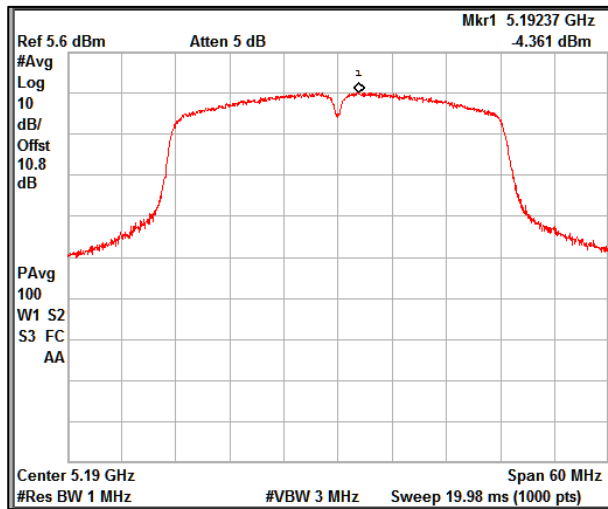
Band: UNII 1

Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/1MHz)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/1MHz)	PSD (e.i.r.p) (dBm/1MHz)	FCC PSD Limit (dBm/1MHz)	IC e.i.r.p PSD (dBm/1MHz)
MCS0	5190	-4.36	0.52	-3.84	0.16	11	10
	5230	-2.55	0.52	-2.03	1.97	11	10
MCS4	5190	-4.08	2.36	-1.72	2.28	11	10
	5230	-2.77	2.36	-0.41	3.59	11	10
MCS7	5190	-6.42	3.39	-3.03	0.97	11	10
	5230	-5.93	3.50	-2.43	1.57	11	10

Band: UNII 3

Data rate (Mbps)	Measured Frequency (MHz)	Measured Average PSD (dBm/300kHz)	RBW Correction factor (dB)	Duty cycle correction factor (dB)	Maximum Average PSD (dBm/500kHz)	FCC PSD Limit (dBm/500kHz)	IC PSD Limit (dBm/500kHz)
MCS0	5755	-6.27	2.22	0.56	-3.49	30	30
	5795	-6.33	2.22	0.49	-3.62	30	30
MCS4	5755	-7.62	2.22	2.43	-2.97	30	30
	5795	-7.67	2.22	2.36	-3.09	30	30
MCS7	5755	-9.87	2.22	3.57	-4.09	30	30
	5795	-9.20	2.22	3.50	-3.48	30	30

Data Rate: MCS0



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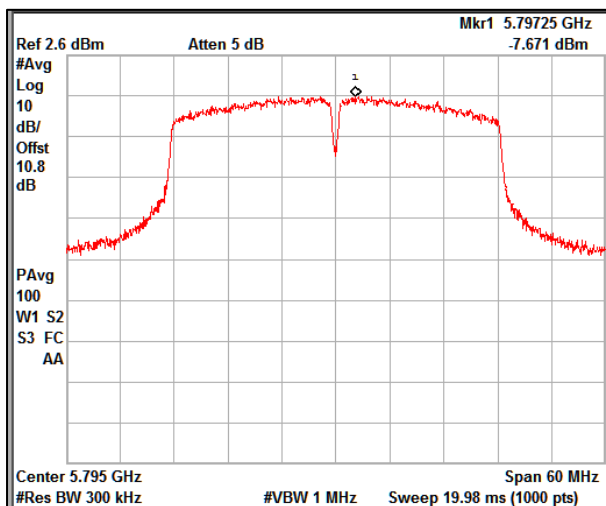
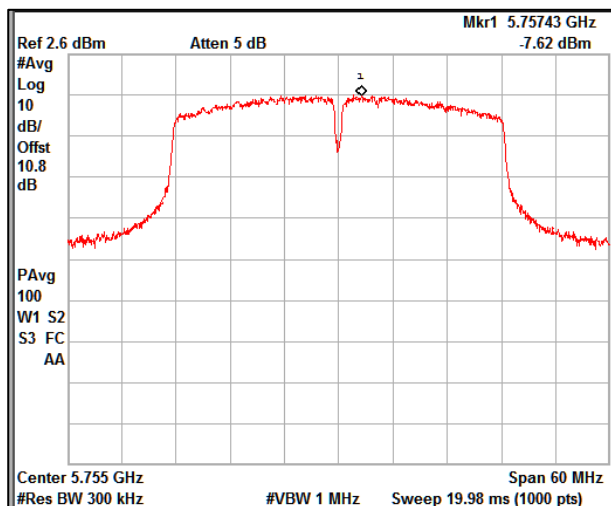
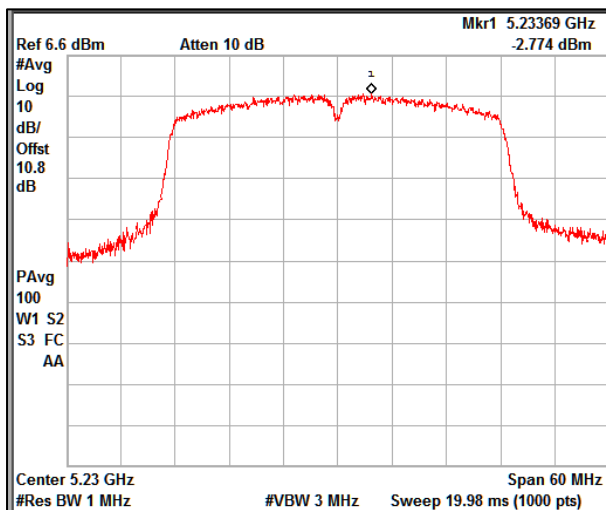
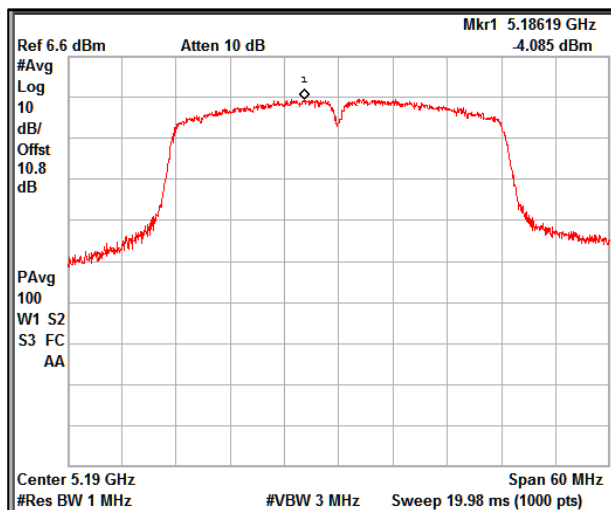
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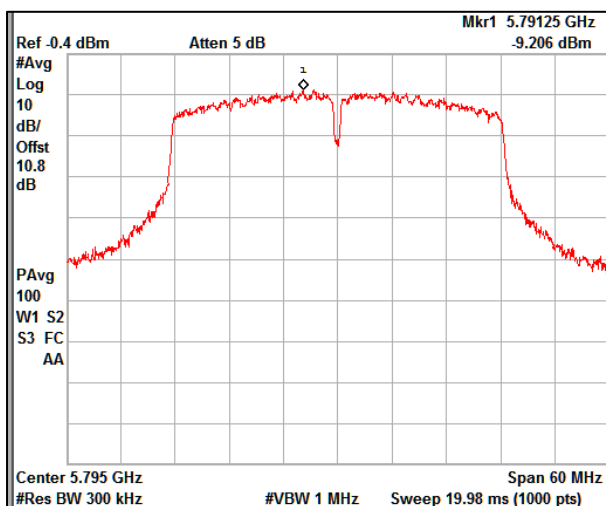
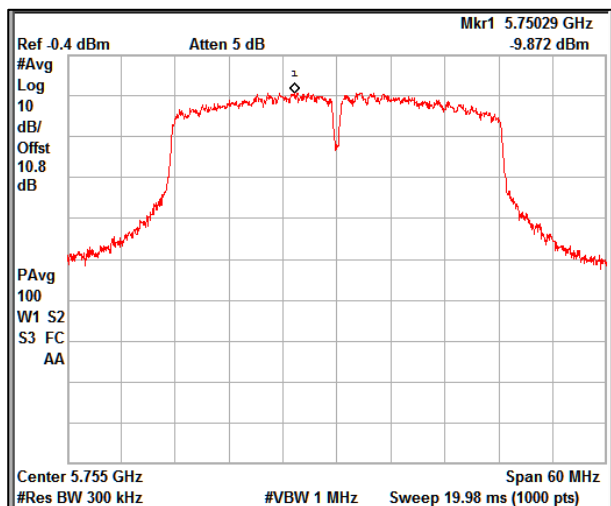
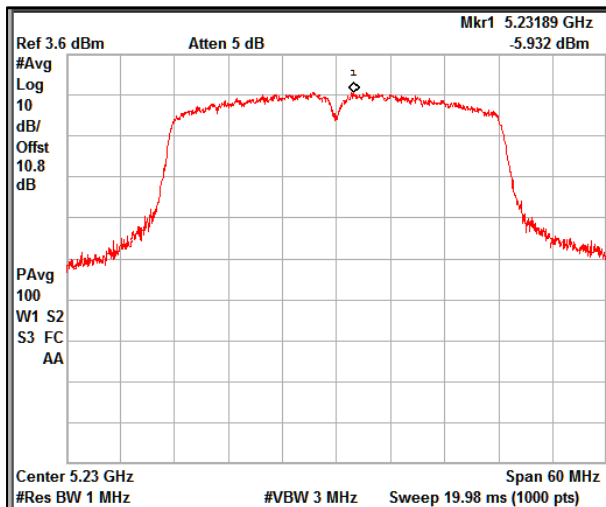
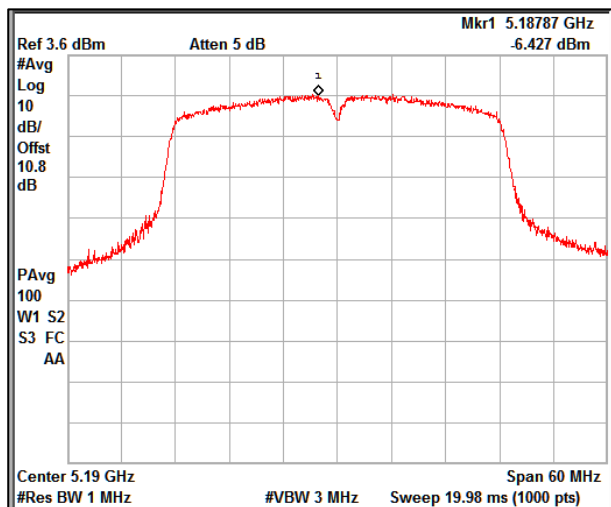
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7.4 Spurious Radiated Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C Section 15.407 (b) (15.205 & 15.209) / RSS 247 Issue 2 Section 6.2.1.2 & 6.2.4.2 / RSS Gen Issue 5 Section 8.9 & 8.10
Test Method	ANSI C 63.10 – 2013
Measurement Bandwidth	100kHz for below 1GHz 1MHz for above 1GHz
Measurement Location	Semi Anechoic Chamber 30MHz - 1 GHz Fully Anechoic Chamber 1 GHz - 40GHz
Measuring Distance	3 m
Detector	Refer Remark
Requirement	As per the limits mentioned in the below table
Test setup	Refer TEST METHODOLOGY

Limit:

Table 6: Undesirable emission limits

Frequency Band	Limit
5.15-5.25 GHz	e.i.r.p. -27dBm [68.2 dBuV/3m]
5.25-5.35 GHz	e.i.r.p. -27dBm [68.2 dBuV/3m]
5.47-5.725 GHz	e.i.r.p. -27dBm [68.2 dBuV/3m]
5.725-5.85 GHz	5.715 GHz to 5.725 GHz - e.i.r.p. -17dBm [78.2 dBuV/3m] 5.85 GHz to 5.86 GHz - e.i.r.p. -17dBm [78.2 dBuV/3m] other frequency range - e.i.r.p. -27dBm [68.2 dBuV/3m]

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Table 7: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Condition:

Normal Test Condition:

Temperature (Norm) = + 25 °C

Voltage = 3.6V Li-Ion battery

Relative humidity: 62 %

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Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer TEST METHODOLOGY for more details

Test results for Frequency range : 9kHz – 30MHz

No Emissions found in the frequency range 9kHz – 30MHz

Test results for frequency range 30MHz – 1GHz

Vscan Air SL with Battery Mode: Cardiac

Antenna Polarization	Measured Frequency (MHz)	Measured Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	34.77	14.28	40	-25.72
	52.17	11.91	40	-28.09
	62.76	11.77	40	-28.23
	141.84	22.20	43.5	-21.30
	161.22	23.63	43.5	-19.87
	288.11	17.29	46	-28.71
	364.31	18.47	46	-27.53
	495.20	21.82	46	-24.18
	709.88	26.05	46	-19.95
Horizontal	30.63	13.39	40	-26.61
	52.98	9.54	40	-30.46
	91.77	9.69	43.50	-33.81
	142.05	12.30	43.5	-31.20
	299.99	17.03	46	-28.97
	418.91	19.91	46	-26.09
	549.50	23.69	46	-22.31
	713.03	24.88	46	-21.12

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