FCC Test Report

Report No.: RF170326E02-1

FCC ID: C3K1803

Test Model: 1803

Received Date: Mar. 26, 2017

Test Date: May 12 to 19, 2017

Issued Date: June 22, 2017

Applicant: Microsoft Corporation

Address: One Microsoft Way Redmond WA 98052

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 6
2.2 Modification Record 6

3 General Information **7**

3.1 General Description of EUT 7
3.2 Description of Test Modes 9
3.2.1 Test Mode Applicability and Tested Channel Detail 10
3.3 Duty Cycle of Test Signal 12
3.4 Description of Support Units 13
3.4.1 Configuration of System under Test 13
3.5 General Description of Applied Standard 14

4 Test Types and Results **15**

4.1 Unwanted Emission Measurement (Radiated Versus Conducted) 15
4.1.1 Limits of Radiated Emission and Bandedge Measurement 15
4.1.2 Test Instruments 16
4.1.3 Test Procedure 18
4.1.4 Deviation from Test Standard 20
4.1.5 Test Setup 20
4.1.6 EUT Operating Condition 21
4.1.7 Test Results (Radiated Measurement) 21
4.1.8 Test Results (Conducted Measurement) 36
4.2 Conducted Emission Measurement 56
4.2.1 Limits of Conducted Emission Measurement 56
4.2.2 Test Instruments 56
4.2.3 Test Procedure 57
4.2.4 Deviation from Test Standard 57
4.2.5 Test Setup 57
4.2.6 EUT Operating Condition 57
4.2.7 Test Results 58
4.3 Transmit Power Measurment 60
4.3.1 Limits of Transmit Power Measurement 60
4.3.2 Test Setup 60
4.3.3 Test Instruments 60
4.3.4 Test Procedure 60
4.3.5 Deviation from Test Standard 60
4.3.6 EUT Operating Condition 60
4.3.7 Test Result 61
4.4 Occupied Bandwidth Measurement 62
4.4.1 Test Setup 62
4.4.2 Test Instruments 62
4.4.3 Test Procedure 62
4.4.4 Test Results 63
4.5 Peak Power Spectral Density Measurement 65
4.5.1 Limits of Peak Power Spectral Density Measurement 65
4.5.2 Test Setup 65
4.5.3 Test Instruments 65
4.5.4 Test Procedure 65
4.5.5 Deviation from Test Standard 65
4.5.6 EUT Operating Condition 65
4.5.7 Test Results 66
4.6 Frequency Stability Measurement 68

4.6.1 Limits of Frequency Stability Measurement 68
4.6.2 Test Setup 68
4.6.3 Test Instruments 68
4.6.4 Test Procedure 68
4.6.5 Deviation from Test Standard 68
4.6.6 EUT Operating Condition 68
4.6.7 Test Results 69
4.7 6dB Bandwidth Measurment 70
4.7.1 Limits of 6dB Bandwidth Measurement 70
4.7.2 Test Setup 70
4.7.3 Test Instruments 70
4.7.4 Test Procedure 70
4.7.5 Deviation from Test Standard 70
4.7.6 EUT Operating Condition 70
4.7.7 Test Results 71

5 Pictures of Test Arrangements 72

Appendix – Information on the Testing Laboratories 73

Release Control Record

Issue No.	Description	Date Issued
RF170326E02-1	Original release.	June 22, 2017

1 Certificate of Conformity

Product: 1T1R dual-band wireless accessory radio

Brand: Microsoft

Test Model: 1803

Sample Status: ENGINEERING SAMPLE

Applicant: Microsoft Corporation

Test Date: May 12 to 19, 2017

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** June 22, 2017
Wendy Wu / Specialist

Approved by : _____ , **Date:** June 22, 2017
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -16.75dB at 0.57969MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -5.3dB at 143.66MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	dual-band wireless accessory radio
Brand	Microsoft
Test Model	1803
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	OFDM
Transfer Rate	802.11n : up to 72.2Mbps
Operating Frequency	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz **For 15.247** 2.412 ~ 2.462GHz
Number of Channel	**For 15.407** 9 for 802.11n (HT20) **For 15.247** 11 for 802.11n (HT20)
Output Power	**For 15.407** 5.18GHz -5.24GHz : 7.87mW 5.745GHz ~ 5.825GHz: 7.852 mW **For 15.247** 60.534mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

2. The EUT has three type models, which are identical to each other in all aspects except for the following:

Type	MTK P/N	Different
Type 1	M1023477-009 (LiteOn)	For Marketing request.
Type 2	M1023477-010 (LiteOn)	
Type 3	M1023477-011 (Askey)	
Note: From the above types, Type 1 was selected as representative model for the test and its data was recorded in this report.		

3. The EUT incorporates a SISO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11n (HT20)	MCS 0~7	1TX	1RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11n (HT20)	MCS 0~7	1TX (fixed on Ant 3)	1RX (diversity)

4. The antennas provided to the EUT, please refer to the following table:

Antenna No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)	Function
Ant. 1 (for WLAN 2.4GHz)	Microsoft	NA	5.2	PCB	NA	2.4~2.4835	TX/RX
Ant. 2 (for WLAN 5GHz) Chan (0)			4.7			5.15~5.85	RX
Ant. 3 (for WLAN 5GHz) Chan (1)			6.1			5.15~5.85	TX/RX

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

For 5180 ~ 5240MHz

4 channels are provided for 802.11n (HT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

For 5745 ~ 5825MHz:

5 channels are provided for 802.11n (HT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11n (HT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11n (HT20)	5180-5240	36 to 48	165	OFDM	BPSK	6.5
	5745-5825	149 to 165				

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11n (HT20)	5180-5240	36 to 48	165	OFDM	BPSK	6.5
	5745-5825	149 to 165				

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11n (HT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5

Test Condition:

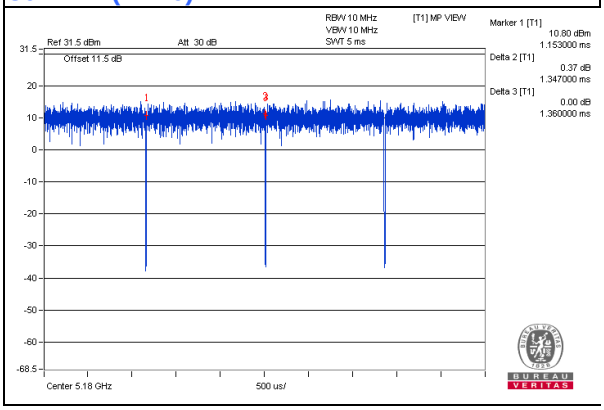
Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Terry Huang
RE<1G	22deg. C, 64%RH	120Vac, 60Hz	Terry Huang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	24deg. C, 68%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11n (HT20): Duty cycle = 1.347 ms/1.36 ms = 0.99

802.11n (HT20)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

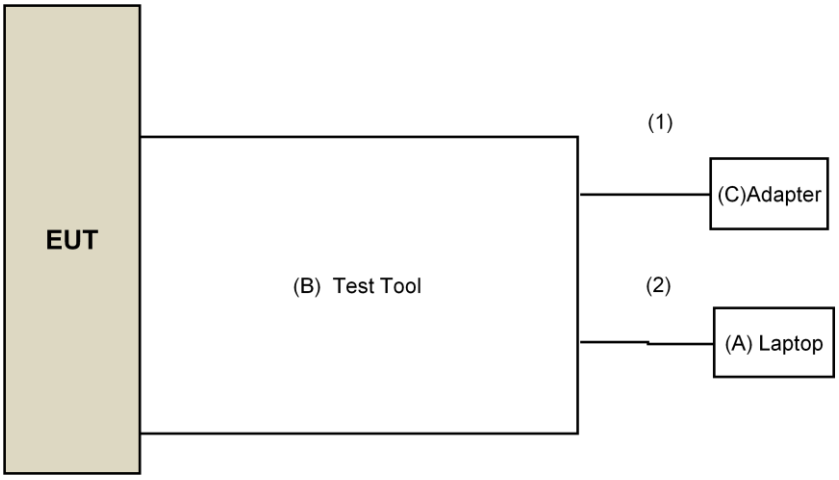
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	DELL	E6420	B92T3R1	FCC DoC	Supplied by Client
B	Test Tool	NA	NA	NA	NA	Supplied by client
C	Adapter	CUI	EPSA050250U	NA	NA	Supplied by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	USB Cable	1	1.7	Yes	0	Supplied by client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r04
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Unwanted Emission Measurement (Radiated Versus Conducted)

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	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 (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Limits of unwanted emission out of the restricted bands

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v01r04			Field Strength at 3m	
			PK:74 (dBµV/m)	AV:54 (dBµV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK:-27 (dBm/MHz)	PK:68.2(dBµV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBµV/m) *1 PK:105.2 (dBµV/m) *2 PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

*1 beyond 75 MHz or more above of the band edge.

*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.

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ µV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 20, 2016	July 19, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-01	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Dec. 13, 2016	Dec. 12, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 27, 2016	Dec. 26, 2017
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150323	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045S E	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated _V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSv40	100964	June 28, 2016	June 27, 2017
Power meter Anritsu	ML2495A	0824006	May 26, 2016	May 25, 2017
Power sensor Anritsu	MA2411B	0738172	May 26, 2016	May 25, 2017
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
Digital Multimeter FLUKE	87III	73680266	Nov. 10, 2016	Nov. 09, 2017

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. The FCC Site Registration No. is 292998
4. The CANADA Site Registration No. is 20331-2
5 *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
6 Loop antenna was used for all emissions below 30 MHz.
7. Tested Date: May 12 to 16, 2017

4.1.3 Test Procedure

Following FCC KDB 789033 D02 General UNII Test Procedures:
Radiated versus Conducted Measurements.
The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.
The following steps was performed:

a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.

b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT

c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

d. For all of Radiation emission test

For Radiated emission below 30MHz

d-1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

d-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d-3. Both X and Y axes of the antenna are set to make the measurement.

d-4. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

d-5. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.
2. KDB 414788 OATS and Chamber Correlation Justification
   -Based on FCC 15.31(f)(2) : measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field.
   -OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

For Radiated emission above 30MHz

d-1. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

d-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d-3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d-4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

d-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

d-6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note:

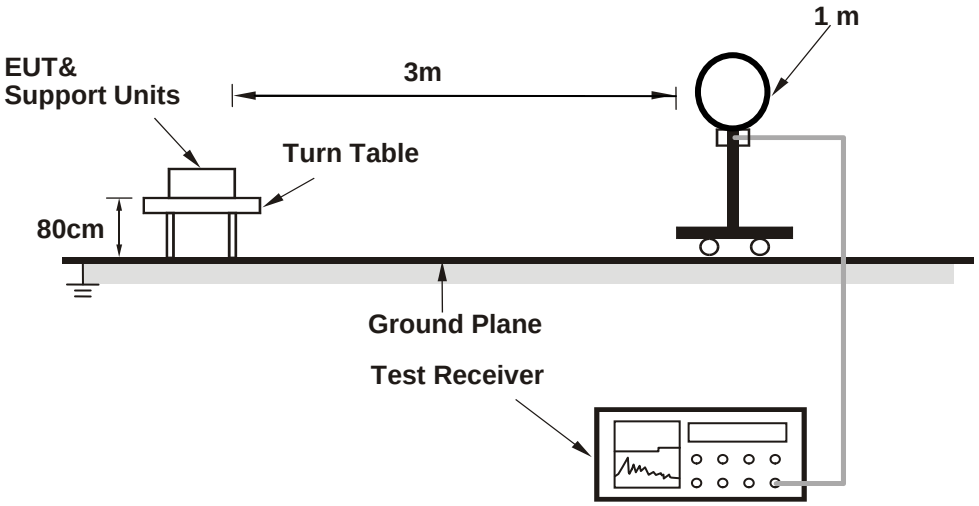
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

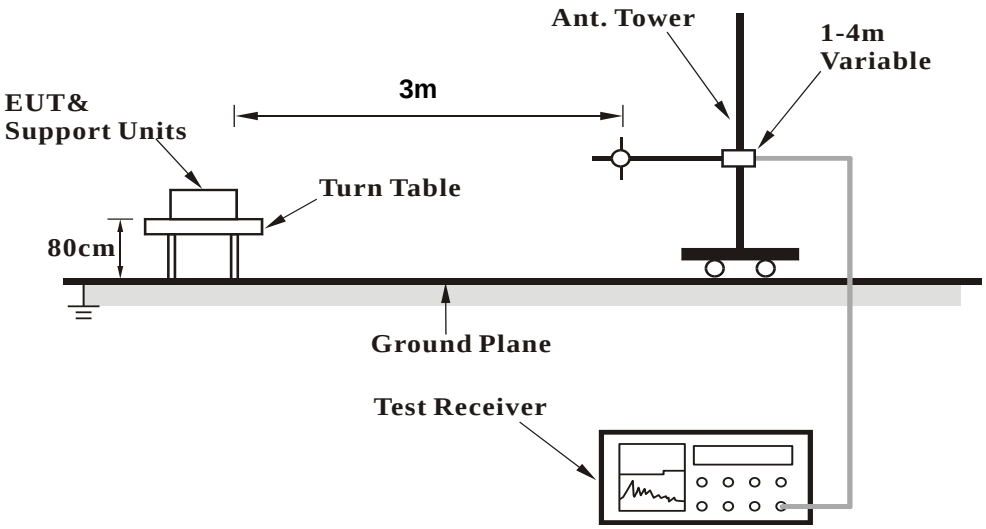
No deviation.

4.1.5 Test Setup

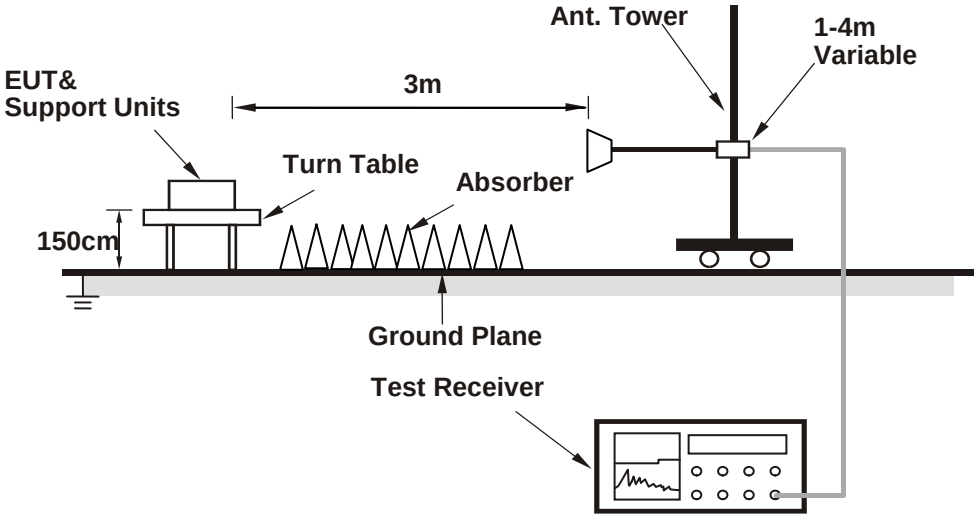
For Radiated emission below 30MHz



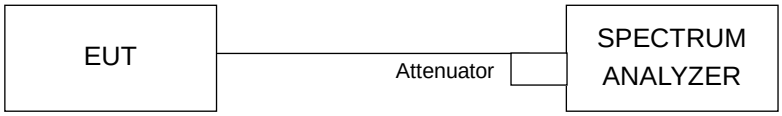
For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For conducted configuration:



4.1.6 EUT Operating Condition

1. Connect the EUT with the support unit A (Laptop) which is placed on test table.
2. The communication partner run test program “MT7662UQA.exe _V1.0.3.13” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results (Radiated Measurement)

Radiated versus Conducted Measurement	
☐ Conducted measurement	☒ Radiated measurement
For Radiated measurement: The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) For Conducted measurement: The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

Radiated test was done with 50ohm terminator on antenna port

Above 1GHz Data

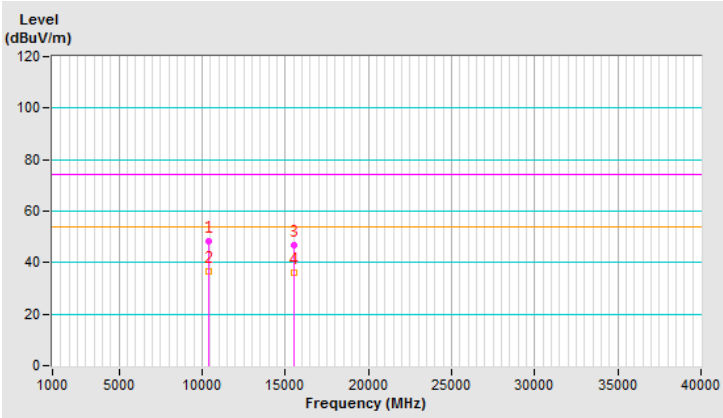
802.11n (HT20)

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	#10360.00	48.2 PK	74.0	-25.8	2.47 H	13	34.6	13.6
2	#10360.00	36.8 AV	54.0	-17.2	2.47 H	13	23.2	13.6
3	15540.00	46.8 PK	74.0	-27.2	1.59 H	327	33.6	13.2
4	15540.00	36.2 AV	54.0	-17.8	1.59 H	327	23.0	13.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

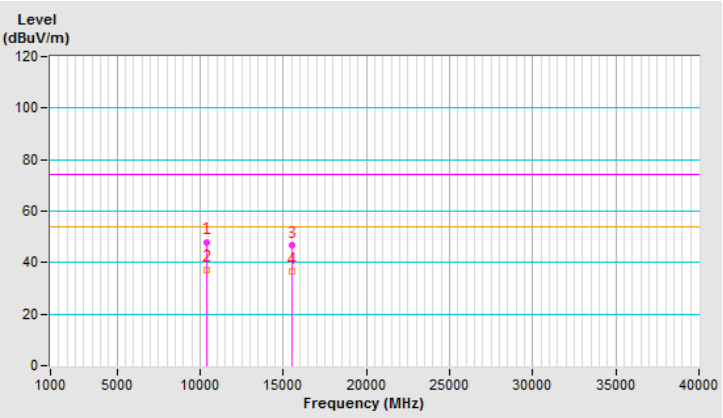


CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10360.00	47.8 PK	74.0	-26.2	1.05 V	150	34.2	13.6
2	#10360.00	37.1 AV	54.0	-16.9	1.05 V	150	23.5	13.6
3	15540.00	46.6 PK	74.0	-27.4	2.00 V	68	33.4	13.2
4	15540.00	36.4 AV	54.0	-17.6	2.00 V	68	23.2	13.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

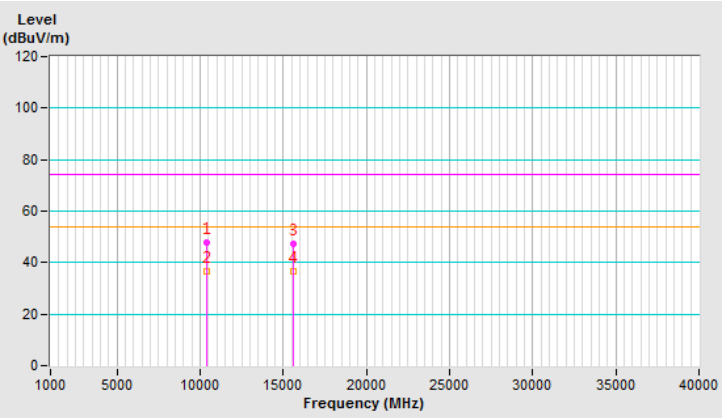


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10400.00	47.8 PK	74.0	-26.2	2.49 H	11	34.2	13.6
2	#10400.00	36.5 AV	54.0	-17.5	2.49 H	11	22.9	13.6
3	15600.00	47.5 PK	74.0	-26.5	1.60 H	315	34.1	13.4
4	15600.00	36.7 AV	54.0	-17.3	1.60 H	315	23.3	13.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

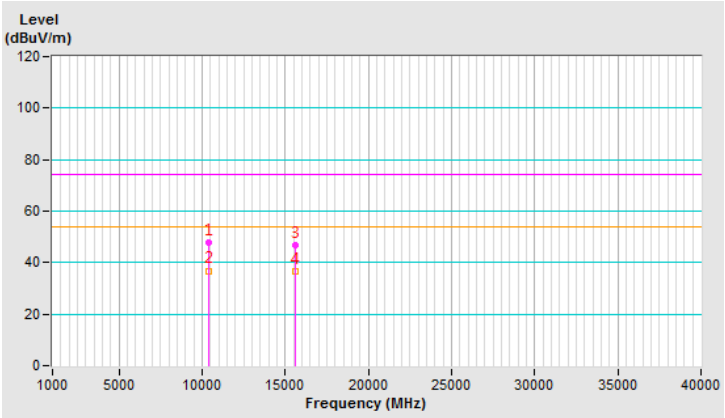


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10400.00	47.6 PK	74.0	-26.4	1.06 V	140	34.0	13.6
2	#10400.00	36.8 AV	54.0	-17.2	1.06 V	140	23.2	13.6
3	15600.00	46.6 PK	74.0	-27.4	2.04 V	54	33.2	13.4
4	15600.00	36.4 AV	54.0	-17.6	2.04 V	54	23.0	13.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

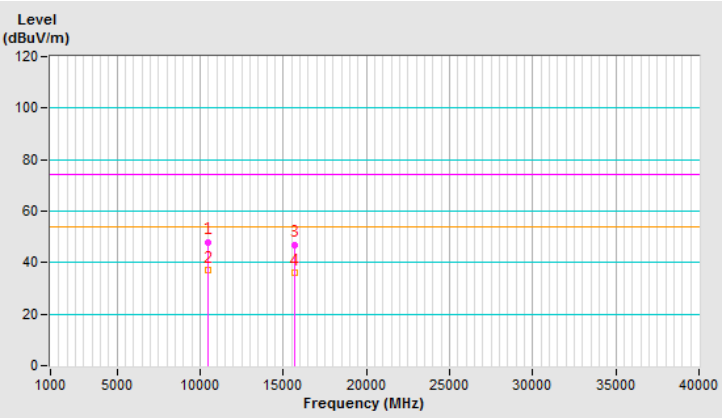


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10480.00	48.0 PK	74.0	-26.0	2.42 H	11	34.3	13.7
2	#10480.00	36.9 AV	54.0	-17.1	2.42 H	11	23.2	13.7
3	15720.00	46.7 PK	74.0	-27.3	1.57 H	312	32.7	14.0
4	15720.00	35.9 AV	54.0	-18.1	1.57 H	312	21.9	14.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

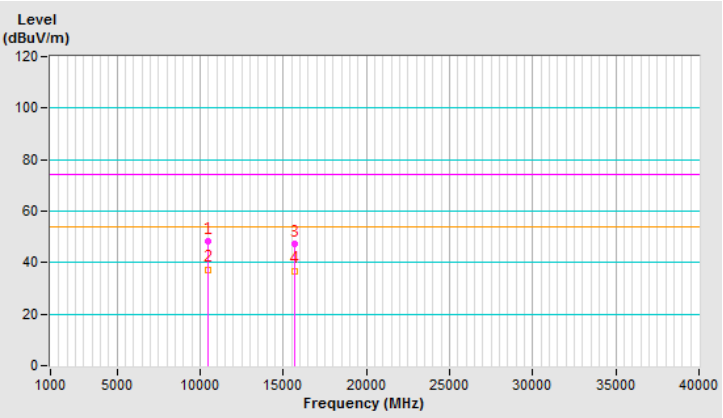


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10480.00	48.1 PK	74.0	-25.9	1.02 V	145	34.4	13.7
2	#10480.00	37.3 AV	54.0	-16.7	1.02 V	145	23.6	13.7
3	15720.00	47.1 PK	74.0	-26.9	2.03 V	72	33.1	14.0
4	15720.00	36.5 AV	54.0	-17.5	2.03 V	72	22.5	14.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

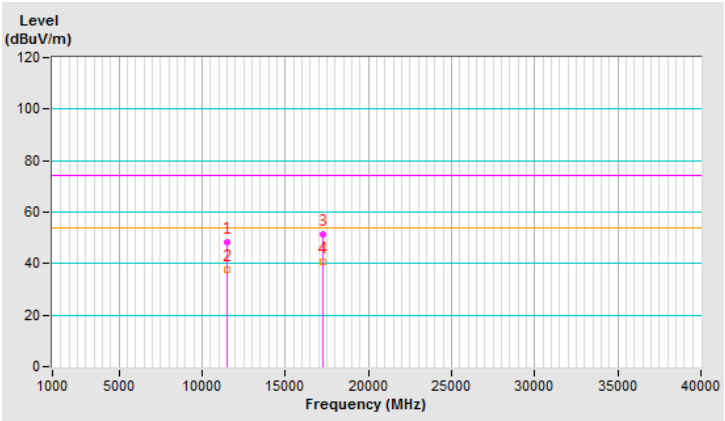


CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11490.00	48.4 PK	74.0	-25.6	1.00 H	241	34.3	14.1
2	11490.00	37.5 AV	54.0	-16.5	1.00 H	241	23.4	14.1
3	#17235.00	51.6 PK	74.0	-22.4	1.00 H	159	33.3	18.3
4	#17235.00	40.7 AV	54.0	-13.3	1.00 H	159	22.4	18.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

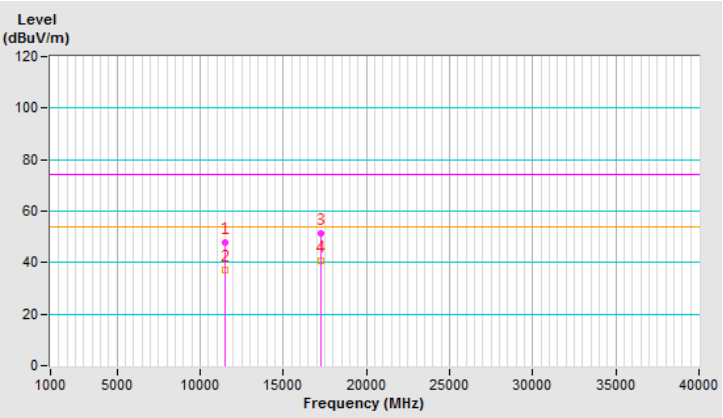


CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11490.00	47.9 PK	74.0	-26.1	1.03 V	137	33.8	14.1
2	11490.00	37.2 AV	54.0	-16.8	1.03 V	137	23.1	14.1
3	#17235.00	51.4 PK	74.0	-22.6	1.98 V	80	33.1	18.3
4	#17235.00	40.6 AV	54.0	-13.4	1.98 V	80	22.3	18.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

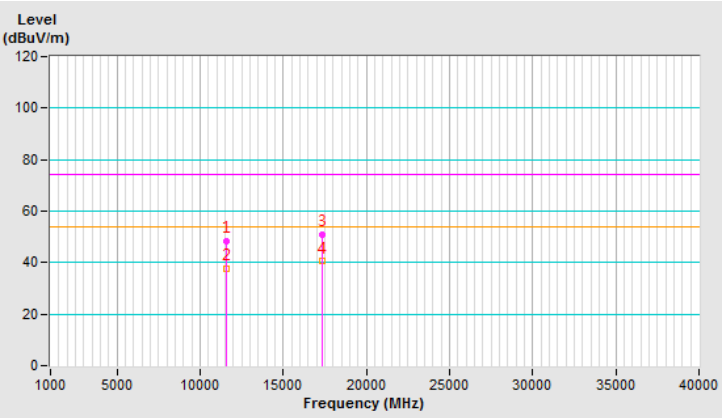


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11570.00	48.5 PK	74.0	-25.5	1.00 H	229	34.5	14.0
2	11570.00	37.6 AV	54.0	-16.4	1.00 H	229	23.6	14.0
3	#17355.00	51.1 PK	74.0	-22.9	1.00 H	175	32.2	18.9
4	#17355.00	40.5 AV	54.0	-13.5	1.00 H	175	21.6	18.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

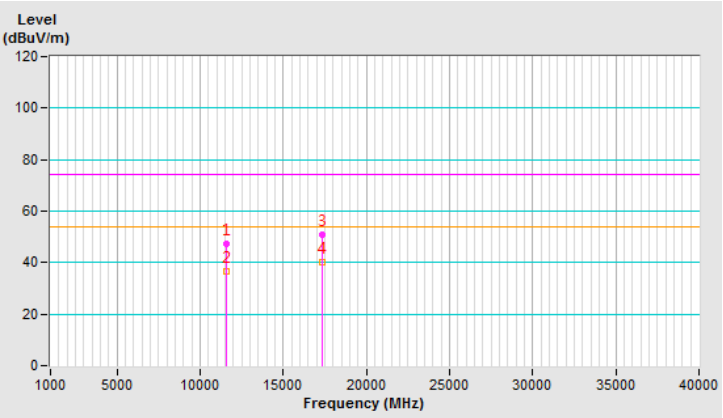


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11570.00	47.3 PK	74.0	-26.7	1.02 V	147	33.3	14.0
2	11570.00	36.8 AV	54.0	-17.2	1.02 V	147	22.8	14.0
3	#17355.00	51.0 PK	74.0	-23.0	1.94 V	77	32.1	18.9
4	#17355.00	40.2 AV	54.0	-13.8	1.94 V	77	21.3	18.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

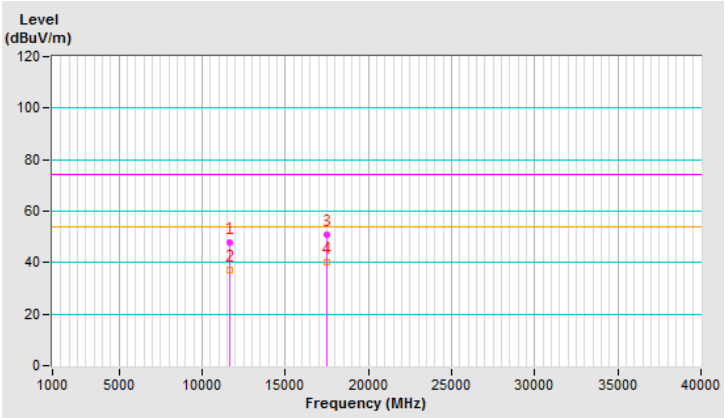


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11650.00	48.0 PK	74.0	-26.0	1.00 H	235	33.9	14.1
2	11650.00	37.2 AV	54.0	-16.8	1.00 H	235	23.1	14.1
3	#17475.00	51.0 PK	74.0	-23.0	1.00 H	166	31.3	19.7
4	#17475.00	40.3 AV	54.0	-13.7	1.00 H	166	20.6	19.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.

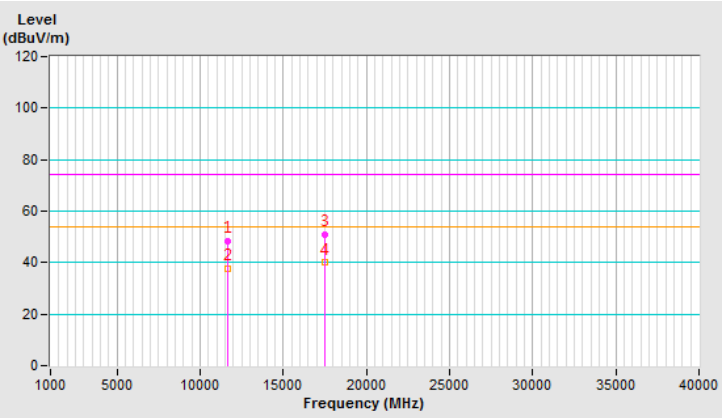


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11650.00	48.4 PK	74.0	-25.6	1.02 V	134	34.3	14.1
2	11650.00	37.5 AV	54.0	-16.5	1.02 V	134	23.4	14.1
3	#17475.00	50.8 PK	74.0	-23.2	1.96 V	86	31.1	19.7
4	#17475.00	40.0 AV	54.0	-14.0	1.96 V	86	20.3	19.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " # ": The radiated frequency is out of the restricted band.
6. The emission levels were very low against the limit of all the restricted bands.



Below 1GHz Data:

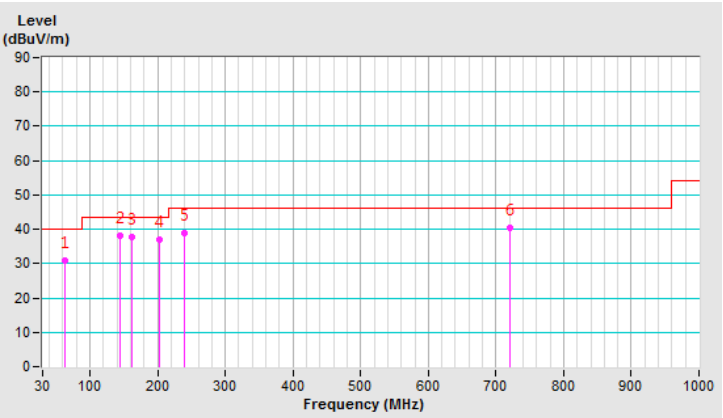
802.11n (HT20)

CHANNEL	TX Channel 165	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	62.91	31.0 QP	40.0	-9.0	2.00 H	11	39.9	-8.9
2	**143.66**	**38.2 QP**	**43.5**	**-5.3**	**1.00 H**	**206**	**46.3**	**-8.1**
3	161.12	37.8 QP	43.5	-5.7	1.50 H	310	45.7	-7.9
4	203.34	37.0 QP	43.5	-6.5	2.00 H	44	48.4	-11.4
5	240.00	38.8 QP	46.0	-7.2	1.50 H	306	48.8	-10.0
6	720.01	40.4 QP	46.0	-5.6	1.00 H	127	39.3	1.1

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

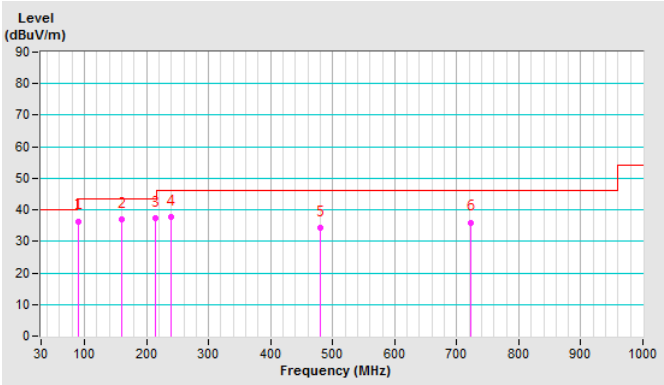


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	89.44	36.4 QP	43.5	-7.1	1.50 V	255	50.6	-14.2
2	160.61	37.0 QP	43.5	-6.5	1.00 V	181	44.8	-7.8
3	215.08	37.2 QP	43.5	-6.3	1.00 V	97	48.7	-11.5
4	240.00	37.9 QP	46.0	-8.1	1.50 V	0	47.9	-10.0
5	480.01	34.4 QP	46.0	-11.6	1.00 V	213	37.4	-3.0
6	721.88	36.0 QP	46.0	-10.0	2.00 V	295	34.9	1.1

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



4.1.8 Test Results (Conducted Measurement)

Radiated versus Conducted Measurement	
☒ Conducted measurement	☐ Radiated measurement

For Radiated measurement:

The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)

For Conducted measurement:

The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).

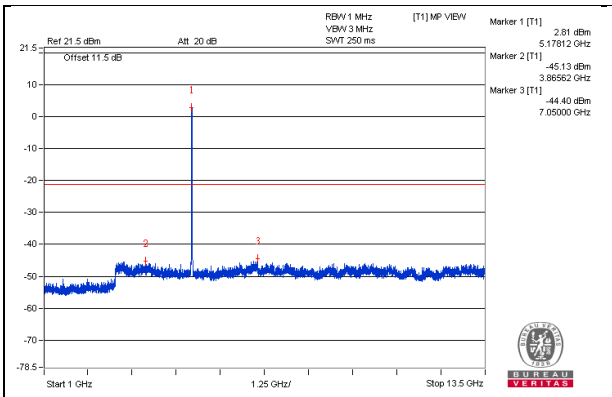
Conducted Measurement Factor
a. The max antenna gain will be used for conducted measurement shown as “Correction factor” in spurious emissions tables. (Antenna gain= 6.1dBi) b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands. c. For the band edge the gain for the specific band may have been used. d. In restricted bands below 1000 MHz, add upper bound on ground plane reflection: For f = 30 – 1000 MHz, add 4.7 dB. Note: The conducted emission test was considered some factor to compute test result.

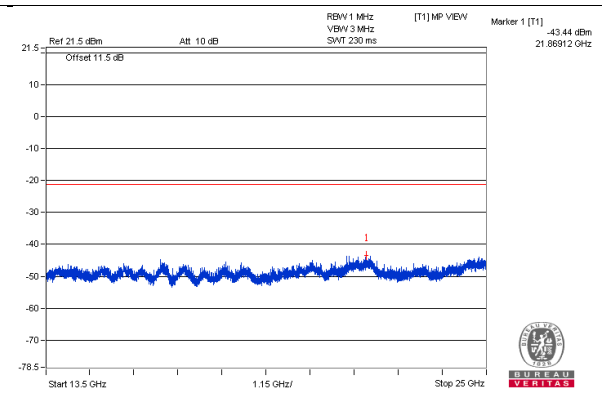
Above 1GHz Data
802.11n (HT20) - Channel 36

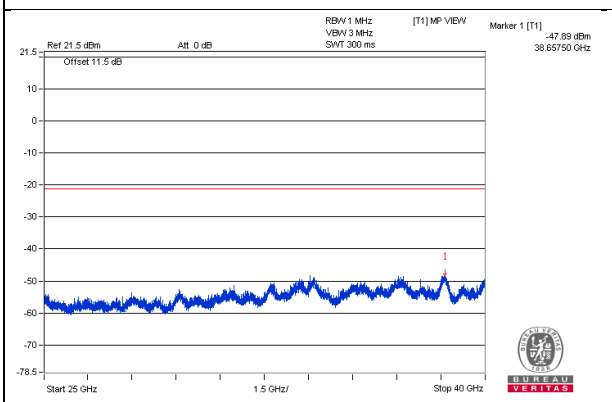
Conducted spurious emission table

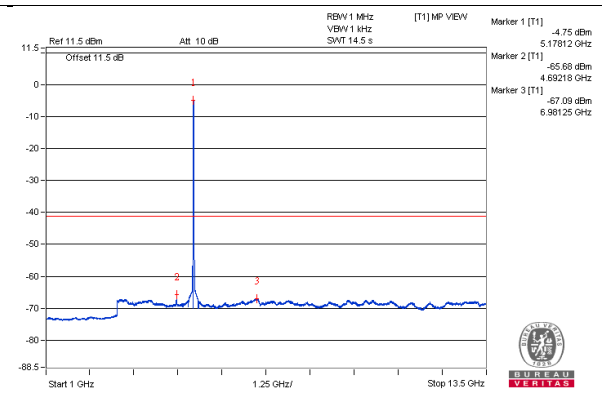
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3462.5 PK	54.71	74	-19.29	-46.65	6.1	-40.55
2	3453.12 AV	33.28	54	-20.72	-68.08	6.1	-61.98
3	6904.68 PK	54.97	74	-19.03	-46.39	6.1	-40.29
4	6901.56 AV	33.9	54	-20.1	-67.46	6.1	-61.36
5	10357.81 PK	54.1	74	-19.9	-47.26	6.1	-41.16
6	10362.5 AV	33.3	54	-20.7	-68.06	6.1	-61.96
7	15539.81 PK	54.59	74	-19.41	-46.77	6.1	-40.67
8	15547 AV	43.81	54	-10.19	-57.55	6.1	-51.45

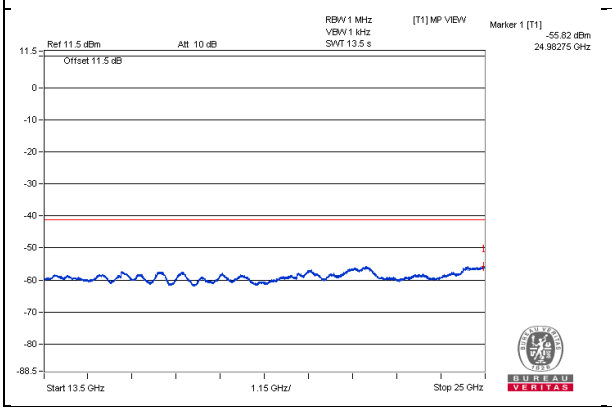
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

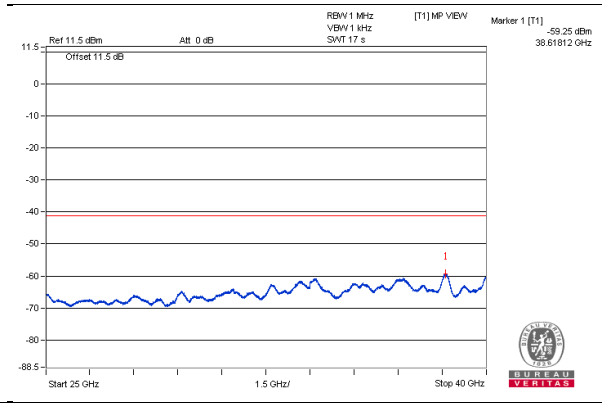

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Marker 1 [T1]
2.81 dBm
5.17812 GHz
Marker 2 [T1]
-45.13 dBm
3.86562 GHz
Marker 3 [T1]
-44.40 dBm
7.05000 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-43.44 dBm
21.86912 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-47.89 dBm
38.65750 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-4.75 dBm
5.17812 GHz
Marker 2 [T1]
-65.68 dBm
4.69218 GHz
Marker 3 [T1]
-67.09 dBm
6.98125 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz

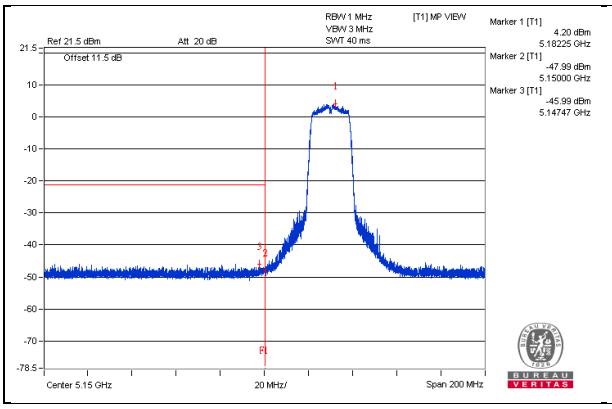

RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-55.82 dBm
24.98275 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

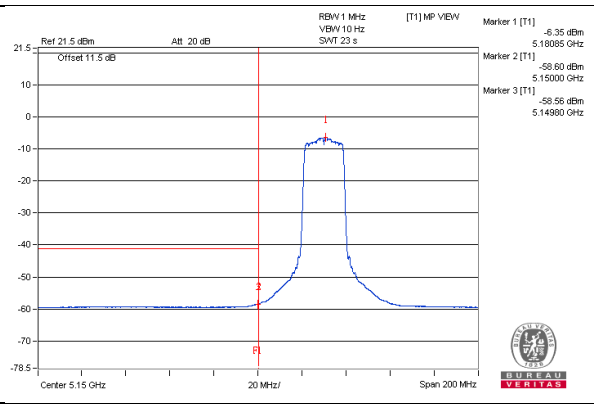

RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-59.25 dBm
38.61812 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz

Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	5147.47 PK	55.37	74	-18.63	-45.99	6.1	-39.89
2	5149.8 AV	42.8	54	-11.2	-58.56	6.1	-52.46

Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.



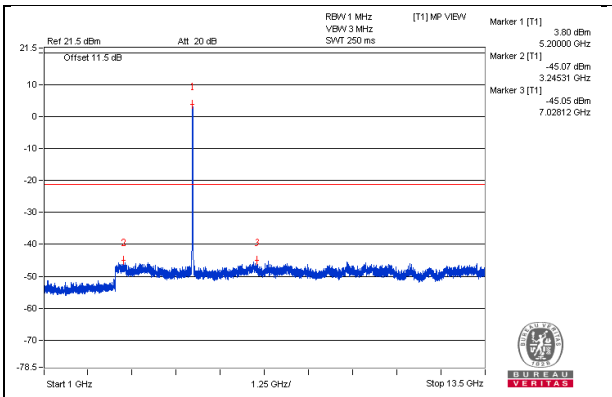


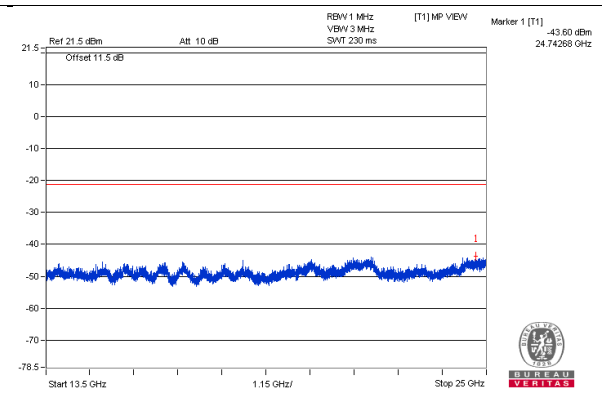
802.11n (HT20) - Channel 40

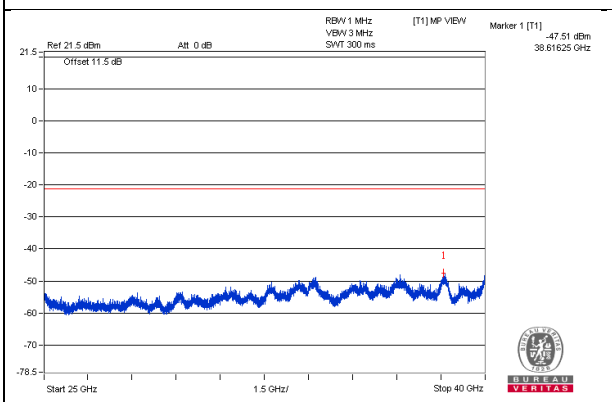
Conducted spurious emission table

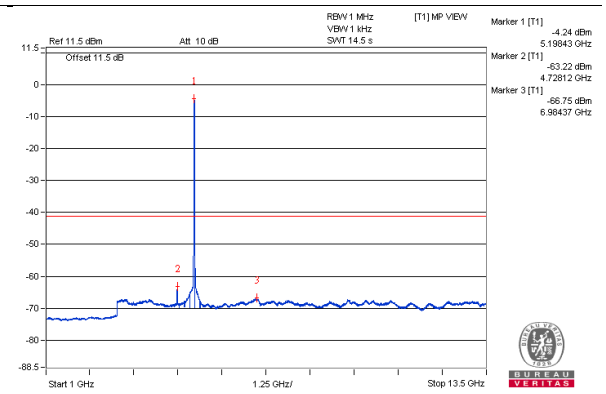
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3460.93 PK	53.7	74	-20.3	-47.66	6.1	-41.56
2	3465.62 AV	33.25	54	-20.75	-68.11	6.1	-62.01
3	6942.18 PK	55.86	74	-18.14	-45.5	6.1	-39.4
4	6929.68 AV	34.15	54	-19.85	-67.21	6.1	-61.11
5	10403.12 PK	54.4	74	-19.6	-46.96	6.1	-40.86
6	10396.87 AV	32.94	54	-21.06	-68.42	6.1	-62.32
7	15595.87 PK	55.15	74	-18.85	-46.21	6.1	-40.11
8	15594.43 AV	43.52	54	-10.48	-57.84	6.1	-51.74

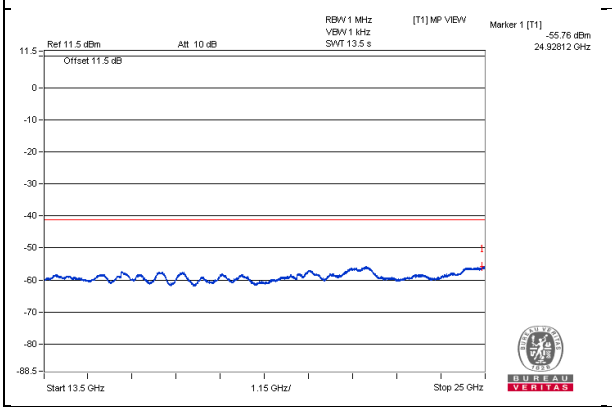
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

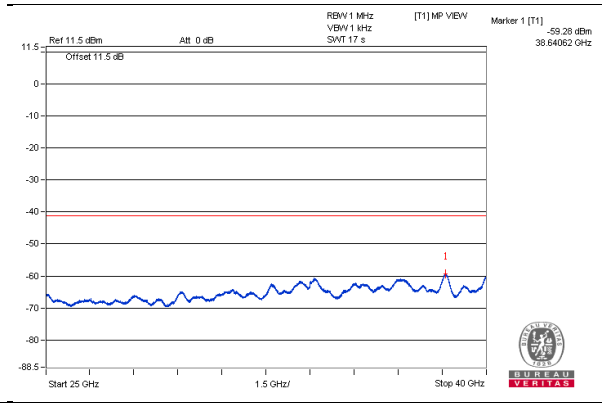

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Marker 1 [T1]
3.80 dBm
5.20000 GHz
Marker 2 [T1]
-45.07 dBm
3.24531 GHz
Marker 3 [T1]
-45.05 dBm
7.02812 GHz
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Marker 1 [T1]
-43.60 dBm
24.74268 GHz
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Marker 1 [T1]
-47.51 dBm
38.61625 GHz
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Marker 1 [T1]
-4.24 dBm
5.19843 GHz
Marker 2 [T1]
-63.22 dBm
4.72812 GHz
Marker 3 [T1]
-66.75 dBm
6.98437 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz

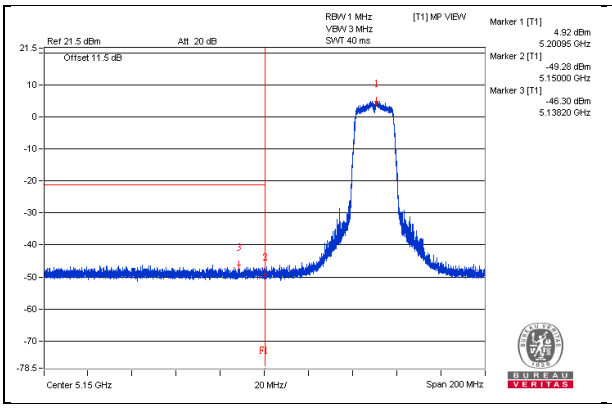

RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Marker 1 [T1]
-55.76 dBm
24.92812 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

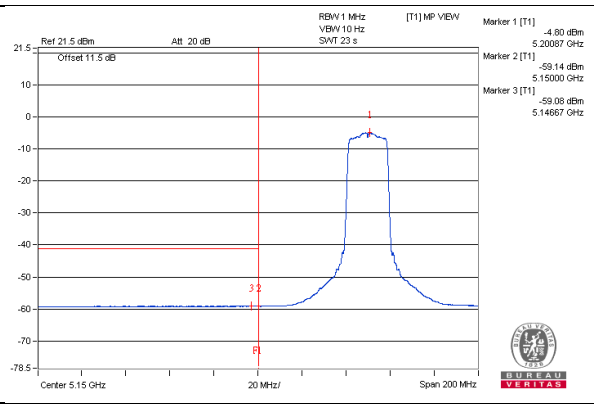

RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Marker 1 [T1]
-59.28 dBm
38.64062 GHz
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz

Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	5138.2 PK	55.06	74	-18.94	-46.3	6.1	-40.2
2	5146.67 AV	42.28	54	-11.72	-59.08	6.1	-52.98

Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.



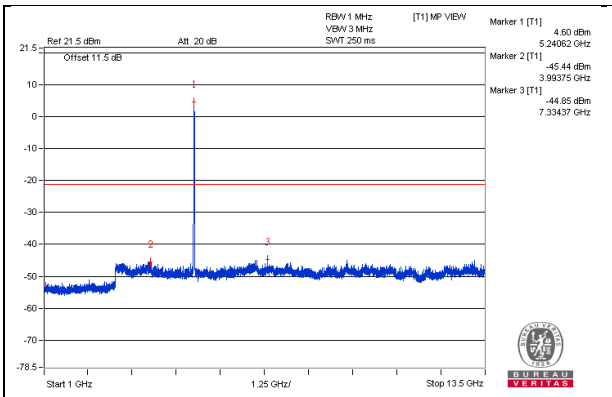


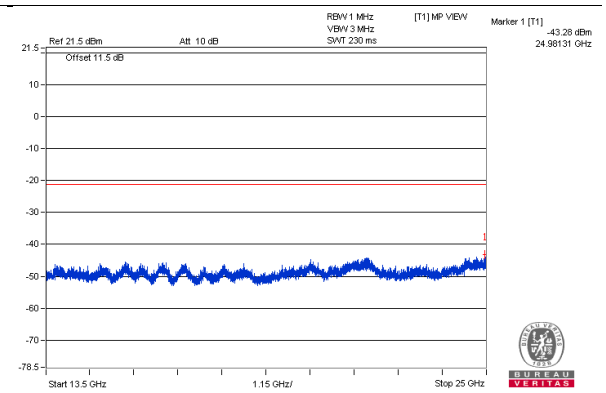
802.11n (HT20) - Channel 48

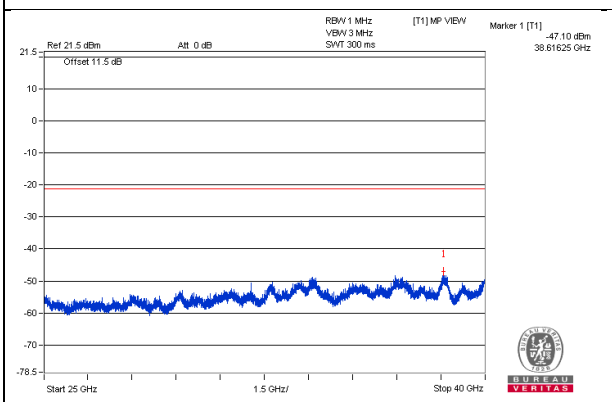
Conducted spurious emission table

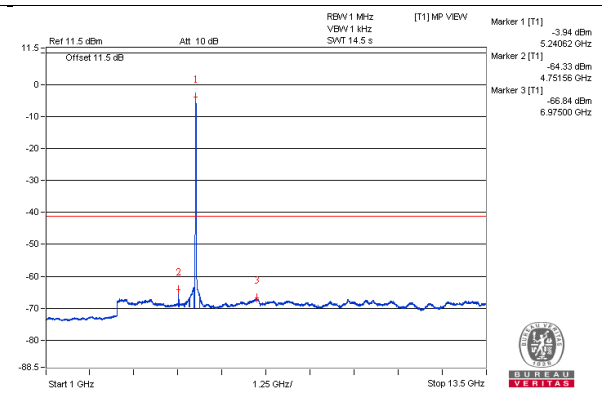
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3484.37 PK	53.64	74	-20.36	-47.72	6.1	-41.62
2	3492.18 AV	32.88	54	-21.12	-68.48	6.1	-62.38
3	6989.06 PK	56.33	74	-17.67	-45.03	6.1	-38.93
4	6987.5 AV	34.35	54	-19.65	-67.01	6.1	-60.91
5	10478.12 PK	53.37	74	-20.63	-47.99	6.1	-41.89
6	10482.81 AV	32.69	54	-21.31	-68.67	6.1	-62.57
7	15719.5 PK	53.99	74	-20.01	-47.37	6.1	-41.27
8	15715.18 AV	42.19	54	-11.81	-59.17	6.1	-53.07

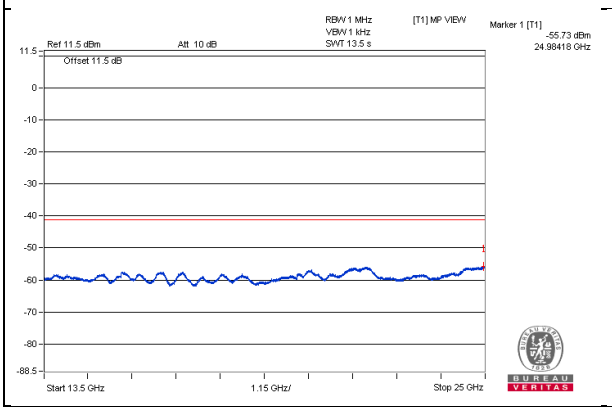
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

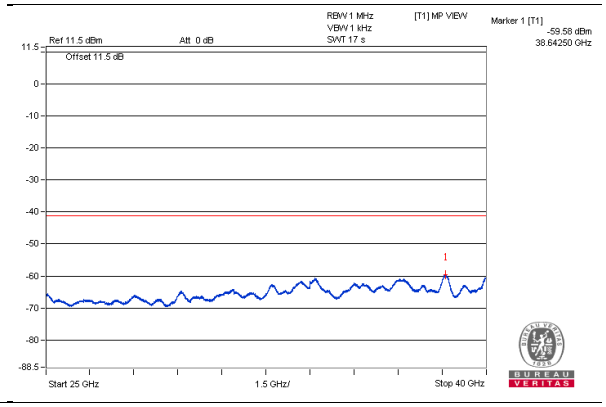

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Marker 1 [T1]
4.60 dBm
5.24062 GHz
Marker 2 [T1]
-45.44 dBm
3.99375 GHz
Marker 3 [T1]
-44.85 dBm
7.33437 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-43.28 dBm
24.98131 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-47.10 dBm
38.61625 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-3.94 dBm
5.24062 GHz
Marker 2 [T1]
-64.33 dBm
4.75156 GHz
Marker 3 [T1]
-66.84 dBm
6.97500 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz

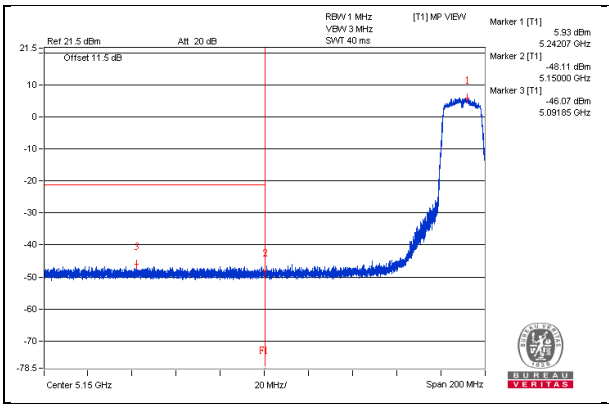

RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-55.73 dBm
24.98418 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

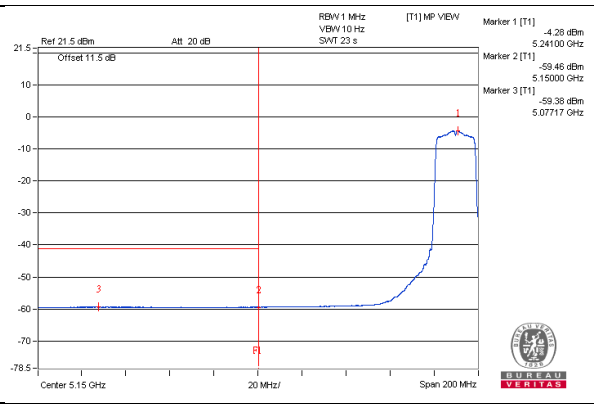

RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-59.58 dBm
38.64250 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz

Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	5091.85 PK	55.29	74	-18.71	-46.07	6.1	-39.97
2	5077.17 AV	41.98	54	-12.02	-59.38	6.1	-53.28

Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.



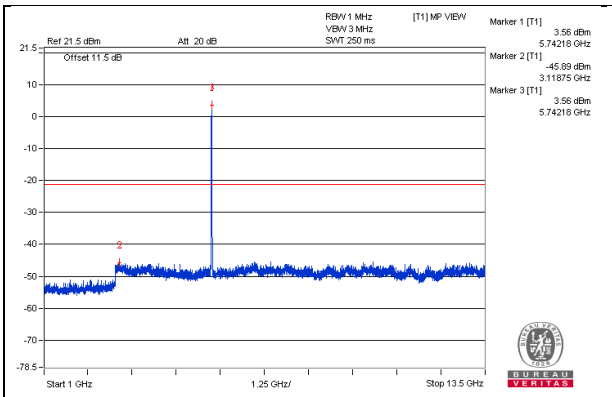


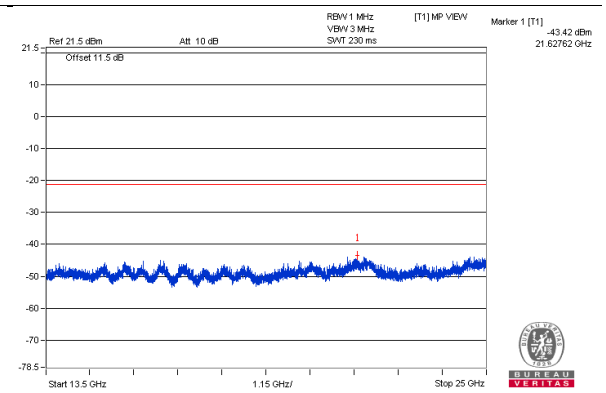
802.11n (HT20) - Channel 149

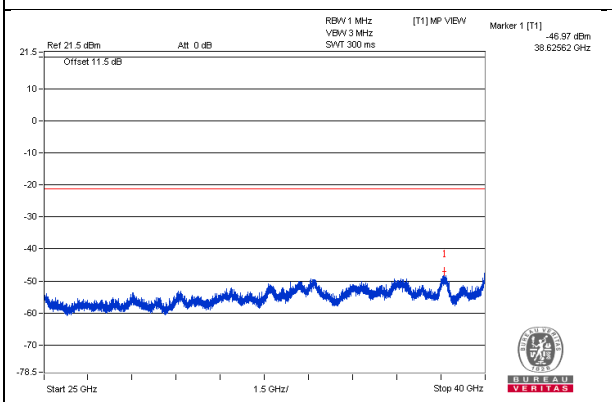
Conducted spurious emission table

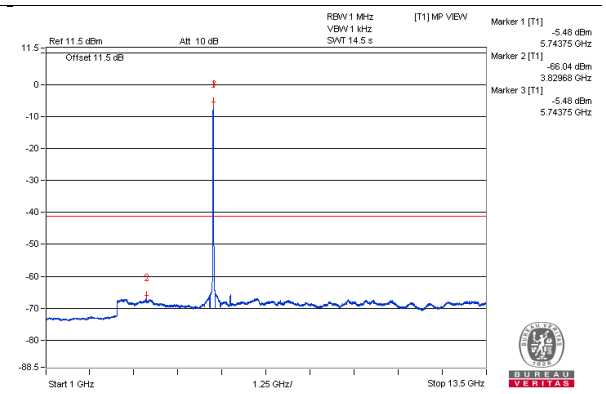
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3834.37 PK	54.61	74	-19.39	-46.75	6.1	-40.65
2	3829.68 AV	35.32	54	-18.68	-66.04	6.1	-59.94
3	7662.5 PK	54.02	74	-19.98	-47.34	6.1	-41.24
4	7659.37 AV	33.84	54	-20.16	-67.52	6.1	-61.42
5	11487.5 PK	53.72	74	-20.28	-47.64	6.1	-41.54
6	11482.81 AV	32.24	54	-21.76	-69.12	6.1	-63.02
7	17238.93 PK	53.69	74	-20.31	-47.67	6.1	-41.57
8	17236.06 AV	42.01	54	-11.99	-59.35	6.1	-53.25

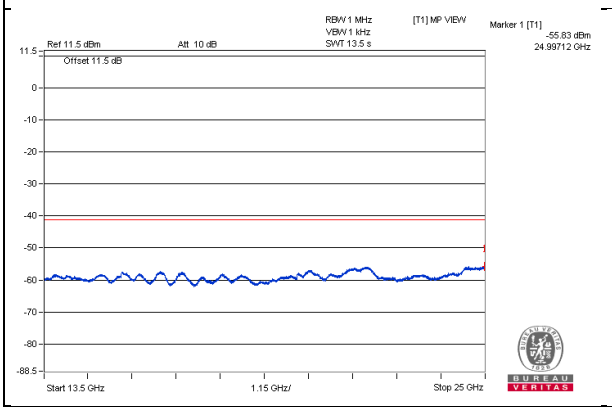
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

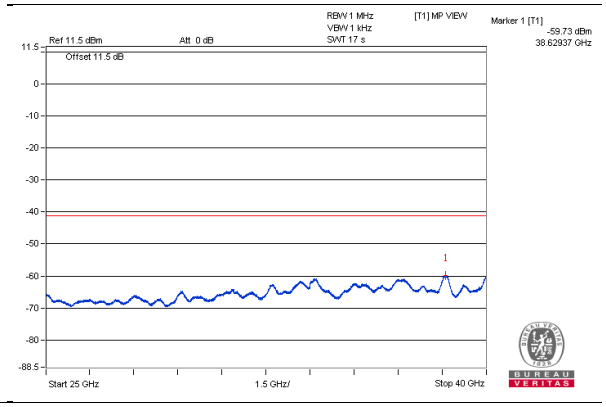

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Marker 1 [T1]
3.56 dBm
5.74218 GHz
Marker 2 [T1]
-45.89 dBm
3.11875 GHz
Marker 3 [T1]
3.56 dBm
5.74218 GHz
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Marker 1 [T1]
-43.42 dBm
21.62762 GHz
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

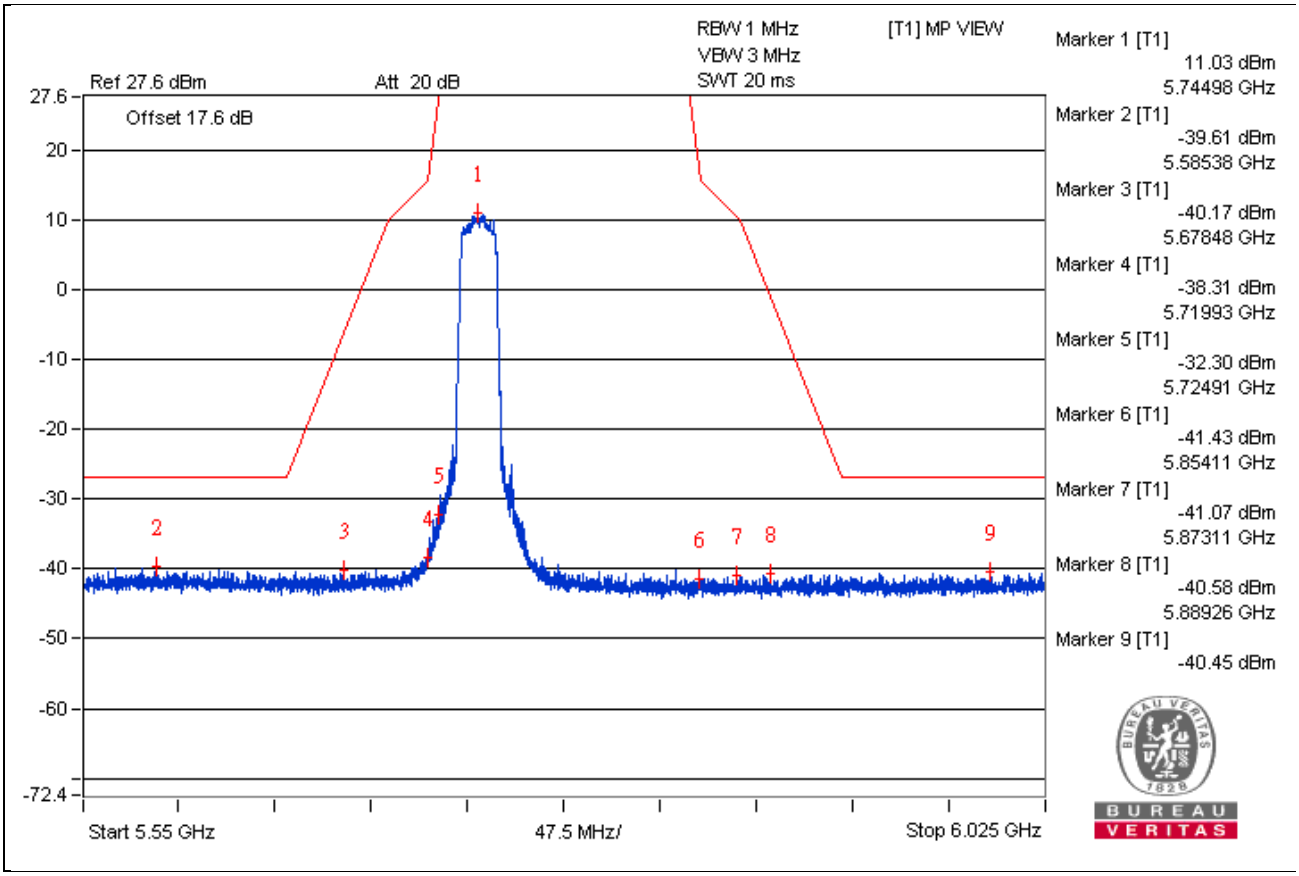

RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Marker 1 [T1]
-46.97 dBm
38.62562 GHz
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Marker 1 [T1]
-5.48 dBm
5.74375 GHz
Marker 2 [T1]
-66.04 dBm
3.82968 GHz
Marker 3 [T1]
-5.48 dBm
5.74375 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Marker 1 [T1]
-55.83 dBm
24.99712 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Marker 1 [T1]
-59.73 dBm
38.62937 GHz
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz

Bandedge table

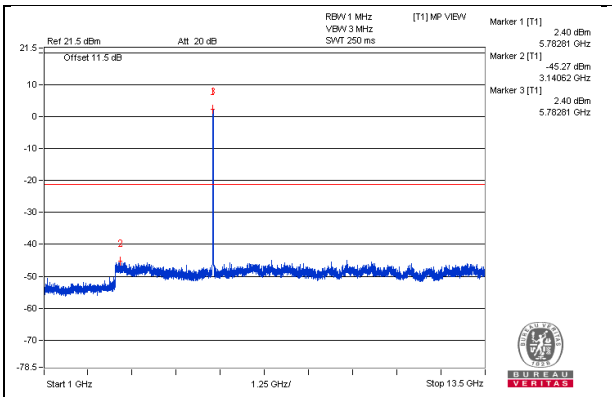


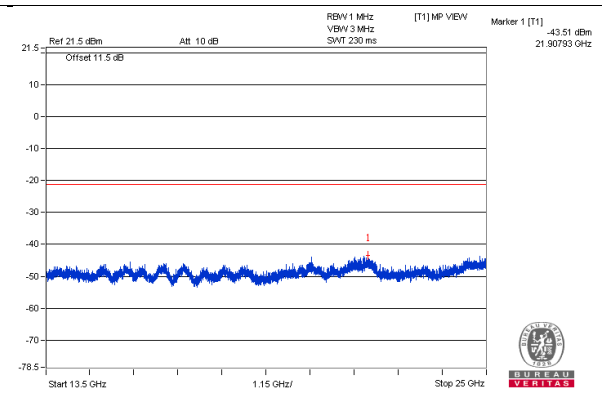
802.11n (HT20) - Channel 157

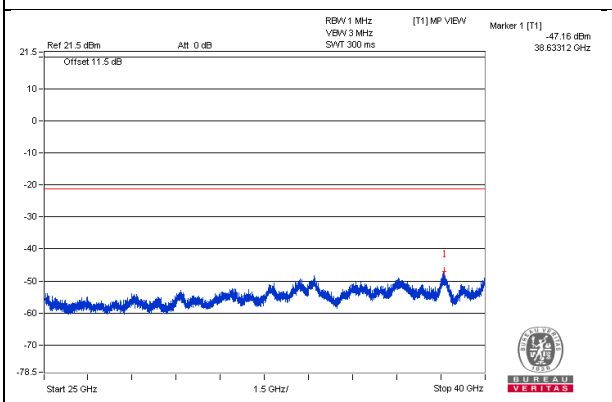
Conducted spurious emission table

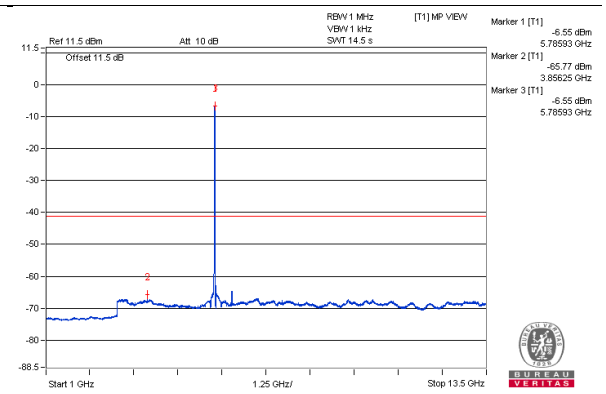
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3850 PK	54.51	74	-19.49	-46.85	6.1	-40.75
2	3856.25 AV	35.59	54	-18.41	-65.77	6.1	-59.67
3	7706.25 PK	52.92	74	-21.08	-48.44	6.1	-42.34
4	7714.06 AV	33.89	54	-20.11	-67.47	6.1	-61.37
5	11575 PK	52.83	74	-21.17	-48.53	6.1	-42.43
6	11568.75 AV	31.72	54	-22.28	-69.64	6.1	-63.54
7	17364 PK	50.41	74	-23.59	-50.95	6.1	-44.85
8	17349.62 AV	40.58	54	-13.42	-60.78	6.1	-54.68

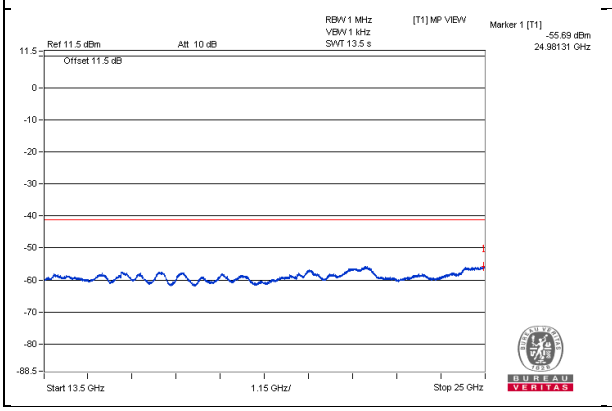
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

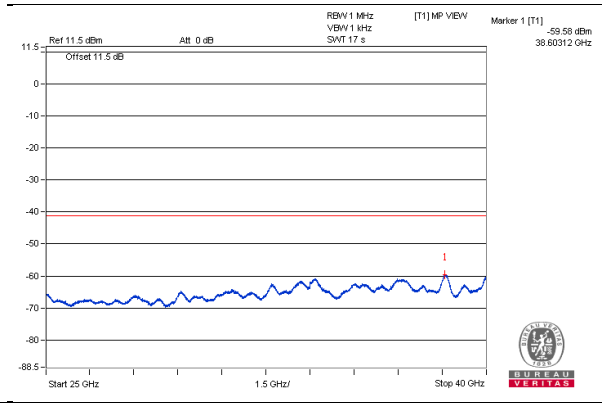

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Marker 1 [T1]
2.40 dBm
5.78281 GHz
Marker 2 [T1]
-45.27 dBm
3.14062 GHz
Marker 3 [T1]
2.40 dBm
5.78281 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-43.51 dBm
21.90793 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

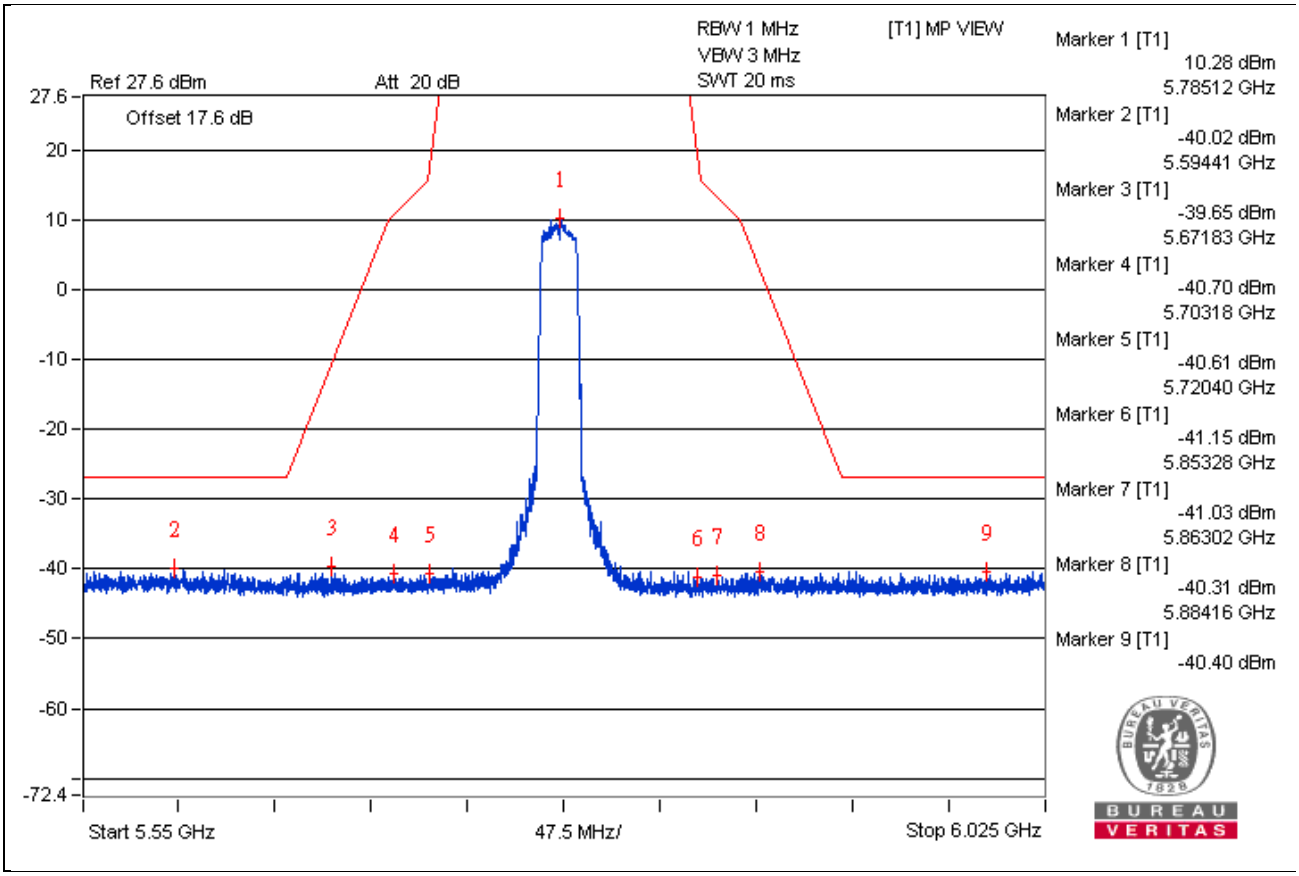

RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-47.16 dBm
38.63312 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-6.55 dBm
5.78593 GHz
Marker 2 [T1]
-65.77 dBm
3.85625 GHz
Marker 3 [T1]
-6.55 dBm
5.78593 GHz
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Marker 1 [T1]
-55.69 dBm
24.98131 GHz
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Marker 1 [T1]
-59.58 dBm
38.60312 GHz
Start 25 GHz
1.5 GHz/
Stop 40 GHz

Bandedge table

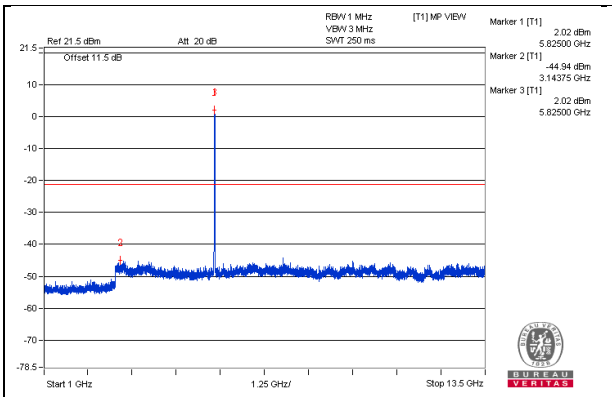


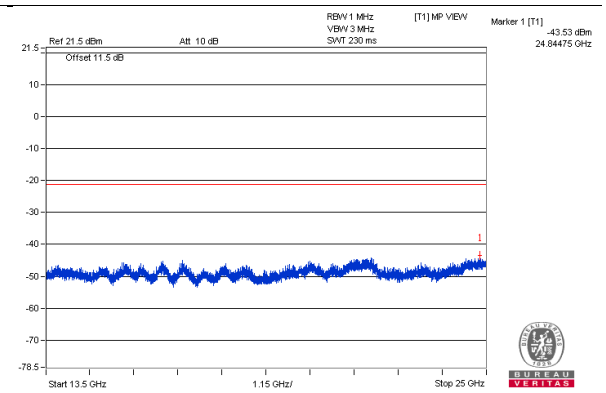
802.11n (HT20) - Channel 165

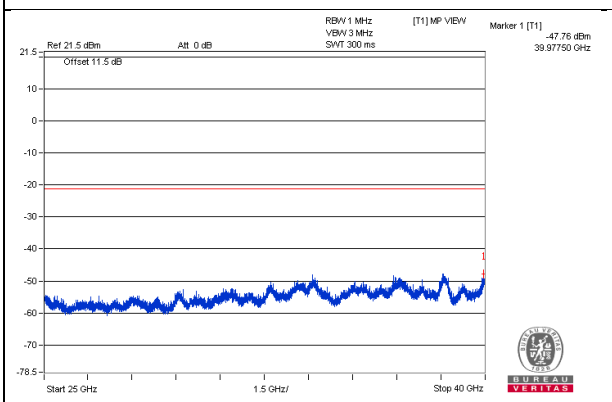
Conducted spurious emission table

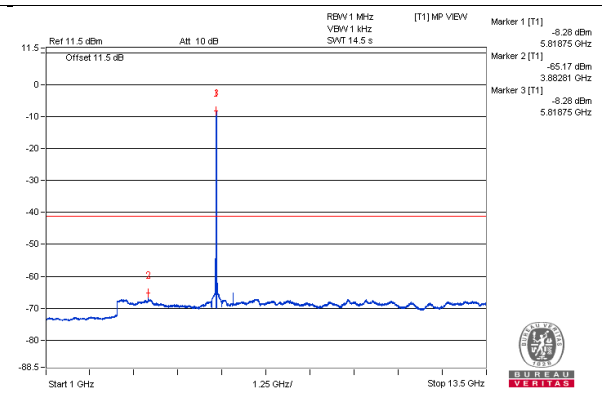
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	3892.18 PK	54	74	-20	-47.36	6.1	-41.26
2	3882.81 AV	36.19	54	-17.81	-65.17	6.1	-59.07
3	7770.31 PK	57.13	74	-16.87	-44.23	6.1	-38.13
4	7767.18 AV	33.34	54	-20.66	-68.02	6.1	-61.92
5	11650 PK	52.26	74	-21.74	-49.1	6.1	-43
6	11640.62 AV	31.16	54	-22.84	-70.2	6.1	-64.1
7	17479 PK	52.13	74	-21.87	-49.23	6.1	-43.13
8	17483.31 AV	40.5	54	-13.5	-60.86	6.1	-54.76

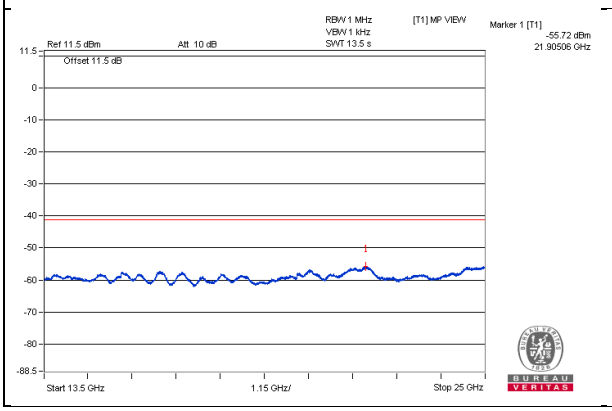
Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

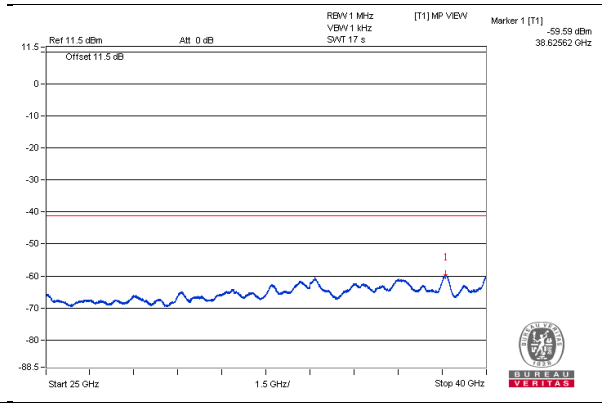

RBW 1 MHz
VBW 3 MHz
SWT 250 ms
[T1] MP VIEW
Marker 1 [T1]
2.02 dBm
5.82500 GHz
Marker 2 [T1]
-44.94 dBm
3.14375 GHz
Marker 3 [T1]
2.02 dBm
5.82500 GHz
Ref 21.5 dBm
Att 20 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 3 MHz
SWT 230 ms
[T1] MP VIEW
Marker 1 [T1]
-43.53 dBm
24.84475 GHz
Ref 21.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz

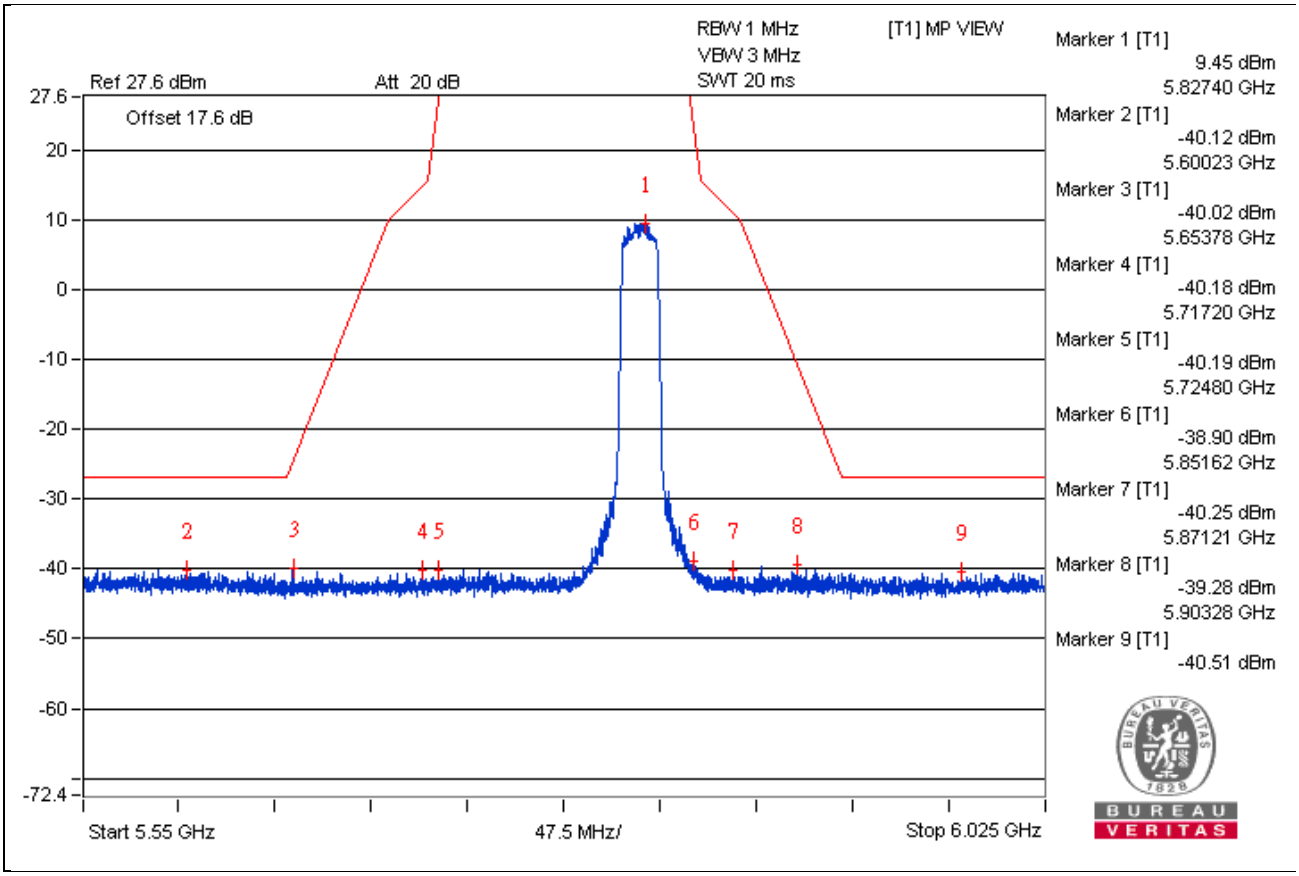

RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MP VIEW
Marker 1 [T1]
-47.76 dBm
39.97750 GHz
Ref 21.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz


RBW 1 MHz
VBW 1 kHz
SWT 14.5 s
[T1] MP VIEW
Marker 1 [T1]
-8.28 dBm
5.81875 GHz
Marker 2 [T1]
-65.17 dBm
3.88281 GHz
Marker 3 [T1]
-8.28 dBm
5.81875 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 1 GHz
1.25 GHz/
Stop 13.5 GHz


RBW 1 MHz
VBW 1 kHz
SWT 13.5 s
[T1] MP VIEW
Marker 1 [T1]
-55.72 dBm
21.90506 GHz
Ref 11.5 dBm
Att 10 dB
Offset 11.5 dB
Start 13.5 GHz
1.15 GHz/
Stop 25 GHz


RBW 1 MHz
VBW 1 kHz
SWT 17 s
[T1] MP VIEW
Marker 1 [T1]
-59.59 dBm
38.62562 GHz
Ref 11.5 dBm
Att 0 dB
Offset 11.5 dB
Start 25 GHz
1.5 GHz/
Stop 40 GHz

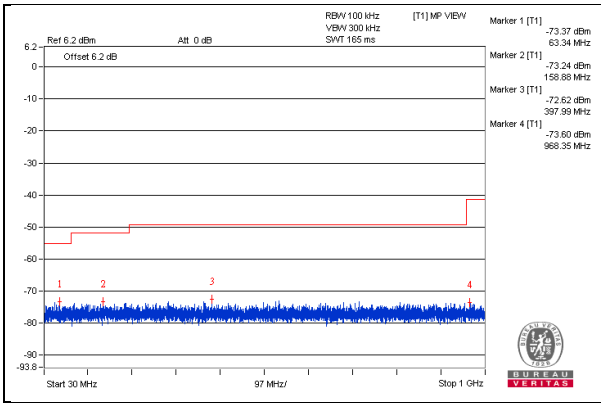
Bandedge table



Below 1GHz Data:
802.11n (HT20) - Channel 165
Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	63.34	27.99	40	-12.01	-73.37	6.1	-67.27
2	158.88	28.12	43.5	-15.38	-73.24	6.1	-67.14
3	397.99	28.74	46	-17.26	-72.62	6.1	-66.52
4	547.13	28.39	46	-17.61	-72.97	6.1	-66.87
5	722.82	28.12	46	-17.88	-73.24	6.1	-67.14
6	968.35	27.76	54	-26.24	-73.6	6.1	-67.5

Note :
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
Emission levels include upper bound on ground plane reflection (4.7dB) for below 1GHz emission.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3 Tested Date: May 19, 2017

4.2.3 Test Procedure

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

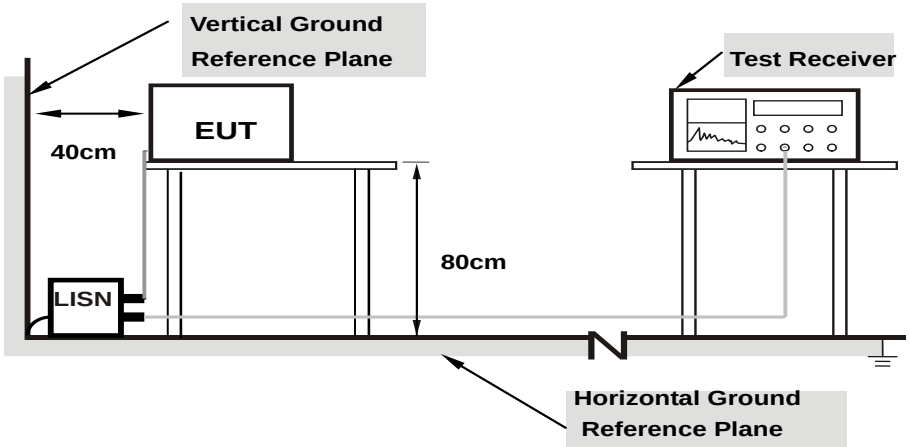
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Condition

Same as 4.1.6.

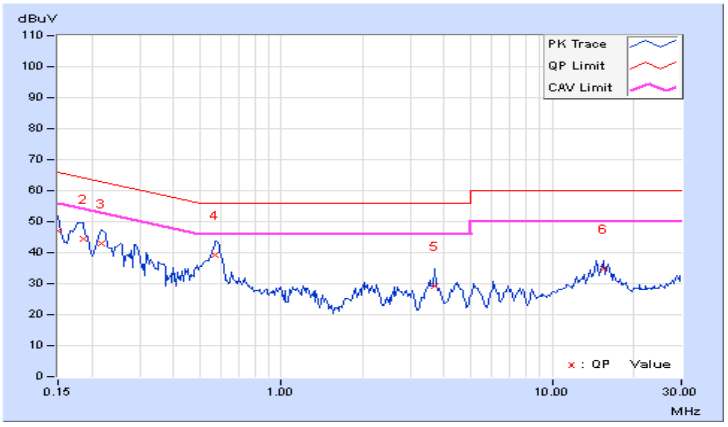
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.20	36.99	26.46	47.19	36.66	66.00	56.00	-18.81	-19.34
2	0.18516	10.20	34.41	22.95	44.61	33.15	64.25	54.25	-19.64	-21.10
3	0.21641	10.20	32.91	23.21	43.11	33.41	62.96	52.96	-19.85	-19.55
4	0.57188	10.26	28.92	23.07	39.18	33.33	56.00	46.00	-16.82	-12.67
5	3.66406	10.31	19.00	12.10	29.31	22.41	56.00	46.00	-26.69	-23.59
6	15.55469	11.34	23.37	18.13	34.71	29.47	60.00	50.00	-25.29	-20.53

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

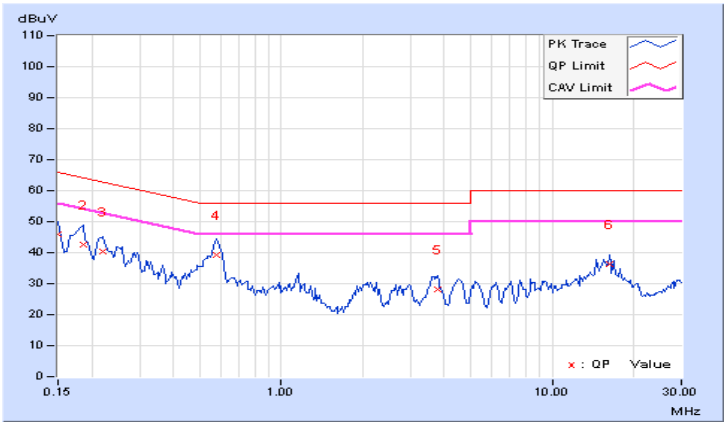


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.19	35.82	25.00	46.01	35.19	66.00	56.00	-19.99	-20.81
2	0.18516	10.18	32.53	20.73	42.71	30.91	64.25	54.25	-21.54	-23.34
3	0.22031	10.18	30.23	18.10	40.41	28.28	62.81	52.81	-22.40	-24.53
4	**0.57969**	**10.25**	**29.00**	**23.91**	**39.25**	**34.16**	**56.00**	**46.00**	**-16.75**	**-11.84**
5	3.77344	10.23	17.93	11.41	28.16	21.64	56.00	46.00	-27.84	-24.36
6	16.30859	11.17	24.98	20.78	36.15	31.95	60.00	50.00	-23.85	-18.05

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



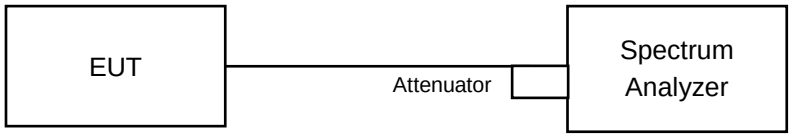
4.3 Transmit Power Measurment

4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

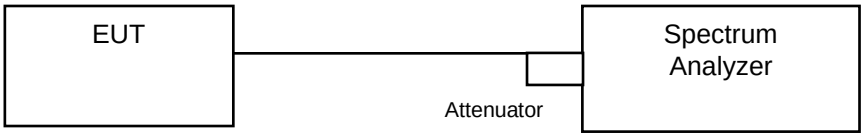
802.11n (HT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
36	5180	7.87	8.96	29.90	Pass
40	5200	7.78	8.91	29.90	Pass
48	5240	7.709	8.87	29.90	Pass
149	5745	7.852	8.95	29.90	Pass
157	5785	7.656	8.84	29.90	Pass
165	5825	7.621	8.82	29.90	Pass

Note: 1. For UNII-1 & UNII-3: Antenna gain = 6.1dBi > 6dBi, so the power limit shall be reduced to 30-(6.1-6) =29.90dBm.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

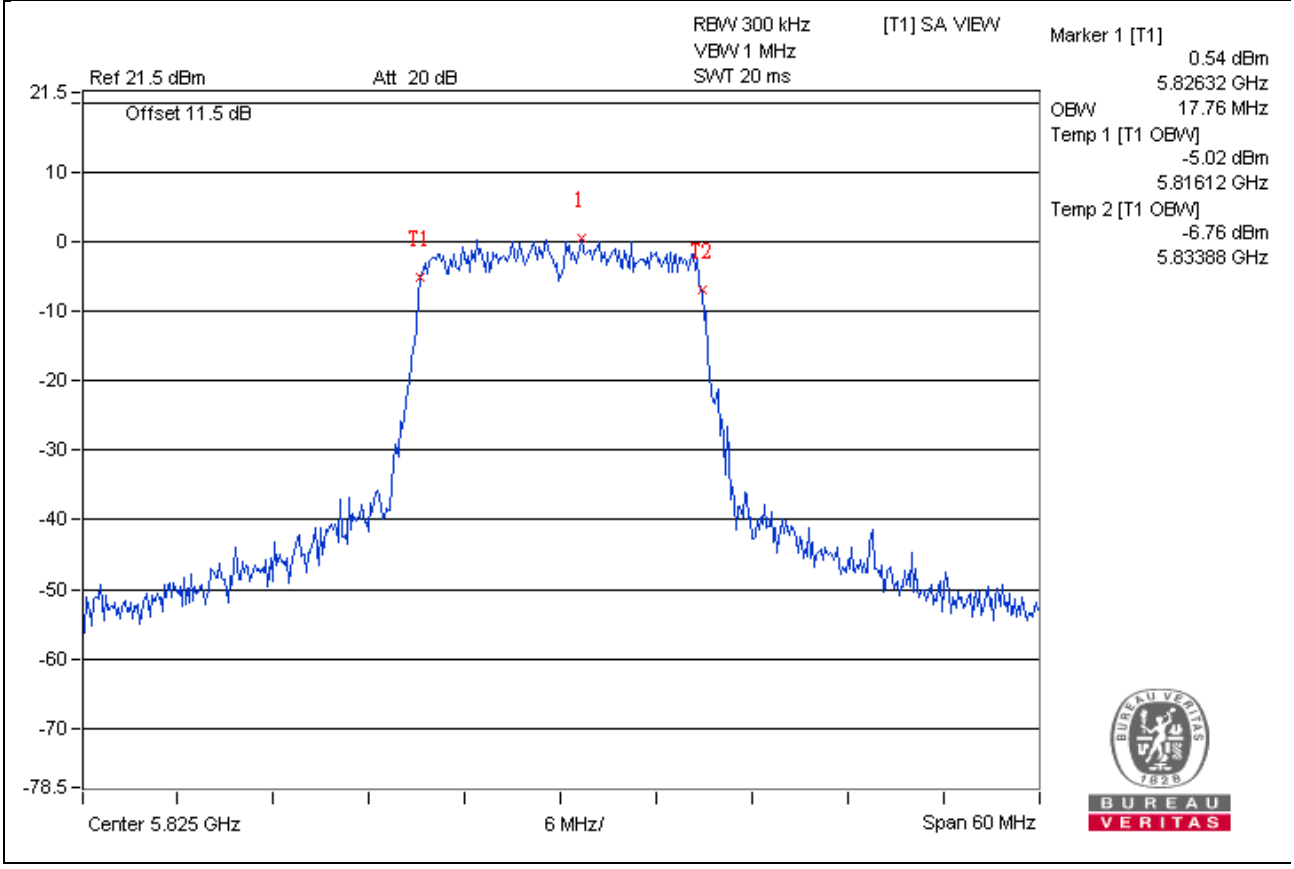
4.4.4 Test Results

802.11n (HT20)

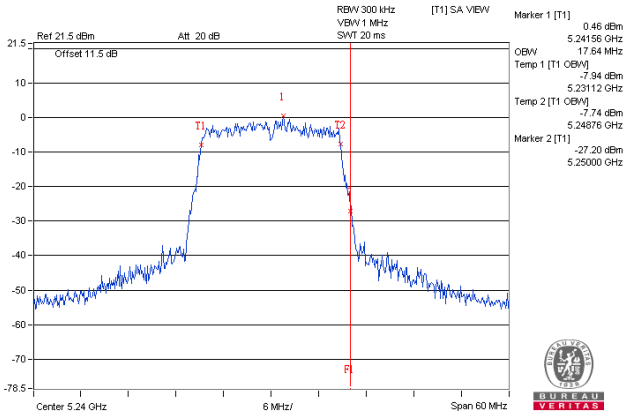
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	17.64
40	5200	17.64
48	5240	17.64
149	5745	17.64
157	5785	17.64
165	5825	17.76

Spectrum Plot of Worst Value

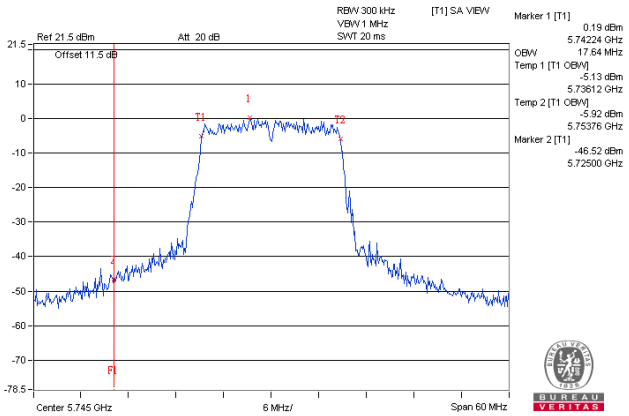
CH 165



Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11n (HT20) / CH48	



Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2C band)	
802.11n (HT20) / CH149	

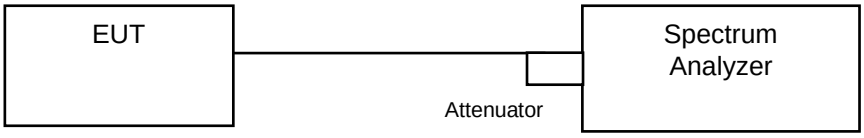


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1:

Using method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1 band:

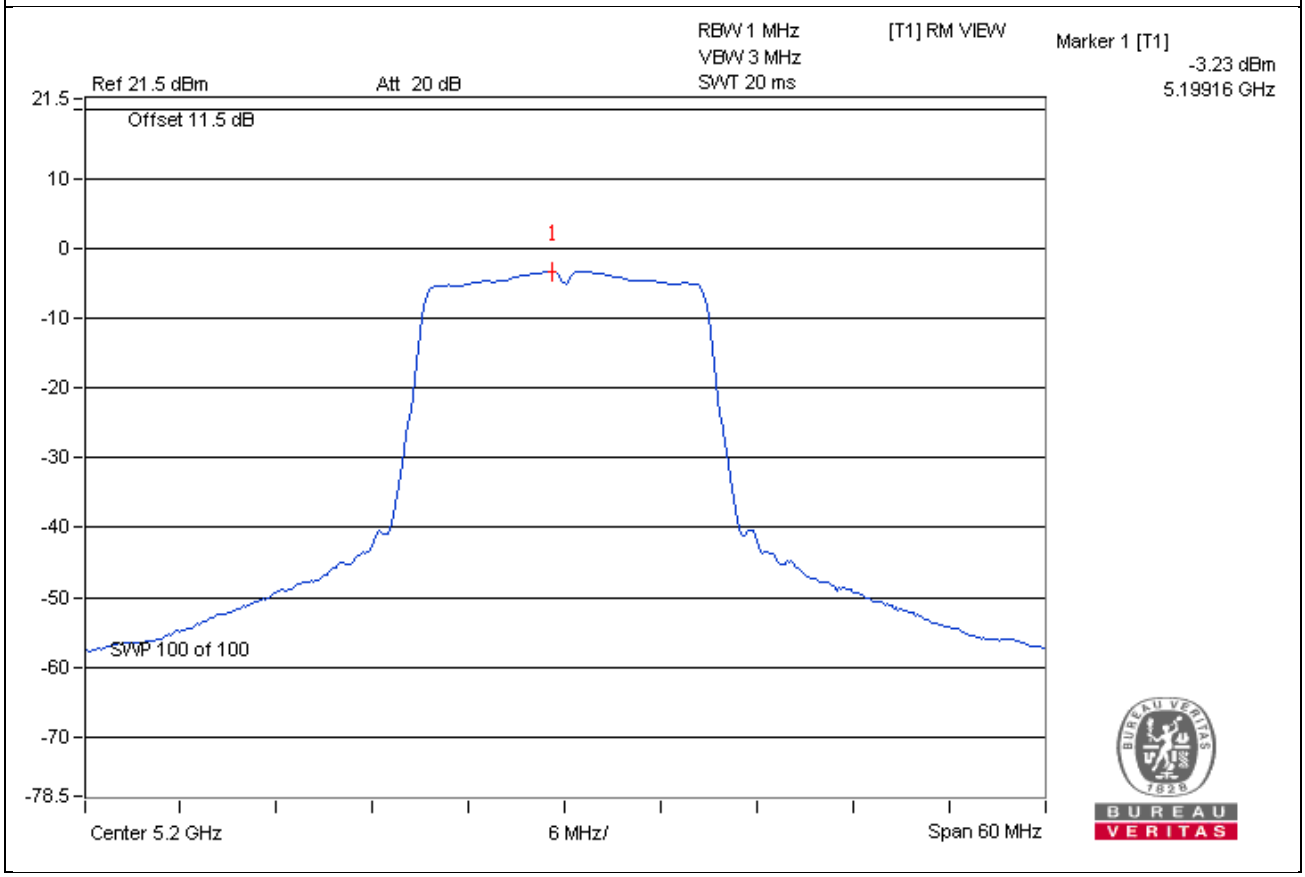
802.11n (HT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
36	5180	-4.13	16.90	Pass
40	5200	-3.23	16.90	Pass
48	5240	-3.55	16.90	Pass

Note: 1. For UNII-1: Antenna gain = 6.1dBi > 6dBi, so the power density limit shall be reduced to 17-(6.1-6) =16.90dBm.

Spectrum Plot of Worst Value

CH 40



For U-NII-3 Band:

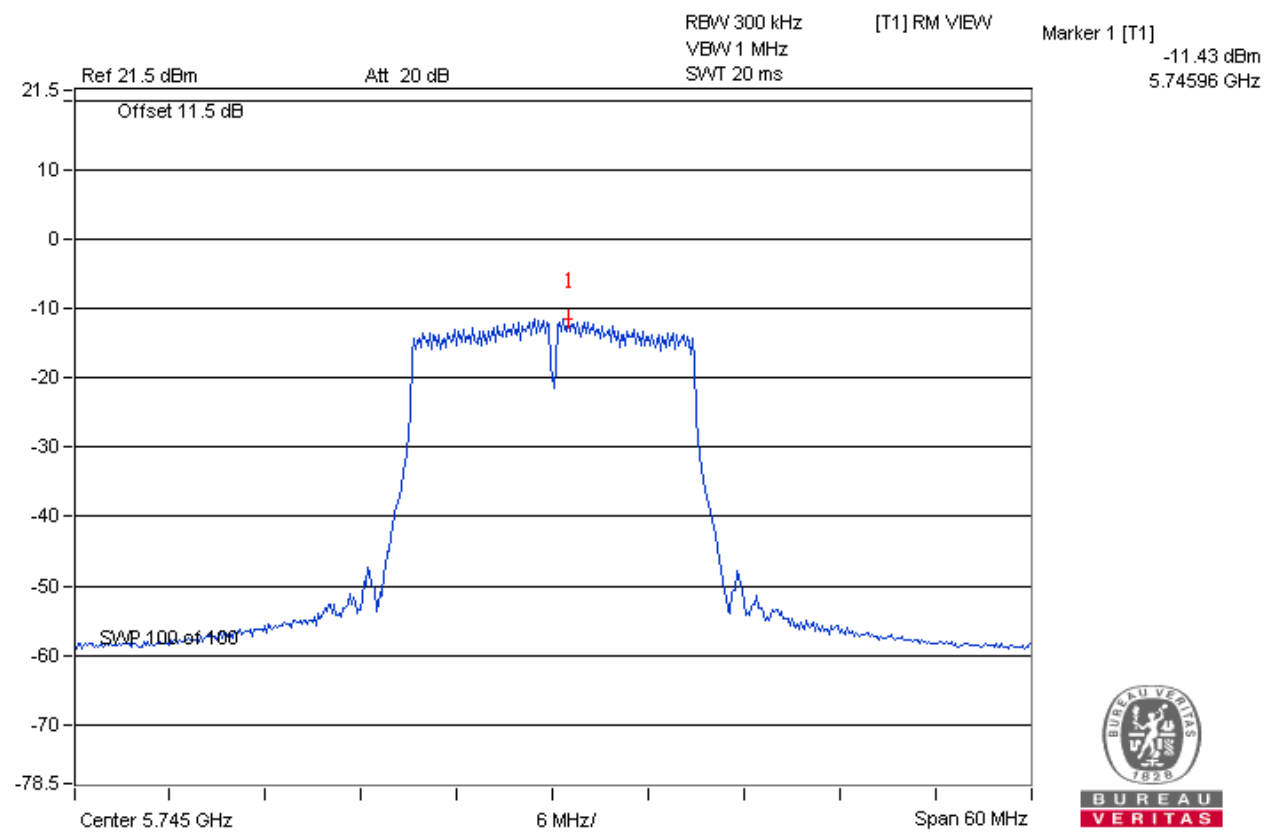
802.11n (HT20)

Chan.	Chan. Freq. (MHz)	PSD		Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		(dBm/300kHz)	(dBm/500kHz)			
149	5745	-11.43	-9.21	-9.21	29.90	Pass
157	5785	-12.16	-9.94	-9.94	29.90	Pass
165	5825	-12.02	-9.80	-9.80	29.90	Pass

Note: 1. Antenna gain = 6.1dBi > 6dBi, so the power density limit shall be reduced to 30-(6.1-6) =29.90dBm.

Spectrum Plot of Worst Value

CH 149

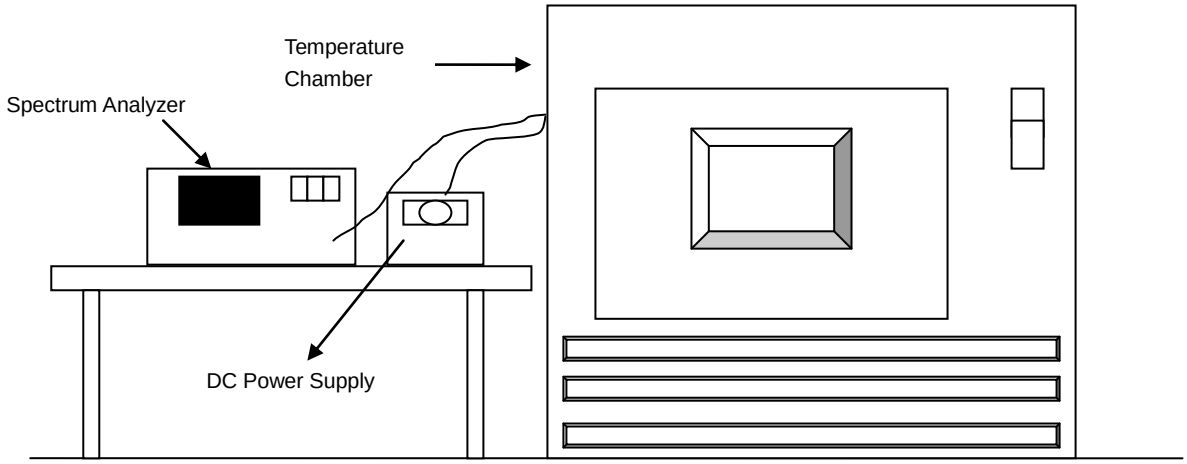


4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	3.3	5180.0024	PASS	5180.0031	PASS	5180.0007	PASS	5180.0026	Pass
40	3.3	5180.0147	PASS	5180.0113	PASS	5180.0117	PASS	5180.0139	Pass
30	3.3	5180.0074	PASS	5180.0094	PASS	5180.0079	PASS	5180.0107	Pass
20	3.3	5179.9957	PASS	5179.9939	PASS	5179.9928	PASS	5179.9971	Pass
10	3.3	5180.0098	PASS	5180.0097	PASS	5180.0074	PASS	5180.0108	Pass
0	3.3	5179.9772	PASS	5179.9731	PASS	5179.9725	PASS	5179.9766	Pass
-10	3.3	5179.9928	PASS	5179.9929	PASS	5179.9939	PASS	5179.9932	Pass
-20	3.3	5179.9847	PASS	5179.9836	PASS	5179.9839	PASS	5179.9837	Pass
-30	3.3	5180.0207	PASS	5180.018	PASS	5180.018	PASS	5180.02	Pass

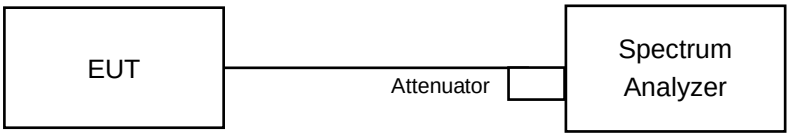
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	3.3	5179.9954	PASS	5179.9944	PASS	5179.9933	PASS	5179.9974	PASS
	3.3	5179.9957	PASS	5179.9939	PASS	5179.9928	PASS	5179.9971	PASS
	3.3	5179.9958	PASS	5179.9941	PASS	5179.9922	PASS	5179.9967	PASS

4.7 6dB Bandwidth Measurment

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

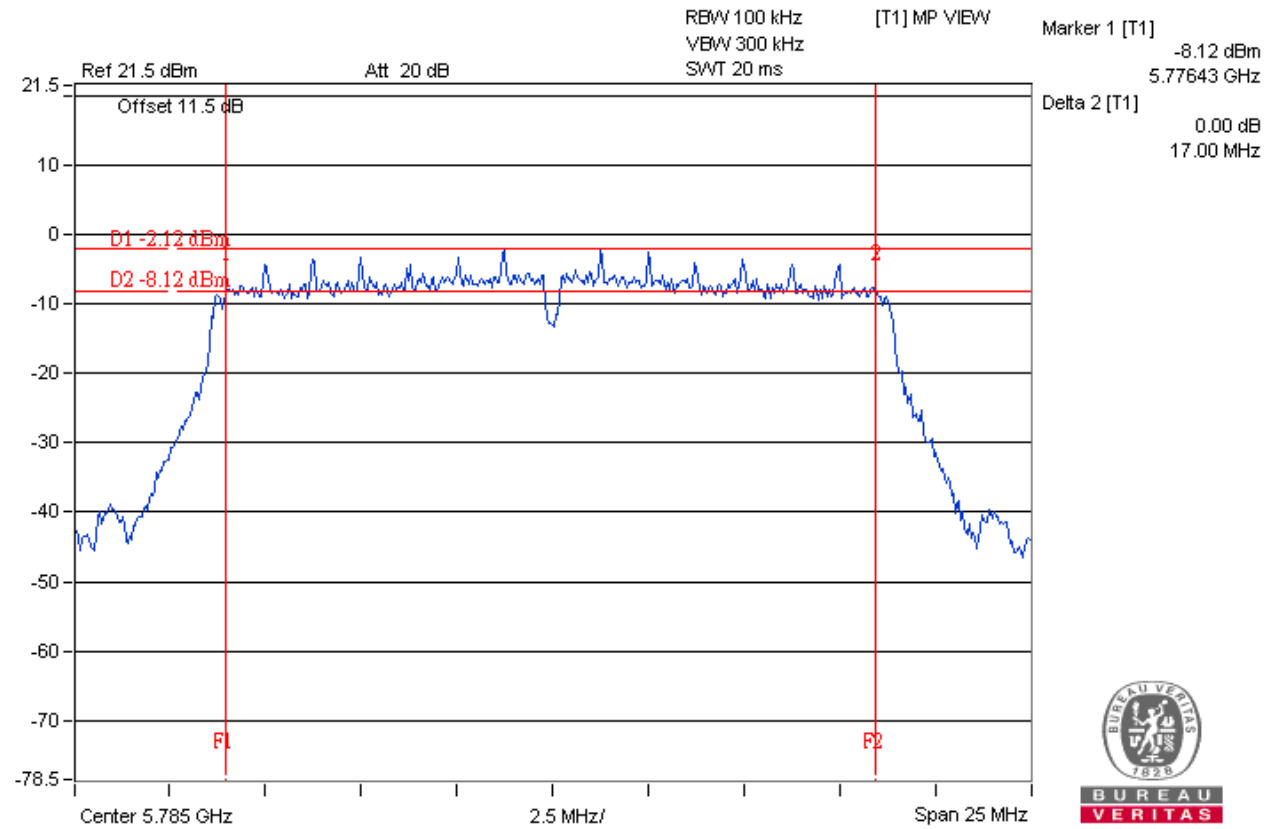
4.7.7 Test Results

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	17.08	0.5	PASS
157	5785	17.00	0.5	PASS
165	5825	17.11	0.5	PASS

Spectrum Plot of Worst Value

CH 157



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---