

FCC Test Report

Report No.: RF200224C21

FCC ID: T4829973T

Test Model: 29973-TX

Received Date: Feb. 24, 2020

Test Date: Mar. 31 ~ Apr. 08, 2020

Issued Date: Apr. 21, 2020

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FCC Registration / 788550 / TW0003
Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RF200224C21	Original release	Apr. 21, 2020

1 Certificate of Conformity

Product: WIRELESS CONFERENCE ROOM VIDEO HUB - HDMI AND USB-C

Brand: C2G

Test Model: 29973-TX

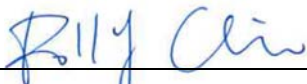
Sample Status: Engineering sample

Applicant: Ortronics Inc.

Test Date: Mar. 31 ~ Apr. 08, 2020

Standards: 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 RF characteristics under the conditions specified in this report.

Prepared by : , **Date:** Apr. 21, 2020
Polly Chien / Specialist

Approved by : , **Date:** Apr. 21, 2020
Bruce Chen / Senior Project Engineer

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 -11.38dB at 0.16173MHz.
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 -1.1dB at 11100.00MHz.
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.

Note:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB test plots were recorded in Annex A.
- For U-NII-1, U-NII-2A and U-NII-2C band compliance with rule 15.407(b) of the band-edge items, the test plots were recorded in Annex B. Test Procedures refer to report 4.1.3.

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	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	WIRELESS CONFERENCE ROOM VIDEO HUB - HDMI AND USB-C
Brand	C2G
Test Model	29973-TX
Status of EUT	Engineering sample
Power Supply Rating	Refer to note
Modulation Technology	OFDM
Transfer Rate	500Mbps
Operating Frequency	5190-5230MHz, 5270-5310MHz, 5510-5670MHz, 5755-5795MHz
Number of Channel	5190-5230MHz: 2 5270-5310MHz: 2 5510-5670MHz: 3 5755-5795MHz: 2
Output Power	5190-5230MHz: 52.848mW 5270-5310MHz: 53.523mW 5510-5670MHz: 53.716mW 5755-5795MHz: 53.349mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter, 1.8m non-shielded AC power cord without core
Data Cable Supplied	0.95m shielded HDMI cable without core (Brand: Polywell Technology Corporation, Model: PW15-W50-A034) 0.95m shielded Type-C cable without core (Brand: Lian Shuo Electronics Co., Ltd, Model: L0140137-UCCE)

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and one receiver.

Modulation Mode	TX Function
WHDl (40MHz)	2TX

2. The following antennas were provided to the EUT.

Ant. Type	PIFA								
Connector	NA								
Item	Model	Antenna Gain (dBi)							
		5150 MHz	5250 MHz	5350 MHz	5450 MHz	5550 MHz	5650 MHz	5750 MHz	5850 MHz
Ant.1	AJWP9Q-Q0003(973_B)	3.04	3.68	3.8	3.95	4.51	4.75	4.52	4.54
Ant.2	AJWP9Q-Q0004(973_G)	5.3	6.03	5.24	4.67	4.95	3.28	4.3	4.41

* The maximum antenna gain is chosen for final test.

3. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

4. The EUT consumes power from the following adapter.

Brand	Sunny COMPUTER TECHNOLOGY CO.,LTD.
Model	SYS1544-1212-T2
Input Power	100-240Vac, 50-60Hz, 1.0A MAX.
Output Power	+12Vdc, 1A
Power Line	1.4m DC power cable without core attached on adapter

3.2 Description of Test Modes

Operated in 5190 - 5230MHz

2 channels are provided as below:

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

Operated in 5270 - 5310MHz

2 channels are provided as below:

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

Operated in 5510 - 5670MHz

3 channels are provided as below:

Channel	Frequency	Channel	Frequency
102	5510 MHz	134	5670 MHz
110	5550 MHz		

Operated in 5755 - 5795MHz

2 channels are provided as below:

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 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 & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
-	WHDI (40MHz)	5190-5230	38 to 46	38, 46	OFDM	500
		5270-5310	54 to 62	54, 62	OFDM	500
		5510-5670	102 to 134	102, 110, 134	OFDM	500
		5755-5795	151 to 159	151, 159	OFDM	500

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
-	WHDI (40MHz)	5190-5230	38 to 46	134	OFDM	500
		5270-5310	54 to 62		OFDM	500
		5510-5670	102 to 134		OFDM	500
		5755-5795	151 to 159		OFDM	500

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
-	WHDI (40MHz)	5190-5230	38 to 46	134	OFDM	500
		5270-5310	54 to 62		OFDM	500
		5510-5670	102 to 134		OFDM	500
		5755-5795	151 to 159		OFDM	500

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
-	WHDI (40MHz)	5190-5230	38 to 46	38, 46	OFDM	500
		5270-5310	54 to 62	54, 62	OFDM	500
		5510-5670	102 to 134	102, 110, 134	OFDM	500
		5755-5795	151 to 159	151, 159	OFDM	500

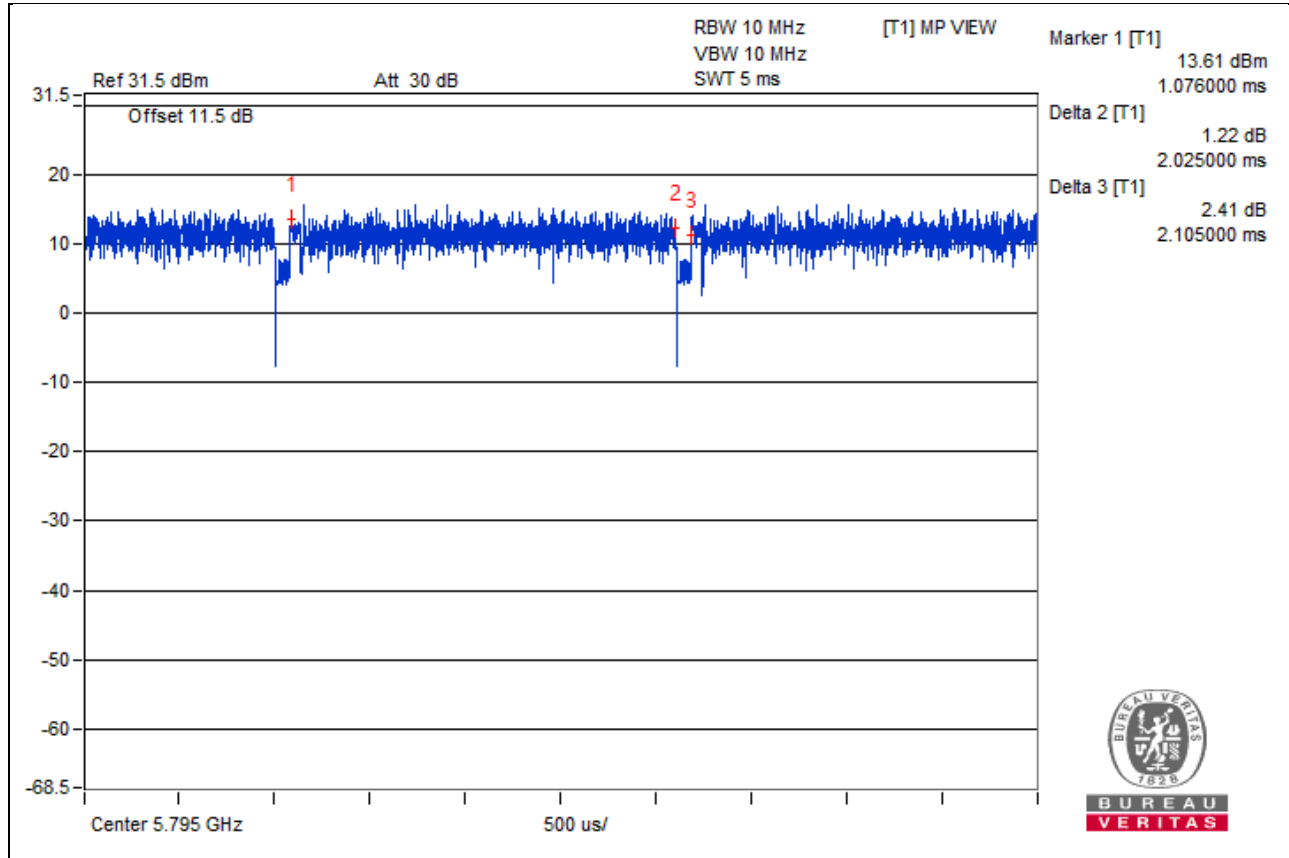
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	23deg. C, 66%RH	120Vac, 60Hz	Titan Hsu
RE $<$ 1G	23deg. C, 66%RH	120Vac, 60Hz	Titan Hsu
PLC	25deg. C, 75%RH	120Vac, 60Hz	Titan Hsu
APCM	23deg. C, 66%RH	120Vac, 60Hz	Ted Chang

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98%, duty factor is required.

WHDI (40MHz): Duty cycle = $2.025/2.105 = 0.962$, Duty factor = $10 * \log (1/0.962) = 0.17$

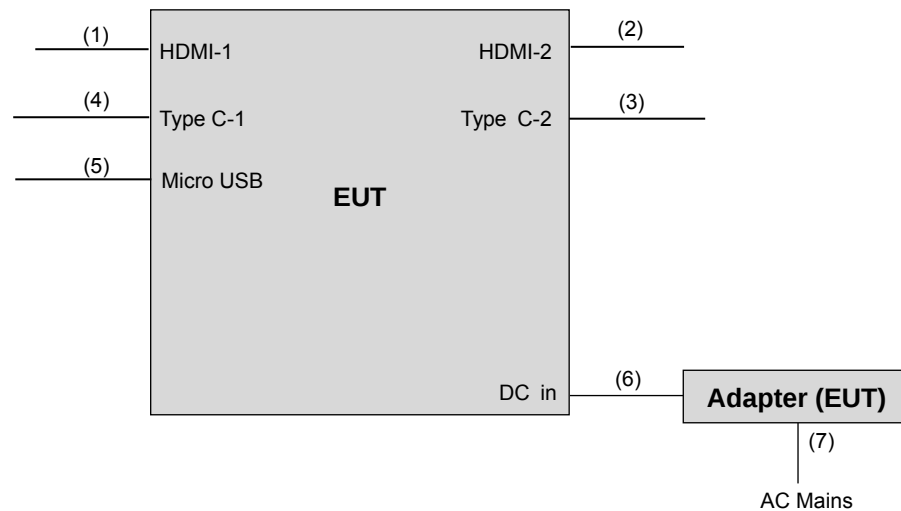


3.4 Description of Support Units

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	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	HDMI cable	1	0.95	Y	0	Accessory of EUT (Brand: Polywell Technology Corporation, Model: PW15-W50-A034)
2.	HDMI cable	1	0.95	Y	0	Provided by client (Brand: Polywell Technology Corporation, Model: PW15-W50-A034)
3.	Type C USB cable	1	0.95	Y	0	Accessory of EUT
4.	Type C USB cable	1	0.95	Y	0	Provided by client
5.	Micro USB cable	1	1	Y	0	-
6.	DC cable	1	1.4	N	0	Attached on adapter
7.	AC cable	1	1.8	N	0	Provided by client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test standard:

FCC Part 15, Subpart E (15.407)

ANSI C63.10:2013

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

References Test Guidance:

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

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. Other emissions shall be at least 20dB below the highest level of the desired power:

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.

Limits of unwanted emission out of the restricted bands

Applicable To	Limit	
789033 D02 General UNII Test Procedure New Rules v02r01	FIELD STRENGTH at 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
Applicable To	EIRP Limit	Equivalent Field Strength at 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2 (dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)(i)	PK: -27 (dBm/MHz) ^{*1} PK: 10 (dBm/MHz) ^{*2} PK: 15.6 (dBm/MHz) ^{*3} PK: 27 (dBm/MHz) ^{*4}	PK: 68.2 (dBuV/m) ^{*1} PK: 105.2 (dBuV/m) ^{*2} PK: 110.8 (dBuV/m) ^{*3} PK: 122.2 (dBuV/m) ^{*4}
15.407(b)(4)(ii)	FIELD STRENGTH at 3m / § 15.247(d),	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
^{*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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 11, 2019	Nov. 10, 2020
HORN Antenna SCHWARZBECK	9120D	209	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Sep. 05, 2019	Sep. 04, 2020
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5 5190004/MY55190 007/MY55210005	Jul. 15, 2019	Jul. 14, 2020

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 HwaYa Chamber 3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. 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.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. 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.
- e. 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.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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. 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.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

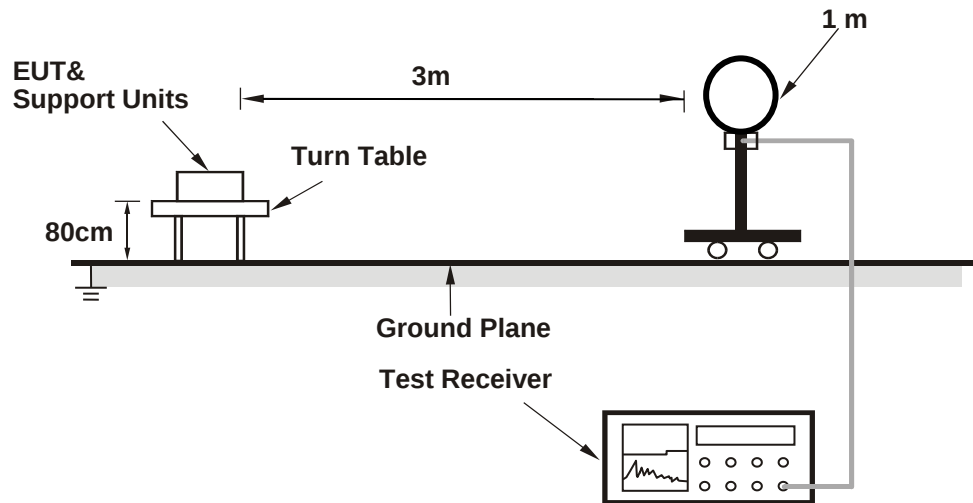
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) 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

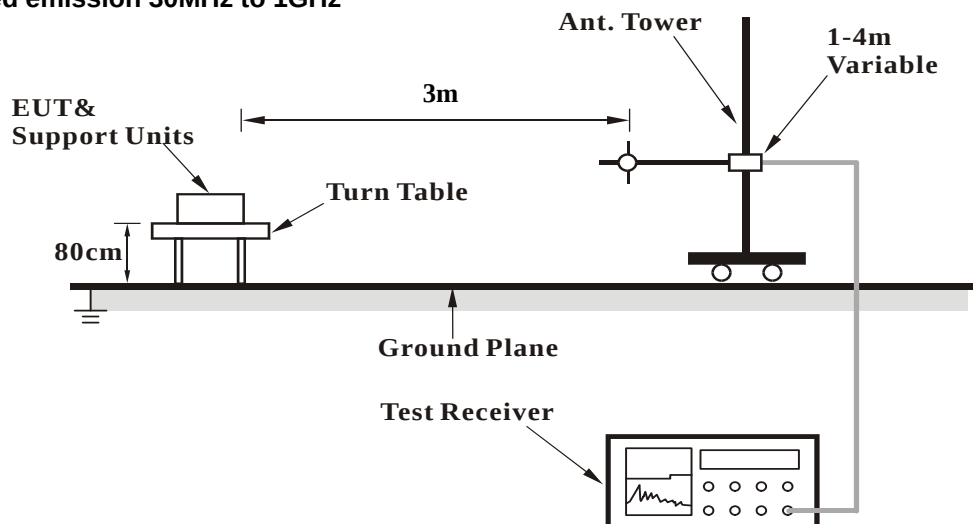
No deviation.

4.1.5 Test Set Up

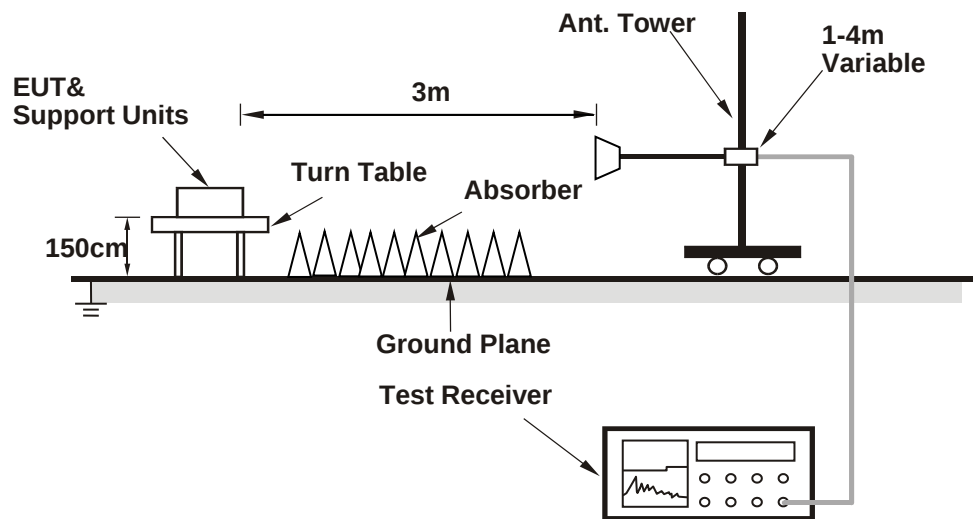
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- a. The EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz data:

CHANNEL	TX Channel 38	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	5150.00	60.3 PK	74.0	-13.7	2.32 H	9	56.2	4.1
2	5150.00	43.7 AV	54.0	-10.3	2.32 H	9	39.6	4.1
3	*5190.00	103.8 PK			2.32 H	9	64.5	39.3
4	*5190.00	89.9 AV			2.32 H	9	50.6	39.3
5	#10380.00	59.9 PK	68.2	-8.3	2.92 H	202	42.5	17.4
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	5150.00	63.8 PK	74.0	-10.2	3.68 V	296	59.7	4.1
2	5150.00	45.9 AV	54.0	-8.1	3.68 V	296	41.8	4.1
3	*5190.00	106.8 PK			3.68 V	296	67.5	39.3
4	*5190.00	93.1 AV			3.68 V	296	53.8	39.3
5	#10380.00	60.0 PK	68.2	-8.2	3.02 V	149	42.6	17.4

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	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	5150.00	55.8 PK	74.0	-18.2	2.33 H	43	51.7	4.1
2	5150.00	42.6 AV	54.0	-11.4	2.33 H	43	38.5	4.1
3	*5230.00	104.8 PK			2.33 H	43	65.7	39.1
4	*5230.00	90.6 AV			2.33 H	43	51.5	39.1
5	5350.00	55.3 PK	74.0	-18.7	2.33 H	43	51.2	4.1
6	5350.00	42.3 AV	54.0	-11.7	2.33 H	43	38.2	4.1
7	#10460.00	60.1 PK	68.2	-8.1	3.12 H	211	42.3	17.8
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	5150.00	55.6 PK	74.0	-18.4	3.81 V	292	51.5	4.1
2	5150.00	42.6 AV	54.0	-11.4	3.81 V	292	38.5	4.1
3	*5230.00	106.3 PK			3.81 V	292	67.2	39.1
4	*5230.00	92.5 AV			3.81 V	292	53.4	39.1
5	5350.00	55.3 PK	74.0	-18.7	3.81 V	292	51.2	4.1
6	5350.00	42.3 AV	54.0	-11.7	3.81 V	292	38.2	4.1
7	#10460.00	60.3 PK	68.2	-7.9	3.05 V	152	42.5	17.8

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 54	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	5150.00	56.0 PK	74.0	-18.0	2.42 H	46	51.9	4.1
2	5150.00	42.7 AV	54.0	-11.3	2.42 H	46	38.6	4.1
3	*5270.00	105.3 PK			2.42 H	46	66.2	39.1
4	*5270.00	91.6 AV			2.42 H	46	52.5	39.1
5	#10540.00	60.8 PK	68.2	-7.4	2.89 H	221	42.3	18.5
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	5150.00	55.7 PK	74.0	-18.3	2.94 V	302	51.6	4.1
2	5150.00	42.7 AV	54.0	-11.3	2.94 V	302	38.6	4.1
3	*5270.00	106.7 PK			2.94 V	302	67.6	39.1
4	*5270.00	92.9 AV			2.94 V	302	53.8	39.1
5	#10540.00	61.0 PK	68.2	-7.2	3.10 V	166	42.5	18.5

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 62	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	*5310.00	105.2 PK			2.54 H	31	66.0	39.2
2	*5310.00	92.4 AV			2.54 H	31	53.2	39.2
3	5350.00	60.4 PK	74.0	-13.6	2.54 H	31	56.3	4.1
4	5350.00	44.1 AV	54.0	-9.9	2.54 H	31	40.0	4.1
5	10620.00	61.5 PK	74.0	-12.5	2.85 H	38	42.7	18.8
6	10620.00	48.3 AV	54.0	-5.7	2.85 H	38	29.5	18.8
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	*5310.00	107.7 PK			2.97 V	308	68.5	39.2
2	*5310.00	93.7 AV			2.97 V	308	54.5	39.2
3	5350.00	63.9 PK	74.0	-10.1	2.97 V	308	59.8	4.1
4	5350.00	44.9 AV	54.0	-9.1	2.97 V	308	40.8	4.1
5	10620.00	61.2 PK	74.0	-12.8	3.11 V	169	42.4	18.8
6	10620.00	48.1 AV	54.0	-5.9	3.11 V	169	29.3	18.8

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 102	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	5460.00	56.3 PK	74.0	-17.7	2.63 H	39	51.8	4.5
2	5460.00	43.0 AV	54.0	-11.0	2.63 H	39	38.5	4.5
3	#5470.00	62.9 PK	68.2	-5.3	2.63 H	39	58.4	4.5
4	*5510.00	105.4 PK			2.63 H	39	65.7	39.7
5	*5510.00	91.6 AV			2.63 H	39	51.9	39.7
6	11020.00	60.8 PK	74.0	-13.2	3.11 H	40	41.7	19.1
7	11020.00	49.6 AV	54.0	-4.4	3.11 H	40	30.5	19.1
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	5460.00	57.1 PK	74.0	-16.9	3.73 V	316	52.6	4.5
2	5460.00	43.5 AV	54.0	-10.5	3.73 V	316	39.0	4.5
3	#5470.00	65.8 PK	68.2	-2.4	3.73 V	316	61.3	4.5
4	*5510.00	107.2 PK			3.73 V	316	67.5	39.7
5	*5510.00	92.5 AV			3.73 V	316	52.8	39.7
6	11020.00	61.4 PK	74.0	-12.6	2.98 V	300	42.3	19.1
7	11020.00	51.6 AV	54.0	-2.4	2.98 V	300	32.5	19.1

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 110	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	*5550.00	106.4 PK			2.68 H	55	66.7	39.7
2	*5550.00	92.3 AV			2.68 H	55	52.6	39.7
3	11100.00	60.9 PK	74.0	-13.1	2.69 H	42	42.3	18.6
4	11100.00	48.8 AV	54.0	-5.2	2.69 H	42	30.2	18.6
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	*5550.00	106.5 PK			3.51 V	292	66.8	39.7
2	*5550.00	91.9 AV			3.51 V	292	52.2	39.7
3	11100.00	61.5 PK	74.0	-12.5	2.51 V	318	42.9	18.6
4	11100.00	52.9 AV	54.0	-1.1	2.51 V	318	34.3	18.6

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 134	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	*5670.00	105.7 PK			2.67 H	37	65.9	39.8
2	*5670.00	91.8 AV			2.67 H	37	52.0	39.8
3	#5725.00	56.3 PK	68.2	-11.9	2.67 H	37	51.6	4.7
4	11340.00	60.1 PK	74.0	-13.9	3.07 H	11	41.4	18.7
5	11340.00	48.1 AV	54.0	-5.9	3.07 H	11	29.4	18.7
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	*5670.00	108.0 PK			3.46 V	328	68.2	39.8
2	*5670.00	94.1 AV			3.46 V	328	54.3	39.8
3	#5725.00	55.8 PK	68.2	-12.4	3.46 V	328	51.1	4.7
4	11340.00	60.8 PK	74.0	-13.2	2.41 V	323	42.1	18.7
5	11340.00	48.5 AV	54.0	-5.5	2.41 V	323	29.8	18.7

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 151	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	#5646.15	55.4 PK	68.2	-12.8	2.55 H	55	50.9	4.5
2	#5650.00	55.4 PK	68.2	-12.8	2.55 H	55	51.0	4.4
3	*5755.00	107.2 PK			2.55 H	55	67.2	40.0
4	*5755.00	93.2 AV			2.55 H	55	53.2	40.0
5	#5995.51	57.4 PK	68.2	-10.8	2.55 H	55	52.0	5.4
6	11510.00	61.2 PK	74.0	-12.8	2.89 H	223	42.3	18.9
7	11510.00	48.1 AV	54.0	-5.9	2.89 H	223	29.2	18.9
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	#5645.51	55.4 PK	68.2	-12.8	2.54 V	314	50.9	4.5
2	#5650.00	55.4 PK	68.2	-12.8	2.54 V	314	51.0	4.4
3	*5755.00	106.6 PK			2.54 V	314	66.6	40.0
4	*5755.00	92.9 AV			2.54 V	314	52.9	40.0
5	#5936.54	57.3 PK	68.2	-10.9	2.54 V	314	52.0	5.3
6	11510.00	61.2 PK	74.0	-12.8	3.12 V	192	42.3	18.9
7	11510.00	48.1 AV	54.0	-5.9	3.12 V	192	29.2	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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 159	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	#5647.44	55.9 PK	68.2	-12.3	2.75 H	57	51.4	4.5
2	*5795.00	106.1 PK			2.75 H	57	65.8	40.3
3	*5795.00	93.2 AV			2.75 H	57	52.9	40.3
4	#5925.00	56.4 PK	68.2	-11.8	2.75 H	57	51.1	5.3
5	#5939.74	58.2 PK	68.2	-10.0	2.75 H	57	52.9	5.3
6	11590.00	60.7 PK	74.0	-13.3	3.13 H	219	42.3	18.4
7	11590.00	47.6 AV	54.0	-6.4	3.13 H	219	29.2	18.4
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	#5637.18	55.9 PK	68.2	-12.3	2.53 V	314	51.4	4.5
2	*5795.00	106.3 PK			2.53 V	314	66.0	40.3
3	*5795.00	92.7 AV			2.53 V	314	52.4	40.3
4	#5925.00	47.5 PK	68.2	-20.7	2.53 V	314	42.2	5.3
5	#5937.82	56.5 PK	68.2	-11.7	2.53 V	314	51.2	5.3
6	11590.00	60.8 PK	74.0	-13.2	3.12 V	193	42.4	18.4
7	11590.00	47.5 AV	54.0	-6.5	3.12 V	193	29.1	18.4

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

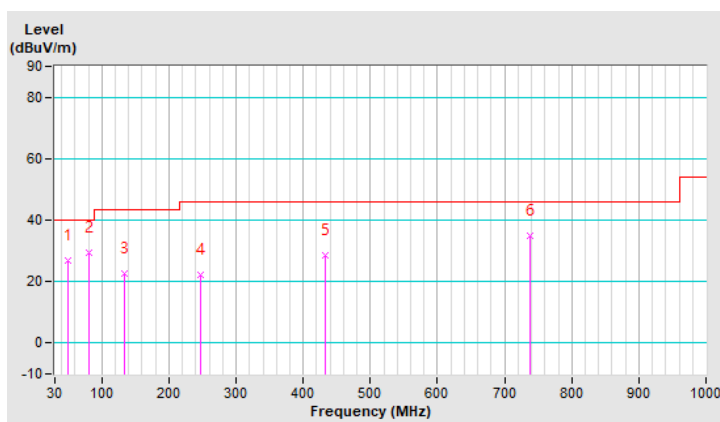
Below 1GHz worst-case data:

CHANNEL	TX Channel 134	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	49.68	26.9 QP	40.0	-13.1	2.00 H	14	35.7	-8.8
2	80.61	29.2 QP	40.0	-10.8	2.00 H	172	42.5	-13.3
3	134.03	22.8 QP	43.5	-20.7	2.00 H	70	32.3	-9.5
4	247.90	22.1 QP	46.0	-23.9	1.00 H	64	31.6	-9.5
5	432.06	28.4 QP	46.0	-17.6	1.00 H	183	31.5	-3.1
6	738.52	34.8 QP	46.0	-11.2	1.00 H	10	32.0	2.8

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: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

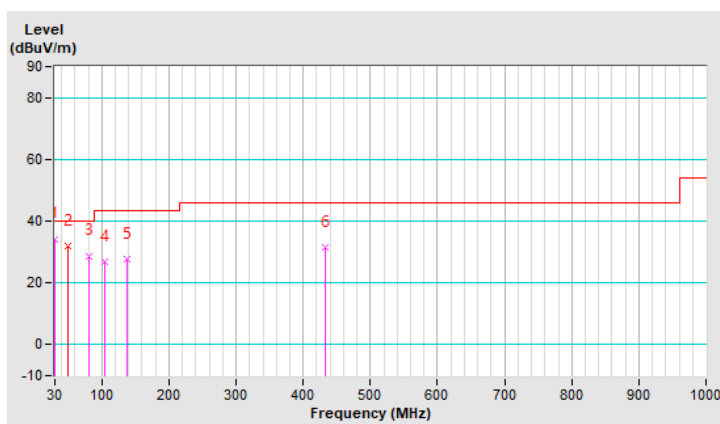


CHANNEL	TX Channel 134	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	30.00	34.3 QP	40.0	-5.7	1.49 V	260	44.7	-10.4
2	50.42	31.8 QP	40.0	-8.2	1.49 V	325	40.5	-8.7
3	80.61	28.8 QP	40.0	-11.2	1.99 V	84	42.1	-13.3
4	104.51	26.8 QP	43.5	-16.7	1.00 V	18	39.2	-12.4
5	138.25	27.7 QP	43.5	-15.8	1.49 V	16	36.9	-9.2
6	432.06	31.4 QP	46.0	-14.6	1.00 V	113	34.5	-3.1

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: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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

Tested date: Mar. 31, 2020

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

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 HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

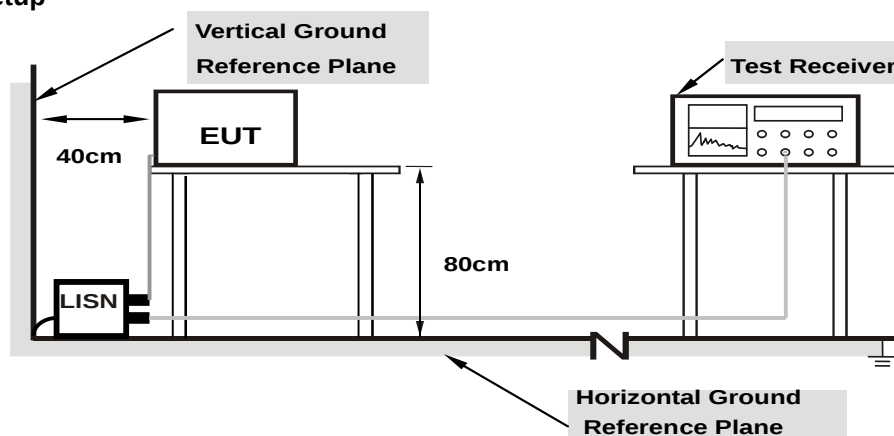
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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 Conditions

Same as 4.1.6.

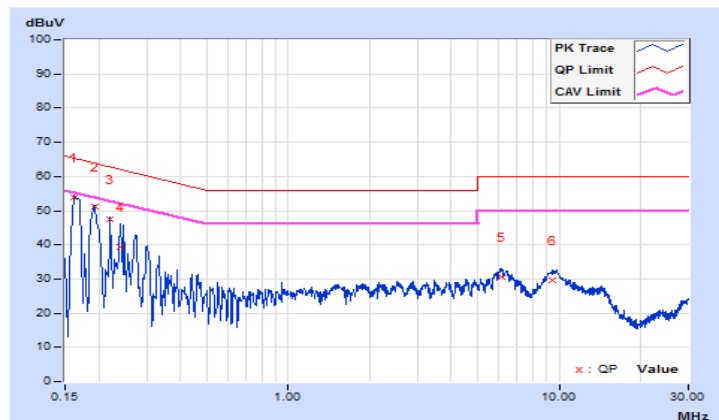
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16173	9.63	44.36	30.95	53.99	40.58	65.37	55.37	-11.38	-14.79
2	0.19301	9.62	41.46	29.50	51.08	39.12	63.91	53.91	-12.83	-14.79
3	0.22038	9.62	38.02	26.69	47.64	36.31	62.80	52.80	-15.16	-16.49
4	0.23993	9.63	29.63	14.14	39.26	23.77	62.10	52.10	-22.84	-28.33
5	6.09320	9.82	20.75	15.99	30.57	25.81	60.00	50.00	-29.43	-24.19
6	9.45971	9.86	19.81	15.23	29.67	25.09	60.00	50.00	-30.33	-24.91

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.

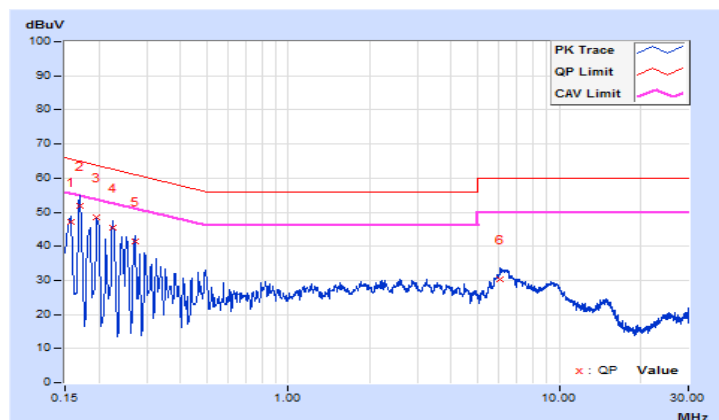


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15760	9.66	37.32	20.65	46.98	30.31	65.59	55.59	-18.61	-25.28
2	0.16955	9.65	42.06	27.91	51.71	37.56	64.98	54.98	-13.27	-17.42
3	0.19692	9.64	38.76	24.52	48.40	34.16	63.74	53.74	-15.34	-19.58
4	0.22429	9.64	35.80	21.74	45.44	31.38	62.66	52.66	-17.22	-21.28
5	0.27120	9.65	31.60	18.72	41.25	28.37	61.08	51.08	-19.83	-22.71
6	6.07756	9.85	20.32	15.50	30.17	25.35	60.00	50.00	-29.83	-24.65

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 Measurement

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 $\leq$ 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

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

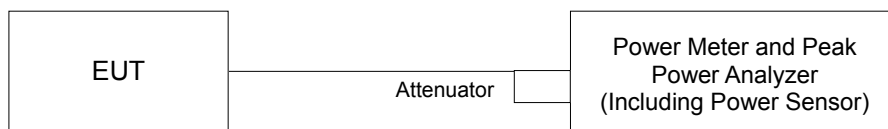
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

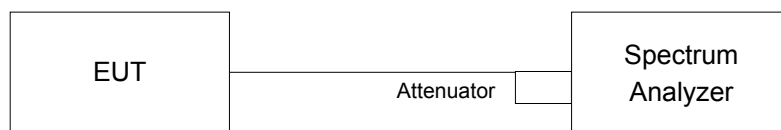
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.3.2 Test Setup

For Power Output



For 26dB Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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 and set the detector to average. Duty factor is not added to measured value.

For 26dB Bandwidth

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- f. For channel aggregation (channel 138, 142, 144) measurement refer to KDB 789033 D02 Section III. CHANNEL AGGREGATION.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

Power Output:

Chan.	Freq. (MHz)	Maximum Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	14.21	14.23	52.848	17.23	23.97	Pass
46	5230	14.17	14.19	52.364	17.19	23.97	Pass
54	5270	14.01	14.09	50.822	17.06	23.97	Pass
62	5310	14.25	14.30	53.523	17.29	23.97	Pass
102	5510	14.05	14.01	50.586	17.04	24.00	Pass
110	5550	14.08	14.10	51.290	17.10	24.00	Pass
134	5670	14.21	14.37	53.716	17.30	24.00	Pass
151	5755	14.17	14.35	53.349	17.27	30.00	Pass
159	5795	14.19	14.24	52.788	17.23	30.00	Pass

NOTE:

5190~5230MHz Antenna Gain = 6.03dBi > 6dBi, so the limit shall be reduced to $24 - (6.03 - 6) = 23.97\text{dBm}$.

5270~5310MHz Antenna Gain = 6.03dBi > 6dBi, so the limit shall be reduced to $24 - (6.03 - 6) = 23.97\text{dBm}$.

5550~5670MHz Antenna Gain = 4.95dBi < 6dBi, so the limit is not reduced.

5755~5795MHz Antenna Gain = 4.54dBi < 6dBi, so the limit is not reduced.

For U-NII-2A, U-NII-2C Band:

Chain 0

1. $11\text{dBm} + 10\log(40.78) = 27.10 > 24\text{dBm}$
2. $11\text{dBm} + 10\log(40.90) = 27.11 > 24\text{dBm}$
3. $11\text{dBm} + 10\log(41.15) = 27.14 > 24\text{dBm}$
4. $11\text{dBm} + 10\log(40.82) = 27.10 > 24\text{dBm}$
5. $11\text{dBm} + 10\log(40.96) = 27.12 > 24\text{dBm}$

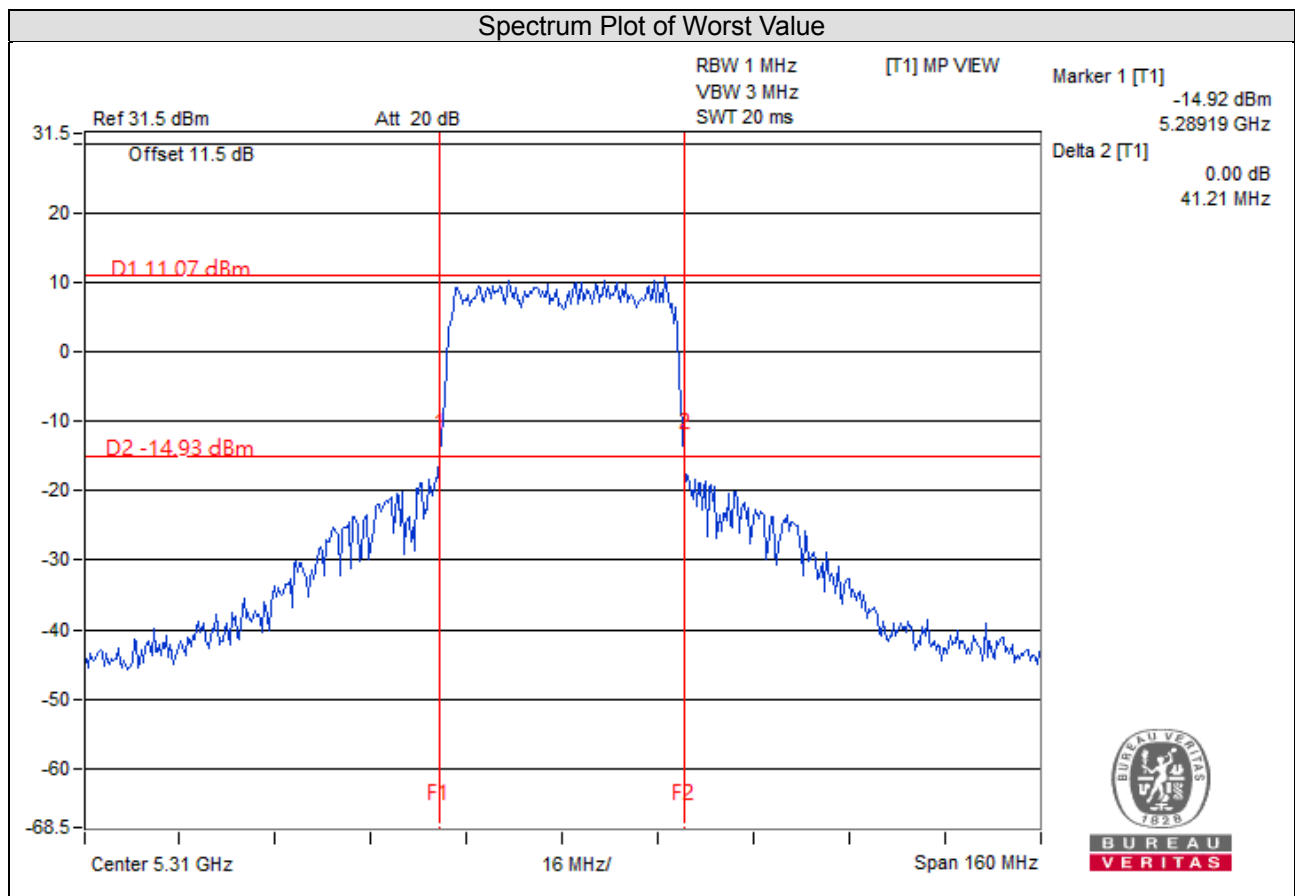
#NUM!

Chain 1

1. $11\text{dBm} + 10\log(41.03) = 27.13 > 24\text{dBm}$
2. $11\text{dBm} + 10\log(41.21) = 27.15 > 24\text{dBm}$
3. $11\text{dBm} + 10\log(41.09) = 27.13 > 24\text{dBm}$
4. $11\text{dBm} + 10\log(40.94) = 27.12 > 24\text{dBm}$
5. $11\text{dBm} + 10\log(41.01) = 27.12 > 24\text{dBm}$

26dB BANDWIDTH:

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	40.78	40.95
46	5230	40.97	40.64
54	5270	40.78	41.03
62	5310	40.90	41.21
102	5510	41.15	41.09
110	5550	40.82	40.94
134	5670	40.96	41.01



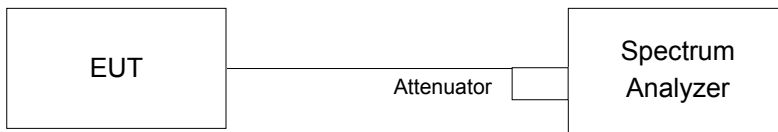
EUT MAXIMUM CONDUCTED POWER

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	53.523	17.29
5470~5725	53.716	17.30

NOTE: Manufacturer provides Transmit Power Control description to meet this requirement.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

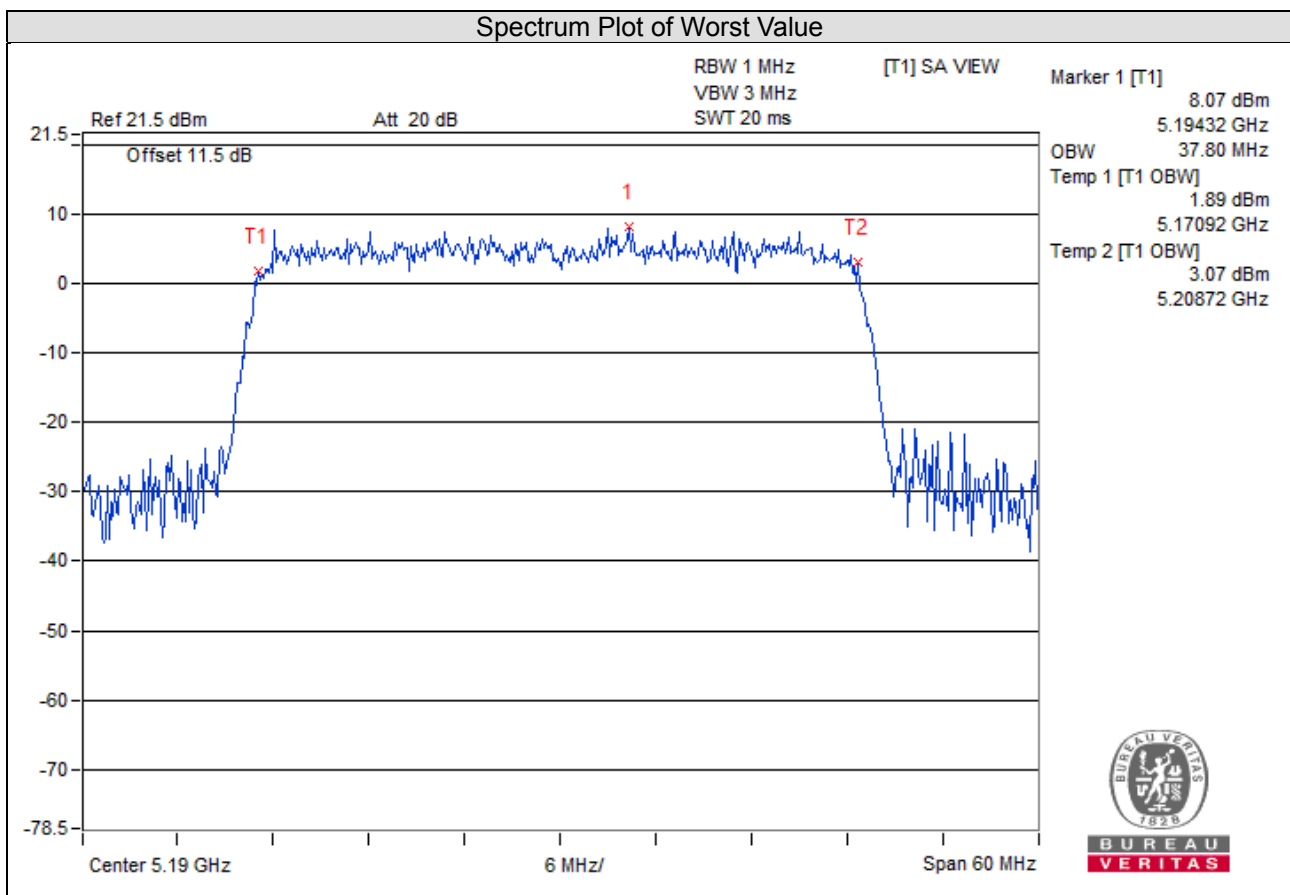
Refer to section 4.1.2 to get information of above instrument.

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 sampling. 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.

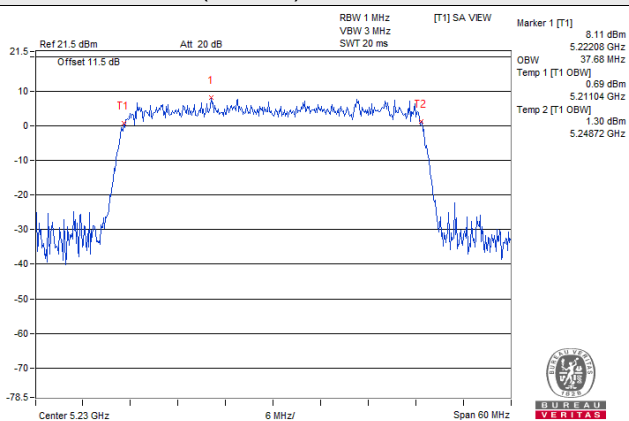
4.4.4 Test Result

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	37.80	37.80
46	5230	37.68	37.68
54	5270	37.68	37.80
62	5310	37.80	37.68
102	5510	37.80	37.80
110	5550	37.68	37.80
134	5670	37.80	37.80
151	5755	37.68	37.68
159	5795	37.68	37.68

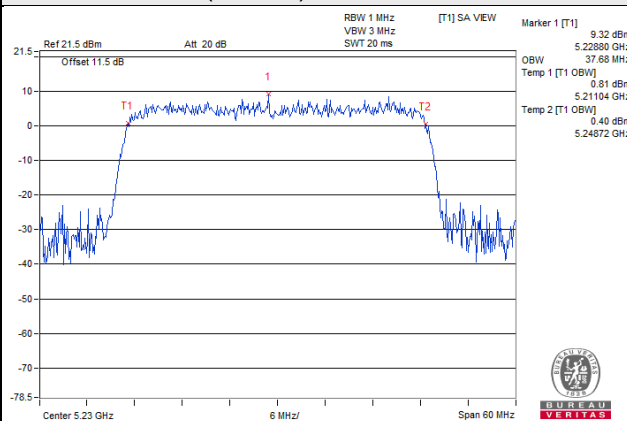


Spectrum Plot for near By DFS Band

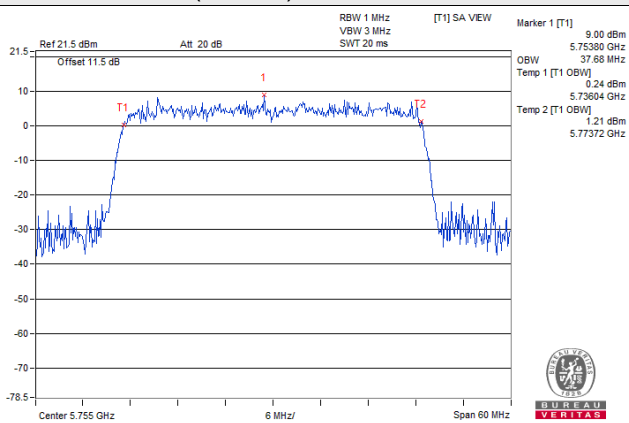
WHDI (40MHz) / Chain 0 / CH 46



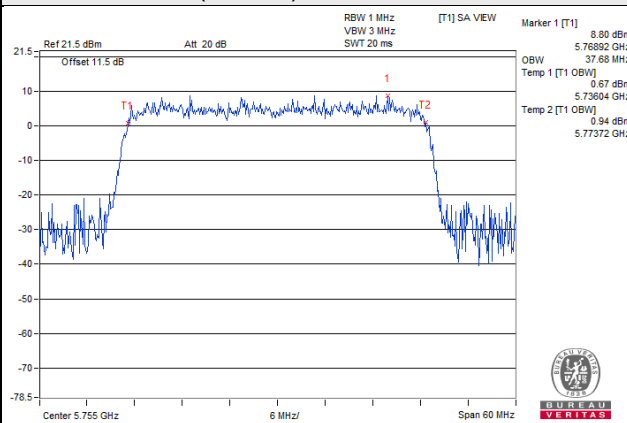
WHDI (40MHz) / Chain 1 / CH 46



WHDI (40MHz) / Chain 0 / CH 151



WHDI (40MHz) / Chain 1 / CH 151

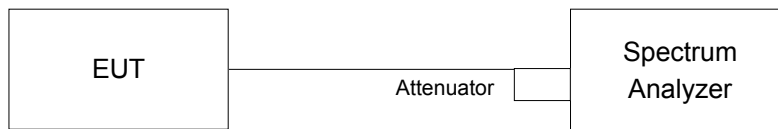


4.5 Peak Power Spectral Density Measurement

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 Procedures

For U-NII-1, U-NII-2A, U-NII-2C band:

Duty cycle of test signal is < 98%

Using method SA-2

- a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b. Set RBW = 1MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
- c. Set Channel power measure = 1MHz
- d. Sweep time = auto, trigger set to "free run".
- e. Trace average at least 100 traces in power averaging mode.
- f. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

Duty cycle of test signal is < 98%

- a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b. Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- d. 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 $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$
- e. Sweep time = auto, trigger set to "free run".
- f. Trace average at least 100 traces in power averaging mode.
- g. Record the max value and add 10 log (1/duty cycle)

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as Item 4.3.6.

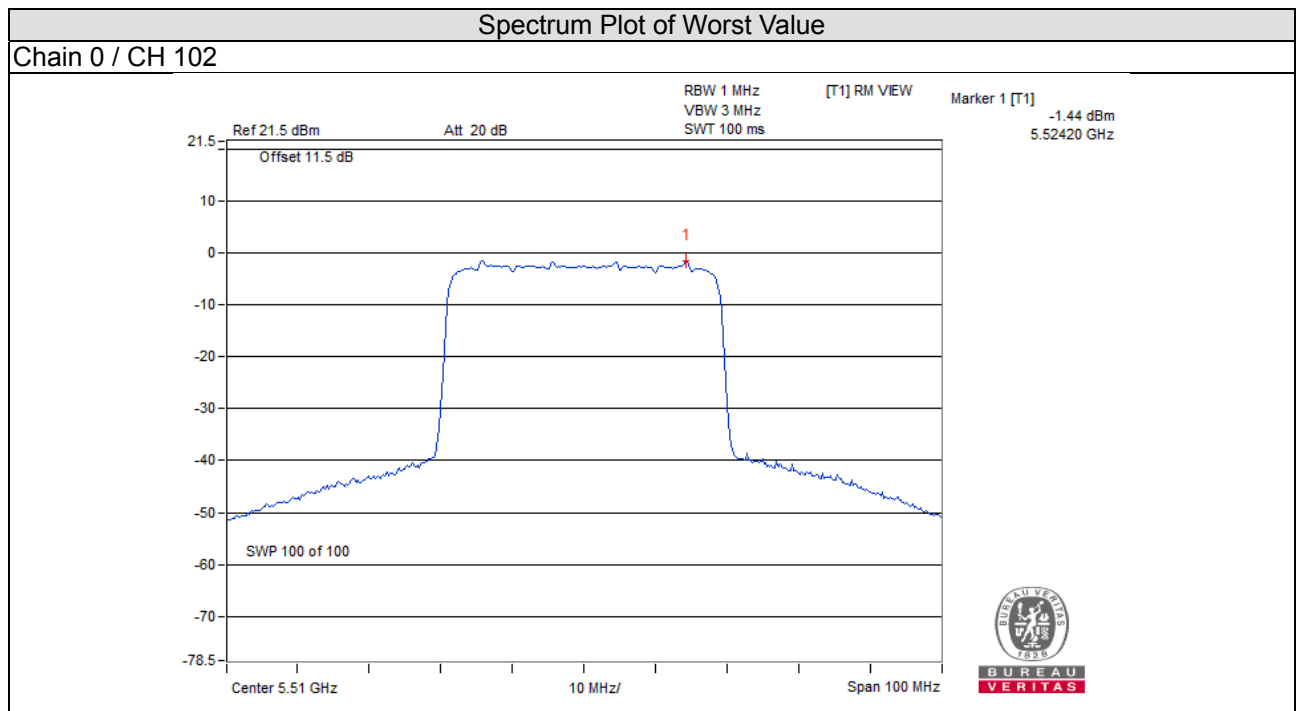
4.5.7 Test Results

For U-NII-1, U-NII-2A, U-NII-2C Band

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-2.98	-2.66	0.17	0.36	9.06	Pass
46	5230	-3.18	-2.69	0.17	0.25	9.06	Pass
54	5270	-2.94	-2.61	0.17	0.41	9.00	Pass
62	5310	-2.44	-2.19	0.17	0.87	9.00	Pass
102	5510	-1.51	-1.67	0.17	1.59	9.26	Pass
110	5550	-2.01	-1.43	0.17	1.47	9.26	Pass
134	5670	-3.15	-2.47	0.17	0.38	9.26	Pass

Note:

- Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- 5190~5230MHz Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.94\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11 - (7.94 - 6) = 9.06\text{dBm}$.
5270~5310MHz Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 8.00\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11 - (8.00 - 6) = 9.00\text{dBm}$.
5510~5670MHz Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.74\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11 - (7.74 - 6) = 9.26\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

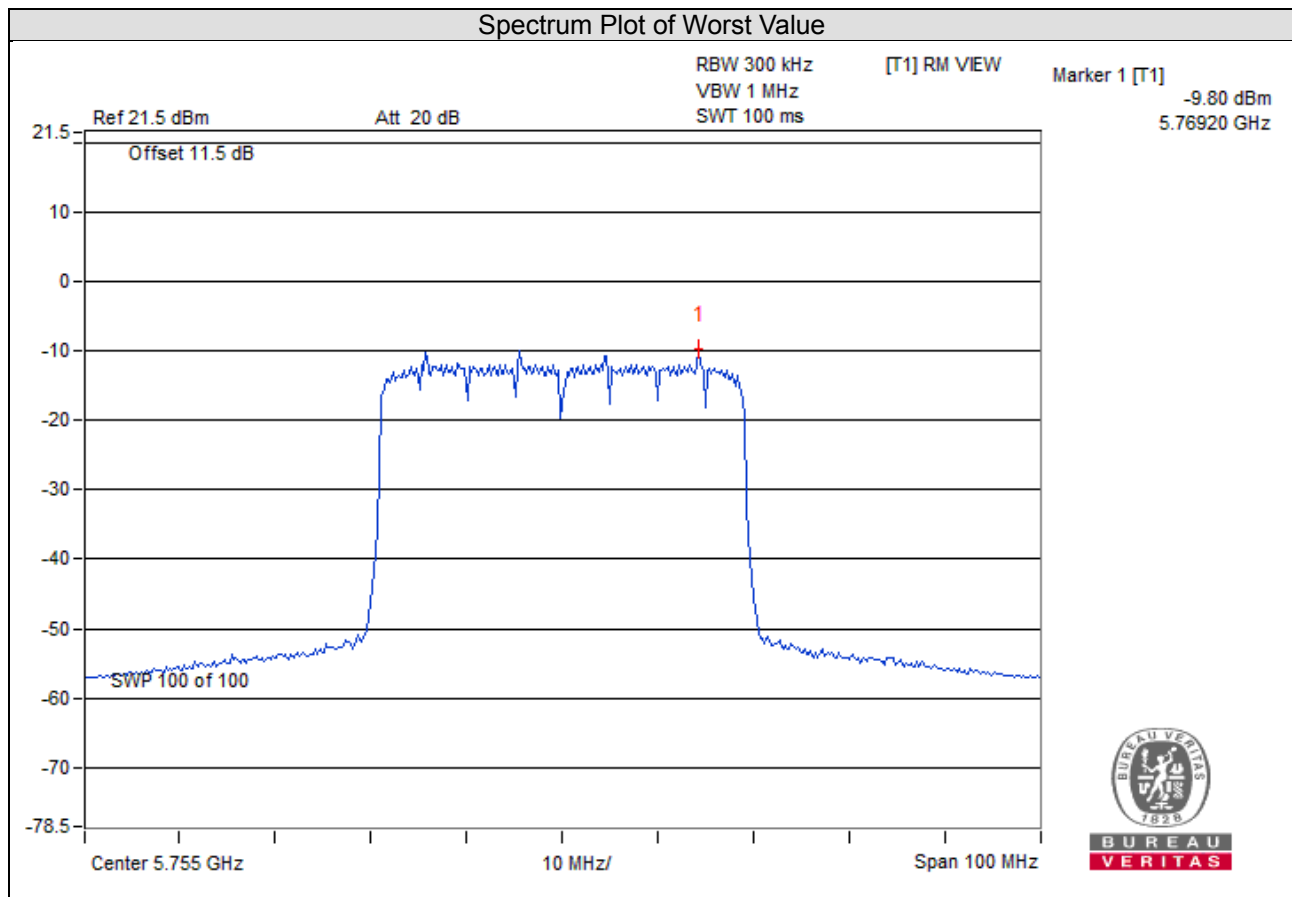


For U-NII-3 Band

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-9.88	-7.66	3.01	0.17	-4.48	28.51	Pass
	159	5795	-10.21	-7.99	3.01	0.17	-4.81	28.51	Pass
1	151	5755	-9.80	-7.58	3.01	0.17	-4.40	28.51	Pass
	159	5795	-9.94	-7.72	3.01	0.17	-4.54	28.51	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure and add 10 log (N_{ANT}) dB.
- Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.49\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.49 - 6) = 28.51\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

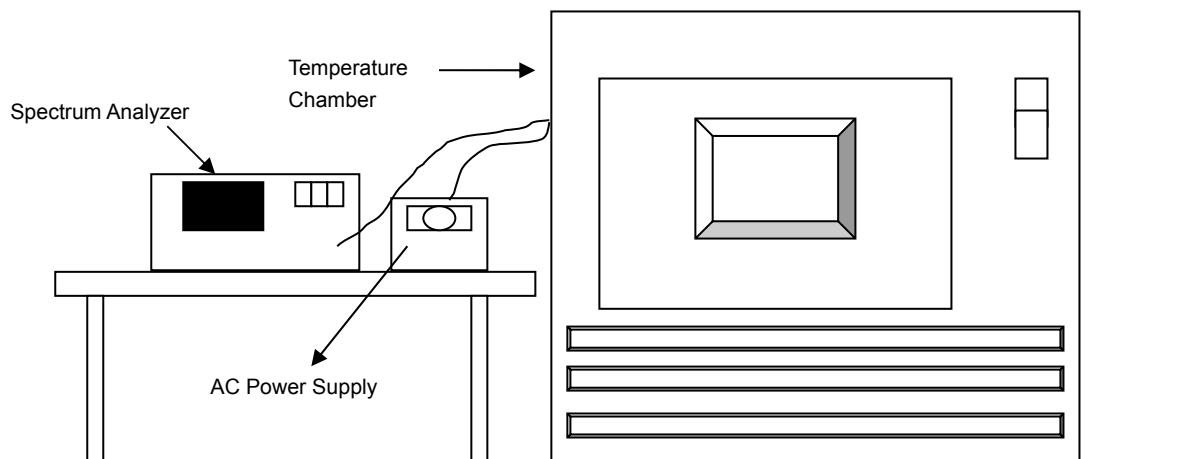


4.6 Frequency Stability

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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 23, 2019	Sep. 22, 2020
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 03, 2019	Jun. 02, 2020
Digital Multimeter Fluke	87-III	70360742	Jun. 28, 2019	Jun. 27, 2020
AC Power Supply Exttech	CFW-105	E000603	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- 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: 5190MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5189.9913	Pass	5189.9901	Pass	5189.9916	Pass	5189.9917	Pass
40	120	5189.9803	Pass	5189.9789	Pass	5189.9784	Pass	5189.9788	Pass
30	120	5189.9813	Pass	5189.9778	Pass	5189.9781	Pass	5189.9780	Pass
20	120	5189.9867	Pass	5189.9901	Pass	5189.9861	Pass	5189.9870	Pass
10	120	5190.0245	Pass	5190.0258	Pass	5190.0228	Pass	5190.0226	Pass
0	120	5189.9942	Pass	5189.9942	Pass	5189.9966	Pass	5189.9976	Pass
-10	120	5189.9985	Pass	5189.9964	Pass	5189.9999	Pass	5189.9992	Pass
-20	120	5190.0148	Pass	5190.0153	Pass	5190.0183	Pass	5190.0137	Pass
-30	120	5190.0226	Pass	5190.0228	Pass	5190.0227	Pass	5190.0196	Pass

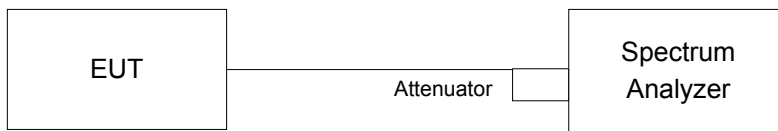
Frequency Stability Versus Voltage.									
Operating Frequency: 5190MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5189.9873	Pass	5189.9911	Pass	5189.9868	Pass	5189.9877	Pass
	120	5189.9867	Pass	5189.9901	Pass	5189.9861	Pass	5189.987	Pass
	102	5189.9875	Pass	5189.9891	Pass	5189.9864	Pass	5189.9864	Pass

4.7 6dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

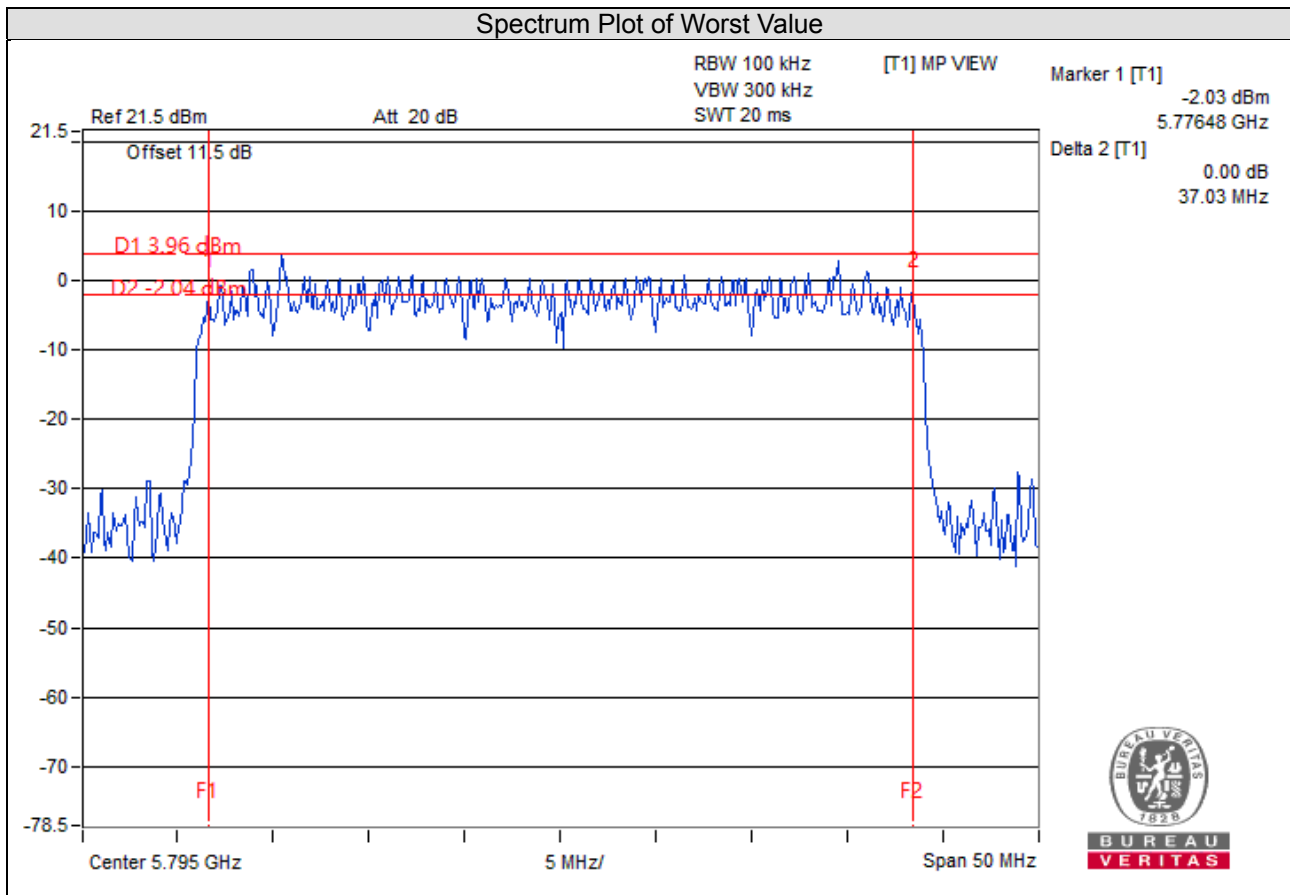
No deviation.

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

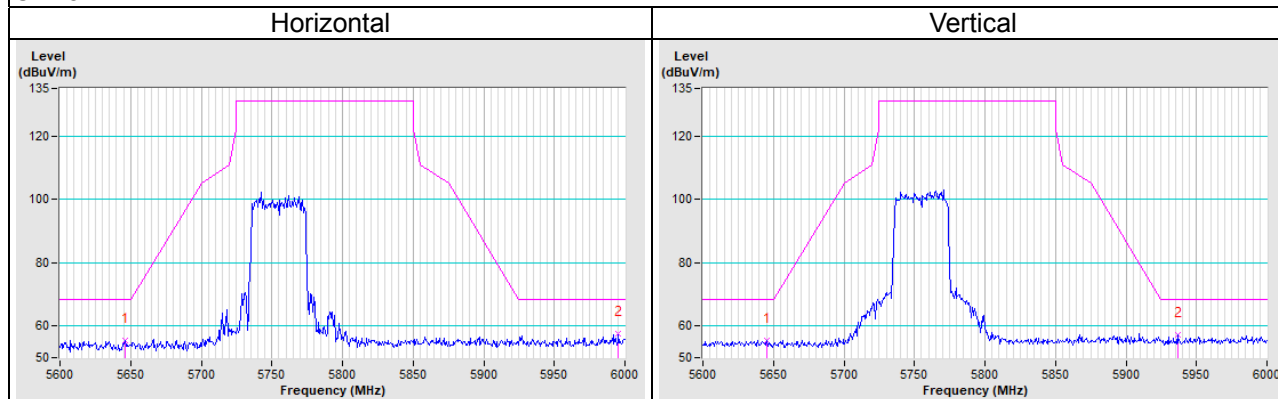
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	37.08	37.04	0.5	Pass
159	5795	37.03	37.05	0.5	Pass



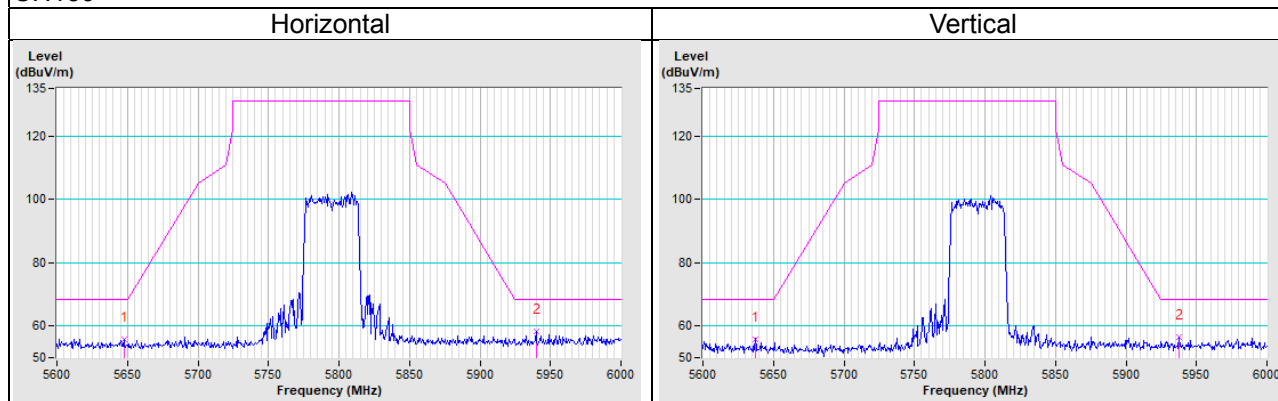
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

WHDI (40MHz)

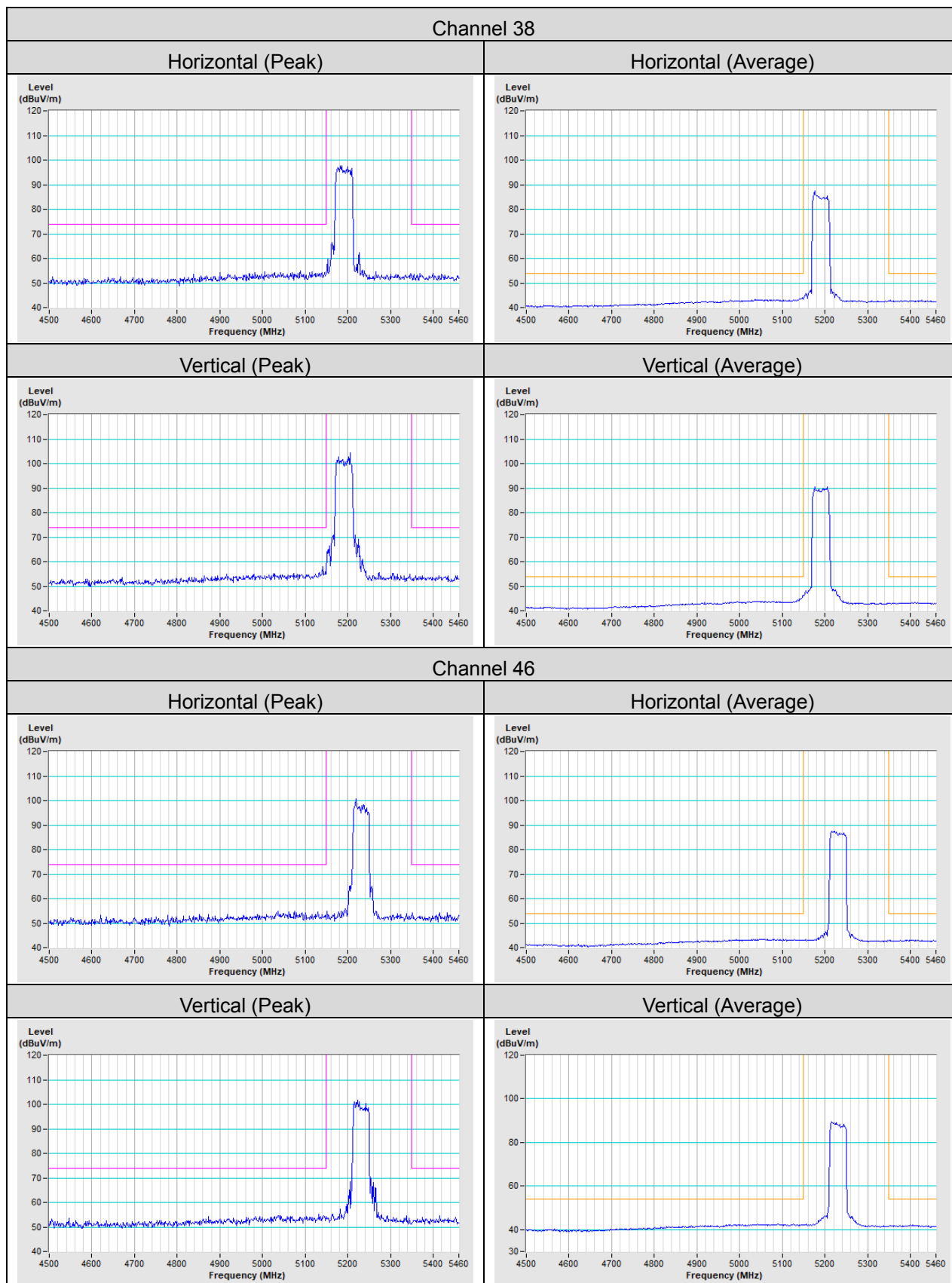
CH151

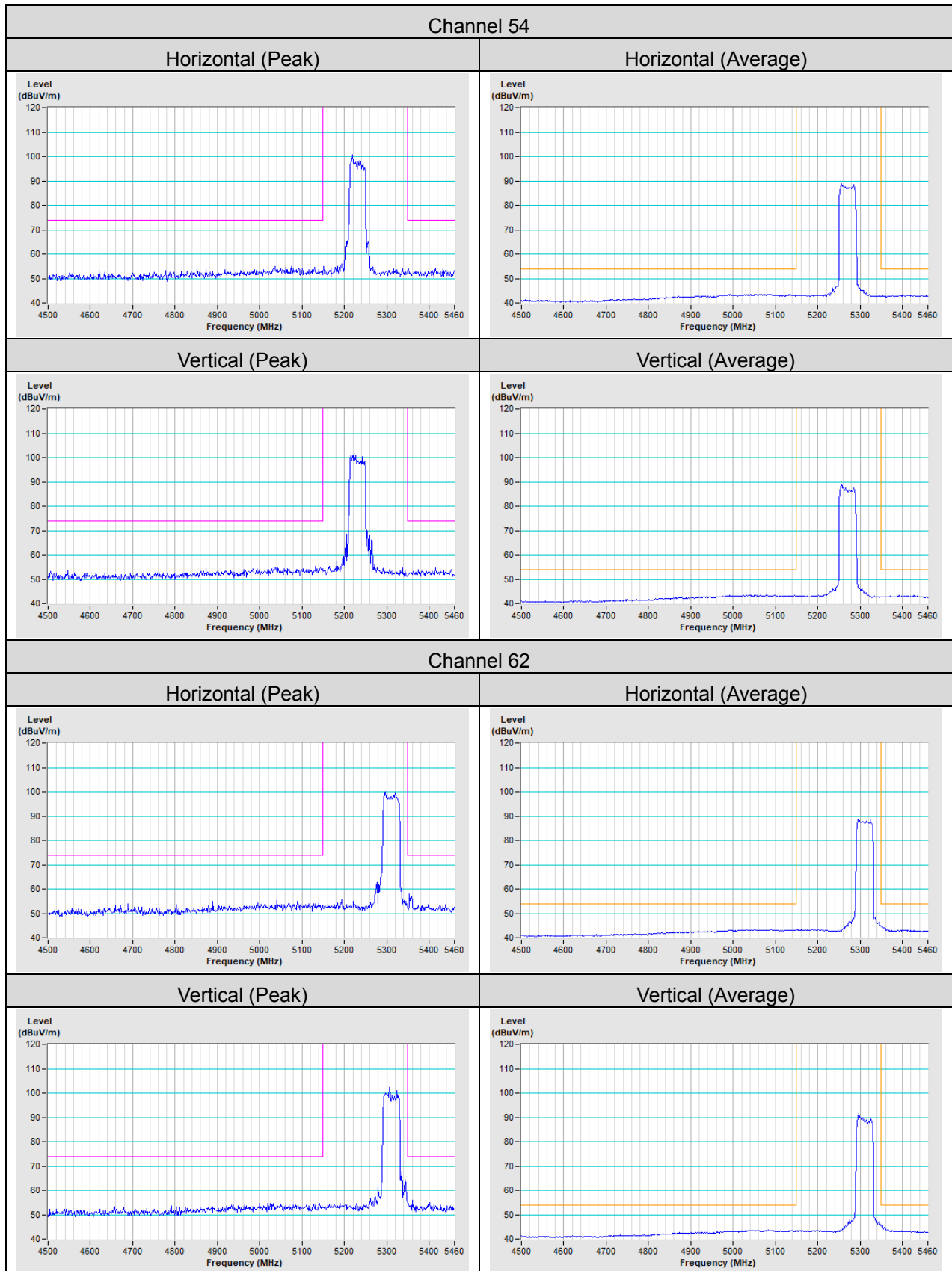


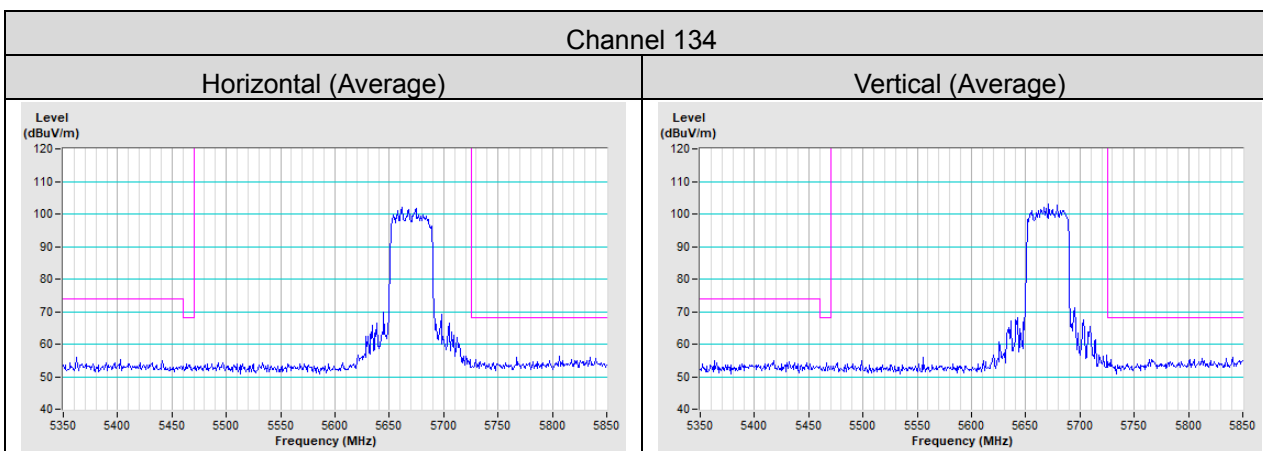
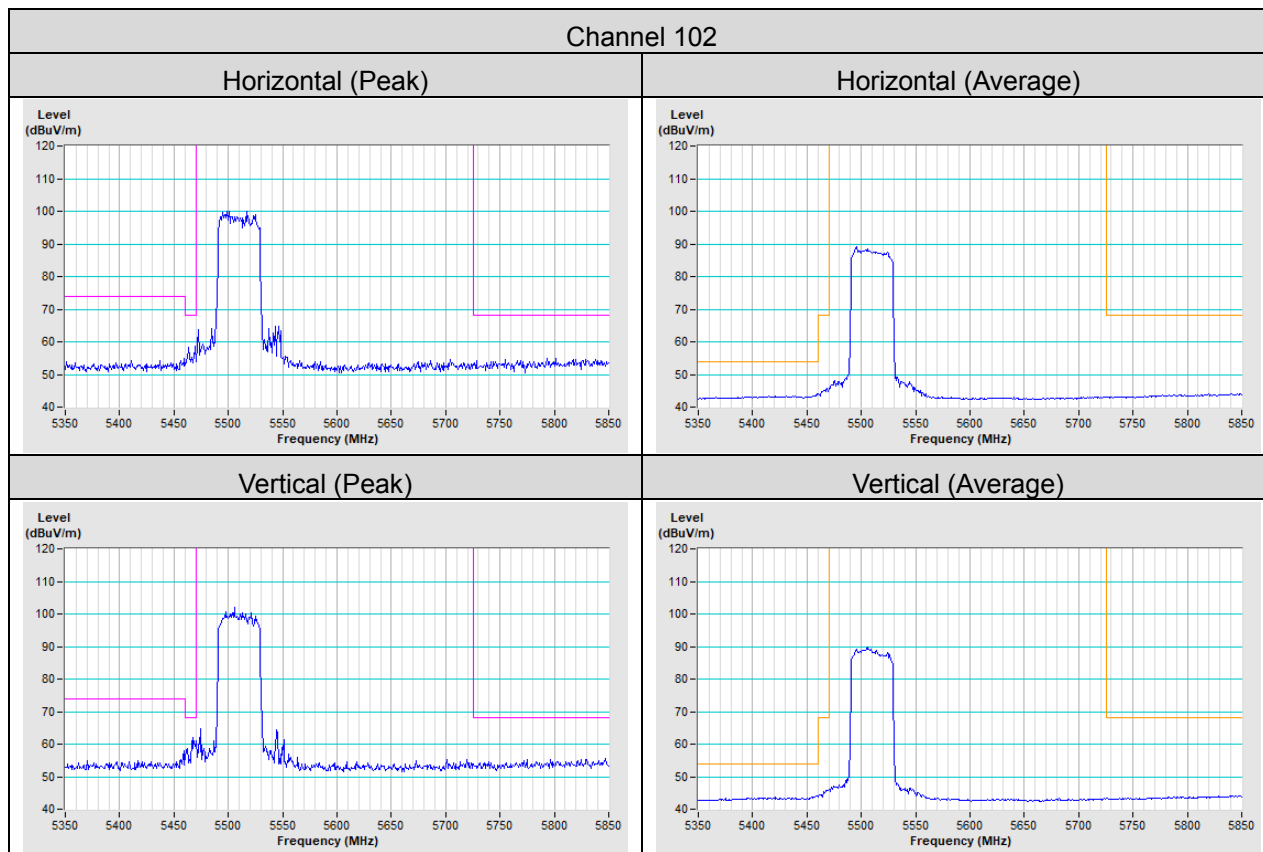
CH159



Annex B- Band Edge Measurement







5 Pictures of Test Arrangements

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

Appendix – Information of 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 FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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Web Site: www.bureauveritas-adt.com

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

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