FCC Test Report

Report No.:	RF110607C08J
FCC ID:	YG7RF31200M
Test Model:	WHD100T
Received Date:	Nov. 10, 2015
Test Date:	Nov. 26 ~ Dec. 25, 2015
Issued Date:	Dec. 28, 2015
Applicant:	Zinwell Corporation
Address:	7F., No. 512, Yuanshan Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF110607C08J	Original release	Dec. 28, 2015

1 Certificate of Conformity

Product:	Wireless HD Net Connect Transmitter
Brand:	ZINWELL
Test Model:	WHD100T
Sample Status:	Engineering sample
Applicant:	Zinwell Corporation
Test Date:	Nov. 06 ~ Dec. 15, 2015
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 EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Dec. 28, 2015

Polly Chien / Specialist

Approved by : _____ , **Date:** Dec. 28, 2015

Ken Liu / Senior 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 -20.48dB at 0.15391MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.7dB at 10540.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
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.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 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 HD Net Connect Transmitter
Brand	ZINWELL
Test Model	WHD100T
Status of EUT	Engineering sample
Power Supply Rating	5Vdc from adapter
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: 5.705mW 5270-5310MHz: 6.058mW 5510-5670MHz: 5.396mW 5755-5795MHz: 5.170mW
Antenna Type	TX: Chip antenna with 4.9dBi gain RX: Chip antenna with 6.2dBi gain
Antenna Connector	NA
Accessory Device	Adapter
Data Cable Supplied	0.45m shielded USB cable without core

Note:

1. This report is prepared for FCC class II permissive change.
2. This report is issued as a supplementary report to the original BV ADT report no.: RF110607C08H & RF110607C08H-1. The differences compared with original report are changing the following items. All test data had been re-tested.
   a. Adding two adapters (adapter 4 & 5).
   b. Updating remote controller's brand & model.
   c. Changing USB cable length and external appearance of the EUT.
   d. Updating standard to the latest version.
   e. Removing brand: GEFEN, Model: EXT-WHD-1080P-SRS
3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and one receiver.

Modulation Mode	TX Function	Support
WHDI (40MHz)	2TX	Nss=2

4. The EUT uses following adapters. (New adapters are adapter 4 and 5)

Adapter 1	
Brand	SINO-AMERICAN
Model	SA110C-05S-A
Input Power	100-240Vac, 50-60Hz, 0.3A
Output Power	5Vdc, 1.5A, 7.5W
Power Line	DC 1.5m shielded USB cable with one core

Adapter 2	
Brand	Asian Power Devices Inc.
Model	WA-10K05R
Input Power	100-240Vac, 50-60Hz, 0.3A Max.
Output Power	5Vdc, 2A

Adapter 3	
Brand	Asian Power Devices Inc.
Model	WA-10P05FU
Input Power	100-240Vac, 50-60Hz, 0.3A Max.
Output Power	5Vdc, 2A
Power Line	1.5m cable with one core attached on adapter

Adapter 4 (New)	
Brand	Asian Power Devices Inc.
Model	WB-10E05FU
Input Power	100-240Vac, 50-60Hz, 0.4A Max.
Output Power	5Vdc, 2A
Power Line	1.45m cable with one core attached on adapter

Adapter 5 (New)	
Brand	Asian Power Devices Inc.
Model	WB-10E05R
Input Power	100-240Vac, 50-60Hz, 0.4A Max.
Output Power	5Vdc, 2A

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
151	5755MHz
159	5795MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT + Adapter 4
B	-	√	√	-	EUT + Adapter 5

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: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
2. "-" means no effect.

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 TYPE	DATA RATE (Mbps)
A	WHDI (40MHz)	5190-5230	38 to 46	38, 46	OFDM	500
A		5270-5310	54 to 62	54, 62	OFDM	500
A		5510-5670	102 to 134	102, 110, 134	OFDM	500
A		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 TYPE	DATA RATE (Mbps)
A, B	WHDI (40MHz)	5190-5230	38 to 46	62	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 TYPE	DATA RATE (Mbps)
A, B	WHDI (40MHz)	5190-5230	38 to 46	62	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 TYPE	DATA RATE (Mbps)
A	WHDI (40MHz)	5190-5230	38 to 46	38, 46	OFDM	500
A		5270-5310	54 to 62	54, 62	OFDM	500
A		5510-5670	102 to 134	102, 110, 134	OFDM	500
A		5755-5795	151 to 159	151, 159	OFDM	500

Test Condition:

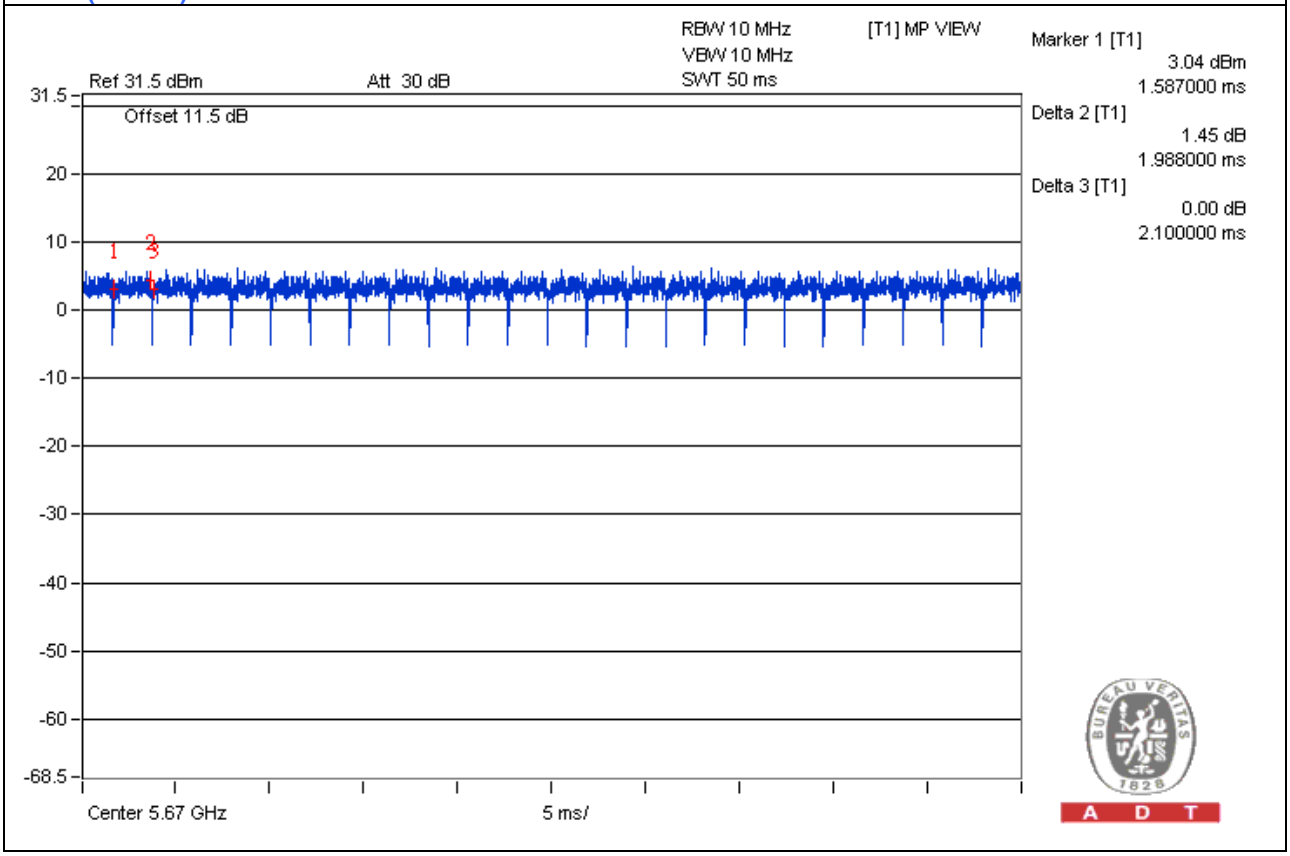
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Tank Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Tank Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 Duty Cycle of Test Signal

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

WHDI (40MHz): Duty cycle = 1.988/2.100= 0.947, Duty factor = 10 * log(1/0.947) = 0.24

WHDI (40MHz)



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.	Notebook	DELL	E5430	2RL3YW1	FCC DoC Approved	-

Note:

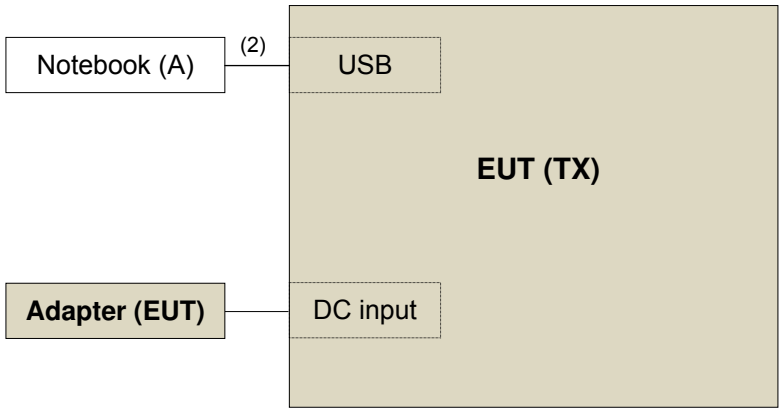
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.45	Y	0	Provided by manufacturer
2.	USB cable	1	0.1	Y	0	-

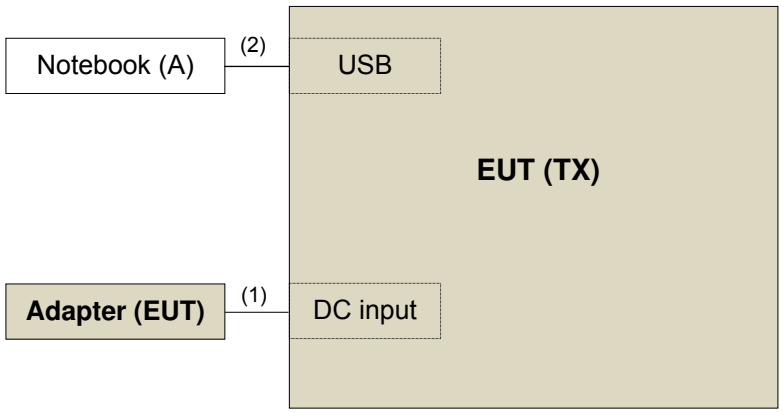
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



3.5 General Description of Applied Standards

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)

789033 D02 General UNII Test Procedures New Rules v01r02

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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 Procedures New Rules v01r02	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) [*1] PK:-17 (dBm/MHz) [*2]	PK: 68.2(dBμV/m) [*1] PK:78.2 (dBμV/m) [*2]

NOTE: [*1] beyond 10MHz of the band edge [*2] within 10 MHz of band edge

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 12, 2015	Oct. 11, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Mar. 30, 2015	Mar. 29, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Feb. 02, 2015	Feb. 01, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2015	Aug. 08, 2016
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02(309222 +248780)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-03(274092)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 11, 2015	Aug. 10, 2016
Software BV ADT	ADT_Radiated_V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

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 9.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 215374.
5. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

a. 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 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:

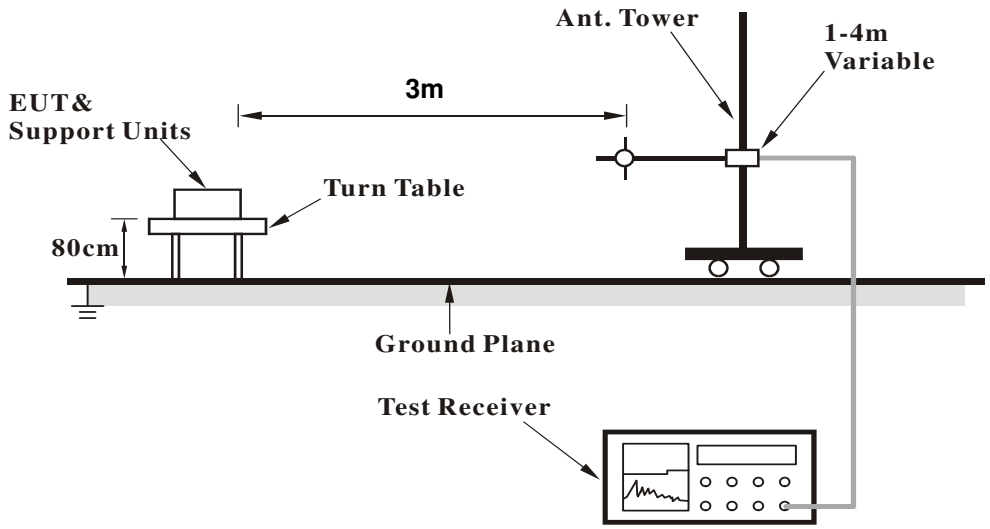
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

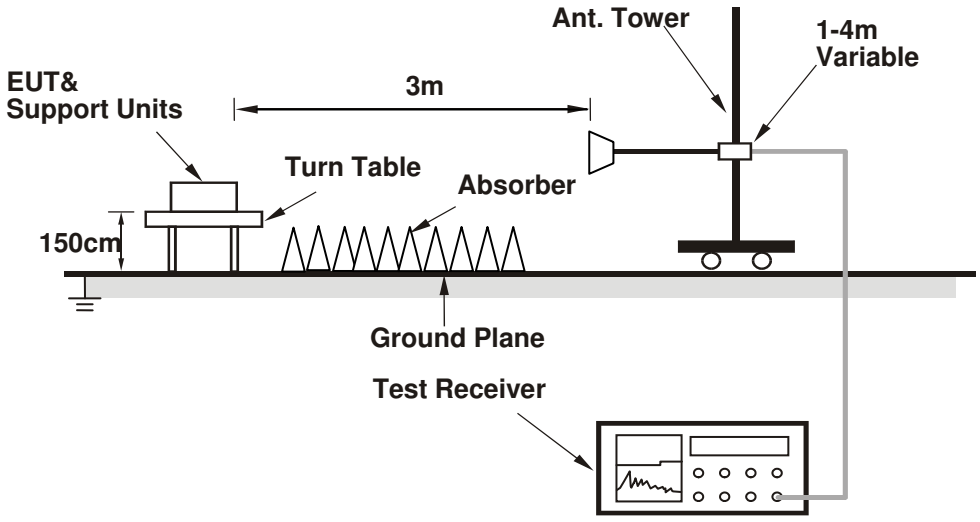
No deviation.

4.1.5 Test Set Up

<Frequency Range 30MHz ~ 1GHz>



<Frequency Range 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 connected with the notebook via USB cable.

b. The notebook ran a test program (provided by manufacturer) to enable 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	58.2 PK	74.0	-15.8	1.66 H	98	54.30	3.90
2	5150.00	45.7 AV	54.0	-8.3	1.66 H	98	41.80	3.90
3	*5190.00	94.0 PK			2.60 H	237	52.50	41.50
4	*5190.00	80.7 AV			2.60 H	237	39.20	41.50
5	#10380.00	64.8 PK	74.0	-9.2	2.55 H	217	49.40	15.40
6	#10380.00	50.4 AV	54.0	-3.6	2.55 H	217	35.00	15.40
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	59.7 PK	74.0	-14.3	1.22 V	220	55.80	3.90
2	5150.00	46.7 AV	54.0	-7.3	1.22 V	220	42.80	3.90
3	*5190.00	98.8 PK			1.51 V	260	57.30	41.50
4	*5190.00	85.1 AV			1.51 V	260	43.60	41.50
5	#10380.00	62.9 PK	74.0	-11.1	1.99 V	141	47.50	15.40
6	#10380.00	49.0 AV	54.0	-5.0	1.99 V	141	33.60	15.40

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	*5230.00	92.4 PK			1.73 H	239	50.80	41.60
2	*5230.00	78.7 AV			1.73 H	239	37.10	41.60
3	5350.00	58.2 PK	74.0	-15.8	1.55 H	106	54.20	4.00
4	5350.00	46.0 AV	54.0	-8.0	1.55 H	106	42.00	4.00
5	#10460.00	63.7 PK	74.0	-10.3	2.57 H	216	48.20	15.50
6	#10460.00	50.0 AV	54.0	-4.0	2.57 H	216	34.50	15.50
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	*5230.00	98.1 PK			1.01 V	326	56.50	41.60
2	*5230.00	84.9 AV			1.01 V	326	43.30	41.60
3	5350.00	59.2 PK	74.0	-14.8	1.26 V	96	55.20	4.00
4	5350.00	46.6 AV	54.0	-7.4	1.26 V	96	42.60	4.00
5	#10460.00	61.6 PK	74.0	-12.4	2.22 V	55	46.10	15.50
6	#10460.00	48.9 AV	54.0	-5.1	2.22 V	55	33.40	15.50

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	58.4 PK	74.0	-15.6	1.47 H	79	54.50	3.90
2	5150.00	45.9 AV	54.0	-8.1	1.47 H	79	42.00	3.90
3	*5270.00	93.4 PK			1.52 H	173	51.70	41.70
4	*5270.00	79.1 AV			1.52 H	173	37.40	41.70
5	#10540.00	65.6 PK	74.0	-8.4	2.17 H	241	49.80	15.80
6	**#10540.00**	**51.3 AV**	**54.0**	**-2.7**	**2.17 H**	**241**	**35.50**	**15.80**
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	58.7 PK	74.0	-15.3	1.28 V	185	54.80	3.90
2	5150.00	45.9 AV	54.0	-8.1	1.28 V	185	42.00	3.90
3	*5270.00	100.3 PK			1.39 V	274	58.60	41.70
4	*5270.00	86.4 AV			1.39 V	274	44.70	41.70
5	#10540.00	64.1 PK	74.0	-9.9	1.72 V	138	48.30	15.80
6	#10540.00	49.9 AV	54.0	-4.1	1.72 V	138	34.10	15.80

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	93.3 PK			1.32 H	173	51.60	41.70
2	*5310.00	79.4 AV			1.32 H	173	37.70	41.70
3	#5350.00	59.2 PK	74.0	-14.8	1.51 H	103	55.20	4.00
4	#5350.00	46.1 AV	54.0	-7.9	1.51 H	103	42.10	4.00
5	#10620.00	64.7 PK	74.0	-9.3	2.52 H	212	48.80	15.90
6	#10620.00	50.1 AV	54.0	-3.9	2.52 H	212	34.20	15.90
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	99.1 PK			1.09 V	219	57.40	41.70
2	*5310.00	85.3 AV			1.09 V	219	43.60	41.70
3	#5350.00	59.9 PK	74.0	-14.1	1.65 V	209	55.90	4.00
4	#5350.00	46.4 AV	54.0	-7.6	1.65 V	209	42.40	4.00
5	#10620.00	62.8 PK	74.0	-11.2	1.48 V	150	46.90	15.90
6	#10620.00	49.0 AV	54.0	-5.0	1.48 V	150	33.10	15.90

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	59.8 PK	74.0	-14.2	1.61 H	139	55.90	3.90
2	5460.00	46.1 AV	54.0	-7.9	1.61 H	139	42.20	3.90
3	#5470.00	59.7 PK	74.0	-14.3	1.66 H	152	55.80	3.90
4	#5470.00	46.2 AV	54.0	-7.8	1.66 H	152	42.30	3.90
5	*5510.00	96.5 PK			2.67 H	230	54.90	41.60
6	*5510.00	82.5 AV			2.67 H	230	40.90	41.60
7	11020.00	64.8 PK	74.0	-9.2	1.81 H	185	47.90	16.90
8	11020.00	49.7 AV	54.0	-4.3	1.81 H	185	32.80	16.90
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	58.6 PK	74.0	-15.4	1.47 V	190	54.70	3.90
2	5460.00	46.1 AV	54.0	-7.9	1.47 V	190	42.20	3.90
3	#5470.00	60.5 PK	74.0	-13.5	1.45 V	218	56.60	3.90
4	#5470.00	46.8 AV	54.0	-7.2	1.45 V	218	42.90	3.90
5	*5510.00	100.0 PK			1.48 V	273	58.40	41.60
6	*5510.00	86.2 AV			1.48 V	273	44.60	41.60
7	11020.00	62.1 PK	74.0	-11.9	1.03 V	305	45.20	16.90
8	11020.00	48.8 AV	54.0	-5.2	1.03 V	305	31.90	16.90

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	96.0 PK			2.69 H	229	54.30	41.70
2	*5550.00	82.1 AV			2.69 H	229	40.40	41.70
3	11100.00	63.1 PK	74.0	-10.9	2.59 H	210	47.30	15.80
4	11100.00	49.2 AV	54.0	-4.8	2.59 H	210	33.40	15.80
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	99.8 PK			1.23 V	274	58.10	41.70
2	*5550.00	85.8 AV			1.23 V	274	44.10	41.70
3	11100.00	61.3 PK	74.0	-12.7	1.25 V	314	45.50	15.80
4	11100.00	48.5 AV	54.0	-5.5	1.25 V	314	32.70	15.80

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	94.2 PK			2.48 H	232	52.20	42.00
2	*5670.00	81.1 AV			2.48 H	232	39.10	42.00
3	#5725.00	58.3 PK	74.0	-15.7	1.39 H	109	53.90	4.40
4	#5725.00	44.6 AV	54.0	-9.4	1.39 H	109	40.20	4.40
5	11340.00	62.2 PK	74.0	-11.8	1.29 H	242	45.40	16.80
6	11340.00	49.1 AV	54.0	-4.9	1.29 H	242	32.30	16.80
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	99.7 PK			1.21 V	262	57.70	42.00
2	*5670.00	85.8 AV			1.21 V	262	43.80	42.00
3	#5725.00	57.9 PK	74.0	-16.1	1.44 V	206	53.50	4.40
4	#5725.00	45.4 AV	54.0	-8.6	1.44 V	206	41.00	4.40
5	11340.00	62.2 PK	74.0	-11.8	1.07 V	299	45.40	16.80
6	11340.00	48.6 AV	54.0	-5.4	1.07 V	299	31.80	16.80

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	#5714.90	58.5 PK	74.0	-15.5	1.43 H	301	54.10	4.40
2	#5714.90	45.2 AV	54.0	-8.8	1.43 H	301	40.80	4.40
3	#5722.90	59.2 PK	78.2	-19.0	1.33 H	317	54.80	4.40
4	#5725.00	45.6 PK	78.2	-32.6	1.31 H	328	41.20	4.40
5	*5755.00	94.2 PK			3.24 H	344	52.00	42.20
6	*5755.00	80.4 AV			3.24 H	344	38.20	42.20
7	11510.00	59.9 PK	74.0	-14.1	1.50 H	223	44.70	15.20
8	11510.00	47.4 AV	54.0	-6.6	1.50 H	223	32.20	15.20
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	#5714.90	59.4 PK	74.0	-14.6	1.25 V	331	55.00	4.40
2	#5714.90	45.5 AV	54.0	-8.5	1.25 V	331	41.10	4.40
3	#5722.90	63.3 PK	78.2	-14.9	1.18 V	329	58.90	4.40
4	#5725.00	50.7 PK	78.2	-27.5	1.14 V	332	46.30	4.40
5	*5755.00	95.7 PK			1.38 V	208	53.50	42.20
6	*5755.00	82.9 AV			1.38 V	208	40.70	42.20
7	11510.00	59.6 PK	74.0	-14.4	1.82 V	175	44.40	15.20
8	11510.00	46.4 AV	54.0	-7.6	1.82 V	175	31.20	15.20

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	*5795.00	95.8 PK			3.31 H	249	53.50	42.30
2	*5795.00	81.7 AV			3.31 H	249	39.40	42.30
3	#5850.00	46.4 PK	78.2	-31.8	1.52 H	282	41.70	4.70
4	#5852.10	58.9 PK	78.2	-19.3	1.50 H	266	54.20	4.70
5	#5860.10	59.0 PK	74.0	-15.0	1.42 H	271	54.30	4.70
6	#5860.10	46.0 AV	54.0	-8.0	1.42 H	271	41.30	4.70
7	11590.00	59.8 PK	74.0	-14.2	1.77 H	139	44.70	15.10
8	11590.00	47.1 AV	54.0	-6.9	1.77 H	139	32.00	15.10
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	*5795.00	98.3 PK			1.02 V	246	56.00	42.30
2	*5795.00	84.0 AV			1.02 V	246	41.70	42.30
3	#5850.00	45.9 PK	78.2	-32.3	1.34 V	153	41.20	4.70
4	#5852.10	59.3 PK	78.2	-18.9	1.33 V	143	54.60	4.70
5	#5860.10	59.5 PK	74.0	-14.5	1.18 V	159	54.80	4.70
6	#5860.10	45.9 AV	54.0	-8.1	1.18 V	159	41.20	4.70
7	11590.00	59.2 PK	74.0	-14.8	1.81 V	174	44.10	15.10
8	11590.00	46.5 AV	54.0	-7.5	1.81 V	174	31.40	15.10

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

Below 1GHz worst-case data:

CHANNEL	TX Channel 62	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	31.94	29.5 QP	40.0	-10.5	1.49 H	27	45.70	-16.20
2	53.28	20.6 QP	40.0	-19.4	1.00 H	34	34.70	-14.10
3	156.10	24.3 QP	43.5	-19.2	2.00 H	94	38.10	-13.80
4	198.78	25.9 QP	43.5	-17.6	1.24 H	259	42.40	-16.50
5	503.36	32.7 QP	46.0	-13.3	1.49 H	135	40.70	-8.00
6	557.68	33.3 QP	46.0	-12.7	1.24 H	153	40.40	-7.10
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	32.58	29.2 QP	40.0	-10.8	1.00 V	168	45.30	-16.10
2	53.28	26.8 QP	40.0	-13.2	1.24 V	15	40.90	-14.10
3	80.44	30.4 QP	40.0	-9.6	1.00 V	50	49.10	-18.70
4	158.04	25.9 QP	43.5	-17.6	1.00 V	206	39.60	-13.70
5	458.74	32.9 QP	46.0	-13.1	1.24 V	345	41.90	-9.00
6	547.98	31.5 QP	46.0	-14.5	1.00 V	167	38.80	-7.30

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 62	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	30.00	28.3 QP	40.0	-11.7	1.00 H	4	43.90	-15.60
2	80.44	21.9 QP	40.0	-18.1	1.26 H	57	40.60	-18.70
3	167.74	30.7 QP	43.5	-12.8	1.50 H	297	44.60	-13.90
4	220.12	29.2 QP	46.0	-16.8	1.00 H	120	45.30	-16.10
5	301.60	26.7 QP	46.0	-19.3	1.00 H	242	39.00	-12.30
6	518.88	35.2 QP	46.0	-10.8	1.50 H	159	43.00	-7.80
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	34.40	29.5 QP	40.0	-10.5	1.00 V	1	45.10	-15.60
2	53.28	27.5 QP	40.0	-12.5	1.24 V	105	41.60	-14.10
3	72.68	26.9 QP	40.0	-13.1	2.00 V	116	43.80	-16.90
4	117.30	28.4 QP	43.5	-15.1	2.00 V	122	44.80	-16.40
5	163.86	30.2 QP	43.5	-13.3	1.00 V	233	44.00	-13.80
6	513.06	34.5 QP	46.0	-11.5	1.00 V	241	42.40	-7.90

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	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-2040.

4.2.3 Test Procedures

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.

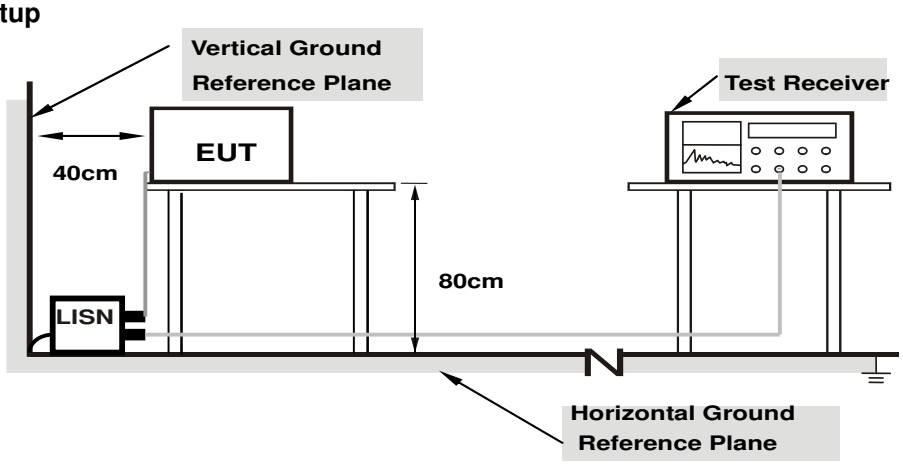
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: 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.

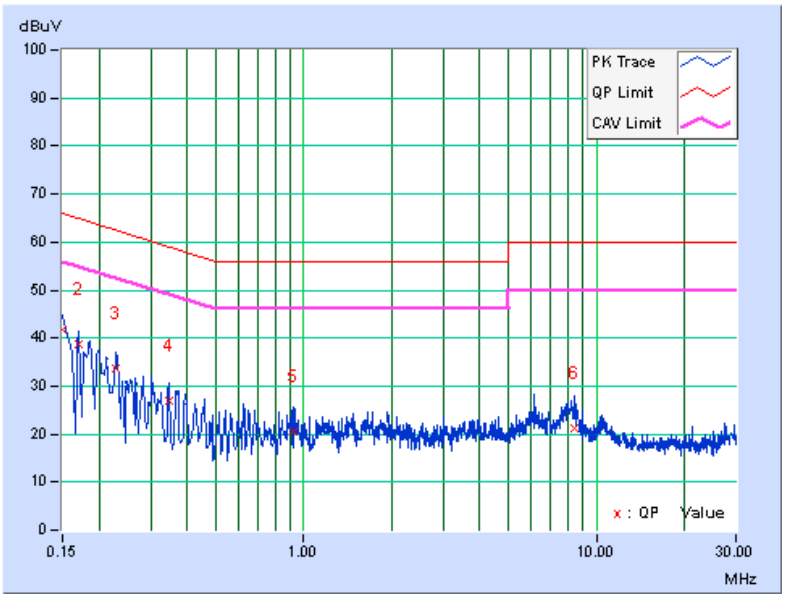
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.82	31.90	21.46	41.72	31.28	66.00	56.00	-24.28	-24.72
2	0.16955	9.83	28.82	14.47	38.65	24.30	64.98	54.98	-26.33	-30.68
3	0.22851	9.85	23.78	15.37	33.63	25.22	62.50	52.50	-28.88	-27.29
4	0.34560	9.87	17.12	3.23	26.99	13.10	59.07	49.07	-32.08	-35.97
5	0.92809	9.92	10.54	3.24	20.46	13.16	56.00	46.00	-35.54	-32.84
6	8.46657	10.41	10.86	2.55	21.27	12.96	60.00	50.00	-38.73	-37.04

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.

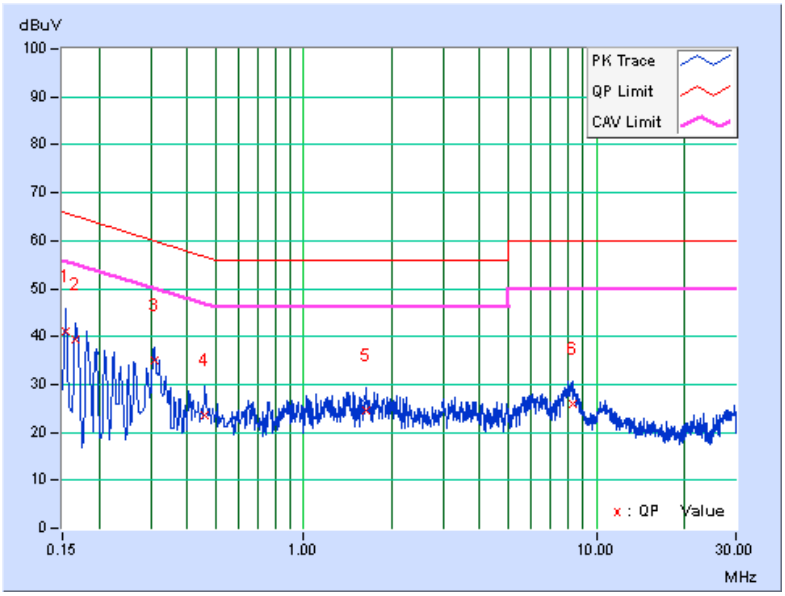


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.82	31.30	22.16	41.12	31.98	65.79	55.79	-24.67	-23.81
2	0.16569	9.82	29.66	15.40	39.48	25.22	65.17	55.17	-25.69	-29.95
3	0.30777	9.86	25.22	15.05	35.08	24.91	60.03	50.03	-24.95	-25.12
4	0.45889	9.88	13.71	8.23	23.59	18.11	56.71	46.71	-33.12	-28.60
5	1.63971	9.97	14.70	7.85	24.67	17.82	56.00	46.00	-31.33	-28.18
6	8.30626	10.38	15.54	8.34	25.92	18.72	60.00	50.00	-34.08	-31.28

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.

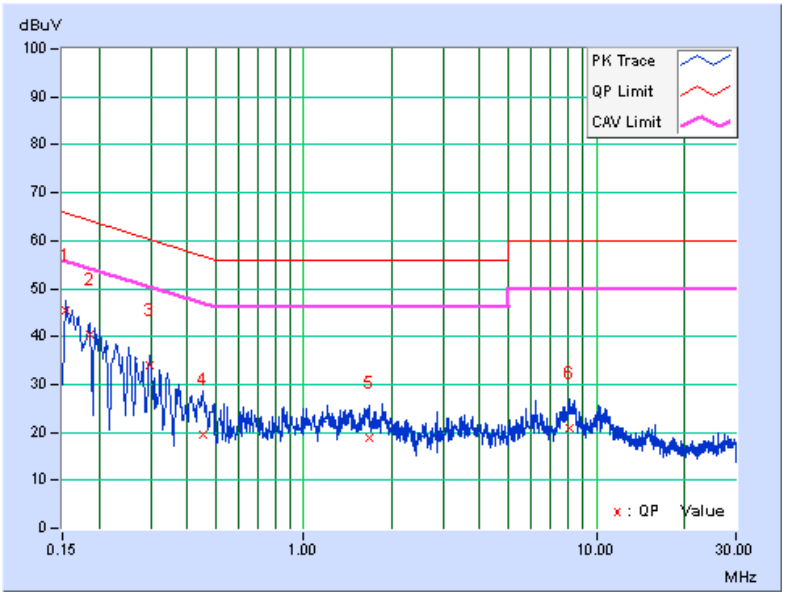


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15391**	**9.82**	**35.48**	**25.32**	**45.30**	**35.14**	**65.79**	**55.79**	**-20.48**	**-20.64**
2	0.18508	9.83	30.50	15.74	40.33	25.57	64.25	54.25	-23.92	-28.68
3	0.29858	9.86	24.06	12.12	33.92	21.98	60.28	50.28	-26.36	-28.30
4	0.45107	9.88	9.59	3.61	19.47	13.49	56.86	46.86	-37.38	-33.36
5	1.67502	9.98	8.96	3.33	18.94	13.31	56.00	46.00	-37.06	-32.69
6	8.07567	10.39	10.49	3.38	20.88	13.77	60.00	50.00	-39.12	-36.23

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.

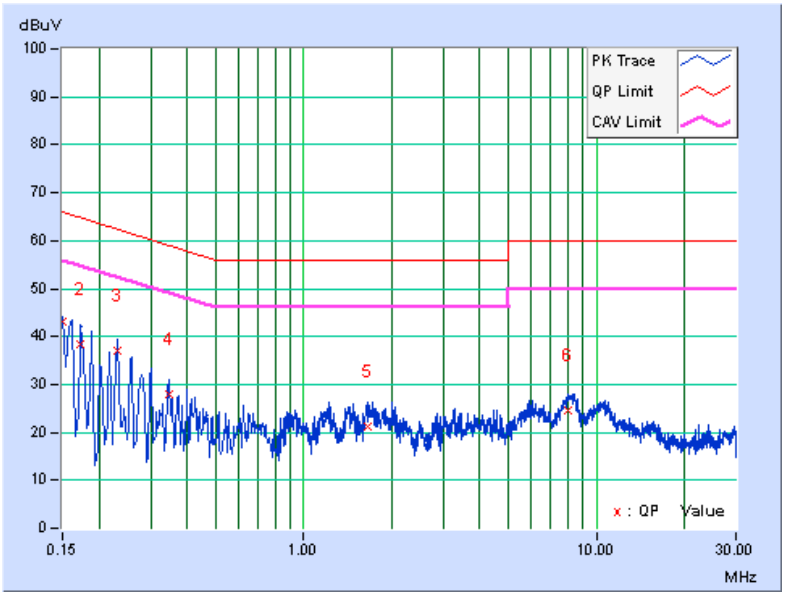


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.82	33.36	21.70	43.18	31.52	66.00	56.00	-22.82	-24.48
2	0.17346	9.82	28.66	12.88	38.48	22.70	64.79	54.79	-26.31	-32.09
3	0.23211	9.84	27.33	18.03	37.17	27.87	62.37	52.37	-25.21	-24.51
4	0.34550	9.87	17.94	8.47	27.81	18.34	59.07	49.07	-31.26	-30.73
5	1.65926	9.97	11.13	4.30	21.10	14.27	56.00	46.00	-34.90	-31.73
6	8.03322	10.37	14.12	6.96	24.49	17.33	60.00	50.00	-35.51	-32.67

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 ≦ 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

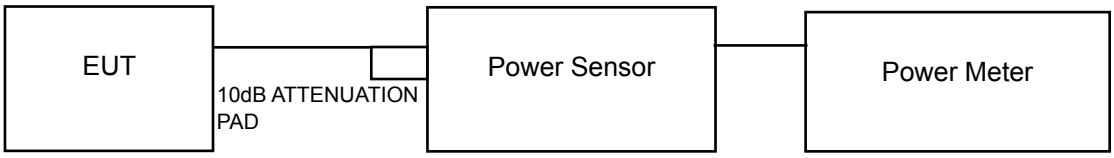
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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 $N_{ANT} \geq 5$.

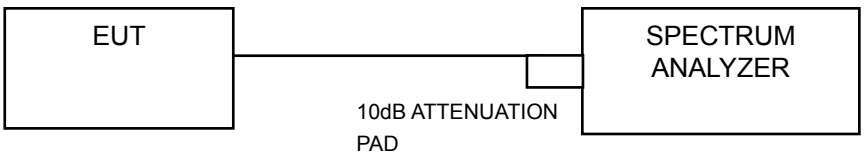
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

For Power Output Measurement



For 26dB and Occupied 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. Duty factor is not added to measured value.

For Occupied Bandwidth

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.

4.3.5 Deviation fromTest 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 Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	3.92	5.02	5.643	7.52	24	Pass
46	5230	3.72	5.25	**5.705**	7.56	24	Pass
54	5270	3.53	5.31	5.650	7.52	24	Pass
62	5310	3.43	5.86	**6.058**	7.82	24	Pass
102	5510	2.82	5.30	5.302	7.24	24	Pass
110	5550	2.80	5.43	**5.396**	7.32	24	Pass
134	5670	3.01	5.25	5.350	7.28	24	Pass
151	5755	2.69	5.02	5.035	7.02	30	Pass
159	5795	2.62	5.24	**5.170**	7.13	30	Pass

NOTE:

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

Chain 0

1. 11dBm + 10log(40.49) = 27.07 dBm > 24dBm.
2. 11dBm + 10log(40.55) = 27.08 dBm > 24dBm.
3. 11dBm + 10log(40.55) = 27.08 dBm > 24dBm.
4. 11dBm + 10log(40.56) = 27.08 dBm > 24dBm.
5. 11dBm + 10log(40.39) = 27.06 dBm > 24dBm.

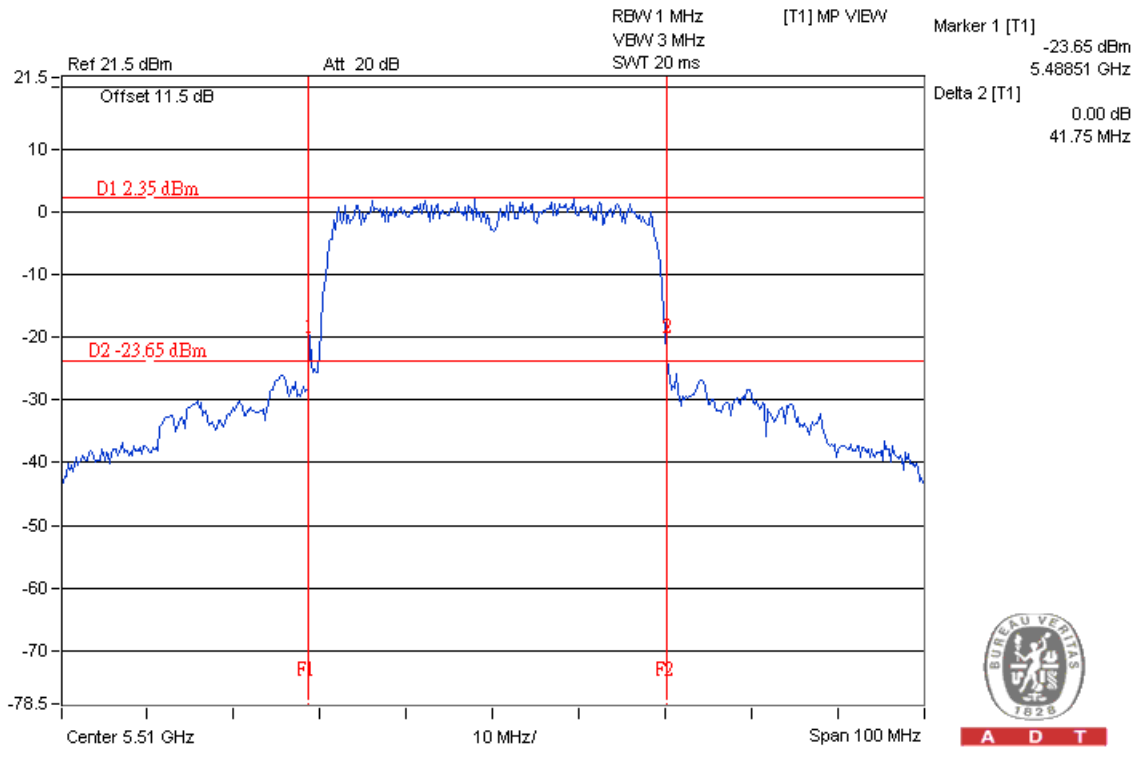
Chain 1

1. 11dBm + 10log(40.53) = 27.08 dBm > 24dBm.
2. 11dBm + 10log(40.85) = 27.11 dBm > 24dBm.
3. 11dBm + 10log(41.75) = 27.21 dBm > 24dBm.
4. 11dBm + 10log(40.68) = 27.09 dBm > 24dBm.
5. 11dBm + 10log(40.42) = 27.07 dBm > 24dBm.

26dB BANDWIDTH:

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
38	5190	40.57	41.02	Pass
46	5230	40.53	40.70	Pass
54	5270	40.49	40.53	Pass
62	5310	40.55	40.85	Pass
102	5510	40.55	41.75	Pass
110	5550	40.56	40.68	Pass
134	5670	40.39	40.42	Pass

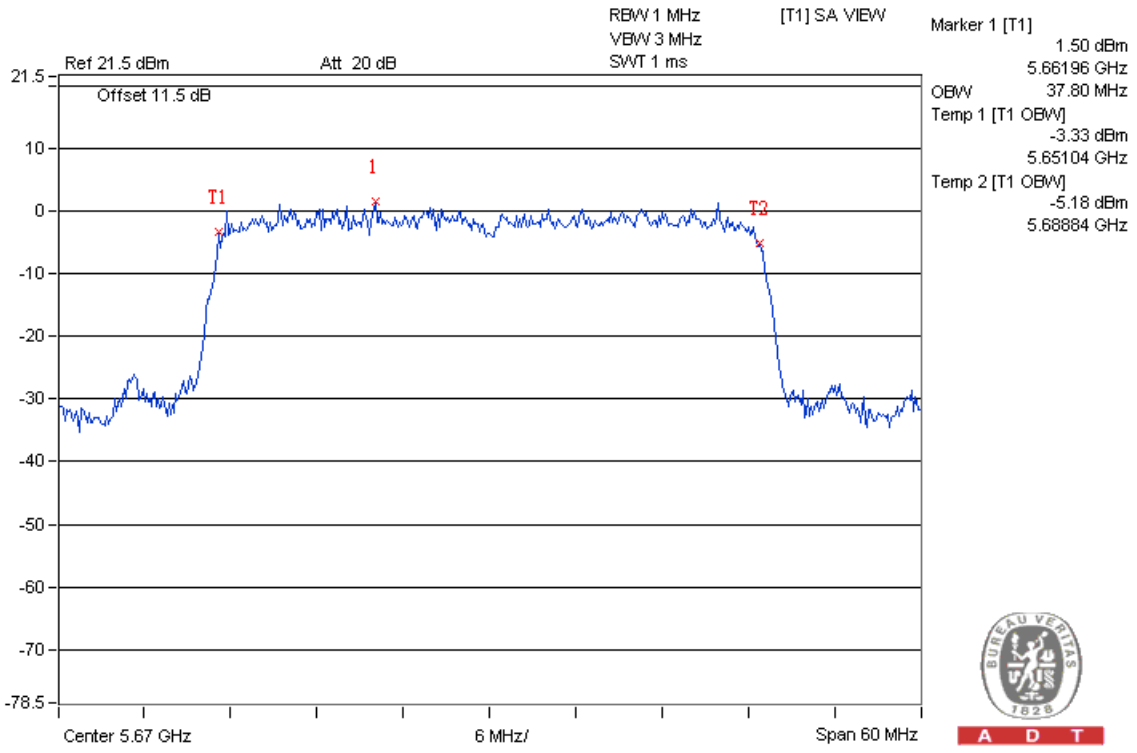
Spectrum Plot of Worst Value



OCCUPIED BANDWIDTH:

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	37.68	37.68
46	5230	37.68	37.68
54	5270	37.56	37.68
62	5310	37.56	37.68
102	5510	37.56	37.68
110	5550	37.56	37.68
134	5670	37.68	37.80
151	5755	37.57	37.65
159	5795	37.68	37.68

Spectrum Plot of Worst Value



EUT MAXIMUM CONDUCTED POWER

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	6.058	7.82
5470~5725	5.396	7.32

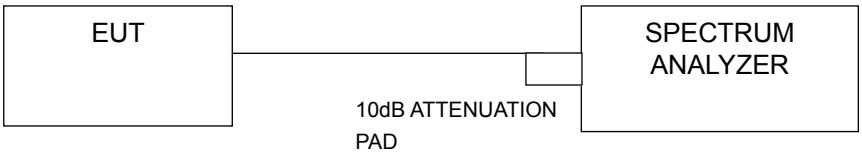
NOTE: Manufacturer provides Transmit Power Control description to meet this requirement.

4.4 Peak Power Spectral Density Measurement

4.4.1 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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

Using method SA-2
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) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

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 and add 10 log (1/duty cycle)

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

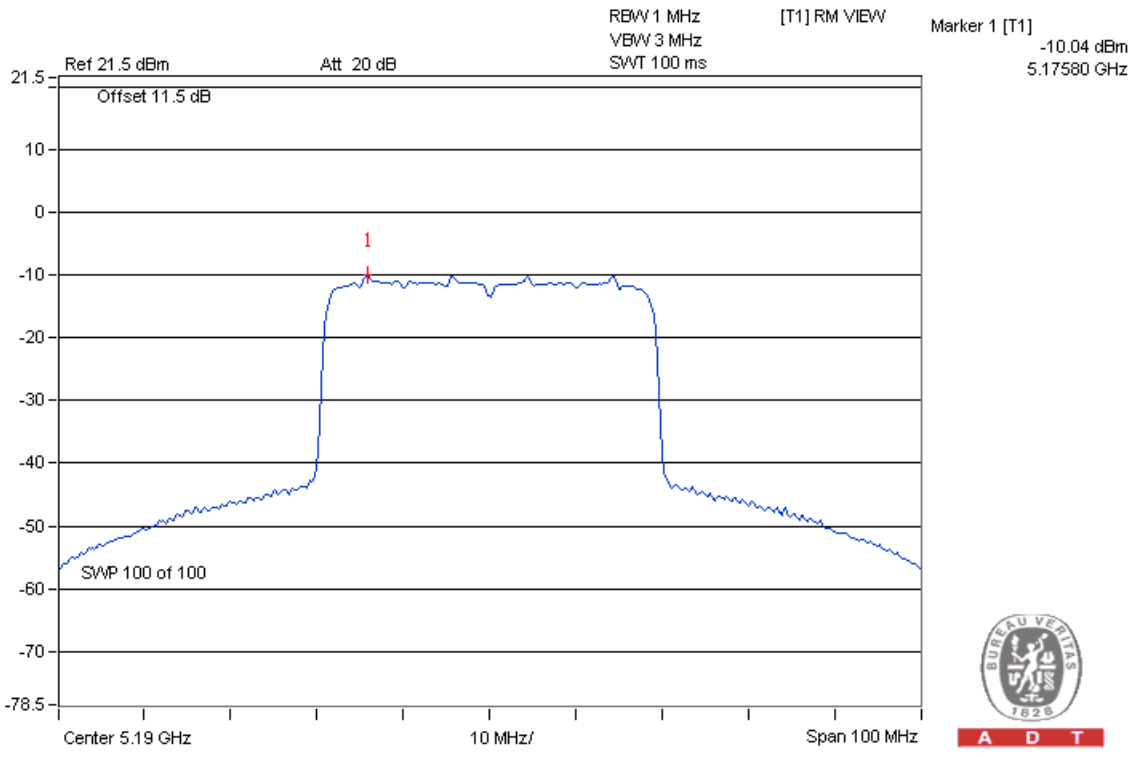
4.4.7 Test Results

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

Chan.	Freq. (MHz)	PSD (dBm)		Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1					
38	5190	-13.37	-10.04	-8.39	0.24	-8.15	11	Pass
46	5230	-13.50	-10.23	-8.56	0.24	-8.32	11	Pass
54	5270	-13.71	-10.37	-8.72	0.24	-8.48	11	Pass
62	5310	-13.94	-10.31	-8.75	0.24	-8.51	11	Pass
102	5510	-14.78	-10.79	-9.33	0.24	-9.09	11	Pass
110	5550	-14.74	-10.77	-9.31	0.24	-9.07	11	Pass
134	5670	-14.41	-10.91	-9.31	0.24	-9.07	11	Pass

Note:
1. Method 1 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.
2. The transmit signals are completely uncorrelated, Directional gain= 4.9dBi, so the power density limit dose not reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value
Ch 38 / Chain 1



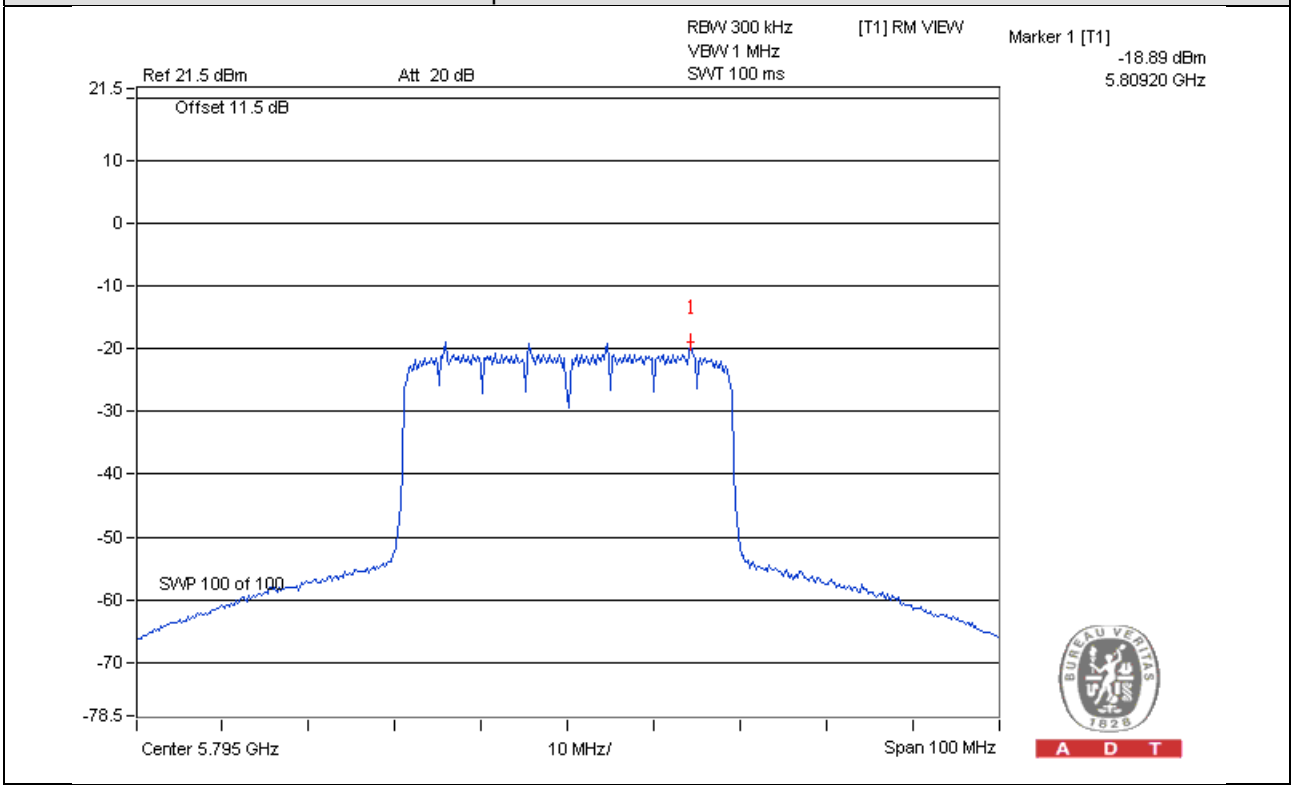
For U-NII-3 Band

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	151	5755	-22.26	-20.04	3.01	0.24	-16.79	30	Pass
	159	5795	-22.19	-19.97	3.01	0.24	-16.72	30	Pass
1	151	5755	-19.05	-16.83	3.01	0.24	-13.58	30	Pass
	159	5795	-18.89	-16.67	3.01	0.24	-13.42	30	Pass

Note:

1. Method 1 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.
2. The transmit signals are completely uncorrelated, Directional gain= 4.9dBi, so the power density limit dose not reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

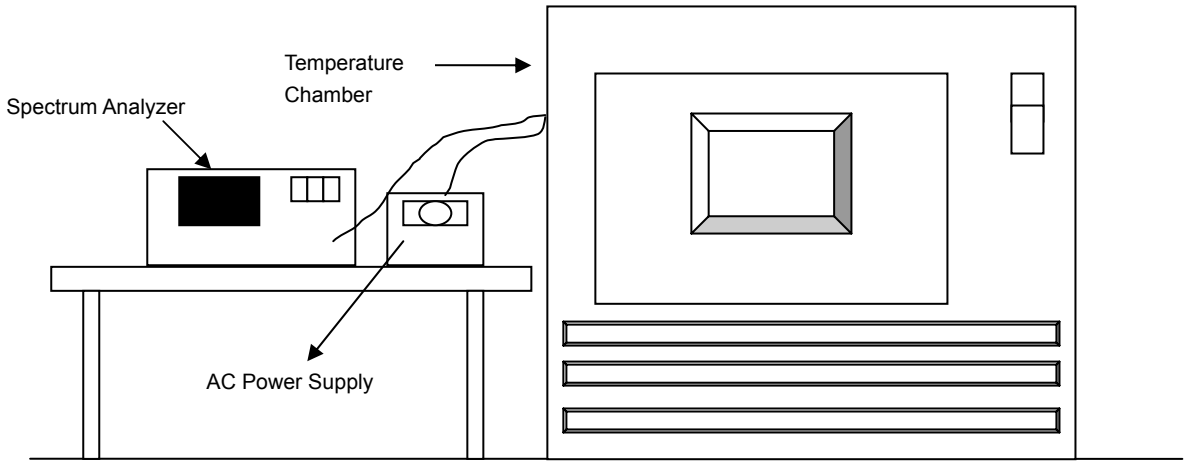


4.5 Frequency Stability

4.5.1 Limits of Frequency Stability Measurement

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

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

a. The EUT was placed inside the environmental test chamber and powered by nominal AC 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.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5190MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5189.9769	-0.00045	5189.9799	-0.00039	5189.9795	-0.00039	5189.9793	-0.00040
40	120	5190.0000	0.00000	5189.999	-0.00002	5190.0012	0.00002	5190.0017	0.00003
30	120	5189.9969	-0.00006	5190.0005	0.00001	5189.9978	-0.00004	5189.9978	-0.00004
20	120	5190.0049	0.00009	5190.0047	0.00009	5190.0078	0.00015	5190.0033	0.00006
10	120	5190.0029	0.00006	5190.0073	0.00014	5190.0056	0.00011	5190.0056	0.00011
0	120	5189.9922	-0.00015	5189.9927	-0.00014	5189.9924	-0.00015	5189.9891	-0.00021
-10	120	5190.0187	0.00036	5190.0187	0.00036	5190.0189	0.00036	5190.0191	0.00037
-20	120	5189.9977	-0.00004	5189.9997	-0.00001	5189.9999	0.00000	5189.9987	-0.00003
-30	120	5190.0238	0.00046	5190.0236	0.00045	5190.0200	0.00039	5190.0211	0.00041

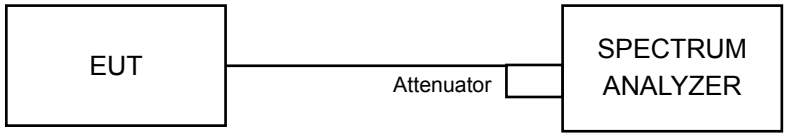
Frequency Stability Versus Voltage.									
Operating Frequency: 5190MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5190.0042	0.00008	5190.0056	0.00011	5190.0084	0.00016	5190.0031	0.00006
	120	5190.0049	0.00009	5190.0047	0.00009	5190.0078	0.00015	5190.0033	0.00006
	102	5190.0039	0.00008	5190.0042	0.00008	5190.0085	0.00016	5190.0030	0.00006

4.6 6dB Bandwidth Measurement

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

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

4.6.5 Deviation from Test Standard

No deviation.

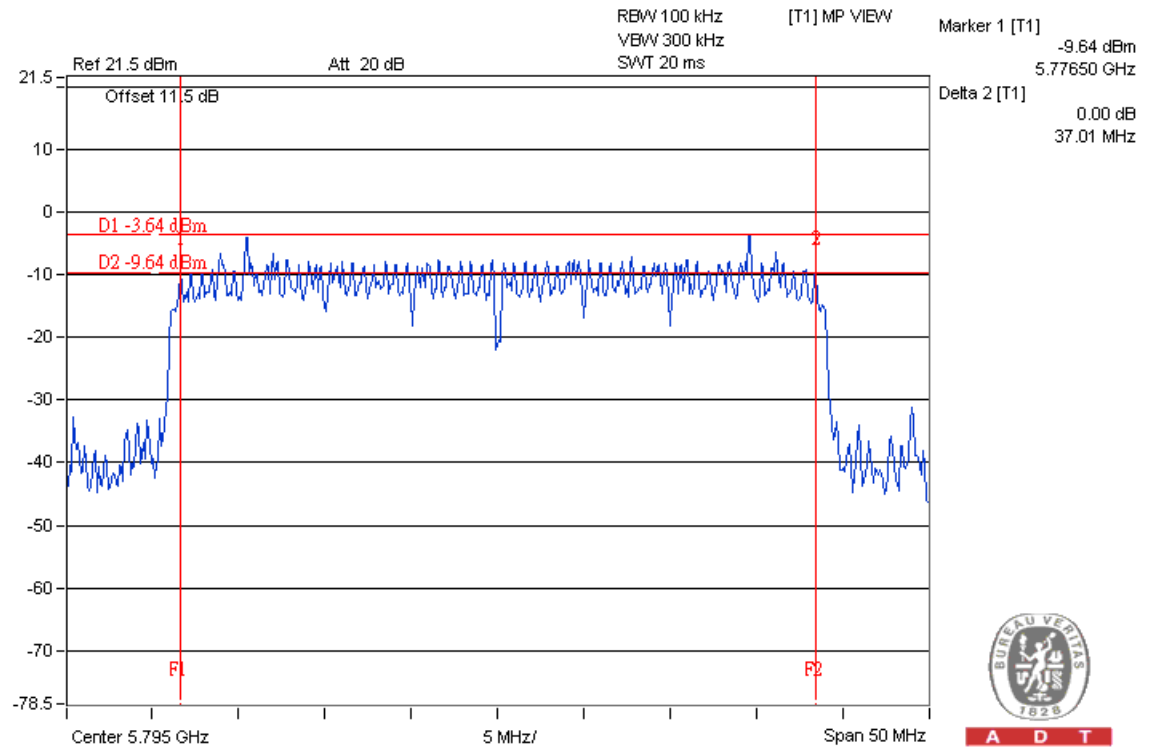
4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	34.49	36.30	0.5	Pass
159	5795	35.80	37.01	0.5	Pass

Spectrum Plot of Worst Value



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

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