

## Supplemental “Transmit Simultaneously” Test Report

**Report No.:** RF150422E07-2

**FCC ID:** KA2IR868LC1

**Test Model:** DIR-868L, DAP-1750

**Received Date:** Apr. 22, 2015

**Test Date:** Apr. 27 to May 08, 2015

**Issued Date:** May 21, 2015

**Applicant:** D-Link Corporation

**Address:** No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.

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

**Lab Address:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin  
Chu Hsien 307, Taiwan R.O.C.

**Test Location (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin  
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**Test Location (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin  
Chu Hsien 307, Taiwan R.O.C.



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A D T

### Release Control Record

Issue No.	Description	Date Issued
RF150422E07-2	Original release.	May 21, 2015



A D T

## 1 Certificate of Conformity

**Product:** Wireless AC1750 Dual Band Gigabit Cloud Router USB 3.0

**Brand:** D-Link

**Test Model:** DIR-868L, DAP-1750

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** D-Link Corporation

**Test Date:** Apr. 27 to May 08, 2015

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10:2009

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 :**

Lori Chung / Specialist

**Date:** May 21, 2015

**Approved by :**

May Chen / Manager

**Date:** May 21, 2015

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.51dB at 0.37266MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.1dB at 37.50MHz.

### 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	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Wireless AC1750 Dual Band Gigabit Cloud Router USB 3.0
Brand	D-Link
Test Model	DIR-868L, DAP-1750
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
Operating Frequency	<b>For 15.407</b> 5.18 ~ 5.24GHz
	<b>For 15.247</b> 2.412 ~ 2.462GHz, 5.745 ~ 5.825GHz
Number of Channel	<b>For 15.407</b> 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	<b>For 15.247 (2.4GHz)</b> 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) <b>For 15.247 (5GHz)</b> 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	<b>For 15.407</b> 802.11a: 295.88mW 802.11ac (VHT20): 414.695mW 802.11ac (VHT40): 279.009mW 802.11ac (VHT80): 76.884mW
	<b>For 15.247 (2.4GHz)</b> 802.11b: 260.338mW 802.11g: 223.301mW 802.11n (HT20): 252.52mW 802.11n (HT40): 129.897mW <b>For 15.247 (5GHz)</b> 802.11a: 522.641mW 802.11ac (VHT20): 514.507mW 802.11ac (VHT40): 520.364mW 802.11ac (VHT80): 195.207mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

**Note:**

- The EUT has below Model names, which are identical to each other in all aspects except for the following information:

Model Name	Difference
DIR-868L	RJ45 port x 5, with WAN port and transformer
DAP-1750	RJ45 port x 4, without WAN port and transformer

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

Antenna No.	Transmitter Circuit	Brand	Model	Ant. Gain(dBi) <Including cable loss>	Frequency range (GHz to GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	Chain (0)	Alpha	WRGAC35-ANT 1	2.5	2.4~2.4835	PCB	lpex(MHF)	60
				2.5	5.15~5.85			
2	Chain (1)		WRGAC35-ANT 2	2.5	2.4~2.4835			
				2.5	5.15~5.85			
3	Chain (2)		WRGAC35-ANT 3	2.5	2.4~2.4835			
				2.5	5.15~5.85			

- The EUT must be supplied with a power adapter and following two different models could be chosen as following table:

No	Brand Name	Model No.	Spec.
1	D-LINK	AMS115-1202000FU	Input: 100-240V, 0.8A, 50/60Hz Output: 12V, 2A DC output cable: 1.2m, unshielded
2	D-LINK	WA-24Q12R	Input: 100-240V, 0.7A, 50/60Hz Output: 12V, 2A DC output cable: 1.2m, unshielded

For Radiated Emission test, the EUT was pre-tested with adapter 1 & 2, the worst case was found in adapter 2. Therefore only the test data of the adapter 2 was recorded in this report.

4. The EUT incorporates a MIMO function.

<b>2.4GHz Band</b>			
<b>MODULATION MODE</b>	<b>DATA RATE (MCS)</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11b</b>	1 ~ 11Mbps	3TX	3RX
<b>802.11g</b>	6 ~ 54Mbps	3TX	3RX
<b>802.11n (HT20)</b>	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
<b>802.11n (HT40)</b>	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
<b>5GHz Band</b>			
<b>MODULATION MODE</b>	<b>DATA RATE (MCS)</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11a</b>	6 ~ 54Mbps	3TX	3RX
<b>802.11n (HT20)</b>	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
<b>802.11n (HT40)</b>	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
<b>802.11ac (VHT20)</b>	MCS 0~8, Nss=1	3TX	3RX
	MCS 0~8, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
<b>802.11ac (VHT40)</b>	MCS 0~9, Nss=1	3TX	3RX
	MCS 0~9, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
<b>802.11ac (VHT80)</b>	MCS 0~9, Nss=1	3TX	3RX
	MCS 0~9, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.

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



### 3.2 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE $<$ 1G	PLC	APCM	
1	√	√	√	√	Model: DIR-868L, with adapter 2
2	-	√	√	-	Model: DAP-1750, with adapter 2
3	-	-	√	-	Model: DIR-868L, with adapter 1
4	-	-	√	-	Model: DAP-1750, with adapter 1

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

**RE $<$ 1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE**: "-" means no effect.

#### **Radiated Emission Test (Above 1GHz):**

Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4GHz (802.11b) + 5GHz (802.11a)	1 to 11	1	DSSS	DBPSK	1
	149 to 157	157	OFDM	BPSK	6

#### **Radiated Emission Test (Below 1GHz):**

Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4GHz (802.11b) + 5GHz (802.11a)	1 to 11	1	DSSS	DBPSK	1
	149 to 157	157	OFDM	BPSK	6

#### **Power Line Conducted Emission Test:**

Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4GHz (802.11b) + 5GHz (802.11a)	1 to 11	1	DSSS	DBPSK	1
	149 to 157	157	OFDM	BPSK	6

#### **Antenna Port Conducted Measurement:**

Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4GHz (802.11b) + 5GHz (802.11a)	1 to 11	1	DSSS	DBPSK	1
	149 to 157	157	OFDM	BPSK	6

#### **Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
<b>RE<math>\geq</math>1G</b>	25deg. C, 69%RH	120Vac, 60Hz	Gary Cheng
<b>RE<math>&lt;</math>1G</b>	23deg. C, 65%RH	120Vac, 60Hz	Gary Cheng
<b>PLC</b>	20deg. C, 70%RH 25deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
<b>APCM</b>	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

### 3.3 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.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	USB 3.0 HDD	Transcend	JetFlash 700	NA	NA	Provided by Lab
B	NOTEBOOK COMOPUTER	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab
C	NOTEBOOK COMOPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
D	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab

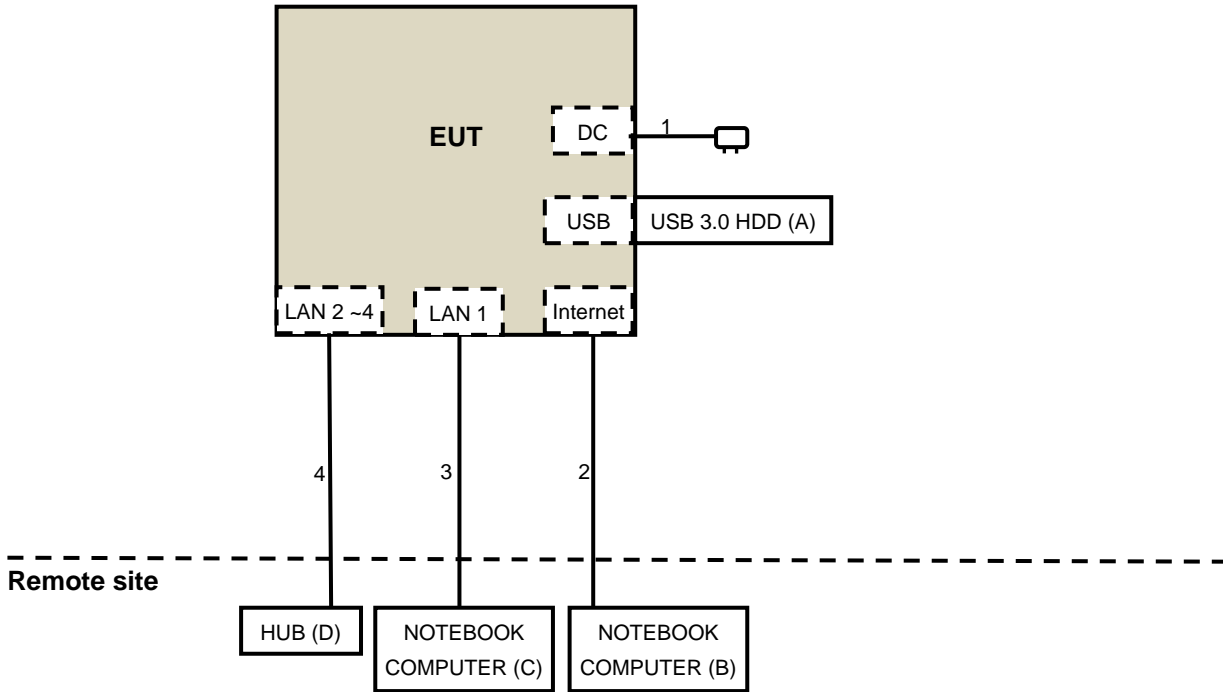
**NOTE:**

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

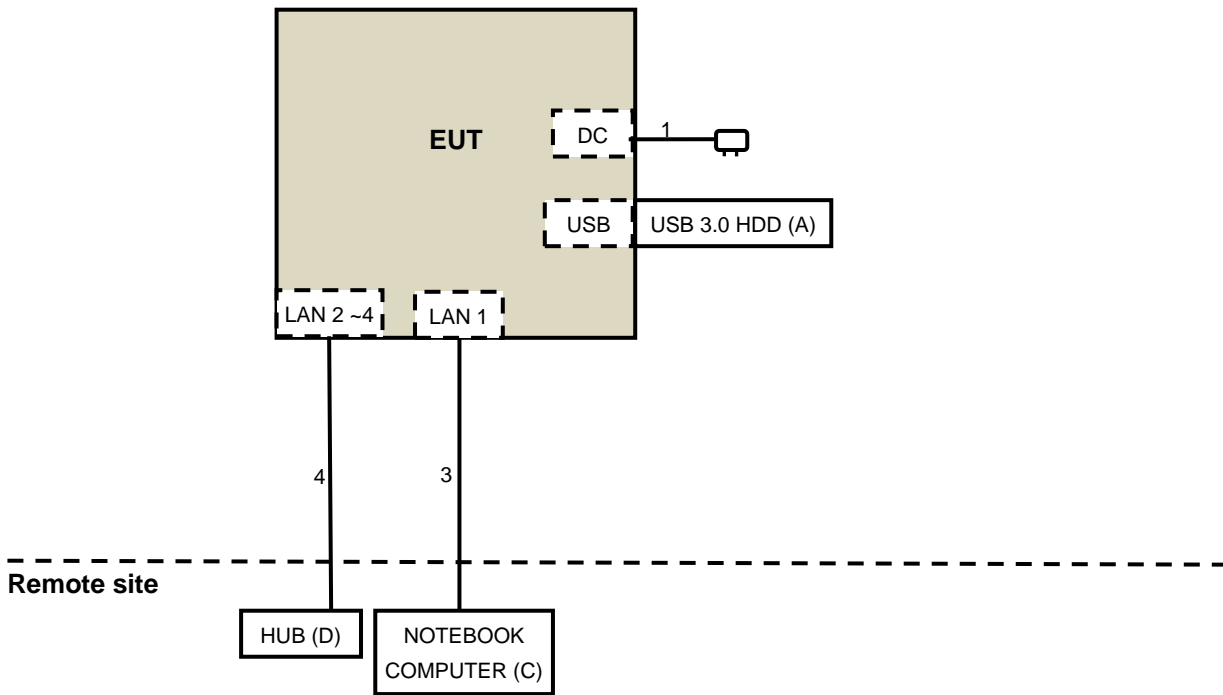
No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	DC	1	1.2	No	0	Supplied by Client
2	RJ45	1	10	No	0	Provided by Lab
3	RJ45	1	10	No	0	Provided by Lab
4	RJ45	3	10	No	0	Provided by Lab

### 3.3.1 Configuration of System under Test

For Model: DIR-868L mode:



For Model: DAP-1750 mode:



### 3.4 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 C (15.247)**

ANSI C63.10-2009

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 30dB 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.

**4.1.2 Test Instruments**

<b>DESCRIPTION &amp; MANUFACTURER</b>	<b>MODEL NO.</b>	<b>SERIAL NO.</b>	<b>CALIBRATED DATE</b>	<b>CALIBRATED UNTIL</b>
Test Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 06, 2015	Feb. 05, 2016
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: May 01 to 08, 2015

#### 4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters 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. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. 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.
4. 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 ( $10 \log(1/\text{duty cycle})$ ).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

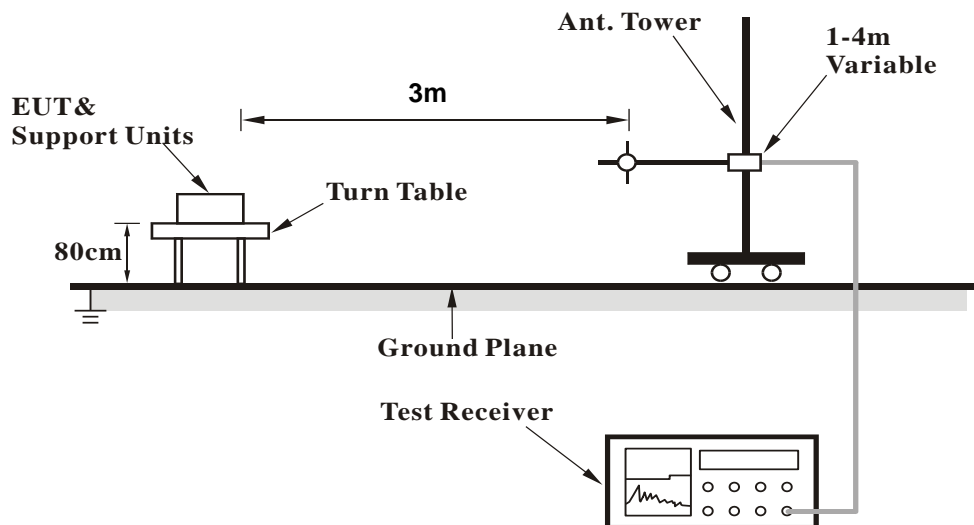
#### 4.1.4 Deviation from Test Standard

No deviation.

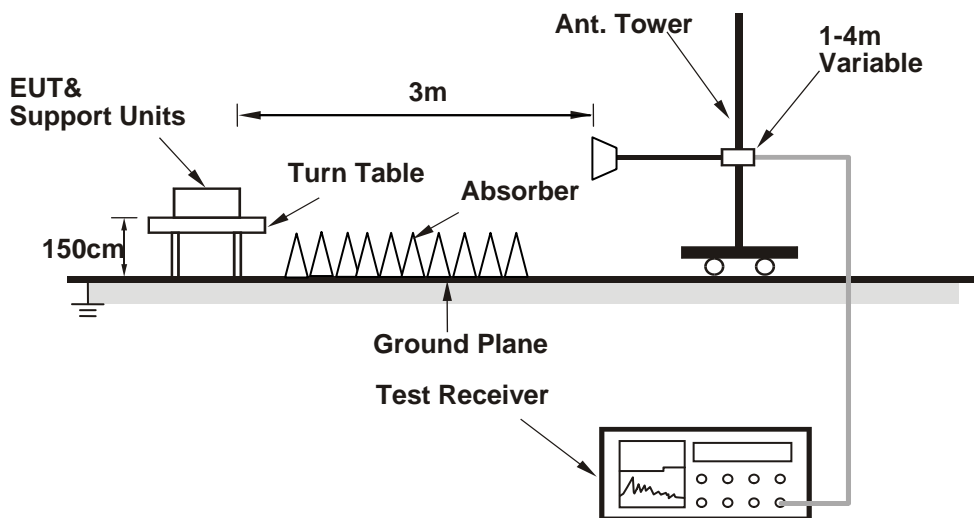


#### 4.1.5 Test Setup

##### <Frequency Range below 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

##### For Model: DIR-868L mode:

1. Connect the EUT with the supports units B & C (NOTEBOOK COMPUTER) which is placed on remote site.
2. Controlling software (MTool 2.0.1.0.msi) has been activated to set the EUT on specific status.

##### For Model: DAP-1750 mode:

1. Connect the EUT with the support unit C (NOTEBOOK COMPUTER) which is placed on remote site.
2. Controlling software (MTool 2.0.1.0.msi) has been activated to set the EUT on specific status.

4.1.7 Test Results (Mode 1)

**Above 1GHz Data:**

<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz	<b>DETECTOR FUNCTION</b>	Peak (PK) Average (AV)
------------------------	--------------	--------------------------	---------------------------

**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	4824.00	49.9 PK	74.0	-24.1	1.07 H	277	46.48	3.42
2	4824.00	43.5 AV	54.0	-10.5	1.07 H	277	40.08	3.42
3	11590.00	55.2 PK	74.0	-18.8	1.08 H	243	45.11	10.09
4	11590.00	43.4 AV	54.0	-10.6	1.08 H	243	33.31	10.09

**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	4824.00	48.6 PK	74.0	-25.4	1.22 V	242	45.18	3.42
2	4824.00	40.4 AV	54.0	-13.6	1.22 V	242	36.98	3.42
3	11590.00	53.3 PK	74.0	-20.7	1.05 V	199	43.21	10.09
4	11590.00	43.2 AV	54.0	-10.8	1.05 V	199	33.11	10.09

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

**Below 1GHz Data:**

<b>FREQUENCY RANGE</b>	Below 1GHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
------------------------	------------	--------------------------	-----------------

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	76.02	30.2 QP	40.0	-9.8	1.12 H	200	46.85	-16.62
2	111.52	32.4 QP	43.5	-11.1	1.10 H	212	48.20	-15.78
3	145.89	30.9 QP	43.5	-12.6	1.10 H	300	43.84	-12.94
4	172.52	35.0 QP	43.5	-8.5	1.03 H	100	48.66	-13.66
5	212.61	31.7 QP	43.5	-11.8	1.00 H	280	47.81	-16.09
6	275.13	34.9 QP	46.0	-11.1	1.20 H	120	47.76	-12.84

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	30.31	34.2 QP	40.0	-5.8	1.10 V	120	49.07	-14.88
<b>2</b>	<b>37.50</b>	<b>36.9 QP</b>	<b>40.0</b>	<b>-3.1</b>	<b>1.10 V</b>	<b>340</b>	<b>50.92</b>	<b>-14.00</b>
3	76.40	31.8 QP	40.0	-8.2	1.00 V	100	48.56	-16.78
4	119.60	36.9 QP	43.5	-6.6	1.20 V	101	52.07	-15.19
5	214.11	35.3 QP	43.5	-8.2	1.00 V	330	51.35	-16.05
6	817.33	35.3 QP	46.0	-10.7	1.10 V	140	36.46	-1.18

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

#### 4.1.8 Test Results (Mode 2)

##### Below 1GHz Data:

<b>FREQUENCY RANGE</b>	Below 1GHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
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<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	76.29	32.2 QP	40.0	-7.8	2.00 H	290	48.97	-16.73
2	109.38	32.6 QP	43.5	-10.9	1.50 H	282	48.68	-16.06
3	148.08	27.0 QP	43.5	-16.5	1.50 H	272	39.81	-12.77
4	273.08	28.8 QP	46.0	-17.3	1.00 H	65	41.71	-12.96
5	351.57	26.7 QP	46.0	-19.3	1.00 H	248	37.36	-10.68
6	940.05	35.0 QP	46.0	-11.0	1.50 H	292	33.99	1.04
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	30.11	32.2 QP	40.0	-7.9	1.50 V	94	47.03	-14.88
2	76.71	35.3 QP	40.0	-4.7	1.00 V	322	52.24	-16.91
3	116.46	35.2 QP	43.5	-8.3	1.50 V	53	50.72	-15.55
4	148.38	28.2 QP	43.5	-15.3	1.00 V	96	41.03	-12.79
5	804.26	36.2 QP	46.0	-9.8	1.50 V	50	37.65	-1.41
6	957.26	33.4 QP	46.0	-12.7	2.00 V	136	32.19	1.16

##### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	847124/029	Oct. 22, 2014	Oct. 21, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYBAO)	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
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 Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Apr. 27 to May 08, 2015

#### 4.2.3 Test Procedures

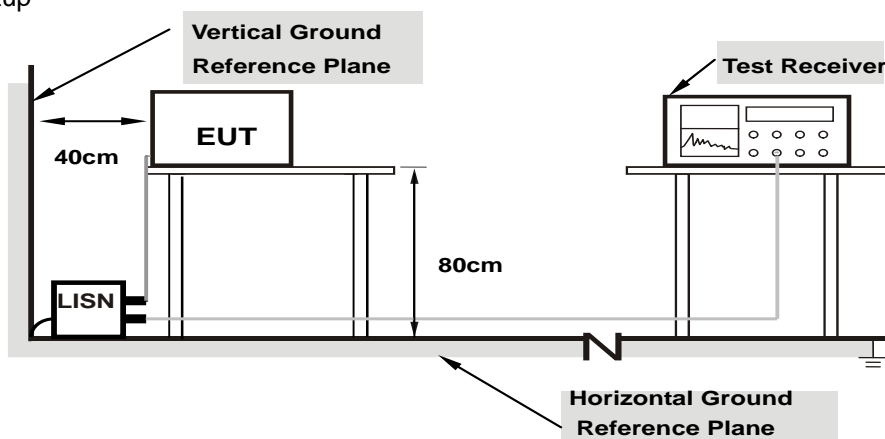
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

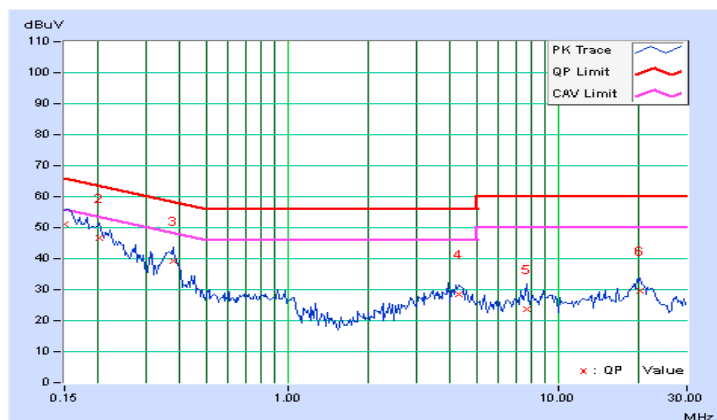
**4.2.7 Test Results (Mode 1)**

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	0.08	51.00	41.10	51.08	41.18	66.00	56.00	-14.92	-14.82
2	0.20078	0.09	46.48	37.29	46.57	37.38	63.58	53.58	-17.01	-16.20
3	0.37656	0.10	39.20	33.72	39.30	33.82	58.35	48.35	-19.06	-14.54
4	4.31641	0.23	28.13	19.54	28.36	19.77	56.00	46.00	-27.64	-26.23
5	7.63672	0.36	23.41	17.41	23.77	17.77	60.00	50.00	-36.23	-32.23
6	20.21484	0.70	28.88	23.50	29.58	24.20	60.00	50.00	-30.42	-25.80

**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.

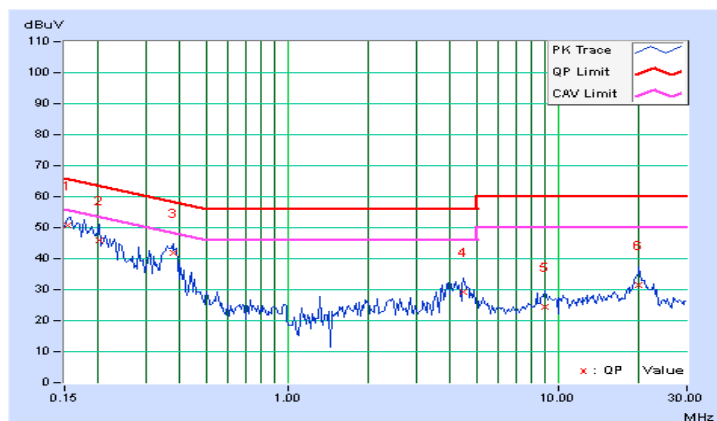


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.08	50.77	40.25	50.85	40.33	65.79	55.79	-14.94	-15.46
2	0.20078	0.08	45.85	36.63	45.93	36.71	63.58	53.58	-17.65	-16.87
3	0.37656	0.10	41.90	38.34	42.00	38.44	58.35	48.35	-16.36	-9.92
4	4.48047	0.25	29.07	20.14	29.32	20.39	56.00	46.00	-26.68	-25.61
5	8.92578	0.42	23.94	18.43	24.36	18.85	60.00	50.00	-35.64	-31.15
6	19.93359	0.74	30.56	24.92	31.30	25.66	60.00	50.00	-28.70	-24.34

**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.





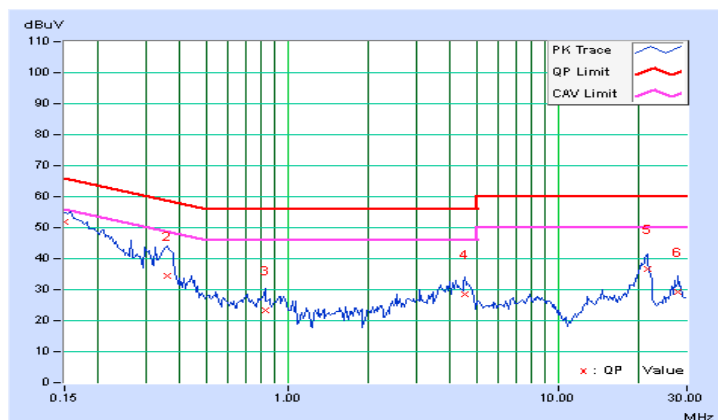
**4.2.8 Test Results (Mode 2)**

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

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	0.08	51.60	41.82	51.68	41.90	66.00	56.00	-14.32	-14.10
2	0.36094	0.10	34.43	21.83	34.53	21.93	58.71	48.71	-24.18	-26.78
3	0.82578	0.12	23.29	17.71	23.41	17.83	56.00	46.00	-32.59	-28.17
4	4.53516	0.24	28.17	19.74	28.41	19.98	56.00	46.00	-27.59	-26.02
5	21.47266	0.73	36.07	28.66	36.80	29.39	60.00	50.00	-23.20	-20.61
6	27.87109	0.87	28.37	21.44	29.24	22.31	60.00	50.00	-30.76	-27.69

**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.

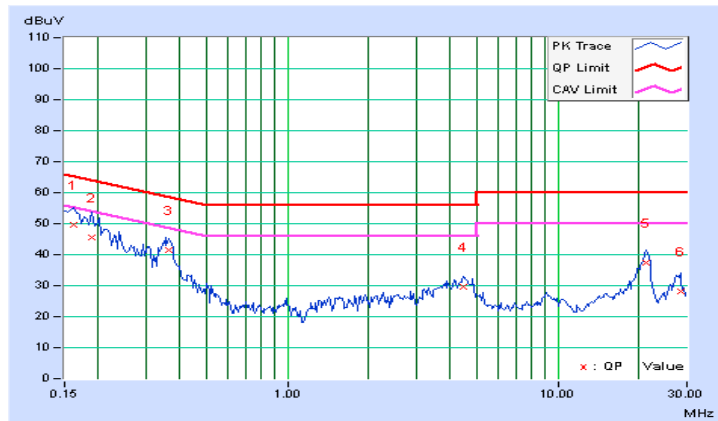


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.08	49.55	38.68	49.63	38.76	65.38	55.38	-15.75	-16.62
2	0.18906	0.08	45.64	36.79	45.72	36.87	64.08	54.08	-18.36	-17.21
3	0.36484	0.10	41.31	32.59	41.41	32.69	58.62	48.62	-17.21	-15.93
4	4.46484	0.25	29.38	19.97	29.63	20.22	56.00	46.00	-26.37	-25.78
5	21.20703	0.77	36.74	29.40	37.51	30.17	60.00	50.00	-22.49	-19.83
6	28.33984	0.94	27.34	21.37	28.28	22.31	60.00	50.00	-31.72	-27.69

**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.



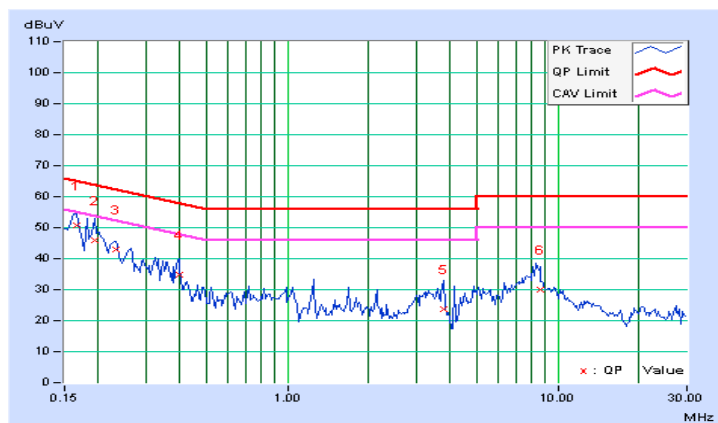
4.2.9 Test Results (Mode 3)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.16562	0.08	50.77	44.48	50.85	44.56	65.18	55.18	-14.32	-10.61
2	0.19297	0.09	45.87	38.83	45.96	38.92	63.91	53.91	-17.95	-14.99
3	0.23203	0.09	42.73	36.00	42.82	36.09	62.38	52.38	-19.56	-16.29
4	0.39609	0.10	34.79	27.98	34.89	28.08	57.93	47.93	-23.05	-19.86
5	3.78906	0.21	23.60	16.91	23.81	17.12	56.00	46.00	-32.19	-28.88
6	8.62500	0.40	29.55	25.14	29.95	25.54	60.00	50.00	-30.05	-24.46

**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.

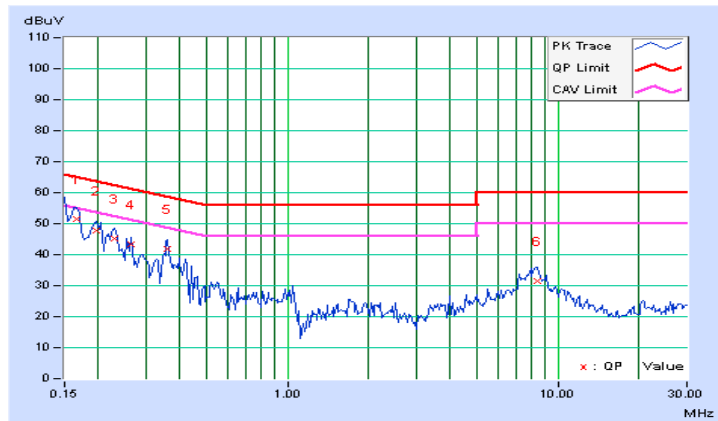


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16520	0.08	51.40	44.01	51.48	44.09	65.20	55.20	-13.72	-11.11
2	0.19687	0.08	47.67	40.89	47.75	40.97	63.74	53.74	-15.99	-12.77
3	0.22812	0.08	45.12	38.89	45.20	38.97	62.52	52.52	-17.32	-13.55
4	0.26328	0.09	43.11	36.90	43.20	36.99	61.33	51.33	-18.13	-14.34
5	0.36094	0.10	41.76	37.56	41.86	37.66	58.71	48.71	-16.85	-11.05
6	8.42188	0.40	31.20	26.81	31.60	27.21	60.00	50.00	-28.40	-22.79

**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.



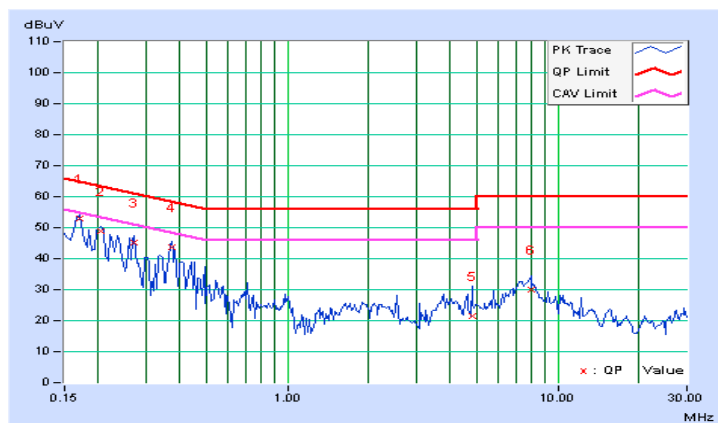
4.2.10 Test Results (Mode 4)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.16953	0.08	52.73	46.06	52.81	46.14	64.98	54.98	-12.17	-8.84
2	0.20469	0.09	48.76	41.60	48.85	41.69	63.42	53.42	-14.57	-11.73
3	0.27109	0.09	44.99	39.59	45.08	39.68	61.08	51.08	-16.00	-11.40
<b>4</b>	<b>0.37266</b>	<b>0.10</b>	<b>43.73</b>	<b>40.83</b>	<b>43.83</b>	<b>40.93</b>	<b>58.44</b>	<b>48.44</b>	<b>-14.61</b>	<b>-7.51</b>
5	4.80469	0.25	21.12	14.91	21.37	15.16	56.00	46.00	-34.63	-30.84
6	7.94922	0.37	29.65	24.71	30.02	25.08	60.00	50.00	-29.98	-24.92

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.

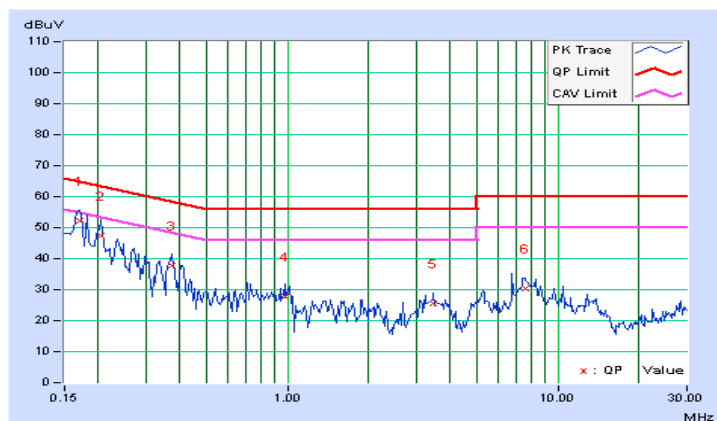


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.08	52.12	46.30	52.20	46.38	64.98	54.98	-12.78	-8.60
2	0.20469	0.08	47.32	40.48	47.40	40.56	63.42	53.42	-16.02	-12.86
3	0.37266	0.10	37.54	34.09	37.64	34.19	58.44	48.44	-20.80	-14.25
4	0.97813	0.13	27.49	22.89	27.62	23.02	56.00	46.00	-28.38	-22.98
5	3.47266	0.21	25.47	20.14	25.68	20.35	56.00	46.00	-30.32	-25.65
6	7.54688	0.37	29.84	24.76	30.21	25.13	60.00	50.00	-29.79	-24.87

**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.

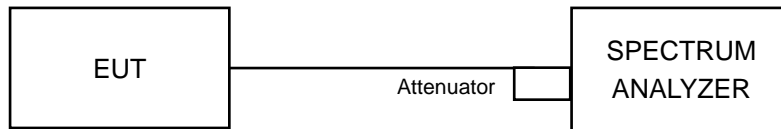


### 4.3 Conducted Out of Band Emission Measurement

#### 4.3.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

##### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

##### MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Condition

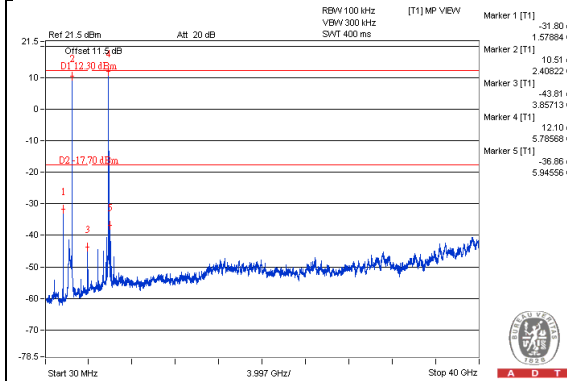
Same as Item 4.3.6

#### 4.3.7 Test Results

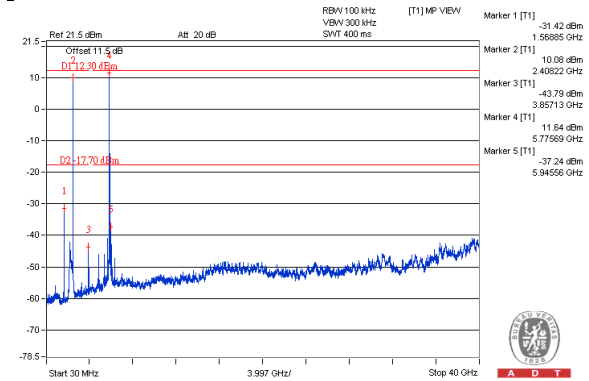
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

## 2.4GHz 802.11b CH 1 + 5GHz 802.11a CH 157

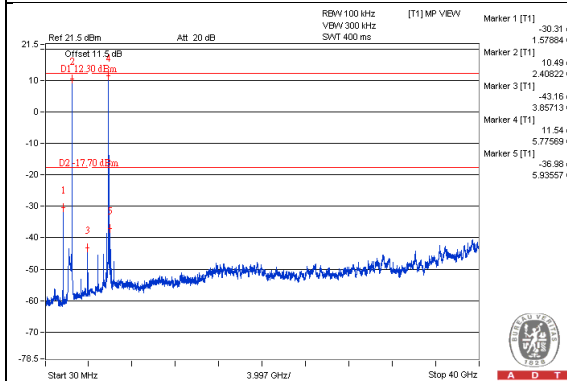
### Chain 0



### Chain 1



### Chain 2







## 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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Tel: 886-3-5935343

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**Hwa Ya EMC/RF/Safety Lab**

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**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://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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