

FCC Test Report

Report No.: RF160418E10-1

FCC ID: KA2CHG022A1

Test Model: DCH-G022

Received Date: Apr. 18, 2016

Test Date: May 05 to 10, 2016

Issued Date: Oct. 17, 2016

Applicant: D-Link Corporation

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
RF160418E10-1	Original release.	Oct. 17, 2016

1 Certificate of Conformity

Product: mydlink Connected Home Hub , mydlink Home Connected Home Hub 2

Brand: D-Link

Test Model: DCH-G022

Sample Status: ENGINEERING SAMPLE

Applicant: D-Link Corporation

Test Date: May 05 to 10, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)
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:** Oct. 17, 2016
Claire Kuan / Specialist

Approved by :  , **Date:** Oct. 17, 2016
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.07dB at 7.27344MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.6dB at 916.00MHz.

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.19 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.43 dB
	6GHz ~ 18GHz	3.49 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 (Z-Wave)

Product	mydlink Connected Home Hub , mydlink Home Connected Home Hub 2
Brand	D-Link
Test Model	DCH-G022
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 5V from power adapter
Modulation Type	FSK
Transfer Rate	up to 100kbps
Operating Frequency	908.4 ~ 916MHz
Number of Channel	3
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ-45 Cable (unshielded, 1.0m)

Note:

1. The EUT is a WLAN and Z-Wave device.
2. Spurious emission of the simultaneous operation (WLAN and Z-Wave) has been evaluated and no non-compliance was found.
3. The EUT has two product names, which are identical to each other in all aspects except for the following table:

Product Name	Brand	Model No.	Difference
mydlink Connected Home Hub	D-Link	DCH-G022	for marketing purposes
mydlink Home Connected Home Hub 2			

4. The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand	Model No.	Spec.
D-Link	WB-10E05R	Input: 100-240Vac, 0.4A, 50-60Hz Output: 5V, 2A DC cable: unshielded, 1.2m

5. The antenna provided to the EUT, please refer to the following table:

Antenna No.	Ant. Gain (dBi)	Frequency range (GHz to GHz)	Antenna Type	Antenna Connector
1	2.8	2.4~2.4835	PCB	NA
	3	865~925	PCB	NA
2	3	2.4~2.4835	PCB	NA

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

3.2 Description of Test Modes

3 channels are provided to this EUT:

Channel	Frequency	Channel	Frequency
1	908.42	3	916
2	908.4		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	
-	√	√	√	-

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **Stand mode**.

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 3	1, 2, 3	FSK

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 3	3	FSK

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 3	3	FSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	26deg. C, 65%RH	120Vac, 60Hz	Gary Cheng
RE<1G	24deg. C, 68%RH	120Vac, 60Hz	Gary Cheng
PLC	26deg. C, 70%RH	120Vac, 60Hz	Eagle 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.

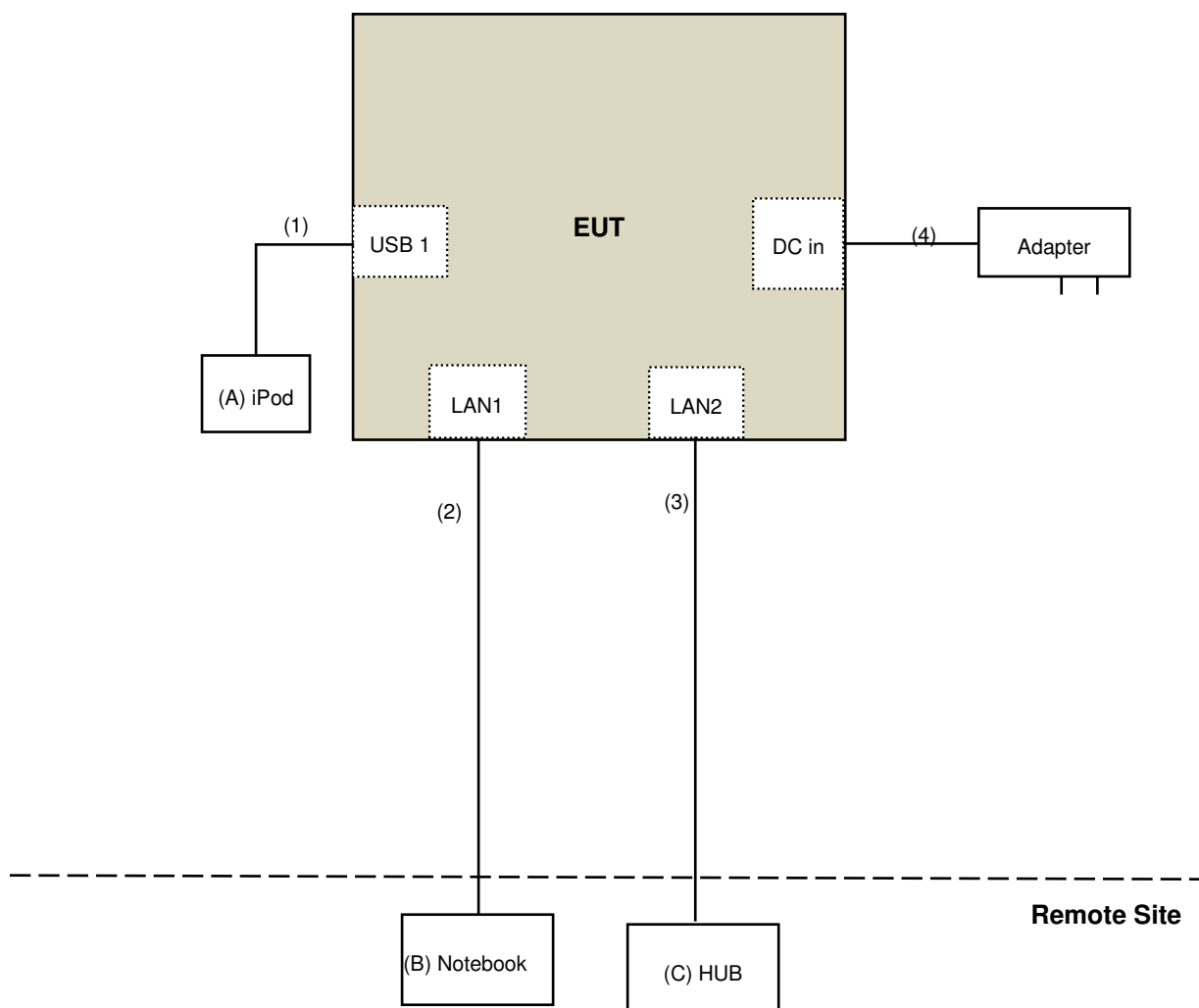
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA	Prodvided by Lab
B.	Notebook Computer	LENOVO	E440	PF071LWC	NA	Prodvided by Lab
C.	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab

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	1	0.1	No	0	Prodvided by Lab
2.	RJ-45	1	10	No	0	Prodvided by Lab
3.	RJ-45	1	10	No	0	Prodvided by Lab
4.	DC	1	1.2	No	0	Supplied by client

3.3.1 Configuration of System under Test



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 (15.249)

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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-01	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 02, 2016	Apr. 01, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM- SM-2000 EMC104-SM- SM-5000 EMC104-SM- SM-5000	150318 150323 150324	Mar. 30, 2016	Mar. 29, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
*The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The test was performed in 966 Chamber No. 4.
- The FCC Site Registration No. is 292998
- The CANADA Site Registration No. is 20331-2
- Tested Date: May 06 to 10, 2016

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:

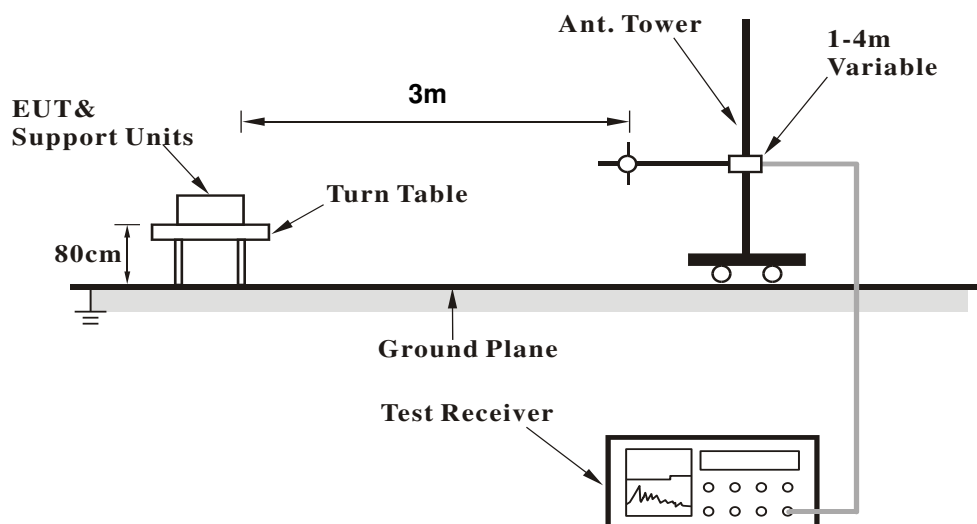
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

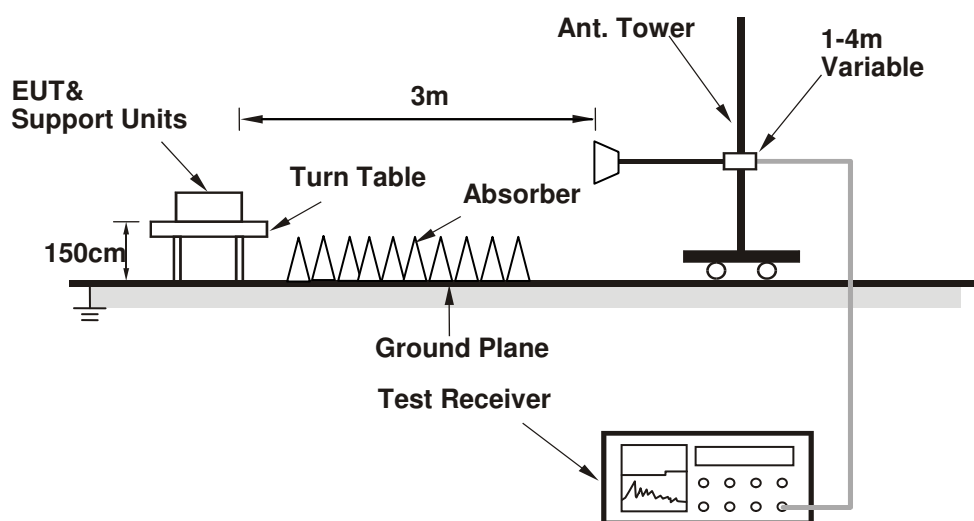
No deviation.

4.1.5 Test Set Up

<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

- a. Connected the EUT with the support unit B (Notebook Computer) which is placed on remote site.
- b. Contorlling software (HyperTerminal.exe paste COMMAND) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data :

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		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	#1816.84	49.6 PK	74.0	-24.4	1.10 H	354	57.39	-7.75
2	#1816.84	32.9 AV	54.0	-21.1	1.10 H	354	40.61	-7.75
3	2725.26	53.4 PK	74.0	-20.6	1.77 H	190	57.77	-4.41
4	2725.26	52.6 AV	54.0	-1.4	1.77 H	190	57.03	-4.41
5	3633.68	38.7 PK	74.0	-35.3	1.13 H	142	41.37	-2.71
6	3633.68	31.5 AV	54.0	-22.5	1.13 H	142	34.23	-2.71
7	4542.10	43.1 PK	74.0	-30.9	1.06 H	194	43.06	0.05
8	4542.10	39.6 AV	54.0	-14.4	1.06 H	194	39.51	0.05
9	5450.52	38.4 PK	74.0	-35.6	1.10 H	272	36.20	2.24
10	5450.52	24.5 AV	54.0	-29.5	1.10 H	272	22.30	2.24
11	#6358.94	45.3 PK	74.0	-28.7	1.46 H	188	40.88	4.45
12	#6358.94	38.4 AV	54.0	-15.6	1.46 H	188	33.97	4.45
13	7267.36	42.9 PK	74.0	-31.1	1.55 H	323	35.28	7.64
14	7267.36	30.0 AV	54.0	-24.0	1.55 H	323	22.39	7.64
15	8175.78	46.5 PK	74.0	-27.5	1.52 H	120	37.82	8.69
16	8175.78	40.2 AV	54.0	-13.8	1.52 H	120	31.54	8.69
17	9084.20	45.4 PK	74.0	-28.6	1.66 H	170	36.35	9.09
18	9084.20	32.7 AV	54.0	-21.3	1.66 H	170	23.59	9.09
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	#1816.84	37.4 PK	74.0	-36.6	1.56 V	326	45.15	-7.75
2	#1816.84	25.6 AV	54.0	-28.4	1.56 V	326	33.35	-7.75
3	2725.26	50.3 PK	74.0	-23.7	1.39 V	120	54.67	-4.41
4	2725.26	49.3 AV	54.0	-4.7	1.39 V	120	53.74	-4.41
5	3633.68	37.6 PK	74.0	-36.4	1.40 V	70	40.35	-2.71
6	3633.68	30.7 AV	54.0	-23.3	1.40 V	70	33.37	-2.71
7	4542.10	42.7 PK	74.0	-31.4	1.26 V	333	42.60	0.05
8	4542.10	39.4 AV	54.0	-14.6	1.26 V	333	39.39	0.05
9	5450.52	37.8 PK	74.0	-36.2	1.26 V	273	35.53	2.24
10	5450.52	25.6 AV	54.0	-28.4	1.26 V	273	23.38	2.24
11	#6358.94	43.3 PK	74.0	-30.7	1.26 V	133	38.88	4.45
12	#6358.94	35.4 AV	54.0	-18.6	1.26 V	133	30.97	4.45
13	7267.36	42.7 PK	74.0	-31.3	1.30 V	211	35.02	7.64
14	7267.36	30.5 AV	54.0	-23.5	1.30 V	211	22.90	7.64
15	8175.78	43.9 PK	74.0	-30.1	1.27 V	135	35.25	8.69
16	8175.78	30.2 AV	54.0	-23.9	1.27 V	135	21.46	8.69
17	9084.20	45.3 PK	74.0	-28.7	1.27 V	354	36.22	9.09
18	9084.20	32.3 AV	54.0	-21.7	1.27 V	354	23.24	9.09

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
5. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 2	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		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	#1816.80	50.0 PK	74.0	-24.0	1.09 H	360	57.75	-7.75
2	#1816.80	33.1 AV	54.0	-20.9	1.09 H	360	40.85	-7.75
3	2725.20	53.1 PK	74.0	-20.9	1.76 H	195	57.51	-4.41
4	2725.20	52.4 AV	54.0	-1.6	1.76 H	195	56.81	-4.41
5	3633.60	38.6 PK	74.0	-35.4	1.19 H	132	41.31	-2.71
6	3633.60	31.2 AV	54.0	-22.8	1.19 H	132	33.91	-2.71
7	4542.00	43.3 PK	74.0	-30.7	1.06 H	183	43.25	0.05
8	4542.00	39.7 AV	54.0	-14.3	1.06 H	183	39.65	0.05
9	5450.40	38.2 PK	74.0	-35.8	1.15 H	274	35.96	2.24
10	5450.40	24.3 AV	54.0	-29.7	1.15 H	274	22.06	2.24
11	#6358.80	44.9 PK	74.0	-29.1	1.50 H	181	40.45	4.45
12	#6358.80	38.2 AV	54.0	-15.8	1.50 H	181	33.75	4.45
13	7267.20	42.9 PK	74.0	-31.1	1.57 H	318	35.26	7.64
14	7267.20	30.3 AV	54.0	-23.7	1.57 H	318	22.66	7.64
15	8175.60	46.4 PK	74.0	-27.6	1.56 H	108	37.71	8.69
16	8175.60	40.1 AV	54.0	-13.9	1.56 H	108	31.41	8.69
17	9084.00	45.7 PK	74.0	-28.3	1.71 H	161	36.61	9.09
18	9084.00	32.9 AV	54.0	-21.1	1.71 H	161	23.81	9.09

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	#1816.80	37.1 PK	74.0	-36.9	1.57 V	311	44.85	-7.75
2	#1816.80	25.4 AV	54.0	-28.6	1.57 V	311	33.15	-7.75
3	2725.20	50.6 PK	74.0	-23.4	1.36 V	133	55.01	-4.41
4	2725.20	49.8 AV	54.0	-4.2	1.36 V	133	54.21	-4.41
5	3633.60	37.6 PK	74.0	-36.4	1.37 V	60	40.31	-2.71
6	3633.60	30.5 AV	54.0	-23.5	1.37 V	60	33.21	-2.71
7	4542.00	43.0 PK	74.0	-31.0	1.26 V	341	42.95	0.05
8	4542.00	39.8 AV	54.0	-14.2	1.26 V	341	39.75	0.05
9	5450.40	38.3 PK	74.0	-35.7	1.28 V	272	36.06	2.24
10	5450.40	25.9 AV	54.0	-28.1	1.28 V	272	23.66	2.24
11	#6358.80	43.2 PK	74.0	-30.8	1.22 V	122	38.75	4.45
12	#6358.80	35.3 AV	54.0	-18.7	1.22 V	122	30.85	4.45
13	7267.20	42.8 PK	74.0	-31.2	1.33 V	207	35.16	7.64
14	7267.20	30.7 AV	54.0	-23.3	1.33 V	207	23.06	7.64
15	8175.60	44.6 PK	74.0	-29.4	1.30 V	121	35.91	8.69
16	8175.60	30.5 AV	54.0	-23.5	1.30 V	121	21.81	8.69
17	9084.00	45.4 PK	74.0	-28.6	1.31 V	350	36.31	9.09
18	9084.00	32.5 AV	54.0	-21.5	1.31 V	350	23.41	9.09

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
5. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		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	#1832.00	49.9 PK	74.0	-24.1	1.14 H	349	57.59	-7.69
2	#1832.00	33.0 AV	54.0	-21.0	1.14 H	349	40.69	-7.69
3	2748.00	53.3 PK	74.0	-20.7	1.82 H	190	57.65	-4.35
4	2748.00	52.5 AV	54.0	-1.5	1.82 H	190	56.85	-4.35
5	3664.00	38.5 PK	74.0	-35.5	1.10 H	135	41.07	-2.57
6	3664.00	31.2 AV	54.0	-22.8	1.10 H	135	33.77	-2.57
7	4580.00	43.1 PK	74.0	-30.9	1.10 H	178	42.98	0.12
8	4580.00	39.5 AV	54.0	-14.5	1.10 H	178	39.38	0.12
9	#5496.00	38.3 PK	74.0	-35.7	1.07 H	272	36.00	2.30
10	#5496.00	24.6 AV	54.0	-29.4	1.07 H	272	22.30	2.30
11	#6412.00	45.2 PK	74.0	-28.8	1.44 H	177	40.64	4.56
12	#6412.00	38.2 AV	54.0	-15.8	1.44 H	177	33.64	4.56
13	7328.00	43.5 PK	74.0	-30.5	1.61 H	327	35.84	7.66
14	7328.00	30.5 AV	54.0	-23.5	1.61 H	327	22.84	7.66
15	8244.00	46.6 PK	74.0	-27.4	1.54 H	123	37.87	8.73
16	8244.00	40.6 AV	54.0	-13.4	1.54 H	123	31.87	8.73
17	9160.00	45.3 PK	74.0	-28.7	1.66 H	157	36.27	9.03
18	9160.00	32.4 AV	54.0	-21.6	1.66 H	157	23.37	9.03

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	#1832.00	37.4 PK	74.0	-36.6	1.54 V	321	45.09	-7.69
2	#1832.00	25.8 AV	54.0	-28.2	1.54 V	321	33.49	-7.69
3	2748.00	50.5 PK	74.0	-23.5	1.45 V	108	54.85	-4.35
4	2748.00	49.6 AV	54.0	-4.4	1.45 V	108	53.95	-4.35
5	3664.00	37.6 PK	74.0	-36.4	1.42 V	62	40.17	-2.57
6	3664.00	30.8 AV	54.0	-23.2	1.42 V	62	33.37	-2.57
7	4580.00	42.2 PK	74.0	-31.8	1.26 V	342	42.08	0.12
8	4580.00	39.0 AV	54.0	-15.0	1.26 V	342	38.88	0.12
9	#5496.00	38.2 PK	74.0	-35.8	1.29 V	264	35.90	2.30
10	#5496.00	25.9 AV	54.0	-28.1	1.29 V	264	23.60	2.30
11	#6412.00	43.4 PK	74.0	-30.6	1.21 V	121	38.84	4.56
12	#6412.00	35.4 AV	54.0	-18.6	1.21 V	121	30.84	4.56
13	7328.00	42.0 PK	74.0	-32.0	1.30 V	220	34.34	7.66
14	7328.00	30.1 AV	54.0	-23.9	1.30 V	220	22.44	7.66
15	8244.00	44.0 PK	74.0	-30.0	1.24 V	137	35.27	8.73
16	8244.00	30.2 AV	54.0	-23.8	1.24 V	137	21.47	8.73
17	9160.00	45.3 PK	74.0	-28.7	1.30 V	360	36.27	9.03
18	9160.00	32.6 AV	54.0	-21.4	1.30 V	360	23.57	9.03

REMARKS:

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

Below 1GHz Data:

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.31	25.0 QP	40.0	-15.0	2.00 H	316	34.00	-9.04
2	66.30	24.8 QP	40.0	-15.2	1.00 H	70	34.93	-10.16
3	137.79	30.1 QP	43.5	-13.4	2.00 H	254	39.10	-9.04
4	250.00	32.4 QP	46.0	-13.6	1.00 H	49	42.38	-9.95
5	901.41	41.4 QP	46.0	-4.6	1.86 H	294	37.60	3.79
6	*908.42	91.1 QP	94.0	-2.9	1.86 H	294	87.15	3.96
7	929.52	40.1 QP	46.0	-5.9	1.86 H	294	35.75	4.34
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	34.12	36.0 QP	40.0	-4.0	1.00 V	270	45.51	-9.54
2	40.45	39.0 QP	40.0	-1.0	1.00 V	74	48.02	-9.03
3	56.02	34.3 QP	40.0	-5.7	1.00 V	340	43.30	-8.98
4	70.79	31.4 QP	40.0	-8.7	1.00 V	120	42.45	-11.10
5	900.90	39.8 QP	46.0	-6.2	1.03 V	65	36.01	3.80
6	*908.42	93.3 QP	94.0	-0.7	1.00 V	112	89.35	3.96
7	929.16	43.5 QP	46.0	-2.6	1.03 V	65	39.11	4.34

REMARKS:

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

CHANNEL	TX Channel 2	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.16	24.8 QP	40.0	-15.2	2.00 H	316	33.81	-9.04
2	66.26	24.9 QP	40.0	-15.1	1.20 H	100	35.01	-10.15
3	137.86	30.3 QP	43.5	-13.2	1.80 H	204	39.29	-9.03
4	249.90	32.6 QP	46.0	-13.4	1.10 H	109	42.51	-9.95
5	901.52	41.4 QP	46.0	-4.6	1.56 H	277	37.65	3.79
6	*908.40	91.3 QP	94.0	-2.7	1.56 H	277	87.33	3.96
7	929.54	40.2 QP	46.0	-5.8	1.56 H	277	35.85	4.34
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	34.16	35.9 QP	40.0	-4.1	1.10 V	200	45.40	-9.54
2	40.40	38.8 QP	40.0	-1.2	1.10 V	104	47.82	-9.03
3	56.02	34.4 QP	40.0	-5.6	1.10 V	300	43.42	-8.98
4	70.78	31.4 QP	40.0	-8.6	1.10 V	110	42.51	-11.09
5	900.86	39.8 QP	46.0	-6.2	1.10 V	105	35.96	3.80
6	*908.40	93.2 QP	94.0	-0.8	1.10 V	105	89.23	3.96
7	929.22	43.4 QP	46.0	-2.6	1.10 V	105	39.06	4.34

REMARKS:

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

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.94	25.7 QP	40.0	-14.3	2.00 H	302	34.72	-9.01
2	66.28	24.8 QP	40.0	-15.2	1.00 H	15	34.93	-10.16
3	138.42	30.0 QP	43.5	-13.5	2.00 H	266	39.04	-9.00
4	165.97	26.5 QP	43.5	-17.0	2.00 H	91	35.39	-8.89
5	901.92	41.9 QP	46.0	-4.1	1.86 H	250	38.13	3.79
6	*916.00	91.1 QP	94.0	-2.9	1.86 H	250	86.91	4.15
7	928.08	43.4 QP	46.0	-2.7	1.86 H	250	39.02	4.33

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	40.04	37.6 QP	40.0	-2.4	1.00 V	360	46.67	-9.05
2	55.90	34.4 QP	40.0	-5.6	1.00 V	344	43.33	-8.96
3	66.25	31.1 QP	40.0	-8.9	2.00 V	284	41.27	-10.15
4	85.51	29.1 QP	40.0	-10.9	2.00 V	331	43.44	-14.36
5	901.95	43.2 QP	46.0	-2.9	1.03 V	70	39.36	3.79
6	*916.00	93.4 QP	94.0	-0.6	1.03 V	70	89.23	4.15
7	929.61	42.4 QP	46.0	-3.6	1.03 V	70	38.04	4.35

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100287	Apr. 16, 2016	Apr. 15, 2017
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Oct. 02, 2015	Oct. 01, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100071	Nov. 11, 2015	Nov. 10, 2016
RF Cable	5D-FB	COACAB-001	May 25, 2015	May 24, 2016
10 dB PAD Mini-Circuits	HAT-10+	CONATT-001	Sep. 18, 2015	Sep. 17, 2016
50 ohms Terminator	50	3	Oct. 21, 2015	Oct. 20, 2016
50 ohms Terminator	N/A	EMC-04	Oct. 28, 2015	Oct. 27, 2016
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: May 05, 2016

4.2.3 Test Procedures

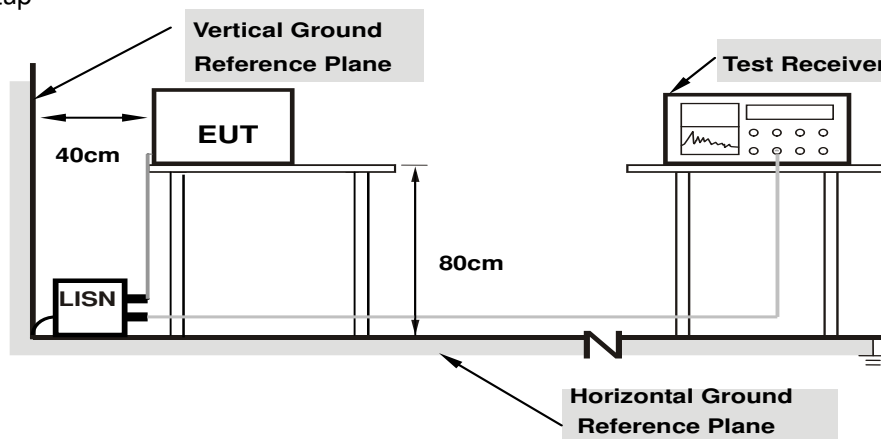
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

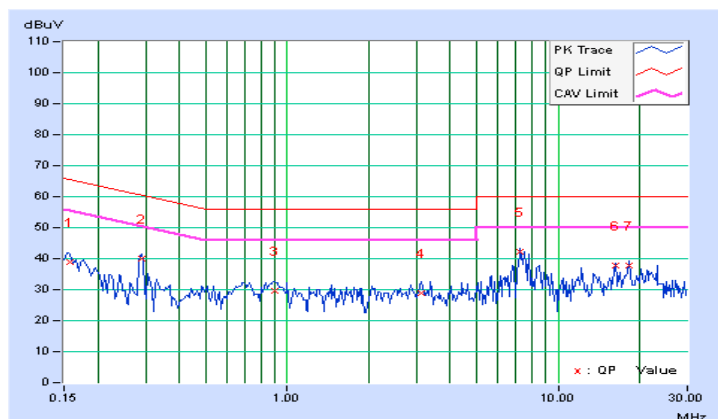
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.22	28.75	13.24	38.97	23.46	65.58	55.58	-26.61	-32.12
2	0.29063	10.25	29.76	25.10	40.01	35.35	60.51	50.51	-20.49	-15.15
3	0.90000	10.25	19.41	9.88	29.66	20.13	56.00	46.00	-26.34	-25.87
4	3.14063	10.41	18.46	10.56	28.87	20.97	56.00	46.00	-27.13	-25.03
5	7.27344	10.56	31.56	27.37	42.12	37.93	60.00	50.00	-17.88	-12.07
6	16.23047	10.91	26.72	20.92	37.63	31.83	60.00	50.00	-22.37	-18.17
7	18.30469	10.97	26.68	21.06	37.65	32.03	60.00	50.00	-22.35	-17.97

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

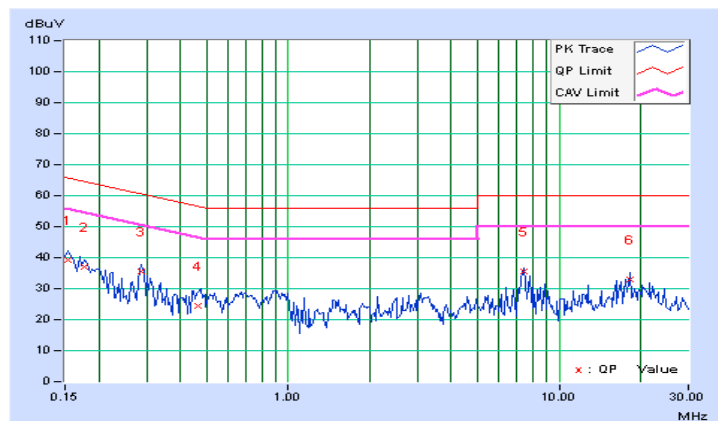


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.29	29.09	14.29	39.38	24.58	65.79	55.79	-26.41	-31.21
2	0.17734	10.30	26.78	12.58	37.08	22.88	64.61	54.61	-27.53	-31.73
3	0.28672	10.34	25.18	19.56	35.52	29.90	60.62	50.62	-25.10	-20.72
4	0.46250	10.37	13.92	4.18	24.29	14.55	56.65	46.65	-32.36	-32.10
5	7.40625	10.60	25.00	19.30	35.60	29.90	60.00	50.00	-24.40	-20.10
6	18.30469	10.95	22.03	15.74	32.98	26.69	60.00	50.00	-27.02	-23.31

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



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:

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Web Site: www.bureauveritas-adt.com

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

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