FCC Test Report (Z-Wave)

Report No.:	RF170417E09-1
FCC ID:	KA2SHG200A1
Test Model:	DSH-G200
Received Date:	Apr. 17, 2017
Test Date:	May 02 to 08, 2017
Issued Date:	May 22, 2017
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:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF170417E09-1	Original release.	May 22, 2017

1 Certificate of Conformity

Product:	Omna Bridge
Brand:	D-Link
Test Model:	DSH-G200
Sample Status:	ENGINEERING SAMPLE
Applicant:	D-Link Corporation
Test Date:	May 02 to 08, 2017
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:** May 22, 2017

Midoli Peng / Specialist

Approved by : _____ , **Date:** May 22, 2017

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 -11.96dB at 0.42344MHz.
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 -0.2dB 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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.32 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.14 dB
	6GHz ~ 18GHz	5.04 dB
	18GHz ~ 40GHz	5.25 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (Z-Wave)

Product	Omna Bridge
Brand	D-Link
Test Model	DSH-G200
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5Vdc from power adapter
Modulation Type	FSK
Transfer Rate	9.6/40/100kbit/s
Operating Frequency	908.4 ~ 916MHz
Number of Channel	2
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	LAN cable(white) (unshielded, 0.2m)

Note:

1. Simultaneously transmission condition.

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

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

No.	Brand	Model No.	Spec.
1	D-Link	F05L5-050100SPAU	Input: 100-240V, 0.2A, 50/60Hz Output: 5V, 1A DC power cable (unshielded, 1.2m)
2	D-Link	2AAU005B US	Input: 100-240V, 0.2A, 50/60Hz Output: 5V, 1A DC power cable (unshielded, 1.5m)
3	Frecom	F06W-050120SPACP	Input: 100-240V, 0.2A, 50/60Hz Output: 5V, 1.2A DC power cable (unshielded, 1.5m)
NOTE: For Radiated emission, the adapter 1 ~ 3, the worst case was found in adapter 2. Therefore only the test data of the adapter was recorded in this report.			

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

WLAN Antenna						
No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)
1	PSA	RFFPA291003IMAB301	4.56	FPC	IPEX	2.4~2.4835
2	PSA	RFFPA291007IMAB301	4.44	FPC	IPEX	2.4~2.4835
Z-Wave Antenna						
No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (MHz to MHz)
1	PSA	RFMTA010504NNRB001	1.64	Metal	NA	863~872
			2.05			902~928

4. 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

2 channels are provided to this EUT:

Channel	Frequency	Channel	Frequency
1	908.4 MHz	2	916 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE≥1G	RE<1G	PLC	
1	-	-	√	With adapter 1
2	√	√	√	With adapter 2
3	-	-	√	With adapter 3

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

NOTE: 1.The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-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.

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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 64%RH	120Vac, 60Hz	Rey Chen
RE<1G	24deg. C, 67%RH	120Vac, 60Hz	Rey Chen
PLC	26deg. C, 65%RH	120Vac, 60Hz	Wythe Lin

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.

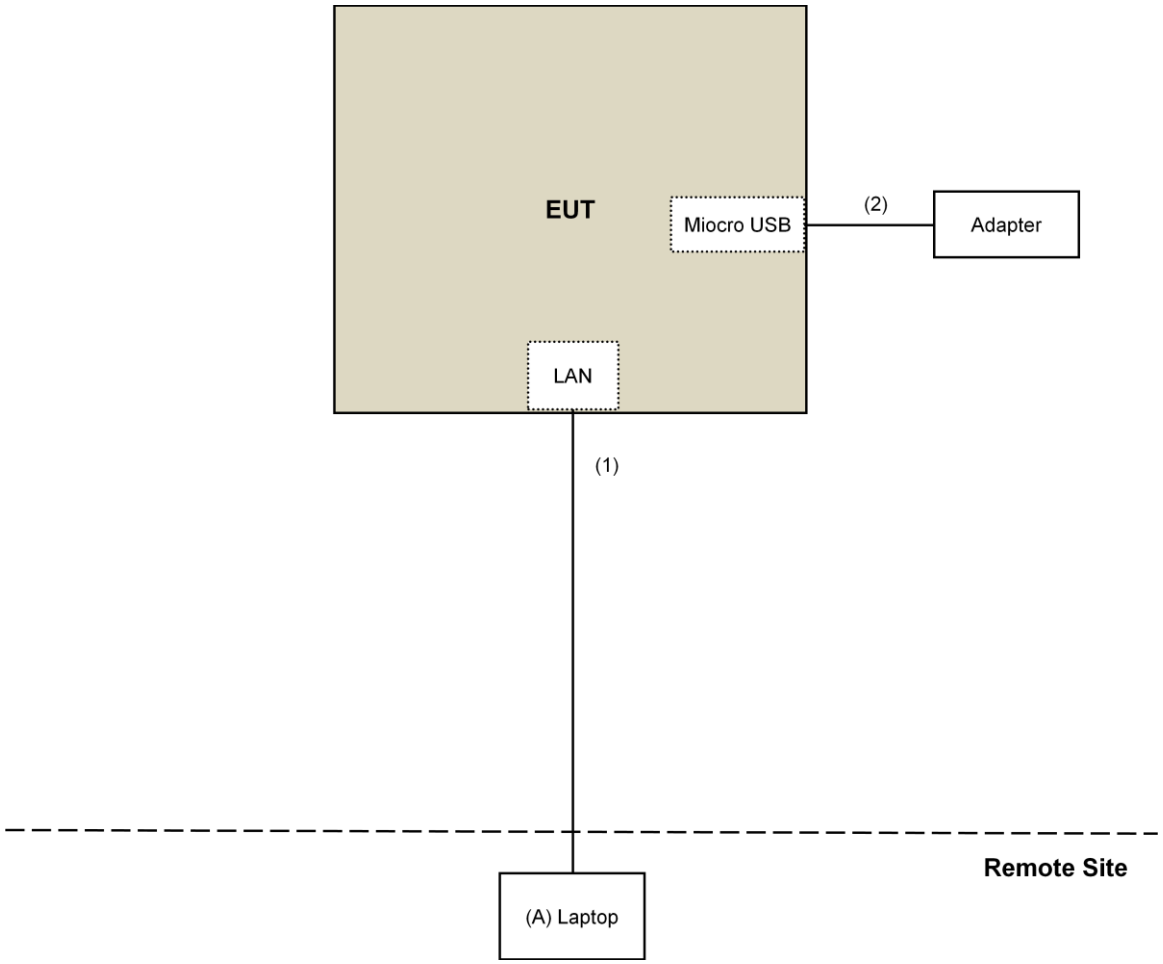
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

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.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	DC Cable	1	1.5	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	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Dec. 29, 2016	Dec. 28, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 28, 2016	Dec. 27, 2017
Pre-Amplifier EMCI	EMC12630SE	980384	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Feb. 02, 2017 Mar. 30, 2016 Mar. 30, 2016	Feb. 01, 2018 Mar. 29, 2017 Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045SE	980386	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 966 Chamber No. 3.
3. The FCC Site Registration No. is 147459
4. The CANADA Site Registration No. is 20331-1
5. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
6. Loop antenna was used for all emissions below 30 MHz.
7. Tested Date: May 02 to 03, 2017

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

c. Both X and Y axes of the antenna are set to make the measurement.

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

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

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

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

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

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

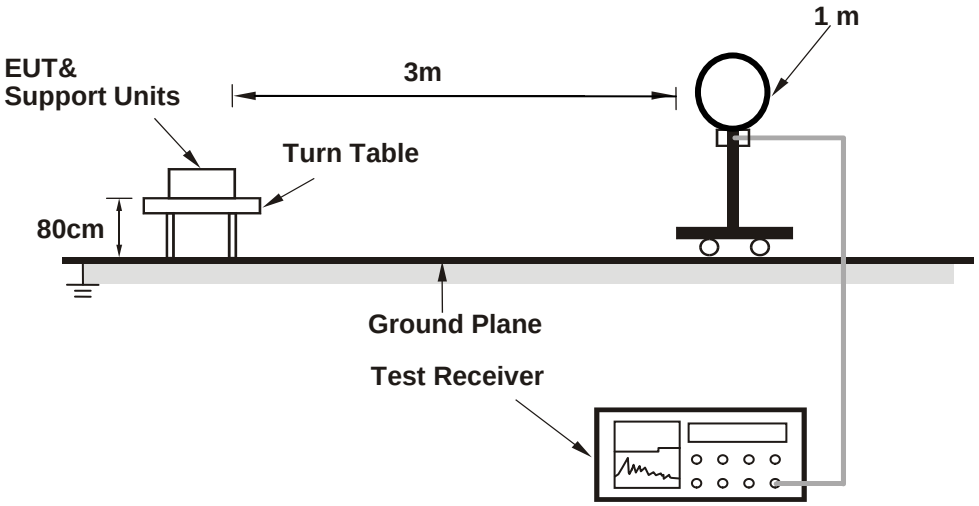
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 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

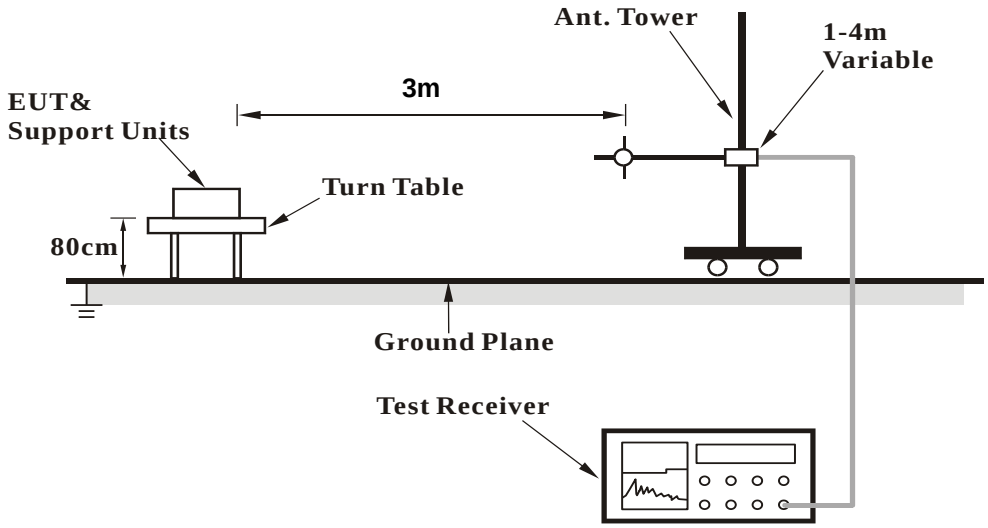
No deviation.

4.1.5 Test Setup

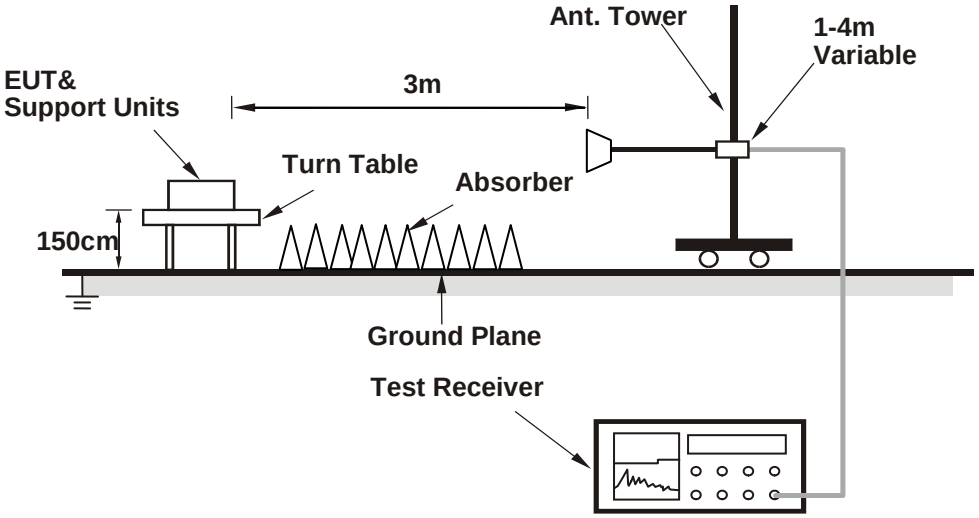
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop which is placed on remote site.
b. Contorlling software (Run TERA TERM paste tx 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) Average (AV)
FREQUENCY RANGE	1GHz ~ 10GHz		

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	38.8 PK	74.0	-35.2	1.03 H	15	42.3	-3.5
2	1816.80	35.7 AV	54.0	-18.3	1.03 H	15	39.2	-3.5
3	2725.20	55.9 PK	74.0	-18.1	1.08 H	277	56.8	-0.9
4	2725.20	51.8 AV	54.0	-2.2	1.08 H	277	52.7	-0.9
5	3633.60	40.4 PK	74.0	-33.6	1.16 H	278	39.7	0.7
6	3633.60	34.7 AV	54.0	-19.3	1.16 H	278	34.0	0.7
7	4542.00	44.2 PK	74.0	-29.8	1.00 H	256	41.7	2.5
8	4542.00	40.8 AV	54.0	-13.2	1.00 H	256	38.3	2.5
9	5450.40	38.5 PK	74.0	-35.5	1.45 H	159	34.3	4.2
10	5450.40	28.4 AV	54.0	-25.6	1.45 H	159	24.2	4.2
11	6358.80	43.7 PK	74.0	-30.3	1.05 H	333	37.4	6.3
12	6358.80	37.7 AV	54.0	-16.3	1.05 H	333	31.4	6.3
13	7267.20	42.1 PK	74.0	-31.9	1.30 H	140	33.2	8.9
14	7267.20	31.0 AV	54.0	-23.0	1.30 H	140	22.1	8.9
15	8175.60	53.8 PK	74.0	-20.2	1.16 H	146	43.4	10.4
16	8175.60	49.6 AV	54.0	-4.4	1.16 H	146	39.2	10.4
17	9084.00	43.9 PK	74.0	-30.1	1.56 H	0	33.3	10.6
18	9084.00	31.4 AV	54.0	-22.6	1.56 H	0	20.8	10.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1816.80	35.0 PK	74.0	-39.0	1.48 V	205	38.5	-3.5
2	1816.80	28.6 AV	54.0	-25.4	1.48 V	205	32.1	-3.5
3	2725.20	51.3 PK	74.0	-22.7	1.36 V	70	52.2	-0.9
4	2725.20	44.7 AV	54.0	-9.3	1.36 V	70	45.6	-0.9
5	3633.60	36.5 PK	74.0	-37.5	1.42 V	88	35.8	0.7
6	3633.60	32.3 AV	54.0	-21.7	1.42 V	88	31.6	0.7
7	4542.00	39.8 PK	74.0	-34.2	1.71 V	75	37.3	2.5
8	4542.00	36.6 AV	54.0	-17.4	1.71 V	75	34.1	2.5
9	5450.40	36.7 PK	74.0	-37.3	1.26 V	326	32.5	4.2
10	5450.40	27.1 AV	54.0	-26.9	1.26 V	326	22.9	4.2
11	6358.80	42.0 PK	74.0	-32.0	1.69 V	139	35.7	6.3
12	6358.80	36.0 AV	54.0	-18.0	1.69 V	139	29.7	6.3
13	7267.20	39.6 PK	74.0	-34.4	1.21 V	356	30.7	8.9
14	7267.20	30.0 AV	54.0	-24.0	1.21 V	356	21.1	8.9
15	8175.60	50.7 PK	74.0	-23.3	1.44 V	321	40.3	10.4
16	8175.60	44.6 AV	54.0	-9.4	1.44 V	321	34.2	10.4
17	9084.00	44.4 PK	74.0	-29.6	1.49 V	360	33.8	10.6
18	9084.00	30.9 AV	54.0	-23.1	1.49 V	360	20.3	10.6

REMARKS:

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

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	1832.00	39.1 PK	74.0	-34.9	1.03 H	26	42.5	-3.4
2	1832.00	35.8 AV	54.0	-18.2	1.03 H	26	39.2	-3.4
3	2748.00	55.4 PK	74.0	-18.6	1.07 H	263	56.3	-0.9
4	2748.00	51.6 AV	54.0	-2.4	1.07 H	263	52.5	-0.9
5	3664.00	40.4 PK	74.0	-33.6	1.15 H	263	39.6	0.8
6	3664.00	34.9 AV	54.0	-19.1	1.15 H	263	34.1	0.8
7	4580.00	44.2 PK	74.0	-29.8	1.02 H	254	41.7	2.5
8	4580.00	41.1 AV	54.0	-12.9	1.02 H	254	38.6	2.5
9	5496.00	38.7 PK	74.0	-35.3	1.48 H	158	34.5	4.2
10	5496.00	28.4 AV	54.0	-25.6	1.48 H	158	24.2	4.2
11	6412.00	44.3 PK	74.0	-29.7	1.10 H	320	37.9	6.4
12	6412.00	38.2 AV	54.0	-15.8	1.10 H	320	31.8	6.4
13	7328.00	42.4 PK	74.0	-31.6	1.28 H	145	33.5	8.9
14	7328.00	31.1 AV	54.0	-22.9	1.28 H	145	22.2	8.9
15	8244.00	54.3 PK	74.0	-19.7	1.20 H	161	43.9	10.4
16	8244.00	49.9 AV	54.0	-4.1	1.20 H	161	39.5	10.4
17	9160.00	44.2 PK	74.0	-29.8	1.50 H	0	33.6	10.6
18	9160.00	31.5 AV	54.0	-22.5	1.50 H	0	20.9	10.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1832.00	35.0 PK	74.0	-39.0	1.44 V	194	38.4	-3.4
2	1832.00	28.7 AV	54.0	-25.3	1.44 V	194	32.1	-3.4
3	2748.00	50.3 PK	74.0	-23.7	1.39 V	83	51.2	-0.9
4	2748.00	44.6 AV	54.0	-9.4	1.39 V	83	45.5	-0.9
5	3664.00	36.5 PK	74.0	-37.5	1.36 V	82	35.7	0.8
6	3664.00	32.5 AV	54.0	-21.5	1.36 V	82	31.7	0.8
7	4580.00	40.3 PK	74.0	-33.7	1.66 V	74	37.8	2.5
8	4580.00	36.8 AV	54.0	-17.2	1.66 V	74	34.3	2.5
9	5496.00	37.5 PK	74.0	-36.5	1.28 V	338	33.3	4.2
10	5496.00	27.6 AV	54.0	-26.4	1.28 V	338	23.4	4.2
11	6412.00	42.1 PK	74.0	-31.9	1.66 V	140	35.7	6.4
12	6412.00	36.4 AV	54.0	-17.6	1.66 V	140	30.0	6.4
13	7328.00	40.2 PK	74.0	-33.8	1.18 V	341	31.3	8.9
14	7328.00	30.5 AV	54.0	-23.5	1.18 V	341	21.6	8.9
15	8244.00	50.6 PK	74.0	-23.4	1.40 V	325	40.2	10.4
16	8244.00	44.6 AV	54.0	-9.4	1.40 V	325	34.2	10.4
17	9160.00	43.8 PK	74.0	-30.2	1.50 V	360	33.2	10.6
18	9160.00	30.5 AV	54.0	-23.5	1.50 V	360	19.9	10.6

REMARKS:

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

Below 1GHz Data:

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	34.51	24.0 QP	40.0	-16.0	1.00 H	277	33.3	-9.3
2	143.32	24.1 QP	43.5	-19.4	1.00 H	83	32.5	-8.4
3	209.86	22.5 QP	43.5	-21.0	1.00 H	261	34.0	-11.5
4	546.65	28.0 QP	46.0	-18.0	1.00 H	19	29.9	-1.9
5	575.07	30.1 QP	46.0	-15.9	1.00 H	93	31.1	-1.0
6	902.00	42.2 QP	46.0	-3.8	1.61 H	354	38.2	4.0
7	*908.40	93.5 QP	94.0	-0.5	1.61 H	354	89.3	4.2
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	34.41	37.0 QP	40.0	-3.0	1.00 V	319	46.3	-9.3
2	54.10	31.2 QP	40.0	-8.8	2.00 V	182	39.6	-8.4
3	88.83	32.8 QP	43.5	-10.7	1.00 V	299	47.1	-14.3
4	106.73	30.7 QP	43.5	-12.8	1.00 V	47	42.1	-11.4
5	644.40	27.3 QP	46.0	-18.7	3.00 V	155	26.9	0.4
6	902.00	40.0 QP	46.0	-6.0	1.62 V	103	36.0	4.0
7	*908.40	91.7 QP	94.0	-2.3	1.60 V	314	87.5	4.2

REMARKS:

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

CHANNEL	TX Channel 2	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.40	22.7 QP	40.0	-17.3	1.00 H	282	32.1	-9.4
2	143.30	27.6 QP	43.5	-15.9	1.00 H	278	36.0	-8.4
3	191.67	27.7 QP	43.5	-15.8	1.00 H	308	38.7	-11.0
4	250.07	21.1 QP	46.0	-24.9	1.00 H	65	30.6	-9.5
5	554.41	28.6 QP	46.0	-17.4	1.00 H	38	30.3	-1.7
6	***916.00**	**93.8 QP**	**94.0**	**-0.2**	**1.60 H**	**314**	**89.4**	**4.4**
7	928.00	41.4 QP	46.0	-4.6	1.60 H	314	36.9	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	41.40	38.3 QP	40.0	-1.7	1.00 V	300	47.3	-9.0
2	89.82	32.7 QP	43.5	-10.8	2.00 V	27	46.9	-14.2
3	106.70	29.8 QP	43.5	-13.7	1.00 V	360	41.2	-11.4
4	205.09	20.4 QP	43.5	-23.1	2.00 V	31	31.9	-11.5
5	548.32	29.6 QP	46.0	-16.4	1.00 V	67	31.4	-1.8
6	*916.00	91.2 QP	94.0	-2.8	1.65 V	344	86.8	4.4
7	928.00	41.3 QP	46.0	-4.7	1.65 V	344	36.8	4.5

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	847124/029	Oct. 10, 2016	Oct. 09, 2017
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Aug. 31, 2016	Aug. 30, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
RF Cable	5D-FB	COACAB-002	Mar. 03, 2017	Mar. 02, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-003	Sep. 13, 2016	Sep. 12, 2017
50 ohms Terminator	N/A	EMC-03	Sep. 29, 2016	Sep. 28, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: May 05 to 08, 2017

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.

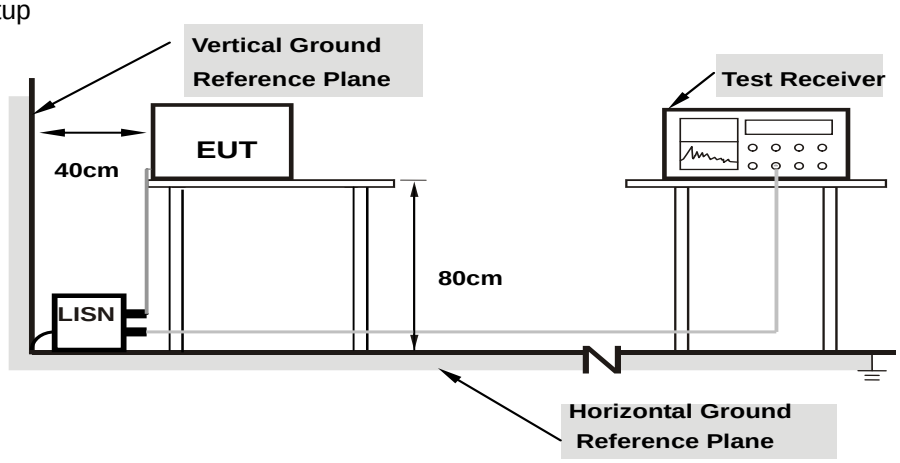
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

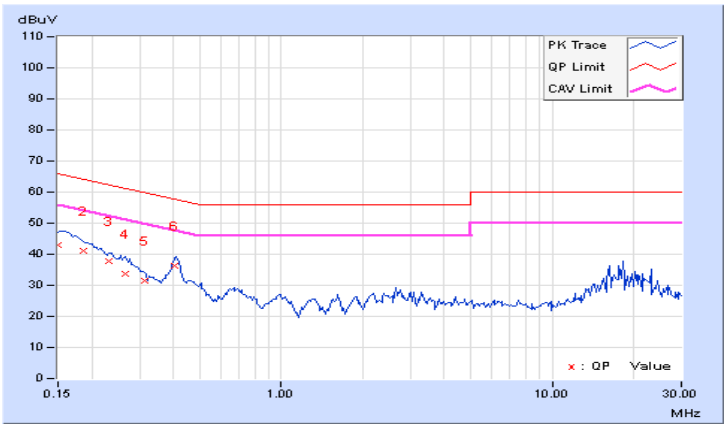
4.2.7 Test Results (Mode 1)

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.14	32.88	18.84	43.02	28.98	66.00	56.00	-22.98	-27.02
2	0.18516	10.12	30.86	16.54	40.98	26.66	64.25	54.25	-23.27	-27.59
3	0.23203	10.12	27.75	16.16	37.87	26.28	62.38	52.38	-24.51	-26.10
4	0.26719	10.12	23.75	10.57	33.87	20.69	61.20	51.20	-27.33	-30.51
5	0.31406	10.12	21.32	8.23	31.44	18.35	59.86	49.86	-28.42	-31.51
6	0.40391	10.12	26.34	19.62	36.46	29.74	57.77	47.77	-21.31	-18.03

Remarks:

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

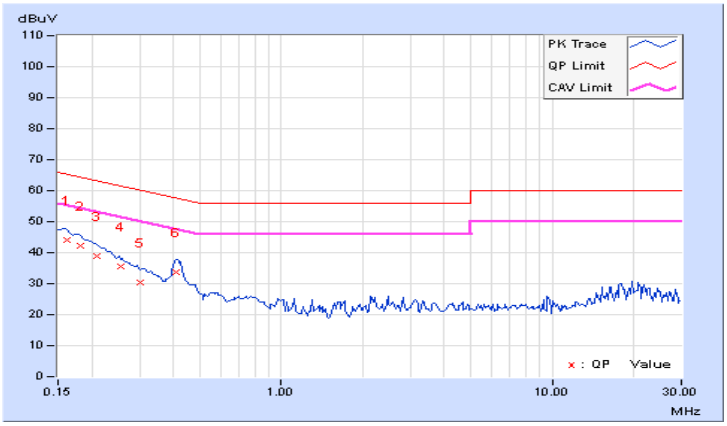


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	10.16	33.85	19.99	44.01	30.15	65.38	55.38	-21.37	-25.23
2	0.18125	10.11	32.09	18.13	42.20	28.24	64.43	54.43	-22.23	-26.19
3	0.20859	10.07	28.76	14.77	38.83	24.84	63.26	53.26	-24.43	-28.42
4	0.25547	10.08	25.52	12.41	35.60	22.49	61.58	51.58	-25.98	-29.09
5	0.30234	10.09	20.41	5.46	30.50	15.55	60.18	50.18	-29.68	-34.63
6	0.40781	10.10	23.44	13.04	33.54	23.14	57.69	47.69	-24.15	-24.55

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



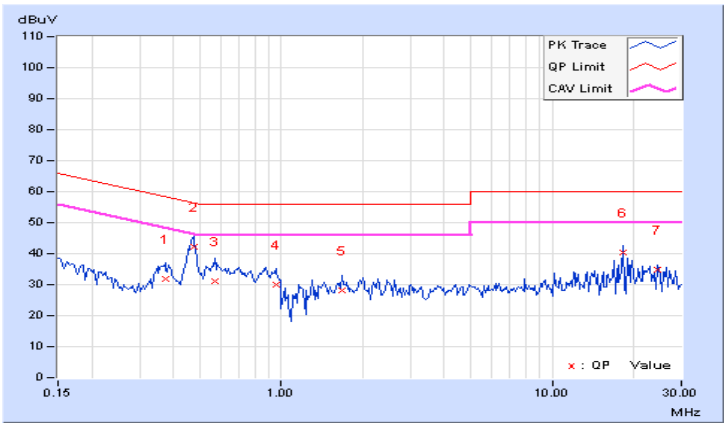
4.2.8 Test Results (Mode 2)

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

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	0.37266	10.12	21.90	13.27	32.02	23.39	58.44	48.44	-26.42	-25.05
2	0.47422	10.12	32.11	23.24	42.23	33.36	56.44	46.44	-14.21	-13.08
3	0.56797	10.13	20.91	9.92	31.04	20.05	56.00	46.00	-24.96	-25.95
4	0.95469	10.14	19.95	9.17	30.09	19.31	56.00	46.00	-25.91	-26.69
5	1.67188	10.23	17.98	8.81	28.21	19.04	56.00	46.00	-27.79	-26.96
6	18.24219	10.75	29.72	25.47	40.47	36.22	60.00	50.00	-19.53	-13.78
7	24.34766	10.99	23.74	19.97	34.73	30.96	60.00	50.00	-25.27	-19.04

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

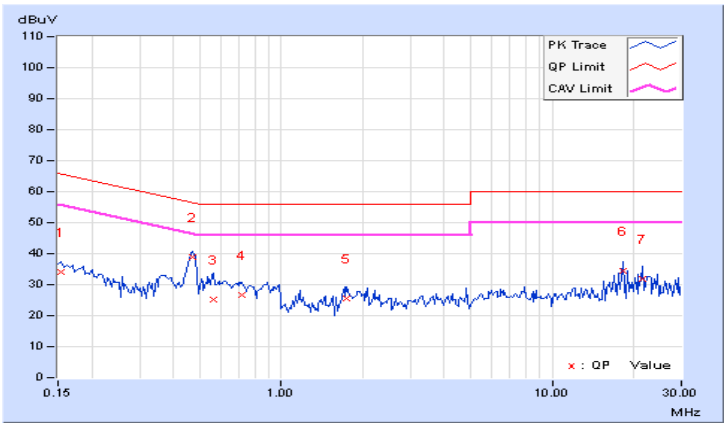


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	10.18	24.04	13.18	34.22	23.36	65.79	55.79	-31.57	-32.43
2	0.47031	10.12	28.60	24.20	38.72	34.32	56.51	46.51	-17.79	-12.19
3	0.56406	10.14	14.98	8.24	25.12	18.38	56.00	46.00	-30.88	-27.62
4	0.71641	10.17	16.57	10.18	26.74	20.35	56.00	46.00	-29.26	-25.65
5	1.74609	10.19	15.50	8.56	25.69	18.75	56.00	46.00	-30.31	-27.25
6	18.30469	10.79	23.49	19.79	34.28	30.58	60.00	50.00	-25.72	-19.42
7	21.66016	10.91	20.81	17.59	31.72	28.50	60.00	50.00	-28.28	-21.50

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



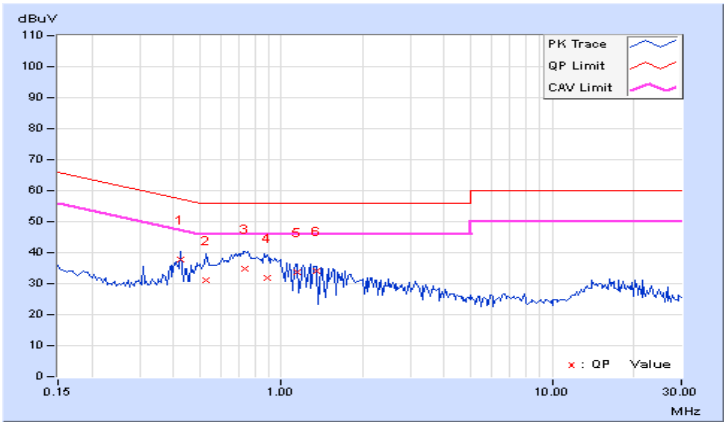
4.2.9 Test Results (Mode 3)

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

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	**0.42344**	**10.12**	**27.73**	**25.30**	**37.85**	**35.42**	**57.38**	**47.38**	**-19.53**	**-11.96**
2	0.52891	10.12	20.82	12.25	30.94	22.37	56.00	46.00	-25.06	-23.63
3	0.73594	10.13	24.87	15.24	35.00	25.37	56.00	46.00	-21.00	-20.63
4	0.89219	10.14	21.89	10.62	32.03	20.76	56.00	46.00	-23.97	-25.24
5	1.14063	10.16	23.58	12.39	33.74	22.55	56.00	46.00	-22.26	-23.45
6	1.35156	10.19	23.77	13.69	33.96	23.88	56.00	46.00	-22.04	-22.12

Remarks:

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

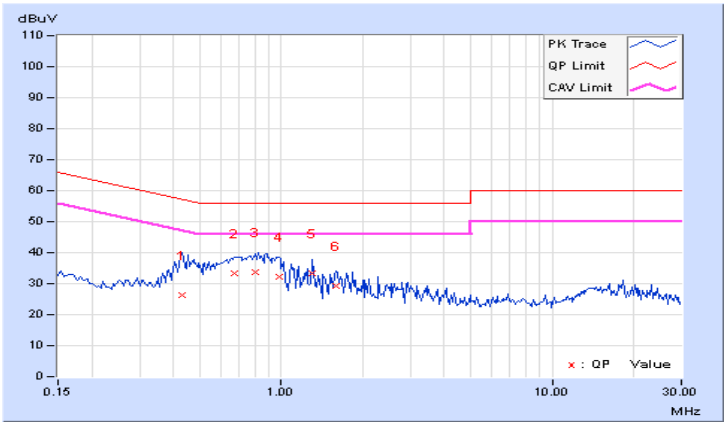


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.43125	10.11	16.35	1.23	26.46	11.34	57.23	47.23	-30.77	-35.89
2	0.67344	10.16	23.02	11.79	33.18	21.95	56.00	46.00	-22.82	-24.05
3	0.80625	10.19	23.60	15.03	33.79	25.22	56.00	46.00	-22.21	-20.78
4	0.98203	10.23	21.99	11.95	32.22	22.18	56.00	46.00	-23.78	-23.82
5	1.30859	10.21	23.01	12.76	33.22	22.97	56.00	46.00	-22.78	-23.03
6	1.59375	10.20	19.19	8.78	29.39	18.98	56.00	46.00	-26.61	-27.02

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

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