FCC Test Report

Report No.:	RF120622C18A
FCC ID:	U2M-FS2
Test Model:	FreeStyl 2
Received Date:	Oct. 16, 2015
Test Date:	Oct. 29 ~ Oct. 30, 2015
Issued Date:	Nov. 05, 2015
Applicant:	Senao Networks, Inc.
Address:	3F, No. 529, Chung Cheng Rd., Hsintien, New Taipei City, R.O.C
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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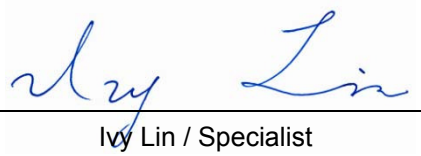
Release Control Record

Issue No.	Description	Date Issued
RF120622C18A	Original release.	Nov. 05, 2015

1 Certificate of Conformity

Product:	Single Line Long Range Cordless Telephone
Brand:	EnGenius
Test Model:	FreeStyl 2
Sample Status:	Engineering sample
Applicant:	Senao Networks, Inc.
Test Date:	Oct. 29 ~ Oct. 30, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

This report is issued as a supplementary report of RF120622C18. This report shall be used combined together with its original report.

Prepared by :  , **Date:** Nov. 05, 2015

Ivy Lin / Specialist

Approved by : , **Date:** Nov. 05, 2015

Ken Liu / Senior Manager

Note: Radiated emission below 1GHz and conducted emission items are performed for the addendum. Refer to original report for the other test data.

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 -14.19dB at 0.15781MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -8.5dB at 53.23MHz.
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.247(a)(2)	6dB bandwidth	N/A	Refer to Note
15.247(b)	Conducted power	N/A	Refer to Note
15.247(e)	Power Spectral Density	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note: Radiated emission below 1GHz and conducted emission items are performed for the addendum. Refer to original report for the other test data.

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) (

3 General Information

3.1 General Description of EUT

Product	Single Line Long Range Cordless Telephone
Brand	EnGenius
Test Model	FreeStyl 2
Status of EUT	Engineering sample
Power Supply Rating	Base Station: 5Vdc (AC Adapter) Portable Handset: 3.7Vdc (Battery) 5Vdc (Charger)
Modulation Type	Differentially Encoded MSK
Operating Frequency	902.269668 ~ 927.654755MHz
Number of Channel	252
Channel Spacing	101.136KHz
Output Power	924.698mW
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Data Cable	NA
I/O Ports	Refer to user's manual
Accessory Device	Adapter, Charger, Battery

NOTE:

1. This report is issued as a supplementary report of BVADT report no.: RF120622C18. This report shall be combined together with its original report.
2. This report is prepared for FCC class II permissive change. Difference compared with the original report is adding second source adapters. Therefore, we re-tested radiated emission below 1GHz and conducted emission tests and presented in the test report.
3. The EUT is including Base station and Portable handset. The following antennas are provided to EUT.

	Antenna Type	Antenna Connector	Antenna Gain (dBi)
Base station	Dipole antenna	Reverse TNC	2
Portable handset	Dipole antenna	NA	1.5

4. The EUT uses following adapters, battery and charger. (Adapter 2 is new adapter)

Adapter 1 (For Base Station and Portable Handset Charger used)	
Brand	DVE
Model	DSA-6E-05 US 050100
Input Power	100-240Vac, 50/60Hz, 0.3A
Output Power	+5Vdc, 1A
Poewr Line	1.5m non-shielded cable without core

Adapter 2 (For Base Station and Portable Handset Charger used)	
Brand	DVE
Model	DSA-6PFG-05 FUS 050100
Input Power	100-240Vac, 50/60Hz, 0.2A
Output Power	+5Vdc / 1A
Poewr Line	1.45m power cable w/o core attached on adapter

Battery (For Portable Handset used)	
Brand	EnGenius
Power Rating	3.7Vdc, 1100mAh

Charger (For Portable Handset used)	
Brand	EnGenius

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

3.2 Description of Test Modes

252 channels are provided to this EUT:

CH.	FREQ. (MHz)	CH.	FREQ. (MHz)	CH.	FREQ. (MHz)	CH	FREQ. (MHz)	CH	FREQ. (MHz)
2	902.269668	32	905.303742	62	908.337817	92	911.371891	122	914.405965
3	902.370804	33	905.404878	63	908.438952	93	911.473026	123	914.507100
4	902.471940	34	905.506014	64	908.540088	94	911.574162	124	914.608236
5	902.573076	35	905.607150	65	908.540088	95	911.675298	125	914.709372
6	902.674212	36	905.708286	66	908.742360	96	911.776434	126	914.810508
7	902.775347	37	905.809421	67	908.843496	97	911.877570	127	914.911644
8	902.876483	38	905.910557	68	908.944631	98	911.978705	128	915.012779
9	902.977619	39	906.011693	69	909.045767	99	912.079841	129	915.113915
10	903.078755	40	906.112829	70	909.146903	100	912.180977	130	915.113915
11	903.179891	41	906.213965	71	909.248039	101	912.282113	131	915.316187
12	903.281026	42	906.315100	72	909.349175	102	912.383249	132	915.417323
13	903.382162	43	906.416236	73	909.450310	103	912.484384	133	915.518458
14	903.483298	44	906.517372	74	909.551446	104	912.585520	134	915.619594
15	903.584434	45	906.618508	75	909.652582	105	912.686656	135	915.720730
16	903.685570	46	906.719644	76	909.753718	106	912.787792	136	915.821866
17	903.786705	47	906.820779	77	909.854854	107	912.888928	137	915.923002
18	903.887841	48	906.921915	78	909.955989	108	912.990063	138	916.024138
19	903.988977	49	907.023051	79	910.057125	109	913.091199	139	916.125273
20	904.090113	50	907.124187	80	910.158261	110	913.192335	140	916.226409
21	904.191249	51	907.225323	81	910.259397	111	913.293471	141	916.327545
22	904.292384	52	907.326458	82	910.360533	112	913.394607	142	916.428681
23	904.393520	53	907.427594	83	910.461668	113	913.495742	143	916.529817
24	904.494656	54	907.528730	84	910.562804	114	913.596878	144	916.630952
25	904.595792	55	907.629866	85	910.663940	115	913.698014	145	916.732088
26	904.696928	56	907.731002	86	910.765076	116	913.799150	146	916.833224
27	904.798063	57	907.832138	87	910.866212	117	913.900286	147	916.934360
28	904.899199	58	907.933273	88	910.967347	118	914.001421	148	917.035496
29	905.000335	59	908.034409	89	911.068483	119	914.102557	149	917.136631
30	905.101471	60	908.135545	90	911.169619	120	914.203693	150	917.237767
31	905.202607	61	908.236681	91	911.270755	121	914.304829	151	917.338903

Ch.	Freq. (MHz)	Ch.	Freq. (MHz)	Ch.	Freq. (MHz)	Ch	Freq. (MHz)	Ch	Freq. (MHz)
152	917.440039	173	919.563891	194	921.687742	215	923.811594	236	925.935446
153	917.541175	174	919.665026	195	921.687742	216	923.912730	237	926.036582
154	917.642310	175	919.766162	196	921.890014	217	924.013866	238	926.137718
155	917.743446	176	919.867298	197	921.991150	218	924.115002	239	926.238854
156	917.844582	177	919.968434	198	922.092286	219	924.216138	240	926.339989
157	917.945718	178	920.069570	199	922.193421	220	924.317273	241	926.441125
158	918.046854	179	920.170705	200	922.294557	221	924.418409	242	926.542261
159	918.147989	180	920.271841	201	922.395693	222	924.519545	243	926.643397
160	918.249125	181	920.372977	202	922.496829	223	924.620681	244	926.744533
161	918.350261	182	920.474113	203	922.597965	224	924.721817	245	926.845668
162	918.451397	183	920.575249	204	922.699100	225	924.822952	246	926.946804
163	918.552533	184	920.676384	205	922.800236	226	924.924088	247	927.047940
164	918.653668	185	920.777520	206	922.901372	227	925.025224	248	927.149076
165	918.754804	186	920.878656	207	923.002508	228	925.126360	249	927.250212
166	918.855940	187	920.979792	208	923.103644	229	925.227496	250	927.351347
167	918.957076	188	921.080928	209	923.204779	230	925.328631	251	927.452483
168	919.058212	189	921.182063	210	923.305915	231	925.429767	252	927.553619
169	919.159347	190	921.283199	211	923.407051	232	925.530903	253	927.654755
170	919.260483	191	921.384335	212	923.508187	233	925.632039		
171	919.361619	192	921.485471	213	923.609323	234	925.733175		
172	919.462755	193	921.586607	214	923.710458	235	925.834310		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO		DESCRIPTION
	RE<1G	PLC	
A	√	√	Base station with adapter 2
B	√	√	Portable handset with adapter 2 (Charging mode)

Where **RE<1G:** Radiated Emission below 1GHz **PLC:** Power Line Conducted Emission

Note: The portable handset is on standby mode when charging.

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	AXIS
A	2 to 253	2, 127, 253	MSK	X
B	Charging mode			

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	2 to 253	2, 127, 253	MSK
B	Charging mode		

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE<1G	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
PLC	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu

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.

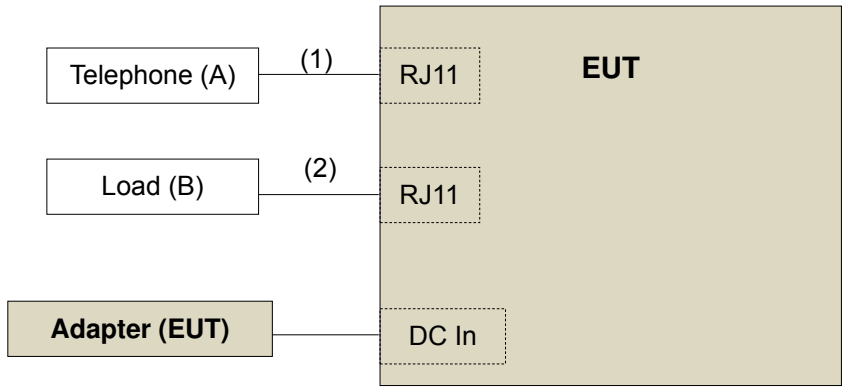
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Telephone	WONDER	WD-303	NA	NA	-
B.	Load	NA	NA	NA	NA	-

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

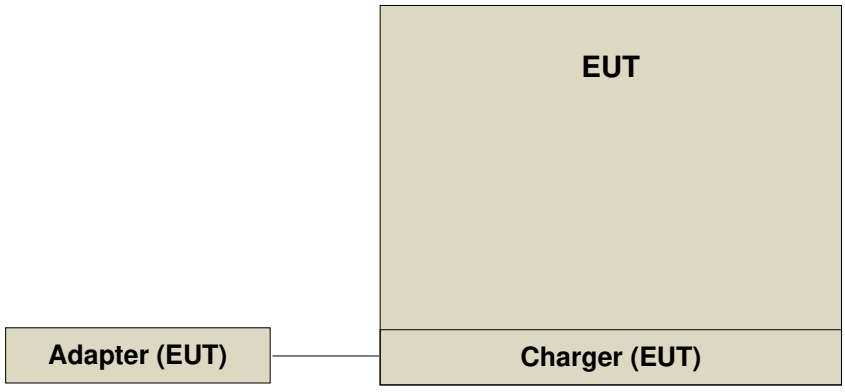
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ11 cable	1	1	N	0	
2.	RJ11 cable	1	1.8	N	0	

3.3.1 Configuration of System under Test

Test Mode A



Test Mode B



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)
558074 D01 DTS Meas Guidance v03r04
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03(214 378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03(309 224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

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:

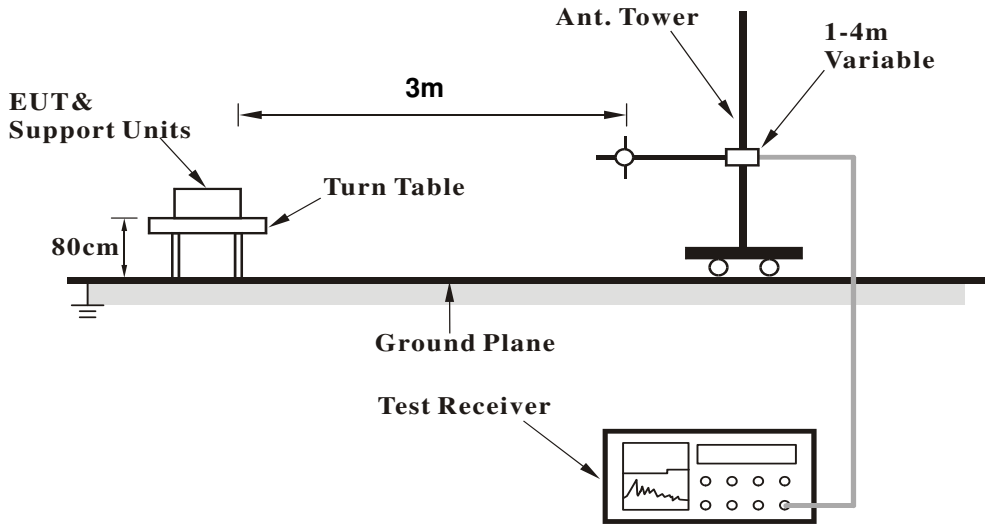
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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



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

4.1.6 EUT Operating Conditions

Test Mode A

a. Placed the EUT on a testing table.
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

Test Mode B

The EUT (Portable handset) was charged by charger.

4.1.7 Test Results

Below 1GHz Worst-Case Data

Channel	Channel 2	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Test Mode	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	212.66	32.2 QP	43.5	-11.3	1.51 H	247	48.80	-16.60
2	228.22	32.5 QP	46.0	-13.5	1.51 H	245	48.90	-16.40
3	385.70	27.0 QP	46.0	-19.0	1.00 H	208	37.80	-10.80
4	467.36	30.9 QP	46.0	-15.1	2.00 H	290	40.00	-9.10
5	482.92	31.9 QP	46.0	-14.1	2.00 H	290	40.70	-8.80
6	729.84	29.7 QP	46.0	-16.3	2.00 H	28	33.30	-3.60
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	**53.23**	**31.5 QP**	**40.0**	**-8.5**	**1.50 V**	**6**	**46.00**	**-14.50**
2	111.56	20.6 QP	43.5	-22.9	1.00 V	301	37.80	-17.20
3	212.66	25.7 QP	43.5	-17.8	1.00 V	7	42.30	-16.60
4	237.94	27.2 QP	46.0	-18.8	1.00 V	183	42.20	-15.00
5	467.36	25.5 QP	46.0	-20.5	1.00 V	244	34.60	-9.10
6	482.92	27.2 QP	46.0	-18.8	1.00 V	202	36.00	-8.80

REMARKS:

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

Channel	Channel 127	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Test Mode	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.23	21.6 QP	40.0	-18.4	1.99 H	81	36.10	-14.50
2	187.39	27.9 QP	43.5	-15.6	1.50 H	247	43.80	-15.90
3	212.66	33.3 QP	43.5	-10.2	1.00 H	236	49.90	-16.60
4	237.94	33.2 QP	46.0	-12.8	1.00 H	221	48.20	-15.00
5	385.70	28.3 QP	46.0	-17.7	1.00 H	211	39.10	-10.80
6	482.92	32.0 QP	46.0	-14.0	1.99 H	278	40.80	-8.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.23	31.1 QP	40.0	-8.9	1.00 V	355	45.60	-14.50
2	148.50	19.8 QP	43.5	-23.7	1.50 V	163	33.80	-14.00
3	212.66	26.3 QP	43.5	-17.2	1.00 V	23	42.90	-16.60
4	237.94	27.3 QP	46.0	-18.7	1.00 V	318	42.30	-15.00
5	385.70	22.6 QP	46.0	-23.4	1.00 V	220	33.40	-10.80
6	482.92	27.6 QP	46.0	-18.4	1.00 V	191	36.40	-8.80

REMARKS:

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

Channel	Channel 253	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Test Mode	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	212.66	32.4 QP	43.5	-11.1	1.00 H	227	49.00	-16.60
2	237.94	32.8 QP	46.0	-13.2	1.00 H	235	47.80	-15.00
3	385.70	27.1 QP	46.0	-18.9	1.00 H	225	37.90	-10.80
4	467.36	30.2 QP	46.0	-15.8	2.00 H	294	39.30	-9.10
5	482.92	31.0 QP	46.0	-15.0	2.00 H	287	39.80	-8.80
6	669.57	30.3 QP	46.0	-15.7	1.00 H	7	35.20	-4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.23	31.0 QP	40.0	-9.0	1.00 V	0	45.50	-14.50
2	148.50	19.6 QP	43.5	-23.9	1.00 V	185	33.60	-14.00
3	212.66	25.8 QP	43.5	-17.7	1.50 V	218	42.40	-16.60
4	228.22	26.6 QP	46.0	-19.4	1.00 V	200	43.00	-16.40
5	434.31	24.0 QP	46.0	-22.0	1.00 V	260	33.50	-9.50
6	482.92	27.7 QP	46.0	-18.3	1.00 V	183	36.50	-8.80

REMARKS:

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

Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	29.90	25.5 QP	40.0	-14.5	1.01 H	75	41.60	-16.10
2	57.12	31.3 QP	40.0	-8.7	2.00 H	76	46.10	-14.80
3	129.06	24.2 QP	43.5	-19.3	1.51 H	14	39.80	-15.60
4	212.66	28.4 QP	43.5	-15.1	1.01 H	232	45.00	-16.60
5	234.05	25.3 QP	46.0	-20.7	1.01 H	255	40.80	-15.50
6	393.48	25.4 QP	46.0	-20.6	1.01 H	243	36.20	-10.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	29.90	28.1 QP	40.0	-11.9	1.00 V	359	44.20	-16.10
2	57.12	26.7 QP	40.0	-13.3	1.00 V	274	41.50	-14.80
3	125.17	28.2 QP	43.5	-15.3	1.00 V	283	44.10	-15.90
4	212.66	25.3 QP	43.5	-18.2	1.00 V	1	41.90	-16.60
5	235.99	26.3 QP	46.0	-19.7	1.00 V	161	41.60	-15.30
6	393.48	23.9 QP	46.0	-22.1	1.50 V	253	34.70	-10.80

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

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

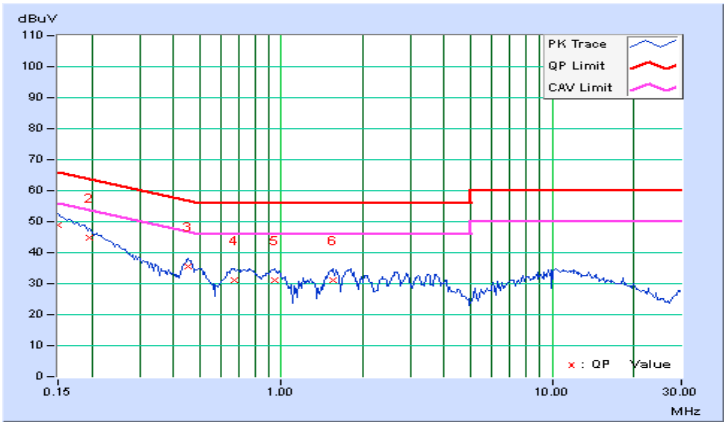
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 2	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	39.03	24.66	48.97	34.60	66.00	56.00	-17.03	-21.40
2	0.19687	9.95	34.68	21.26	44.63	31.21	63.74	53.74	-19.12	-22.54
3	0.45469	9.96	25.42	18.94	35.38	28.90	56.79	46.79	-21.41	-17.89
4	0.66953	10.00	21.04	14.50	31.04	24.50	56.00	46.00	-24.96	-21.50
5	0.94688	10.06	20.95	14.11	31.01	24.17	56.00	46.00	-24.99	-21.83
6	1.54688	10.12	21.08	14.74	31.20	24.86	56.00	46.00	-24.80	-21.14

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.

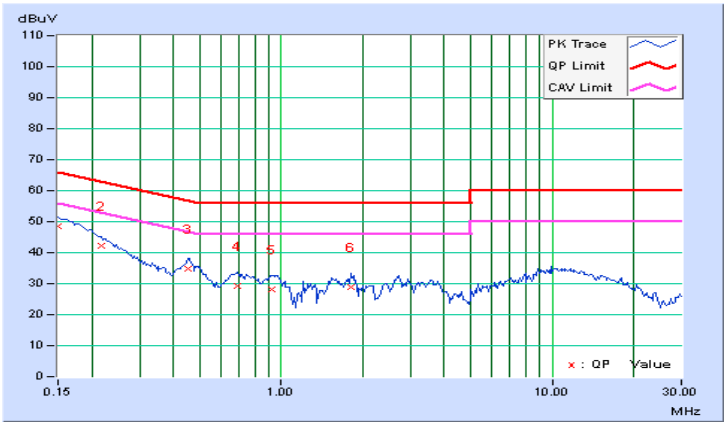


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 2	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.95	38.52	23.86	48.47	33.81	66.00	56.00	-17.53	-22.19
2	0.21641	9.97	32.29	17.51	42.26	27.48	62.96	52.96	-20.70	-25.48
3	0.45469	10.01	24.96	15.90	34.97	25.91	56.79	46.79	-21.82	-20.88
4	0.68516	10.04	19.31	12.29	29.35	22.33	56.00	46.00	-26.65	-23.67
5	0.92734	10.07	18.23	11.50	28.30	21.57	56.00	46.00	-27.70	-24.43
6	1.80078	10.17	18.88	12.54	29.05	22.71	56.00	46.00	-26.95	-23.29

REMARKS:

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

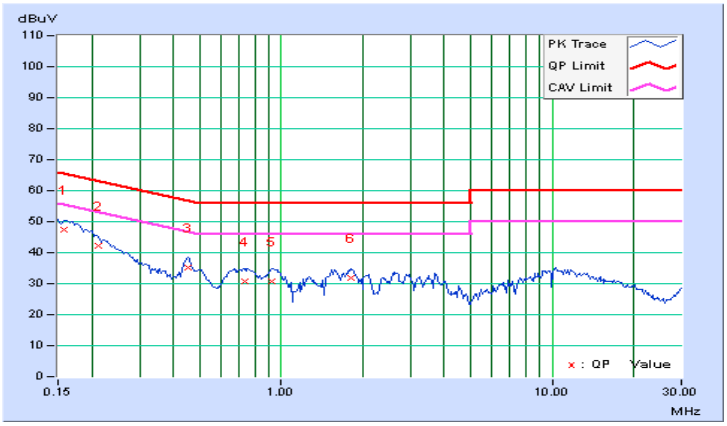


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 127	Test Mode	A

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.94	37.47	24.07	47.41	34.01	65.58	55.58	-18.17	-21.57
2	0.21250	9.95	32.37	19.13	42.32	29.08	63.11	53.11	-20.79	-24.03
3	0.45078	9.96	25.37	19.25	35.33	29.21	56.86	46.86	-21.53	-17.65
4	0.73203	10.02	20.72	14.30	30.74	24.32	56.00	46.00	-25.26	-21.68
5	0.92734	10.05	20.79	13.88	30.84	23.93	56.00	46.00	-25.16	-22.07
6	1.80859	10.14	21.62	14.91	31.76	25.05	56.00	46.00	-24.24	-20.95

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.

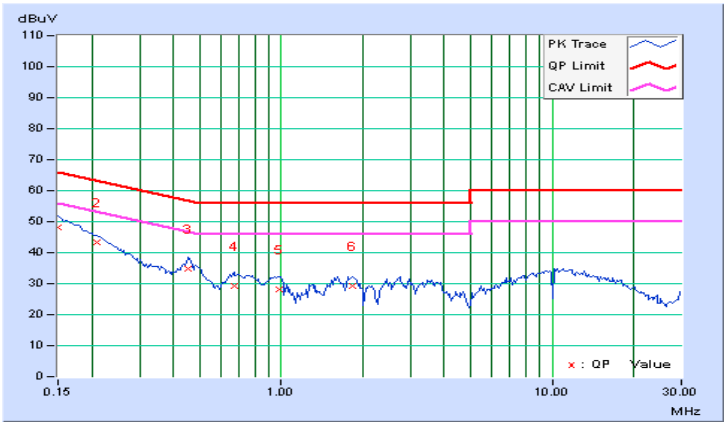


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 127	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.95	38.30	23.56	48.25	33.51	66.00	56.00	-17.75	-22.49
2	0.20859	9.97	33.20	19.26	43.17	29.23	63.26	53.26	-20.09	-24.03
3	0.45469	10.01	24.76	15.60	34.77	25.61	56.79	46.79	-22.02	-21.18
4	0.66953	10.04	19.15	12.23	29.19	22.27	56.00	46.00	-26.81	-23.73
5	0.97813	10.07	18.02	11.34	28.09	21.41	56.00	46.00	-27.91	-24.59
6	1.83203	10.18	19.08	12.77	29.26	22.95	56.00	46.00	-26.74	-23.05

REMARKS:

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

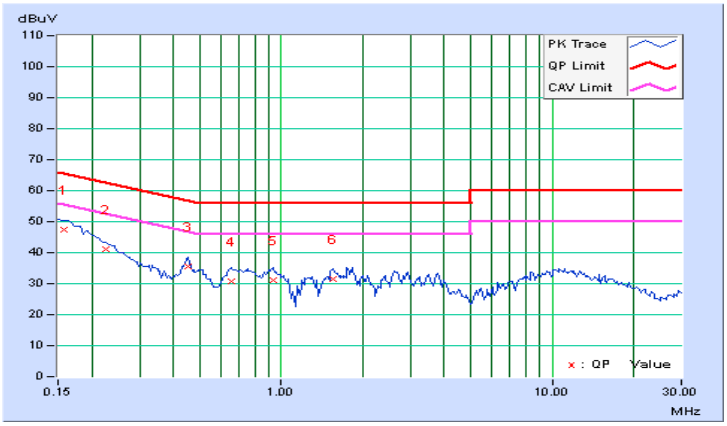


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 253	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.94	37.31	23.79	47.25	33.73	65.58	55.58	-18.33	-21.85
2	0.22422	9.95	31.10	17.66	41.05	27.61	62.66	52.66	-21.61	-25.05
3	0.45078	9.96	25.48	19.37	35.44	29.33	56.86	46.86	-21.42	-17.53
4	0.65391	10.00	20.68	13.88	30.68	23.88	56.00	46.00	-25.32	-22.12
5	0.93516	10.05	21.14	13.78	31.19	23.83	56.00	46.00	-24.81	-22.17
6	1.56250	10.12	21.44	15.04	31.56	25.16	56.00	46.00	-24.44	-20.84

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.

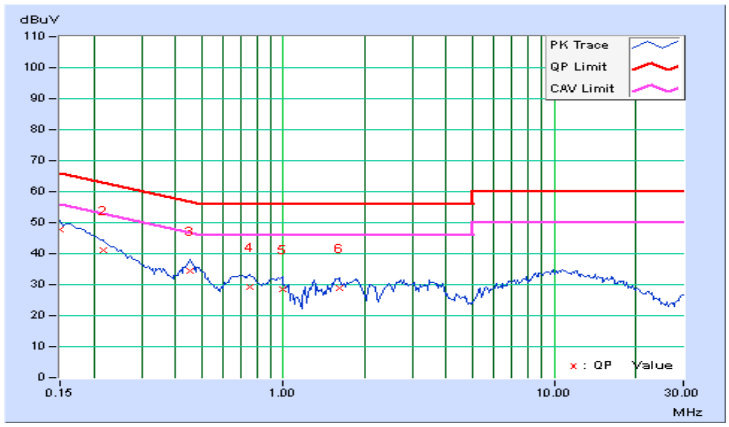


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 253	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.95	37.79	23.25	47.74	33.20	66.00	56.00	-18.26	-22.80
2	0.21641	9.97	31.24	16.73	41.21	26.70	62.96	52.96	-21.75	-26.26
3	0.45078	10.01	24.47	16.24	34.48	26.25	56.86	46.86	-22.38	-20.61
4	0.75547	10.05	19.38	12.40	29.43	22.45	56.00	46.00	-26.57	-23.55
5	0.99375	10.08	18.28	10.96	28.36	21.04	56.00	46.00	-27.64	-24.96
6	1.61328	10.15	18.75	11.96	28.90	22.11	56.00	46.00	-27.10	-23.89

REMARKS:

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

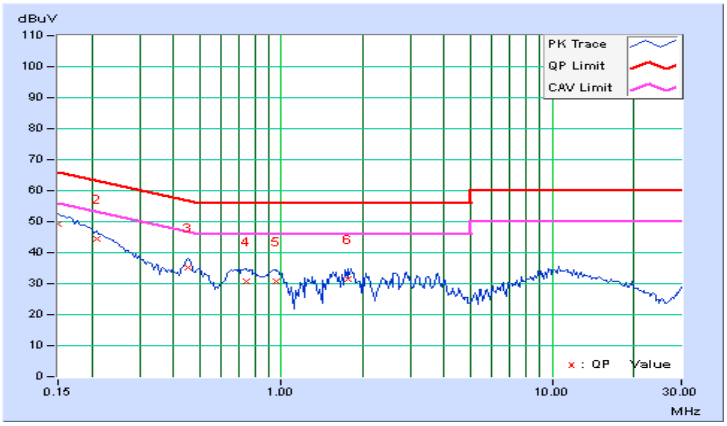


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15781**	**9.94**	**41.45**	**30.01**	**51.39**	**39.95**	**65.58**	**55.58**	**-14.19**	**-15.63**
2	0.18125	9.94	36.62	21.27	46.56	31.21	64.43	54.43	-17.86	-23.21
3	0.45469	9.96	22.54	15.72	32.50	25.68	56.79	46.79	-24.29	-21.11
4	0.88047	10.04	22.46	15.29	32.50	25.33	56.00	46.00	-23.50	-20.67
5	1.97656	10.15	20.27	13.96	30.42	24.11	56.00	46.00	-25.58	-21.89
6	3.97266	10.27	18.93	10.96	29.20	21.23	56.00	46.00	-26.80	-24.77

REMARKS:

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

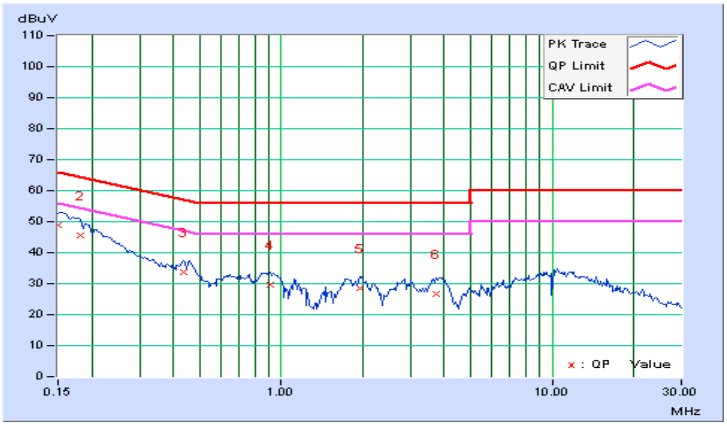


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.95	39.11	22.79	49.06	32.74	66.00	56.00	-16.94	-23.26
2	0.18125	9.96	35.67	19.82	45.63	29.78	64.43	54.43	-18.80	-24.65
3	0.43516	10.01	23.51	11.90	33.52	21.91	57.15	47.15	-23.64	-25.25
4	0.91563	10.07	19.66	12.71	29.73	22.78	56.00	46.00	-26.27	-23.22
5	1.95703	10.19	18.49	11.94	28.68	22.13	56.00	46.00	-27.32	-23.87
6	3.71875	10.29	16.40	9.13	26.69	19.42	56.00	46.00	-29.31	-26.58

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:

Linko EMC/RF Lab
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Hsin Chu EMC/RF/Telecom Lab
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Email: service.adt@tw.bureauveritas.com
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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