

FCC Test Report

Report No.: FD180227D14

Test Model: EA271Q

Series Model: EA271Q, EA271Q-BK

Received Date: Feb. 27, 2018

Test Date: Feb. 28 ~ Mar. 2, 2018

Issued Date: Mar. 16, 2018

Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

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

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**FCC Registration /
Designation Number:** 418586 / TW1078



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Release Control Record

Issue No.	Description	Date Issued
FD180227D14	Original release.	Mar. 16, 2018

1 Certificate of Conformity

Product: LCD Monitor

Brand: NEC

Test Model: EA271Q

Series Model: EA271Q, EA271Q-BK

Sample Status: Engineering sample

Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

Test Date: Feb. 28 ~ Mar. 2, 2018

Standards: 47 CFR FCC Part 15, Subpart B, Class B

ICES-003:2016 Issue 6, Class B

ANSI C63.4:2014

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: Mar. 16, 2018

Albee Chu / Specialist

Approved by :



Date: Mar. 16, 2018

Henry Lai / Director

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, Class B

ANSI C63.4:2014

FCC Clause	ICES-003 Clause	Test Item	Result/Remarks	Verdict
15.107	6.1	AC Power Line Conducted Emissions	Minimum passing Class B margin is -16.99 dB at 0.49247 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -4.46 dB at 742.49 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -13.23 dB at 5000.01 MHz	Pass

Note: There is no deviation to the applied test methods and requirements covered by the scope of this report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.26 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.12 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Features of EUT

The tests reported herein were performed according to the method specified by TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	LCD Monitor
Brand	NEC
Test Model	EA271Q
Model No.	EA271Q, EA271Q-BK
Model Difference	Marketing difference
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Internal switching power supply Rating: 100-240Vac, 50/60Hz Power Cord: Non-shielded AC cable (1.8m)
Accessory Device	Refer to note as below
Data Cable Supplied	Shielded DVI cable (1.8m) with two ferrite cores Shielded Display cable (1.8m) Shielded HDMI cable (1.8m) Shielded USB type C cable (1.8m)

Note:

1. The EUT is a LCD Monitor and the highest resolution is up to 2560*1440 (60Hz).
2. The EUT has several models which are equipped the following interfaces:

Model No.	Interface	Difference
EA271Q	◆ HDMI in ◆ Display in ◆ Display out ◆ DVI in ◆ Audio out ◆ USB (type A) x 1 <Side> ◆ USB (type A) x 2 <Rear> ◆ USB (type B) x 1 ◆ USB type C ◆ Control in ◆ Control out ◆ GND ◆ AC in	Marketing differentiation
EA271Q-BK		

During the test, **model: EA271Q** was selected as the representative one and therefore only its test data was recorded this report.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

1. The EUT has been pre-tested under following test modes, and test **Mode 1** was the worst case.

Description			Test Mode									
			1	2	3	4	5	6	7	8	9	10
Interface	Display	2560*1440 (60Hz)	V	V	V	V						
	HDMI						V					
	DVI							V				
	USB type C	1920*1080 (60Hz)							V			
	Display: 1600*900 (60Hz)									V		
	Display: 640*480 (60Hz)										V	
	HDMI from DVD: 1080p											V
Setup of Panel	Horizontal (up)		V	V			V	V	V	V	V	V
	Horizontal (down)				V							
	Vertical					V						
Headphone	With		V		V	V	V	V	V	V	V	V
	Without			V								

2. Test modes are presented in the report as below.

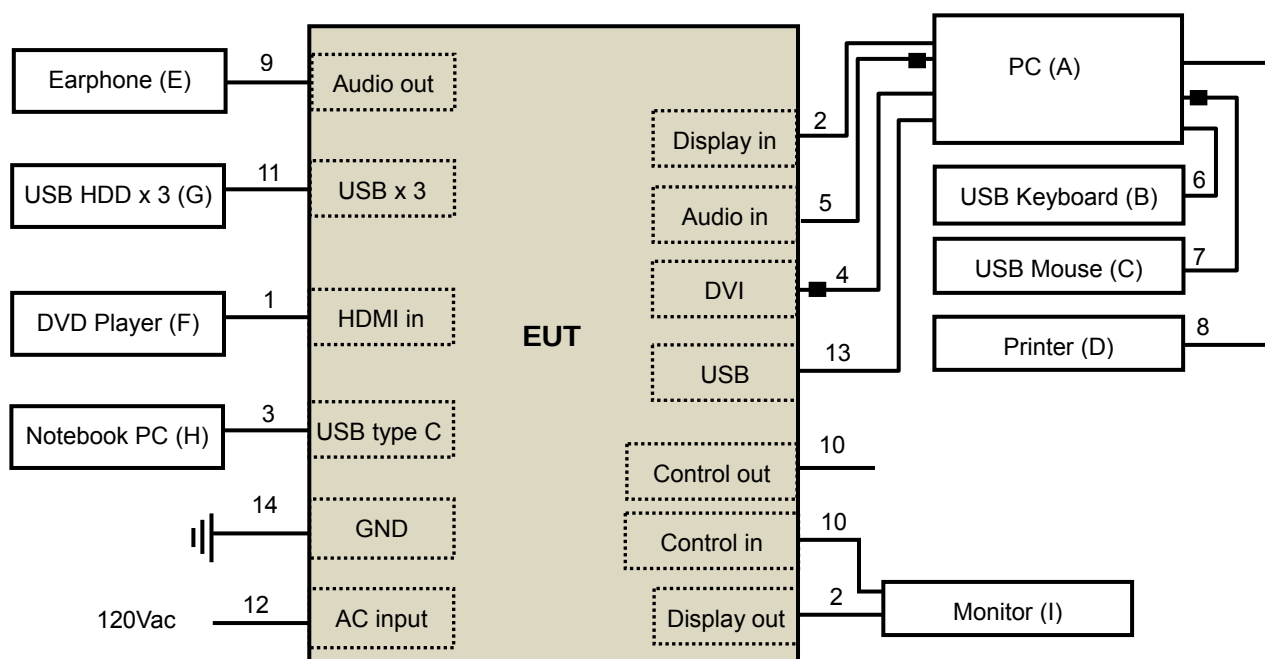
Mode	Interface / Resolution	Panel	Headphone	Input Power
1	Display / 2560*1440 (60Hz)	Horizontal (up)	With Headphone	120V/60Hz
10	HDMI to DVD/ 1080p			

3.4 Test Program Used and Operation Descriptions

- Turned on the power of all equipments.
- PC/ Notebook PC ran a test program to enable all functions.
- PC/ Notebook PC read and wrote messages from HDD.
- PC read and wrote messages from ext. HDDs via EUT.
- PC/ Notebook PC sent "H" patterns" to EUT, and then it displayed them on its screen. **<For Mode 1>**
- DVD player sent color bars messages to EUT, and then it displayed them on its screen. **<For Mode 10>**
- PC sent messages to printer and printer printed them out.
- PC/ DVD Player/ Notebook PC sent audio signal to earphone via EUT.
- Steps c-h were repeated.

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PERSONAL COMPUTER	Lenovo	90G8	R303YS8R	FCC DoC Approved	Provided by Lab
B.	USB KEYBOARD	BTC	5200U	G09302046627	E5XKB5122U	Provided by Lab
C.	USB Mouse	Microsoft	1113	9170515153524	FCC DOC Approved	Provided by Lab
D.	PRINTER	HP	CV136-64001	N/A	FCC DoC Approved	Provided by Lab
E.	EARPHONE	PHILIPS	SBC HL150	H2010154	N/A	Provided by Lab
F.	DVD PLAYER	SONY	BDP-S7200	3200138	Verification	Provided by Lab
G.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXF1E84H2ASN	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXN1E84F21W	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXM1E1562S3E	FCC DoC Approved	Provided by Lab
H.	Notebook PC	DELL	P54G	98HNF72	FCC DoC Approved	Provided by Lab
I.	Monitor	NEC	EA271U	N/A	N/A	Supplied by client

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.	HDMI cable	1	1.8	Y	0	Supplied by client
2.	Display cable	2	1.8	Y	0	Supplied by client
3.	USB type C cable	1	1.8	Y	0	Supplied by client
4.	DVI cable	1	1.8	Y	2	Supplied by client
5.	Audio cable	1	1.8	N	0	Provided by Lab
6.	USB cable	1	1.5	Y	0	Provided by Lab
7.	USB cable	1	1.8	Y	1	Provided by Lab
8.	USB cable	1	1.5	Y	0	Provided by Lab
9.	Audio cable	1	1.2	N	0	Provided by Lab
10.	Control cable	2	1.8	N	0	Supplied by client
11.	USB cable	3	0.5	Y	0	Provided by Lab
12.	AC power cord	1	1.8	N	0	Supplied by client
13.	USB cable	1	1.8	Y	0	Provided by Lab
14.	GND cable	1	1.5	N	0	Provided by Lab

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

5 Conducted Emissions at Mains Ports

5.1 Limits

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

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

5.2 Test Instruments

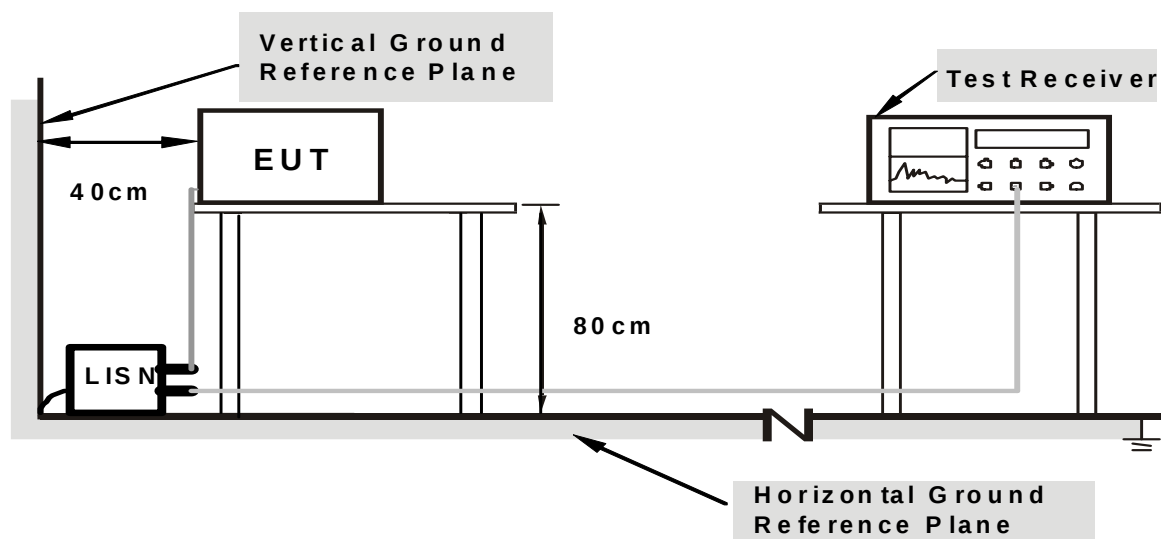
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100290	Dec. 19, 2017	Dec. 18, 2018
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 06, 2017	Dec. 05, 2018
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 06, 2017	Dec. 05, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Nov. 03, 2017	Nov. 02, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 9, 2017	May 8, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C09.01	Feb. 21, 2018	Feb. 20, 2019
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 18, 2017	May 17, 2018
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 14, 2017	Nov. 13, 2018
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 14, 2017	Nov. 13, 2018

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Shielded Room No. 9.
 3. The VCCI Site Registration No. C-1312.
 4. Tested Date: Mar. 1, 2018.

5.3 Test Arrangement

- 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 test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

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.



Note: Support units were connected to second LISN.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

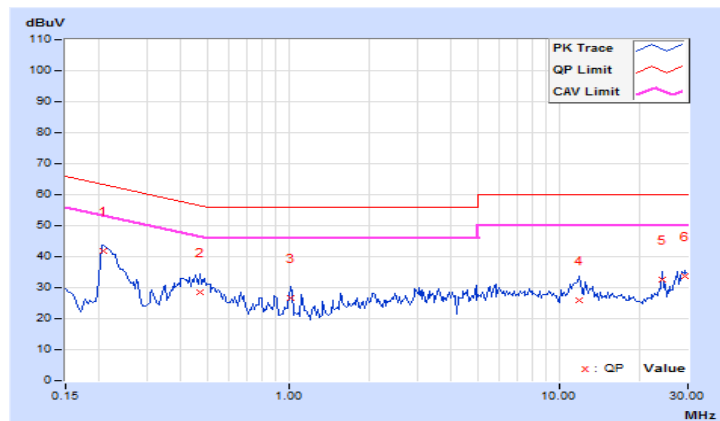
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Ane Wang		
Test Mode	Mode 1		

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	0.20724	10.12	31.72	15.89	41.84	26.01	63.32	53.32	-21.48	-27.31
2	0.47031	10.16	18.40	12.53	28.56	22.69	56.51	46.51	-27.95	-23.82
3	1.02344	10.25	16.50	14.55	26.75	24.80	56.00	46.00	-29.25	-21.20
4	11.85156	10.75	15.27	12.76	26.02	23.51	60.00	50.00	-33.98	-26.49
5	24.00000	11.12	21.38	20.83	32.50	31.95	60.00	50.00	-27.50	-18.05
6	29.22266	11.13	22.44	21.28	33.57	32.41	60.00	50.00	-26.43	-17.59

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

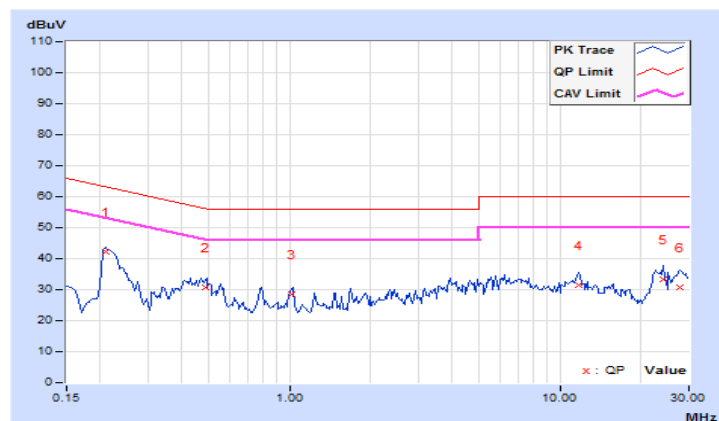


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Ane Wang		
Test Mode	Mode 1		

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	0.20859	10.14	32.09	16.52	42.23	26.66	63.26	53.26	-21.03	-26.60
2	0.49247	10.18	20.65	18.96	30.83	29.14	56.13	46.13	-25.30	-16.99
3	1.02335	10.27	18.07	17.34	28.34	27.61	56.00	46.00	-27.66	-18.39
4	11.80859	10.69	20.95	16.92	31.64	27.61	60.00	50.00	-28.36	-22.39
5	23.99872	10.75	22.67	21.53	33.42	32.28	60.00	50.00	-26.58	-17.72
6	27.92578	10.60	20.02	19.06	30.62	29.66	60.00	50.00	-29.38	-20.34

Remarks:

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

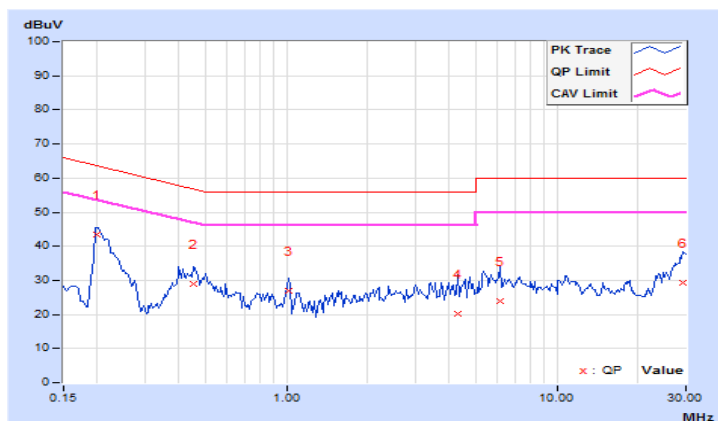


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Ane Wang		
Test Mode	Mode 10		

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	0.19815	10.12	33.16	23.48	43.28	33.60	63.69	53.69	-20.41	-20.09
2	0.45469	10.16	18.83	14.81	28.99	24.97	56.79	46.79	-27.80	-21.82
3	1.02344	10.25	16.57	16.55	26.82	26.80	56.00	46.00	-29.18	-19.20
4	4.31250	10.48	9.58	5.18	20.06	15.66	56.00	46.00	-35.94	-30.34
5	6.13281	10.54	13.44	10.37	23.98	20.91	60.00	50.00	-36.02	-29.09
6	29.32813	11.13	18.01	15.24	29.14	26.37	60.00	50.00	-30.86	-23.63

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

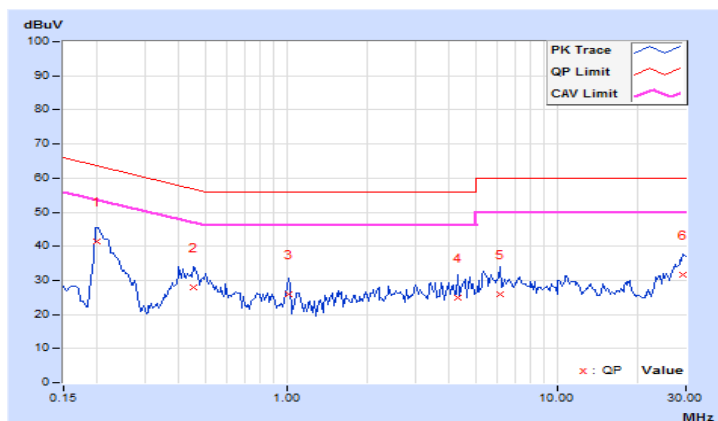


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Ane Wang		
Test Mode	Mode 10		

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	0.19815	10.14	31.16	23.48	41.30	33.62	63.69	53.69	-22.39	-20.07
2	0.45469	10.17	17.83	14.81	28.00	24.98	56.79	46.79	-28.79	-21.81
3	1.02344	10.27	15.57	12.63	25.84	22.90	56.00	46.00	-30.16	-23.10
4	4.31250	10.50	14.58	9.18	25.08	19.68	56.00	46.00	-30.92	-26.32
5	6.13281	10.55	15.44	10.37	25.99	20.92	60.00	50.00	-34.01	-29.08
6	29.32813	10.55	21.01	15.24	31.56	25.79	60.00	50.00	-28.44	-24.21

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



6 Radiated Emissions up to 1 GHz

6.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Continuing:

Radiated Emissions Limits at 10 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960				
960-1000	49.5	43.5	47	37

Radiated Emissions Limits at 3 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960				
960-1000	60	54	57.5	47.5

- Notes: 1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
 3. QP detector shall be applied if not specified.

6.2 Test Instruments

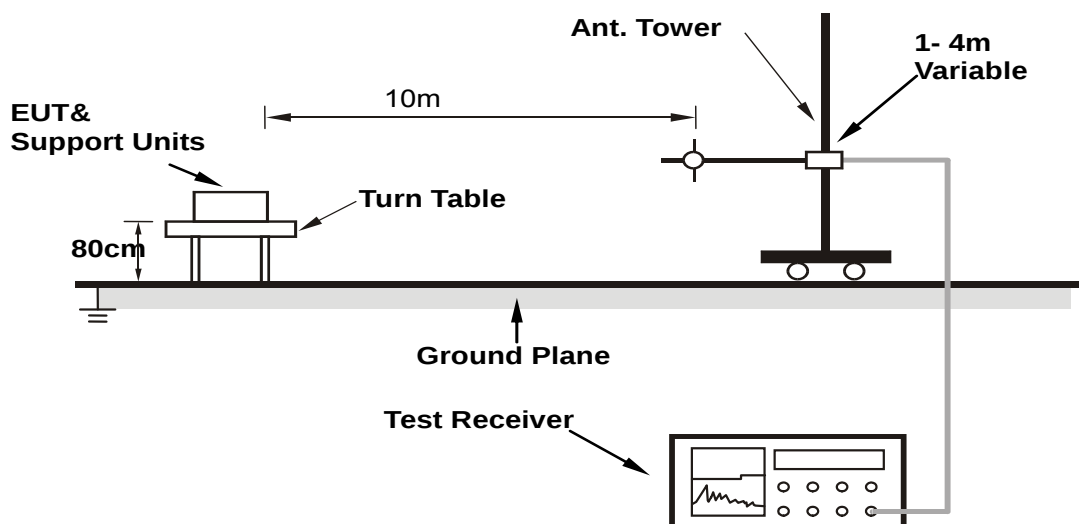
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Sonoma Preamplifier	310N	352922	Feb. 20, 2018	Feb. 19, 2019
Sonoma Preamplifier	310N	352921	Feb. 20, 2018	Feb. 19, 2019
Agilent Test Receiver	N9038A	MY50010158	Jul. 1, 2017	Jun. 30, 2018
Agilent Test Receiver	N9038A	MY51210114	Jul. 5, 2017	Jul. 4, 2018
Schwarzbeck Antenna	VULB9168	9168-316	Dec. 11, 2017	Dec. 10, 2018
Schwarzbeck Antenna	VULB9168	9168-317	Dec. 11, 2017	Dec. 10, 2018
Max Full. Turn Table & Tower	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-01.V	Jun. 26, 2017	Jun. 25, 2018
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-02.H	Jun. 26, 2017	Jun. 25, 2018
WOKEN RF cable With 5dB PAD	8D	CABLE-CH8-03.3M	Jun. 26, 2017	Jun. 25, 2018

- Notes: 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 Chamber No. 8.
 3. The Industry Canada Reference No. IC 7450E-8.
 4. The VCCI Site Registration No. R-12946.
 5. Tested Date: Mar. 2, 2018.

6.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height 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.
- 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.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

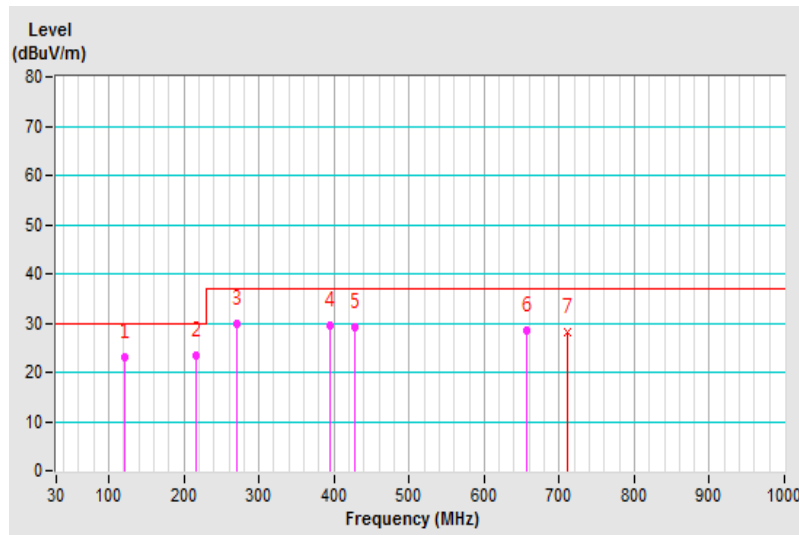
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 76%RH
Tested by	Adam Chen		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	121.18	22.98 QP	30.00	-7.02	4.00 H	70	37.92	-14.94
2	216.02	23.51 QP	30.00	-6.49	3.95 H	144	38.49	-14.98
3	270.54	29.91 QP	37.00	-7.09	3.86 H	334	42.29	-12.38
4	393.92	29.52 QP	37.00	-7.48	2.69 H	322	38.02	-8.50
5	428.04	29.15 QP	37.00	-7.85	2.04 H	320	37.18	-8.03
6	657.25	28.58 QP	37.00	-8.42	1.34 H	276	32.51	-3.93
7	711.57	28.29 QP	37.00	-8.71	1.00 H	181	31.86	-3.57

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

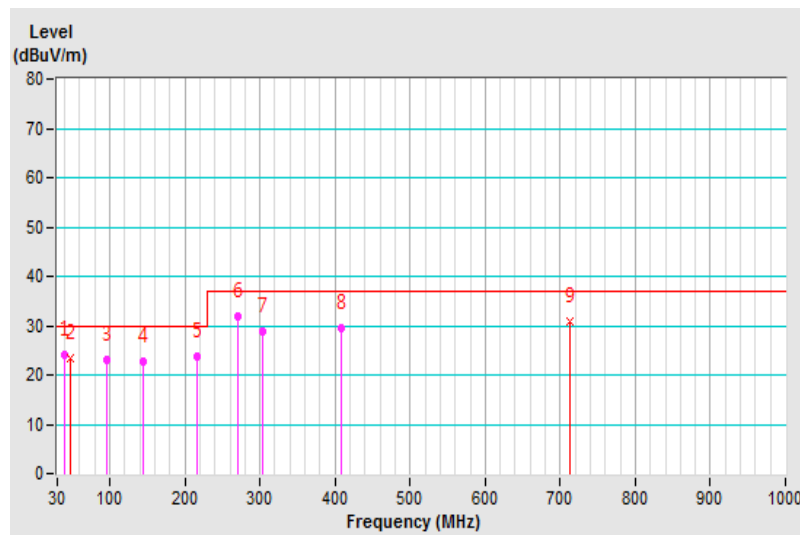


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 76%RH
Tested by	Adam Chen		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.02	24.02 QP	30.00	-5.98	4.00 V	231	38.72	-14.70
2	48.04	23.53 QP	30.00	-6.47	1.73 V	167	37.63	-14.10
3	96.01	23.12 QP	30.00	-6.88	1.69 V	356	42.18	-19.06
4	143.97	22.63 QP	30.00	-7.37	1.00 V	114	36.43	-13.80
5	216.02	23.82 QP	30.00	-6.18	1.00 V	320	39.67	-15.85
6	270.75	31.86 QP	37.00	-5.14	1.00 V	310	44.93	-13.07
7	303.71	28.80 QP	37.00	-8.20	1.98 V	320	41.00	-12.20
8	407.38	29.49 QP	37.00	-7.51	3.39 V	116	39.16	-9.67
9	712.79	30.87 QP	37.00	-6.13	2.16 V	255	33.23	-2.36

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

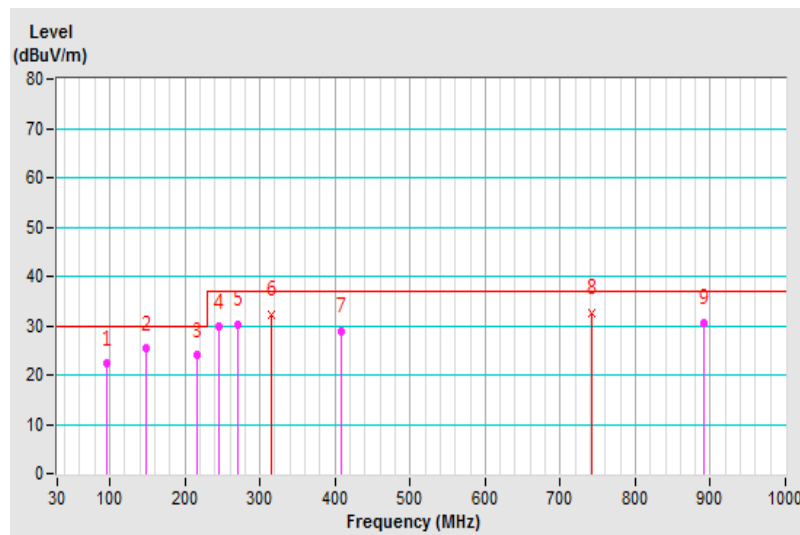


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 76%RH
Tested by	Adam Chen		
Test Mode	Mode 10		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	96.01	22.28 QP	30.00	-7.72	4.00 H	195	40.43	-18.15
2	148.34	25.31 QP	30.00	-4.69	4.00 H	300	38.09	-12.78
3	216.03	23.94 QP	30.00	-6.06	3.08 H	171	38.92	-14.98
4	246.12	29.69 QP	37.00	-7.31	3.86 H	54	42.83	-13.14
5	271.07	30.12 QP	37.00	-6.88	3.34 H	344	42.45	-12.33
6	315.46	32.35 QP	37.00	-4.65	2.59 H	287	43.06	-10.71
7	407.96	28.73 QP	37.00	-8.27	2.14 H	354	37.10	-8.37
8	742.49	32.54 QP	37.00	-4.46	1.08 H	228	34.45	-1.91
9	891.01	30.55 QP	37.00	-6.45	1.00 H	172	31.70	-1.15

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

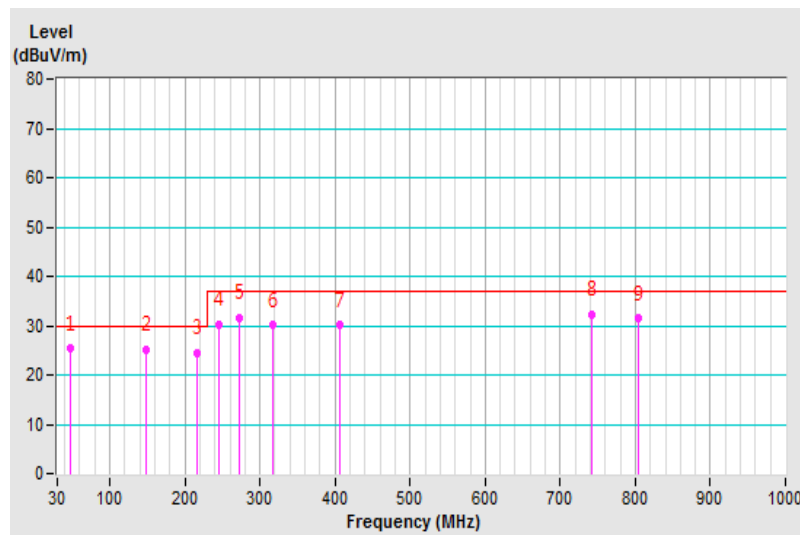


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 76%RH
Tested by	Adam Chen		
Test Mode	Mode 10		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.02	25.31 QP	30.00	-4.69	1.17 V	211	39.41	-14.10
2	148.36	25.13 QP	30.00	-4.87	1.00 V	278	38.43	-13.30
3	216.01	24.42 QP	30.00	-5.58	1.00 V	126	40.27	-15.85
4	245.97	30.22 QP	37.00	-6.78	1.69 V	231	44.54	-14.32
5	272.33	31.54 QP	37.00	-5.46	2.41 V	273	44.55	-13.01
6	316.94	30.04 QP	37.00	-6.96	4.00 V	251	41.76	-11.72
7	405.68	30.06 QP	37.00	-6.94	3.31 V	119	39.73	-9.67
8	742.49	32.34 QP	37.00	-4.66	2.07 V	107	33.48	-1.14
9	803.58	31.38 QP	37.00	-5.62	2.98 V	312	32.29	-0.91

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



7 Radiated Emissions above 1 GHz

7.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
1000-3000	Avg: 49.5	Avg: 43.5	Not defined	Not defined
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

Radiated Emissions Limits at 3 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
1000-3000	Avg: 60	Avg: 54	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000	Peak: 80	Peak: 74	Avg: 60 Peak: 80	Avg: 54 Peak: 74

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
 3. As shown in 15.35(b), 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.

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

7.2 Test Instruments

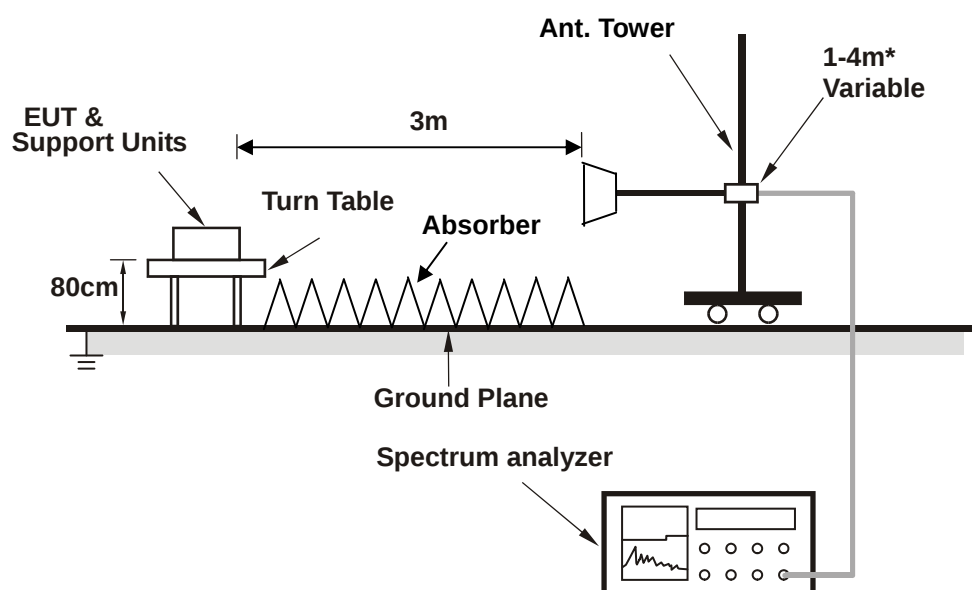
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	Jun. 1, 2017	May 31, 2018
Agilent Test Receiver	N9038A	MY50010135	Jun. 29, 2017	Jun. 28, 2018
Agilent Preamplifier	8449B	3008A02367	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2018	Feb. 20, 2019
EMCI Preamplifier	EMC184045B	980235	Feb. 22, 2018	Feb. 21, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 1, 2017	Nov. 30, 2018
EMCO Horn Antenna	3115	9312-4192	Dec. 1, 2017	Nov. 30, 2018
Max Full. Turn Table & Tower	MF7802	MF780208103	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF106-18	Cable-CH7-01	Aug. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH7-3.6m	Aug. 14, 2017	Aug. 13, 2018
MICRO-TRONICS Notch filter	BRC50703-01	010	May 31, 2017	May 30, 2018
MICRO-TRONICS Band Pass Filter	BRM17690	005	May 31, 2017	May 30, 2018

Notes: 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 Chamber No. 7.
3. The Industry Canada Reference No. IC 7450E-7.
4. The VCCI Site Registration No. G-39
5. Tested Date: Feb. 28, 2018.

7.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the directional antenna, which was pointed towards the source of the emission within the EUT. This could be done by either pointing the antenna at an angle towards the source of the emission, or by rotating the EUT, in both height and polarization, to maximize the measured emission.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



* :depends on the EUT height and the antenna 3dB beamwidth both.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

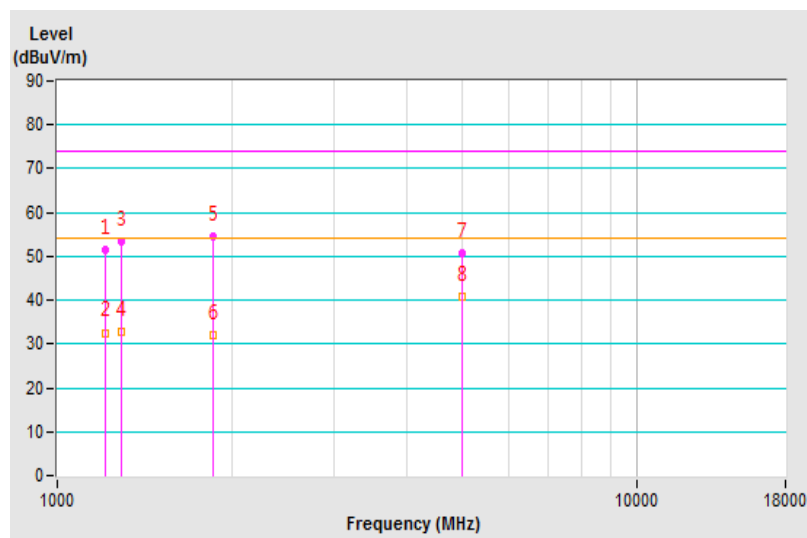
7.4 Test Results

Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 70%RH
Tested by	Paul Chen		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1212.09	51.59 PK	74.00	-22.41	1.11 H	30	53.52	-1.93
2	1212.09	32.59 AV	54.00	-21.41	1.11 H	30	34.52	-1.93
3	1293.01	53.43 PK	74.00	-20.57	1.25 H	198	55.56	-2.13
4	1293.01	32.63 AV	54.00	-21.37	1.25 H	198	34.76	-2.13
5	1857.27	54.45 PK	74.00	-19.55	1.63 H	221	56.02	-1.57
6	1857.27	32.13 AV	54.00	-21.87	1.63 H	221	33.70	-1.57
7	5000.01	50.58 PK	74.00	-23.42	2.22 H	179	46.74	3.84
8	5000.01	40.77 AV	54.00	-13.23	2.22 H	179	36.93	3.84

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

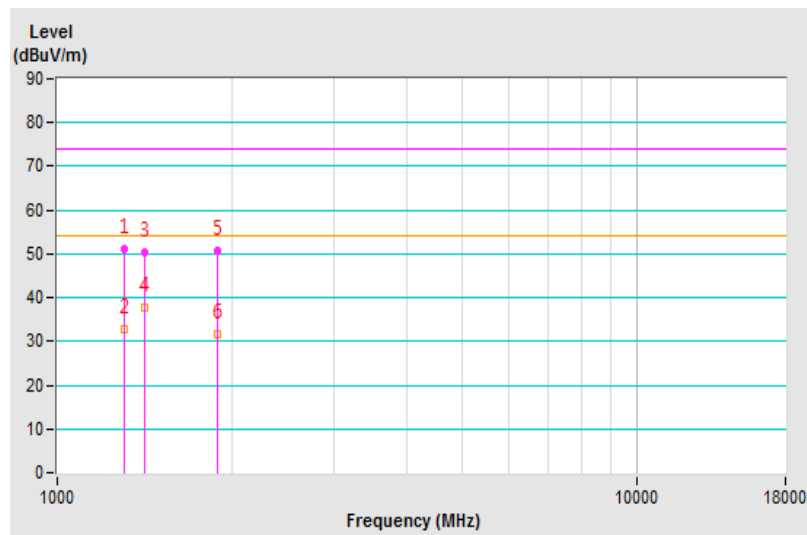


Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 70%RH
Tested by	Paul Chen		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1303.23	51.18 PK	74.00	-22.82	1.87 V	213	53.39	-2.21
2	1303.23	32.87 AV	54.00	-21.13	1.87 V	213	35.08	-2.21
3	1414.80	50.20 PK	74.00	-23.80	2.11 V	21	53.14	-2.94
4	1414.80	37.73 AV	54.00	-16.27	2.11 V	21	40.67	-2.94
5	1883.48	50.58 PK	74.00	-23.42	2.06 V	228	52.07	-1.49
6	1883.48	31.62 AV	54.00	-22.38	2.06 V	228	33.11	-1.49

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

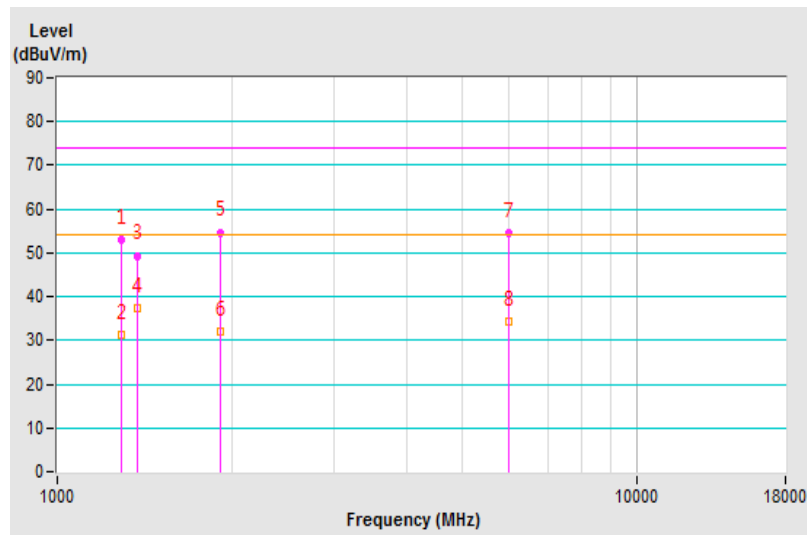


Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 70%RH
Tested by	Paul Chen		
Test Mode	Mode 10		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1293.04	53.03 PK	74.00	-20.97	1.85 H	191	55.16	-2.13
2	1293.04	31.21 AV	54.00	-22.79	1.85 H	191	33.34	-2.13
3	1372.33	49.37 PK	74.00	-24.63	1.11 H	198	52.04	-2.67
4	1372.33	37.33 AV	54.00	-16.67	1.11 H	198	40.00	-2.67
5	1906.42	54.69 PK	74.00	-19.31	1.24 H	224	56.11	-1.42
6	1906.42	31.87 AV	54.00	-22.13	1.24 H	224	33.29	-1.42
7	5994.96	54.53 PK	74.00	-19.47	2.39 H	308	48.42	6.11
8	5994.96	34.43 AV	54.00	-19.57	2.39 H	308	28.32	6.11

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

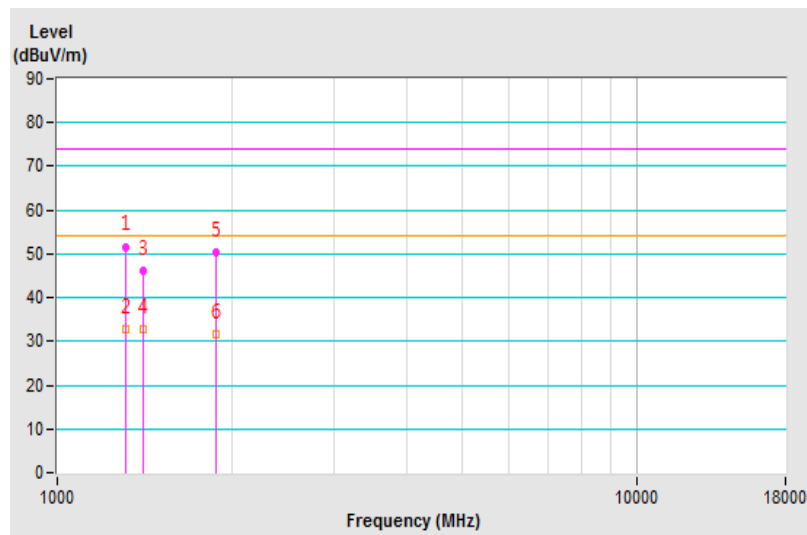


Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 70%RH
Tested by	Paul Chen		
Test Mode	Mode 10		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1313.07	51.66 PK	74.00	-22.34	1.79 V	211	53.95	-2.29
2	1313.07	32.92 AV	54.00	-21.08	1.79 V	211	35.21	-2.29
3	1404.40	46.09 PK	74.00	-27.91	2.18 V	44	48.91	-2.82
4	1404.40	32.76 AV	54.00	-21.24	2.18 V	44	35.58	-2.82
5	1882.18	50.33 PK	74.00	-23.67	1.74 V	226	51.82	-1.49
6	1882.18	31.54 AV	54.00	-22.46	1.74 V	226	33.03	-1.49

Remarks:

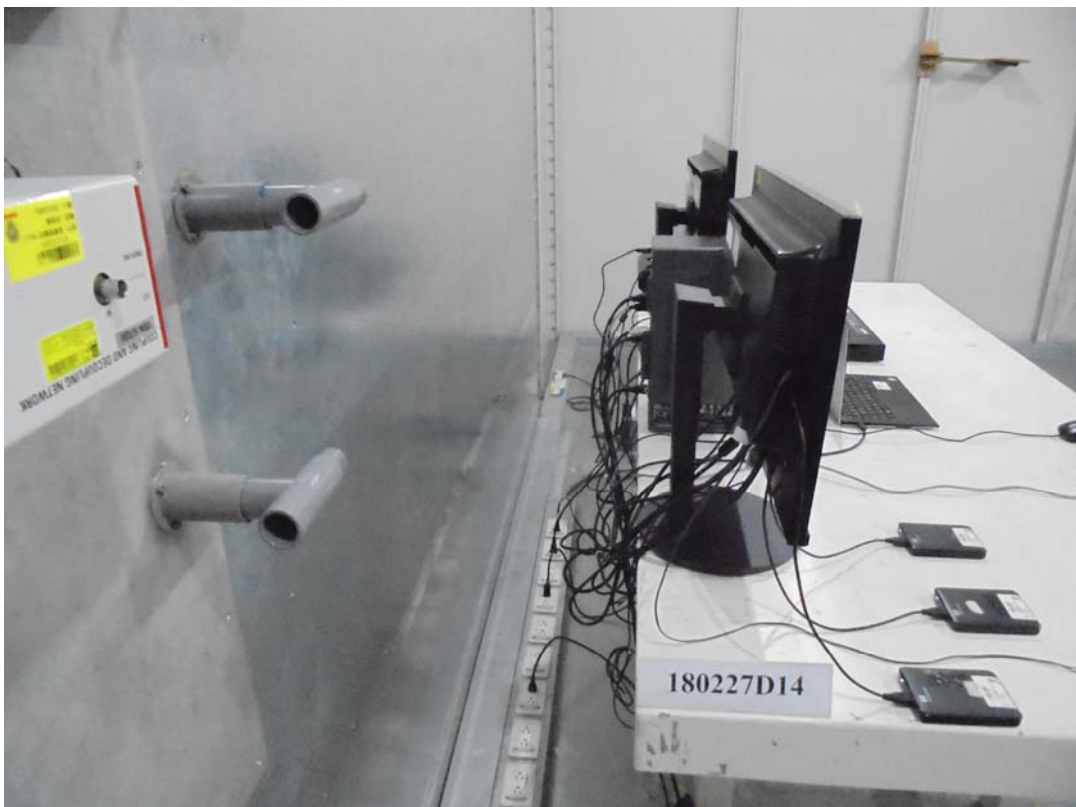
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



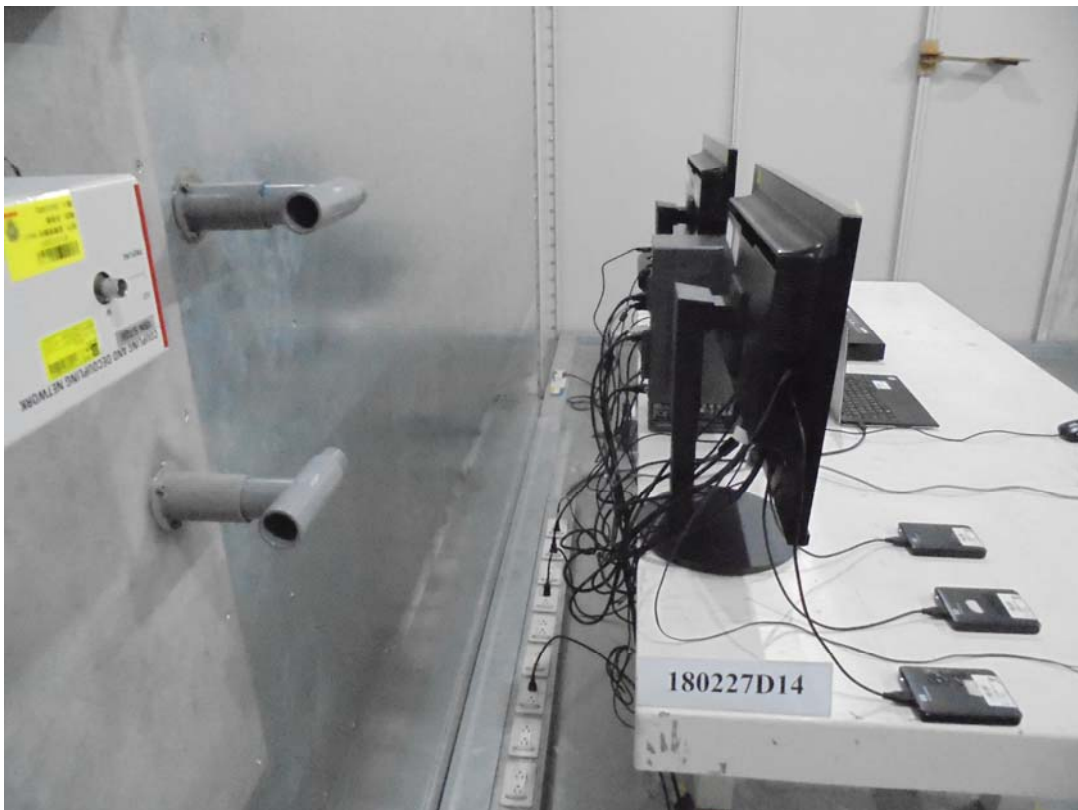
8 Pictures of Test Arrangements

8.1 Conducted Emissions at Mains Ports

Mode 1



Mode 10



8.2 Radiated Emissions up to 1 GHz

Mode 1



Mode 10



8.3 Radiated Emissions above 1 GHz

Mode 1



Mode 10



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

Tel: 886-2-26052180

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Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

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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