FCC Test Report

Report No.:	FD181017D21
Test Model:	FD9187-H
Series Model:	FD9187-HT
Received Date:	Oct. 17, 2018
Test Date:	Oct. 19 ~ Nov. 15, 2018
Issued Date:	Nov. 16, 2018
Applicant:	VIVOTEK INC.
Address:	6F, No.192, Lien-Cheng Rd., Chung-Ho , New Taipei City, 235, Taiwan, 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 (R.O.C.)
FCC Registration / Designation Number:	418586 / TW1078

ACCREDITED
Certificate #4327.01

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
FD181017D21	Original release.	Nov. 16, 2018

1 Certificate of Conformity

Product:	Network Camera
Brand:	VIVOTEK
Test Model:	FD9187-H
Series Model:	FD9187-HT
Sample Status:	Engineering sample
Applicant:	VIVOTEK INC.
Test Date:	Oct. 19 ~ Nov. 15, 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 : Sandra Lin , **Date:** Nov. 16, 2018

Sandra Lin / Specialist

Approved by : Jim Hsiang , **Date:** Nov. 16, 2018

Jim Hsiang / Associate Technical Manager

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	Conducted Emissions at mains ports	Minimum passing Class B margin is -7.45 dB at 20.36601 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -3.31 dB at 168.01 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -13.41 dB at 9001.05 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 as specified in CISPR 16-4-2:

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.97 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.08 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	Network Camera
Brand	VIVOTEK
Test Model	FD9187-H
Series Model	FD9187-HT
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Brand: HONOTO Model: ADS-26FSG-12 12018EPCU Input Power: 100-240Vac, 50/60Hz, 0.7A Output Power: 12V, 1A Power cord: AC 2 Pin Non- Shielding DC cable (3.0m)
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:
The EUT is a Network Camera and it has two models, which are identical to each other except for zoom focus only, as follows:

Model	Difference
FD9187-H	Without Zoom Focus
FD9187-HT	With Zoom Focus

During the test, the Model: **FD9187-H** was selected as the representative one for the test and therefore only its test data were recorded in this report.

3.2 Features of EUT

The tests reported herein were performed according to the method specified by VIVOTEK INC., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

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

1. The EUT consumes power from Adapter, which designed with AC power supply of rating 100-240Vac, 50/60Hz. For radiated emission evaluation, 230Vac/50Hz (for EN 55032 & AS/NZS CISPR 32), 120Vac/60Hz (for FCC Part 15), 100Vac/50Hz & 100Vac/60Hz (for VCCI) had been covered during the pre-test. The worst radiated emission data was found at **230Vac/50Hz** and recorded in the applied test report. Then the other test items were tested at 120Vac/60Hz.
2. EUT has been pre-tested under following test modes, and test **mode 1** was the worst case for final test.

Mode	Test Condition
1	LAN 100Mbps + Adapter
2	LAN 10Mbps + Adapter
3	LAN 100Mbps + PoE

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

Mode	Test Condition	Input power
Conducted emission test		
1	Power from Adapter	120Vac/60Hz
2	Power from PoE Adapter	48Vdc
Radiated emission test		
1	Power from Adapter	230Vac/50Hz
2	Power from PoE Adapter	48Vdc

3.4 Test Program Used and Operation Descriptions

a. Connected the EUT with Adapter or PoE adapter.

b. Turned on the power of all equipment.

c. EUT captured video / audio signal to notebook (kept in a remote area) via an UTP LAN cable, then it displayed messages on its screen. ***<For Power from Adapter>***

d. EUT captured video / audio signal to notebook (kept in a remote area) via PoE by an UTP LAN cable, then it displayed messages on its screen. ***<For Power from PoE Adapter>***

e. EUT Save images to SD card.

f. EUT sent 1kHz audio signal to earphone.

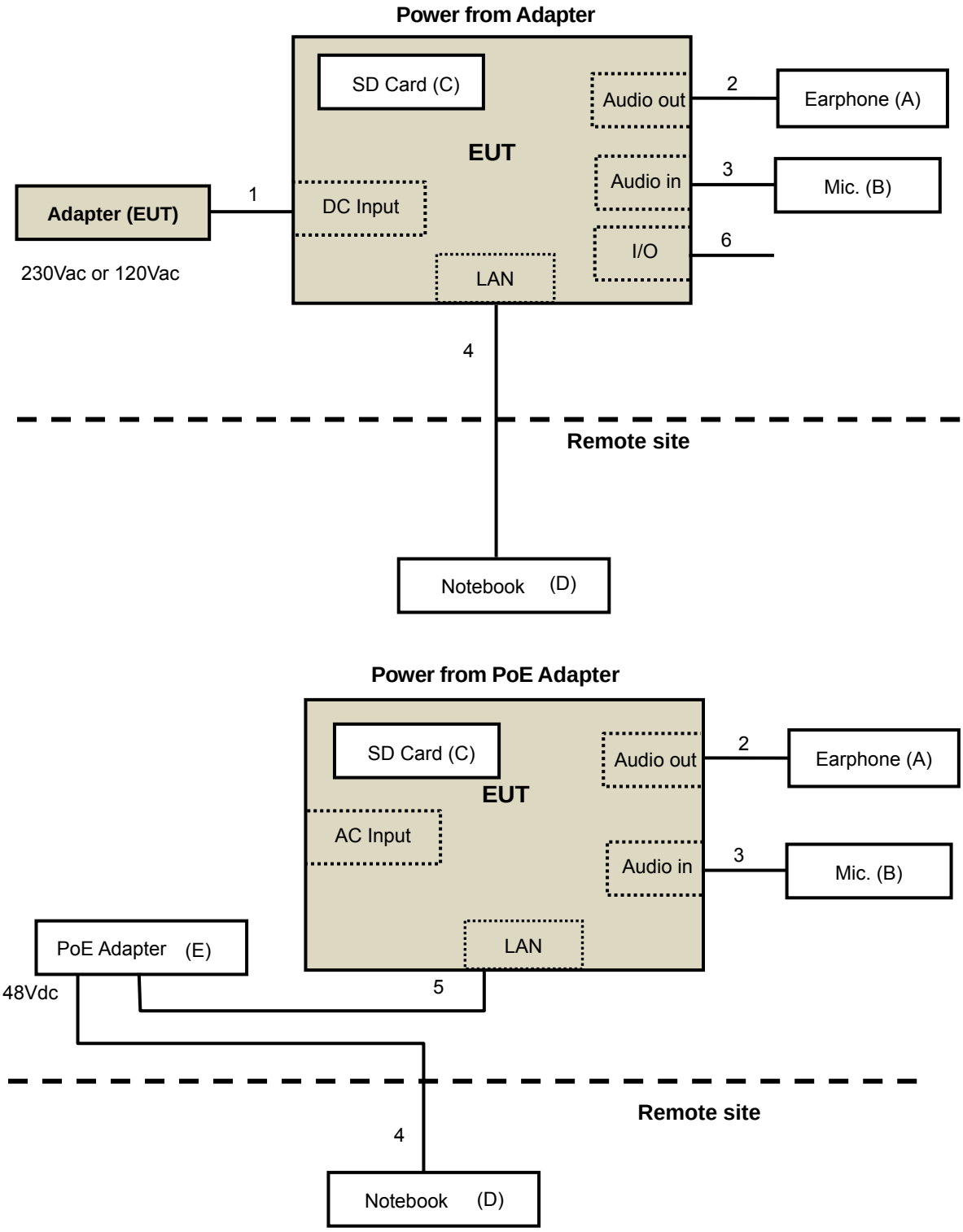
g. Steps c-f were repeated.

3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 1866MHz, provided by VIVOTEK INC., for detailed internal source, please refer to the manufacturer's specifications.

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.	Earphone	PHILIPS	SBC HL150	H2010149	N/A	Provided by Lab
B.	Microphone	Labtec	mic-333	N/A	N/A	Provided by Lab
C.	SD Card	Apacer	8GN	N/A	N/A	Provided by Lab
D.	Notebook	DELL	PP27L	8SNZ12S	FCC DoC Approved	Provided by Lab
E.	PoE Adapter	PSE	PSE151	N/A	FCC DoC Approved	Provided by Lab

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items D-E acted as communication partners to transfer data.
3. Rating of item E was listed as below:
   AC I/P: 100-240V, 50/60Hz, 0.4A
   DC O/P: 48V, 16W

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC power cable	1	3.0	N	0	Supplied by client
2.	Audio cable	1	1.2	N	0	Provided by Lab
3.	Audio cable	1	1.8	N	0	Provided by Lab
4.	LAN cable (Cat.5e)	1	10	N	0	Provided by Lab
5.	LAN cable (Cat.5e)	1	1.5	N	0	Provided by Lab
6.	I/O cable	4	1.0	N	0	Supplied by client

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	ESR3	102413	Feb. 8, 2018	Feb. 7, 2019
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 6, 2017	Dec. 5, 2018
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 6, 2017	Dec. 5, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Nov. 3, 2017	Nov. 2, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 3, 2018	May 2, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK 8121	8121-808	Mar. 5, 2018	Mar. 4, 2019
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
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 8, 2018	May 7, 2019

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: Oct. 20, 2018

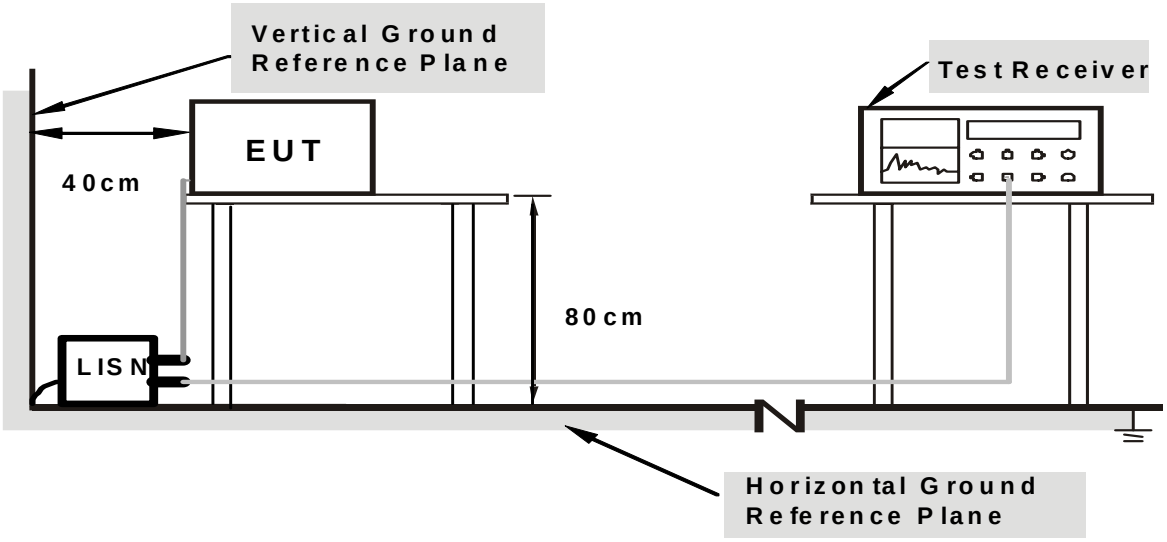
5.3 Test Arrangement

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 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.

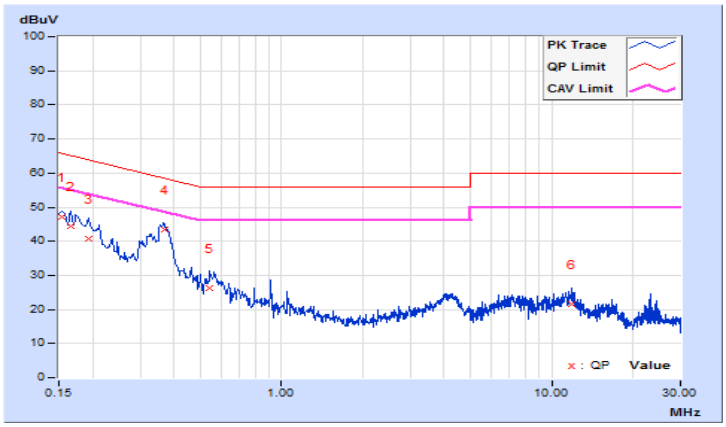
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 72%RH
Tested by	Adam Chen		
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	0.15391	10.14	37.14	20.80	47.28	30.94	65.79	55.79	-18.51	-24.85
2	0.16564	10.15	34.25	18.05	44.40	28.20	65.18	55.18	-20.78	-26.98
3	0.19301	10.17	30.62	16.10	40.79	26.27	63.91	53.91	-23.12	-27.64
4	0.36896	10.21	33.17	23.12	43.38	33.33	58.52	48.52	-15.14	-15.19
5	0.54313	10.25	15.94	10.31	26.19	20.56	56.00	46.00	-29.81	-25.44
6	11.88942	10.99	10.67	6.22	21.66	17.21	60.00	50.00	-38.34	-32.79

Remarks:

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

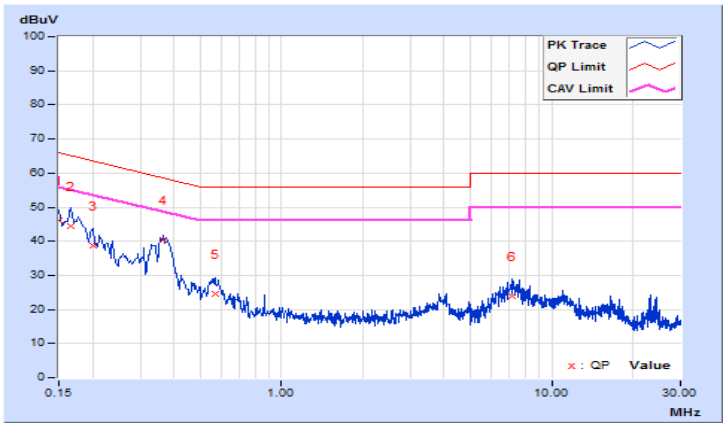


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 72%RH
Tested by	Adam Chen		
Test Mode	Mode 1		

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	0.15000	10.14	35.90	19.67	46.04	29.81	66.00	56.00	-19.96	-26.19
2	0.16564	10.15	34.15	17.64	44.30	27.79	65.18	55.18	-20.88	-27.39
3	0.19978	10.18	28.56	14.14	38.74	24.32	63.62	53.62	-24.88	-29.30
4	0.36505	10.20	30.22	18.90	40.42	29.10	58.61	48.61	-18.19	-19.51
5	0.56647	10.25	14.26	9.17	24.51	19.42	56.00	46.00	-31.49	-26.58
6	7.15050	10.79	13.14	5.61	23.93	16.40	60.00	50.00	-36.07	-33.60

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

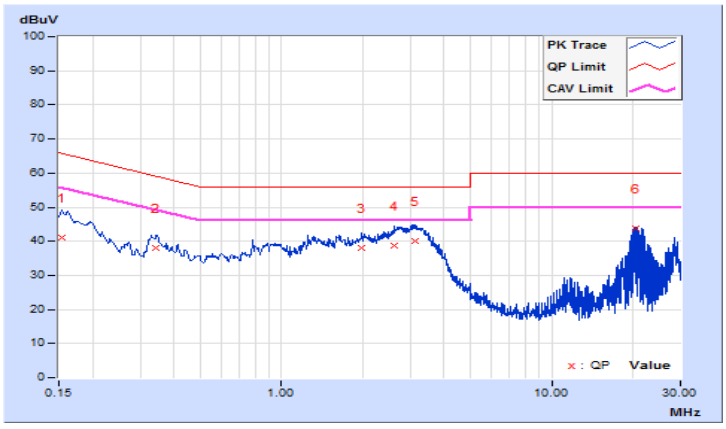


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 72%RH
Tested by	Adam Chen		
Test Mode	Mode 2		

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	0.15391	10.11	30.80	18.78	40.91	28.89	65.79	55.79	-24.88	-26.90
2	0.34469	10.14	28.03	21.67	38.17	31.81	59.09	49.09	-20.92	-17.28
3	1.98189	10.32	27.70	18.66	38.02	28.98	56.00	46.00	-17.98	-17.02
4	2.60358	10.37	28.47	19.28	38.84	29.65	56.00	46.00	-17.16	-16.35
5	3.13925	10.41	29.77	19.99	40.18	30.40	56.00	46.00	-15.82	-15.60
6	**20.36601**	**11.13**	**32.62**	**31.42**	**43.75**	**42.55**	**60.00**	**50.00**	**-16.25**	**-7.45**

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

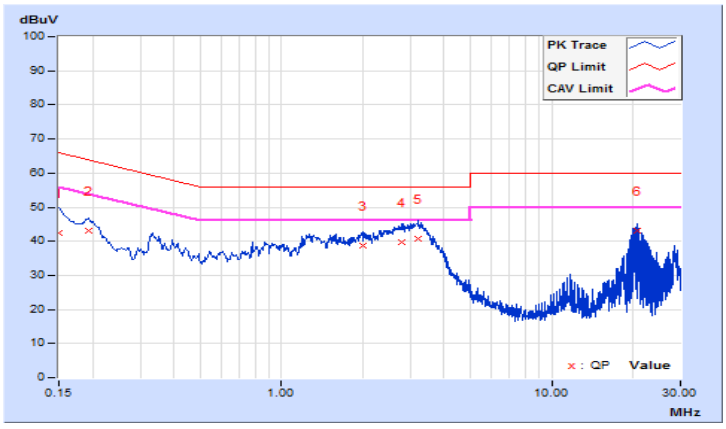


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 72%RH
Tested by	Adam Chen		
Test Mode	Mode 2		

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	0.15000	10.12	32.43	21.39	42.55	31.51	66.00	56.00	-23.45	-24.49
2	0.19301	10.14	32.88	22.69	43.02	32.83	63.91	53.91	-20.89	-21.08
3	1.99310	10.33	28.37	18.50	38.70	28.83	56.00	46.00	-17.30	-17.17
4	2.79126	10.39	29.43	20.19	39.82	30.58	56.00	46.00	-16.18	-15.42
5	3.20572	10.43	30.37	20.09	40.80	30.52	56.00	46.00	-15.20	-15.48
6	20.86171	10.88	32.23	30.95	43.11	41.83	60.00	50.00	-16.89	-8.17

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:

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			47	37
960-1000	49.5	43.5		

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			57.5	47.5
960-1000	60	54		

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

Mode 1

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100027	Dec. 4, 2017	Dec. 3, 2018
Schwarzbeck Bilog Antenna	VULB9168	9168-303	Nov. 29, 2017	Nov. 28, 2018
Agilent Preamplifier	8447D	2944A08119	Feb. 21, 2018	Feb. 20, 2019
ADT. Turn Table	TT100	0205	NA	NA
ADT. Tower	AT100	0205	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
ADT RF Switches BOX	EMH-011	1001	Oct. 25, 2017	Oct. 24, 2018
Pacific RF cable With 5dB PAD	8D	CABLE-ST2-01	Oct. 25, 2017	Oct. 24, 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 Open Site No. 2.
3. The VCCI Site Registration No. R-237.
4. Tested Date: Oct. 19, 2018

Mode 2

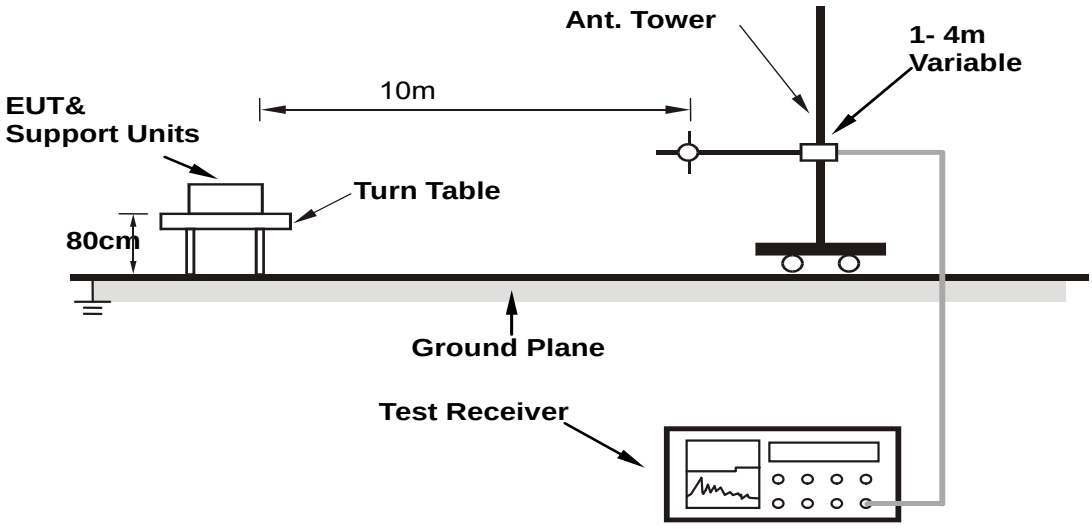
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100027	Dec. 4, 2017	Dec. 3, 2018
Schwarzbeck Bilog Antenna	VULB9168	9168-303	Nov. 29, 2017	Nov. 28, 2018
Agilent Preamplifier	8447D	2944A08119	Feb. 21, 2018	Feb. 20, 2019
ADT. Turn Table	TT100	0205	NA	NA
ADT. Tower	AT100	0205	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
ADT RF Switches BOX	EMH-011	1001	Oct. 25, 2018	Oct. 24, 2019
Pacific RF cable With 5dB PAD	8D	CABLE-ST2-01	Oct. 25, 2018	Oct. 24, 2019

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 Open Site No. 2.
3. The VCCI Site Registration No. R-237.
4. Tested Date: Nov. 15, 2018

6.3 Test Arrangement

a. 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.
b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
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.

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



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

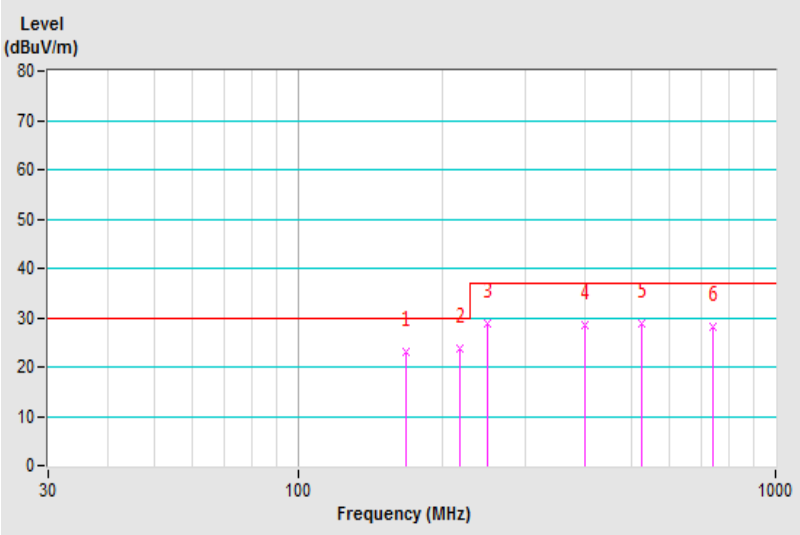
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Vic Lin	Environmental Conditions	22℃, 78%RH
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	169.00	23.16 QP	30.00	-6.84	4.00 H	132	32.37	-9.21
2	218.10	23.87 QP	30.00	-6.13	4.00 H	60	35.94	-12.07
3	249.97	28.71 QP	37.00	-8.29	3.00 H	122	39.08	-10.37
4	398.73	28.63 QP	37.00	-8.37	2.01 H	231	34.81	-6.18
5	524.50	28.87 QP	37.00	-8.13	1.00 H	102	31.97	-3.10
6	740.50	28.14 QP	37.00	-8.86	1.99 H	308	27.80	0.34

Remarks:

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

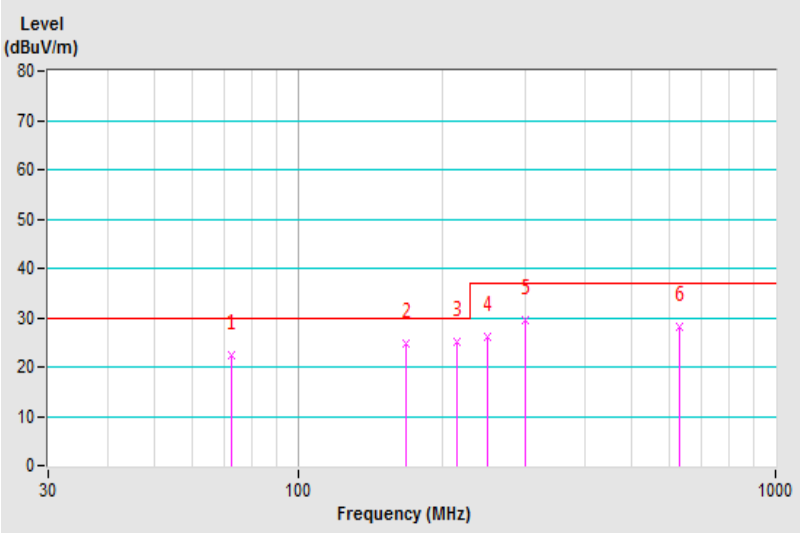


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Vic Lin	Environmental Conditions	22℃, 78%RH
Test Mode	Mode 1		

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	72.48	22.26 QP	30.00	-7.74	1.00 V	101	33.83	-11.57
2	167.83	24.68 QP	30.00	-5.32	1.00 V	218	33.82	-9.14
3	216.01	25.18 QP	30.00	-4.82	1.00 V	125	37.27	-12.09
4	249.97	26.13 QP	37.00	-10.87	1.00 V	261	36.50	-10.37
5	300.12	29.33 QP	37.00	-7.67	1.00 V	174	37.87	-8.54
6	628.00	28.30 QP	37.00	-8.70	2.01 V	315	29.14	-0.84

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

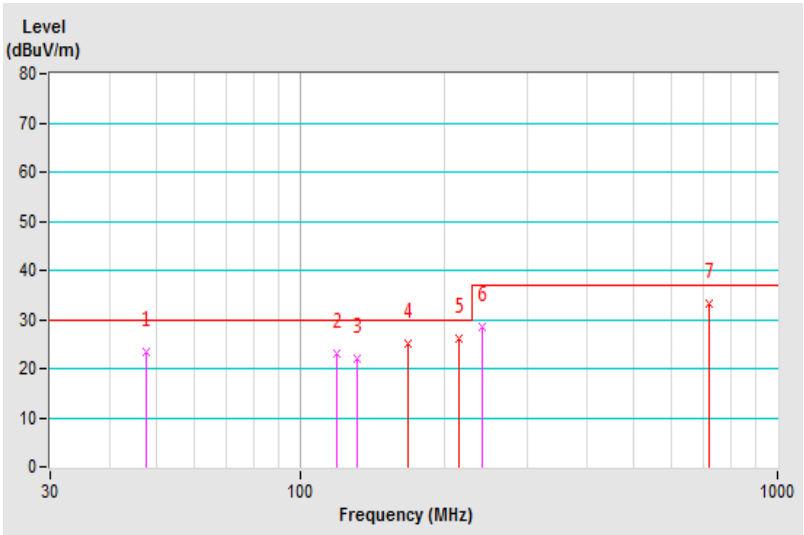


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Vincent Lin	Environmental Conditions	22℃, 72%RH
Test Mode	Mode 2		

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	47.71	23.41 QP	30.00	-6.59	4.00 H	54	32.18	-8.77
2	119.07	22.93 QP	30.00	-7.07	4.00 H	147	34.09	-11.16
3	131.34	22.04 QP	30.00	-7.96	4.00 H	288	31.96	-9.92
4	168.00	25.07 QP	30.00	-4.93	4.00 H	76	34.17	-9.10
5	216.00	26.05 QP	30.00	-3.95	4.00 H	61	38.17	-12.12
6	240.20	28.41 QP	37.00	-8.59	4.00 H	199	38.89	-10.48
7	719.99	33.09 QP	37.00	-3.91	1.56 H	164	32.44	0.65

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

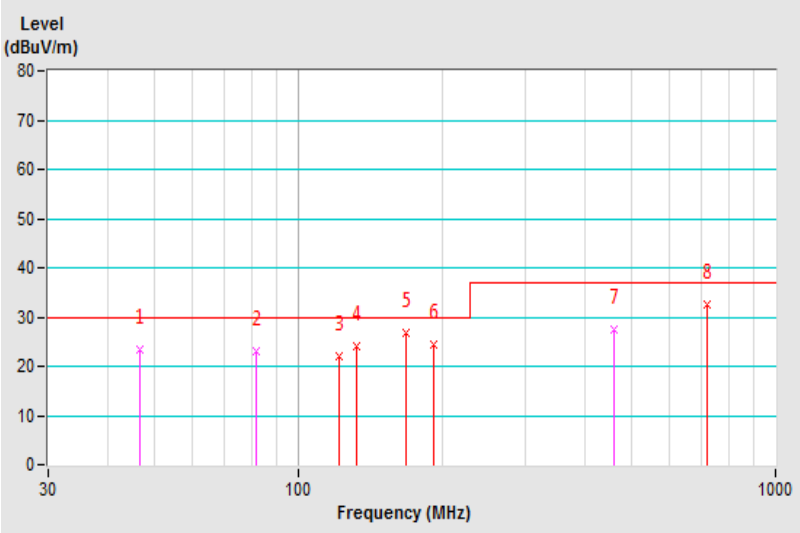


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Vincent Lin	Environmental Conditions	22℃, 72%RH
Test Mode	Mode 2		

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	46.53	23.33 QP	30.00	-6.67	1.00 V	28	32.11	-8.78
2	81.91	23.10 QP	30.00	-6.90	1.00 V	75	37.08	-13.98
3	121.97	22.18 QP	30.00	-7.82	1.00 V	5	32.95	-10.77
4	132.92	23.94 QP	30.00	-6.06	1.00 V	185	33.79	-9.85
5	**168.01**	**26.69 QP**	**30.00**	**-3.31**	**1.00 V**	**140**	**35.79**	**-9.10**
6	192.01	24.57 QP	30.00	-5.43	1.00 V	21	36.33	-11.76
7	457.75	27.60 QP	37.00	-9.40	3.15 V	293	32.03	-4.43
8	719.99	32.53 QP	37.00	-4.47	2.71 V	48	31.88	0.65

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 (dBμV/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 Peak: 69.5	Avg: 43.5 Peak: 63.5	Not defined	Not defined
Above 3000			Not defined	Not defined

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
1000-3000	Avg: 60 Peak: 80	Avg: 54 Peak: 74	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000			Avg: 60 Peak: 80	Avg: 54 Peak: 74

Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/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 of Radiated Measurement (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

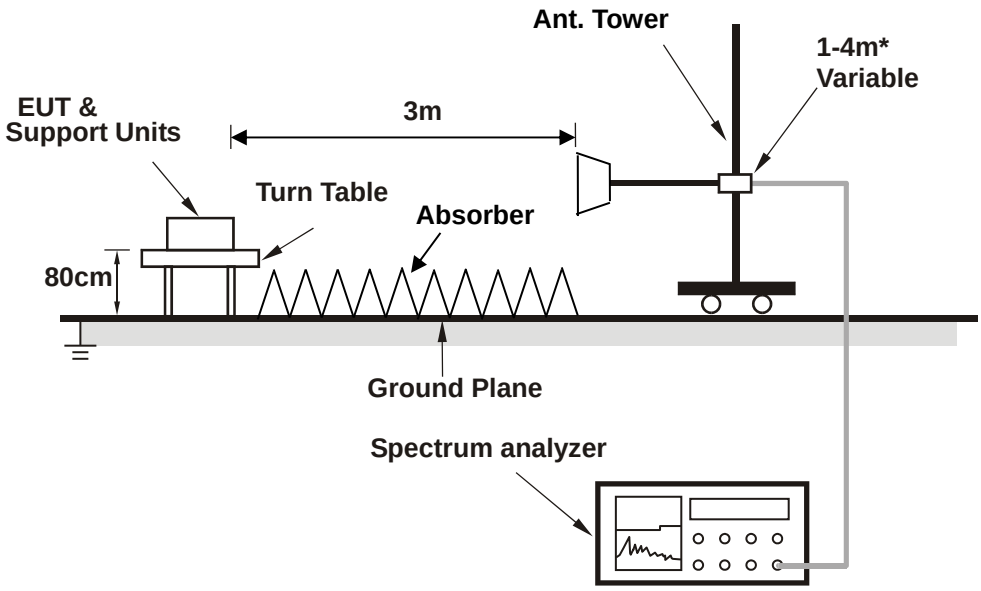
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	Jun. 4, 2018	Jun. 3, 2019
Agilent Test Receiver	N9038A	MY51210137	Jun. 19, 2018	Jun. 18, 2019
Agilent Preamplifier	8449B	3008A01292	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	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	6714	Dec. 12, 2017	Dec. 11, 2018
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH10-3.6m	Aug. 13, 2018	Aug. 12, 2019
MICRO-TRONICS Notch filter	BRC50703-01	010	May 31, 2018	May 30, 2019
MICRO-TRONICS Band Pass Filter	BRM17690	005	May 31, 2018	May 30, 2019

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. 10.
3. The Industry Canada Reference No. IC 7450E-11.
4. The VCCI Site Registration No. G-10427
5. Tested Date: Oct. 20 ~ Nov. 15, 2018

7.3 Test Arrangement

a. 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.
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 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.
d. 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.
e. 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.

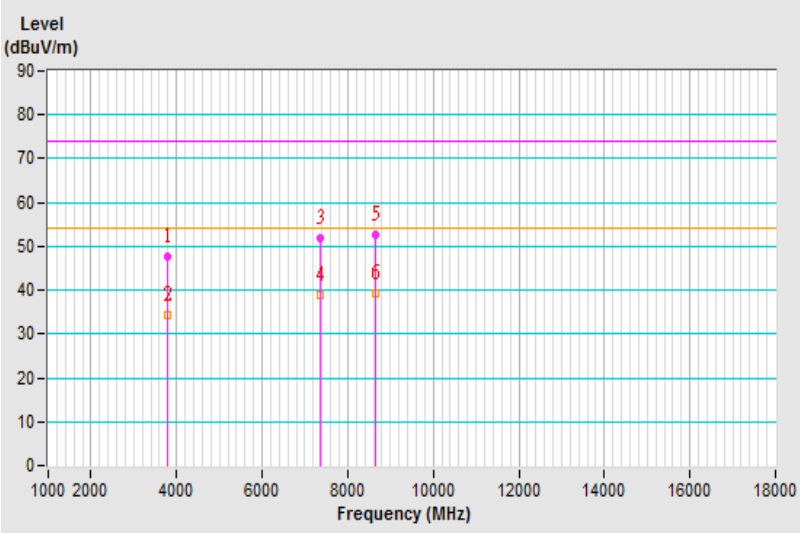
7.4 Test Results

Frequency Range	1GHz ~ 10GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Vincent Chen	Environmental Conditions	23℃, 77%RH
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	3776.95	47.56 PK	74.00	-26.44	1.02 H	278	42.74	4.82
2	3776.95	34.25 AV	54.00	-19.75	1.02 H	278	29.43	4.82
3	7360.98	51.71 PK	74.00	-22.29	1.88 H	10	40.82	10.89
4	7360.98	39.02 AV	54.00	-14.98	1.88 H	10	28.13	10.89
5	8647.87	52.50 PK	74.00	-21.50	2.32 H	305	40.78	11.72
6	8647.87	39.34 AV	54.00	-14.66	2.32 H	305	27.62	11.72

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

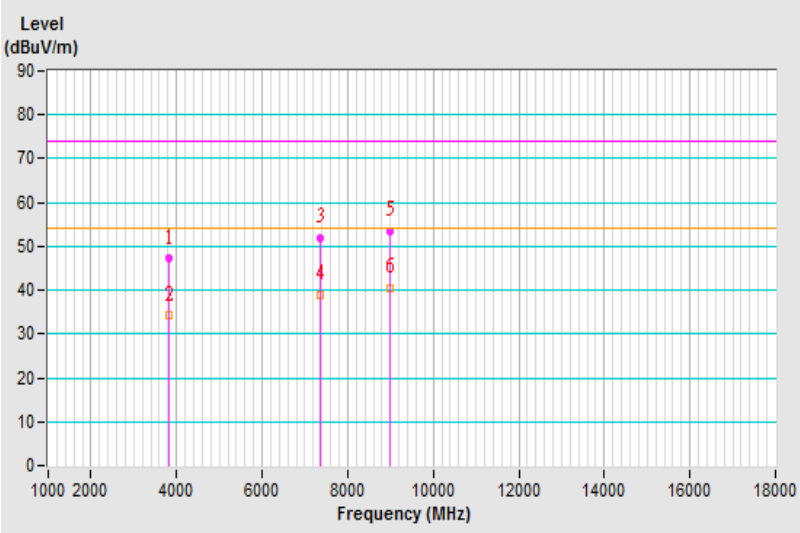


Frequency Range	1GHz ~ 10GHz	**Detector Function & Resolution Bandwidth**	Peak (PK) / Average (AV), 1MHz
Tested by	Vincent Chen	**Environmental Conditions**	23℃, 77%RH
est Mode	Mode 1		

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	3829.65	47.23 PK	74.00	-26.77	1.65 V	6	42.05	5.18
2	3829.65	34.33 AV	54.00	-19.67	1.65 V	6	29.15	5.18
3	7369.90	52.05 PK	74.00	-21.95	1.87 V	351	41.17	10.88
4	7369.90	39.07 AV	54.00	-14.93	1.87 V	351	28.19	10.88
5	9001.05	53.54 PK	74.00	-20.46	1.52 V	155	41.97	11.57
6	**9001.05**	**40.59 AV**	**54.00**	**-13.41**	**1.52 V**	**155**	**29.02**	**11.57**

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

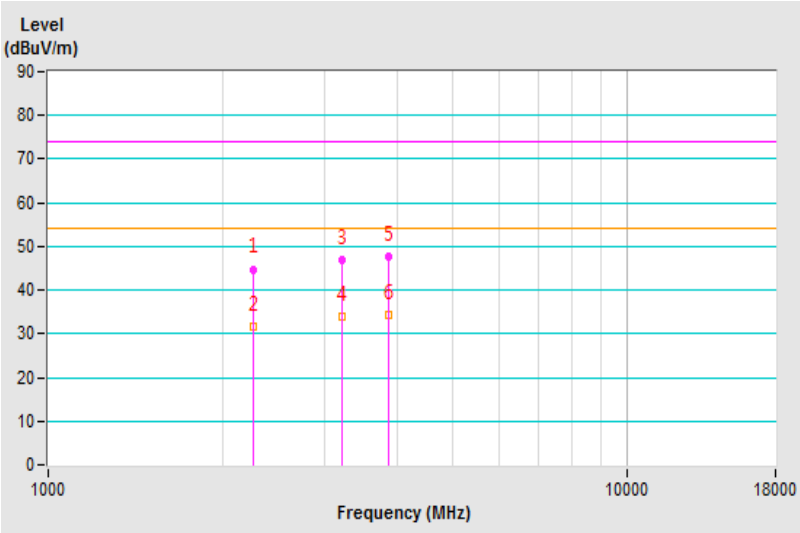


Frequency Range	1GHz ~ 10GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Vincent Lin	Environmental Conditions	19℃, 70%RH
Test Mode	Mode 2		

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	2259.70	44.77 PK	74.00	-29.23	1.08 H	38	45.29	-0.52
2	2259.70	31.76 AV	54.00	-22.24	1.08 H	38	32.28	-0.52
3	3211.28	46.82 PK	74.00	-27.18	1.53 H	260	44.18	2.64
4	3211.28	33.81 AV	54.00	-20.19	1.53 H	260	31.17	2.64
5	3860.68	47.48 PK	74.00	-26.52	1.96 H	111	42.01	5.47
6	3860.68	34.23 AV	54.00	-19.77	1.96 H	111	28.76	5.47

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

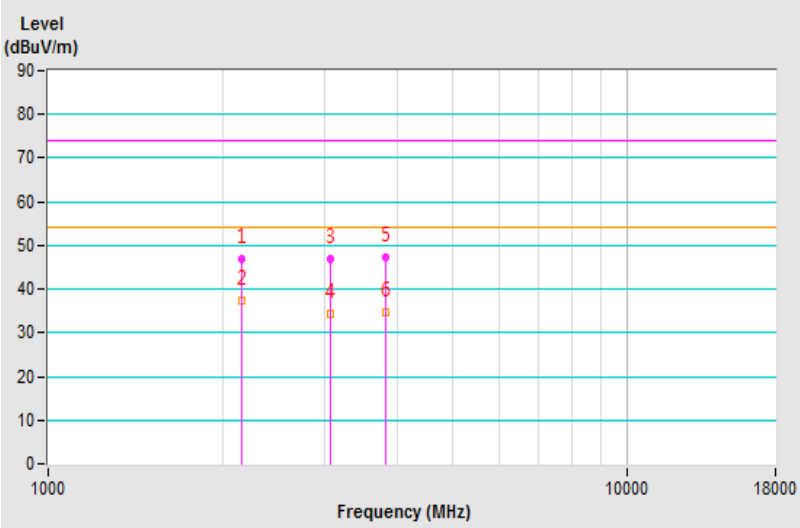


Frequency Range	1GHz ~ 10GHz	**Detector Function & Resolution Bandwidth**	Peak (PK) / Average (AV), 1MHz
Tested by	Vincent Lin	**Environmental Conditions**	19℃, 70%RH
Test Mode	Mode 2		

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	2159.91	46.88 PK	74.00	-27.12	2.51 V	68	47.70	-0.82
2	2159.91	37.19 AV	54.00	-16.81	2.51 V	68	38.01	-0.82
3	3074.85	46.98 PK	74.00	-27.02	1.57 V	358	44.60	2.38
4	3074.85	34.37 AV	54.00	-19.63	1.57 V	358	31.99	2.38
5	3824.97	47.34 PK	74.00	-26.66	1.10 V	254	42.21	5.13
6	3824.97	34.52 AV	54.00	-19.48	1.10 V	254	29.39	5.13

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 2

8.2 Radiated Emissions up to 1 GHz

Mode 1

Mode 2

8.3 Radiated Emissions above 1 GHz

Mode 1

Mode 2

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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Tel: 886-3-3183232
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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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