FCC Test Report

Report No.:	FD180502D06
Test Model:	RBE001
Received Date:	May 2, 2018
Test Date:	May 3 ~ 9, 2018
Issued Date:	May 11, 2018
Applicant:	Robotelf Technologies Co., Ltd.
Address:	8F03, No. 408, Ruiguang Rd., Neihu Dist., Taipei City 114, Taiwan
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

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Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
FD180502D06	Original release.	May 11, 2018

1 Certificate of Conformity

Product:	Robelf Smart robot
Brand:	ROBELF
Test Model:	RBE001
Sample Status:	Engineering sample
Applicant:	Robotelf Technologies Co., Ltd.
Test Date:	May 3 ~ 9, 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:** May 11, 2018

Vivian Chen / Specialist

Approved by : _____ , **Date:** May 11, 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 -14.51 dB at 0.18508 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -4.38 dB at 489.30 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -11.71 dB at 1519.41 MHz	N/A

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.92 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.12 dB
	Above 6GHz	5.09 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 Robotelf Technologies Co., Ltd., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	Robelf Smart robot
Brand	ROBELF
Test Model	RBE001
Sample Status	Engineering sample
Operating Software	N/A
Power Supply	Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT is a Robelf Smart robot, which has wireless module (Model: ROBELF, FCC ID: 2APLA-RBE001).

2. The EUT consumes power from a switching power adapter, as the following:

Brand	Model No.	Spec.
TPV ELECTRONICS(FUJIAN) CO., LTD	ADPC2045	AC Input: 100-240V, 1.5A, 50-60Hz DC Output: 20V, 2.25A

3.3 Test Program Used and Operation Descriptions

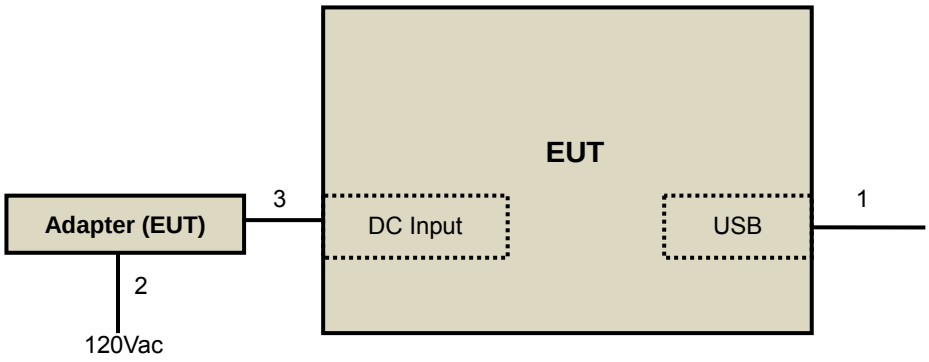
a. Turned on the power of all equipment.
b. EUT ran a test program to enable all functions.
c. EUT sent and received messages to/ from Notebook PC (kept in a remote area) via a Wireless Broadband Router.
d. EUT sent “H” messages to LCD panel. Then it displayed “H” messages on its screen.
e. Steps c-d were repeated.

3.4 Primary Clock Frequencies of Internal Source

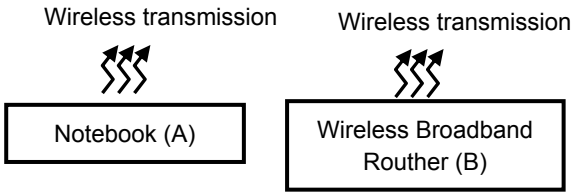
The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 5GHz, provided by Robotelf Technologies Co., Ltd., for detailed internal source, please refer to the manufacturer's specifications.

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices



Remote site



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook PC	DELL	P41G	FT4W952	FCC DoC Approved	Provided by Lab
B.	Wireless Broandband Router	D-LINK	DIR-809	N/A	KA2IR809A2	Provided by Lab

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.	USB cable	1	1.8	Y	0	Provided by Lab
2.	AC power cable	1	1.5	N	0	Supplied by client
3.	DC power cable	1	0.9	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	102414	Feb. 7, 2018	Feb. 6, 2019
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 22, 2017	May 21, 2018
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 22, 2017	May 21, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2017	Nov. 22, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 3, 2018	May 2, 2019
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2018	Feb. 13, 2019
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	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. 10.
3. The VCCI Site Registration No. C-1852.
4. Tested Date: May 3, 2018

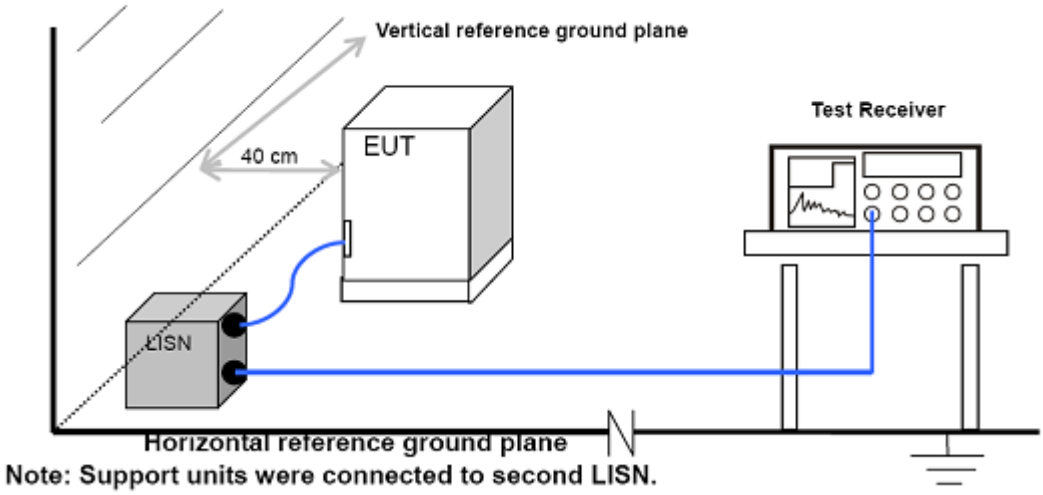
5.3 Test Arrangement

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.



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

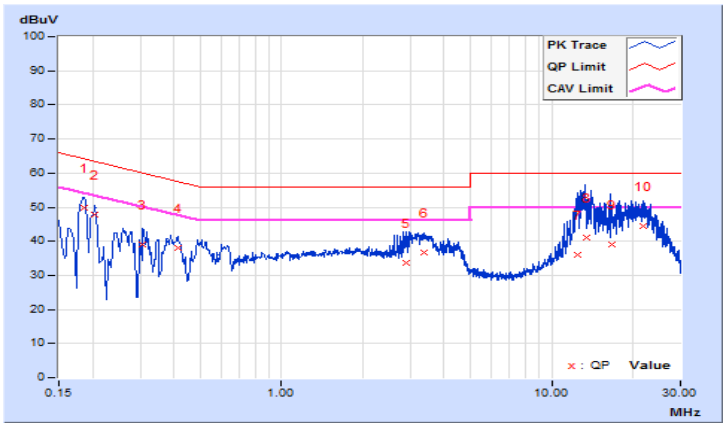
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 76%RH
Tested by	Kobe Lu		
Test Mode	Operating		

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	**0.18508**	**9.66**	**40.08**	**21.84**	**49.74**	**31.50**	**64.25**	**54.25**	**-14.51**	**-22.75**
2	0.20474	9.66	38.11	19.60	47.77	29.26	63.42	53.42	-15.65	-24.16
3	0.30696	9.68	29.31	12.26	38.99	21.94	60.05	50.05	-21.06	-28.11
4	0.41233	9.70	28.42	12.83	38.12	22.53	57.60	47.60	-19.48	-25.07
5	2.89873	9.81	23.95	10.75	33.76	20.56	56.00	46.00	-22.24	-25.44
6	3.38357	9.82	27.00	12.96	36.82	22.78	56.00	46.00	-19.18	-23.22
7	12.41567	9.96	26.14	19.50	36.10	29.46	60.00	50.00	-23.90	-20.54
8	13.40507	9.97	31.18	19.61	41.15	29.58	60.00	50.00	-18.85	-20.42
9	16.65643	10.00	29.13	20.18	39.13	30.18	60.00	50.00	-20.87	-19.82
10	21.75365	10.05	34.30	22.43	44.35	32.48	60.00	50.00	-15.65	-17.52

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

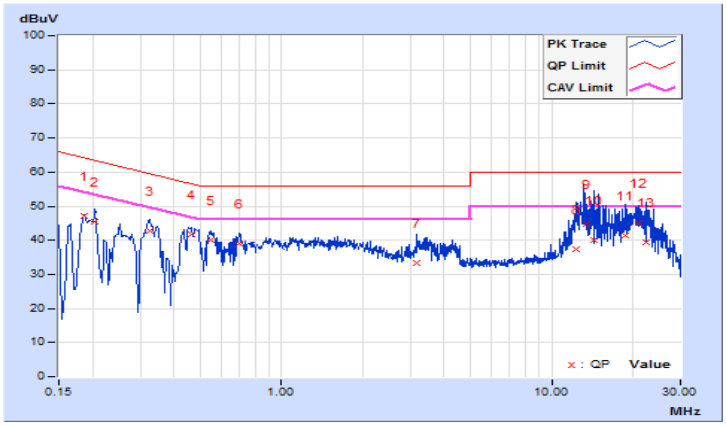


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	24℃, 76%RH
Tested by	Kobe Lu		
Test Mode	Operating		

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	0.18519	9.68	37.47	22.22	47.15	31.90	64.25	54.25	-17.10	-22.35
2	0.20474	9.68	35.61	21.31	45.29	30.99	63.42	53.42	-18.13	-22.43
3	0.32442	9.70	32.95	19.25	42.65	28.95	59.59	49.59	-16.94	-20.64
4	0.46423	9.72	32.05	17.78	41.77	27.50	56.62	46.62	-14.85	-19.12
5	0.54518	9.73	30.35	17.05	40.08	26.78	56.00	46.00	-15.92	-19.22
6	0.69740	9.74	29.43	15.56	39.17	25.30	56.00	46.00	-16.83	-20.70
7	3.18025	9.83	23.45	10.54	33.28	20.37	56.00	46.00	-22.72	-25.63
8	12.34920	10.00	27.30	21.05	37.30	31.05	60.00	50.00	-22.70	-18.95
9	13.40549	10.01	34.83	25.46	44.84	35.47	60.00	50.00	-15.16	-14.53
10	14.28001	10.02	30.10	19.18	40.12	29.20	60.00	50.00	-19.88	-20.80
11	18.66412	10.08	31.18	21.64	41.26	31.72	60.00	50.00	-18.74	-18.28
12	20.98139	10.10	35.01	23.92	45.11	34.02	60.00	50.00	-14.89	-15.98
13	22.29833	10.11	29.35	17.45	39.46	27.56	60.00	50.00	-20.54	-22.44

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

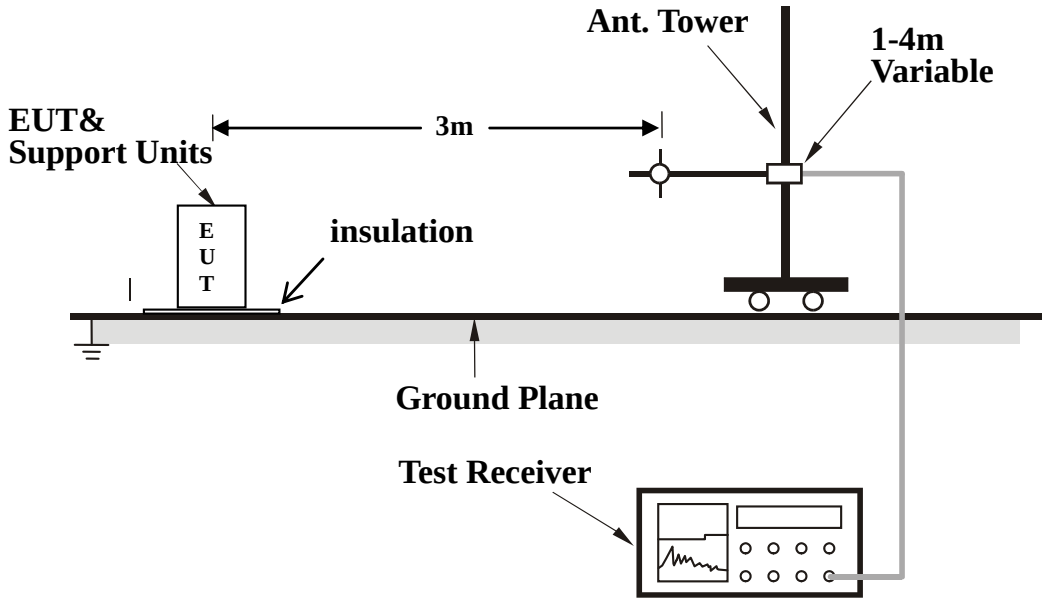
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Preamplifier	8447D	2944A10386	Feb. 20, 2018	Feb. 19, 2019
Agilent Test Receiver	N9038A	MY50010135	Jun. 29, 2017	Jun. 28, 2018
Schwarzbeck Antenna	VULB9168	9168-434	Dec. 6, 2017	Dec. 5, 2018
Max Full. Turn Table & Tower	MF7802	MF780208103	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
WOKEN RF cable With 5dB PAD	8D	CABLE-CH7-01	Jan. 22, 2018	Jan. 21, 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. 7.
3. The Industry Canada Reference No. IC 7450E-7.
4. The VCCI Site Registration No. R-20008.
5. Tested Date: May 9, 2018

6.3 Test Arrangement

a. The EUT was placed on the horizontal ground reference plane at an accredited test facility and orientated for normal use, but separated from metallic contact with the ground reference plane by up to 12 mm of insulation.
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 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 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.

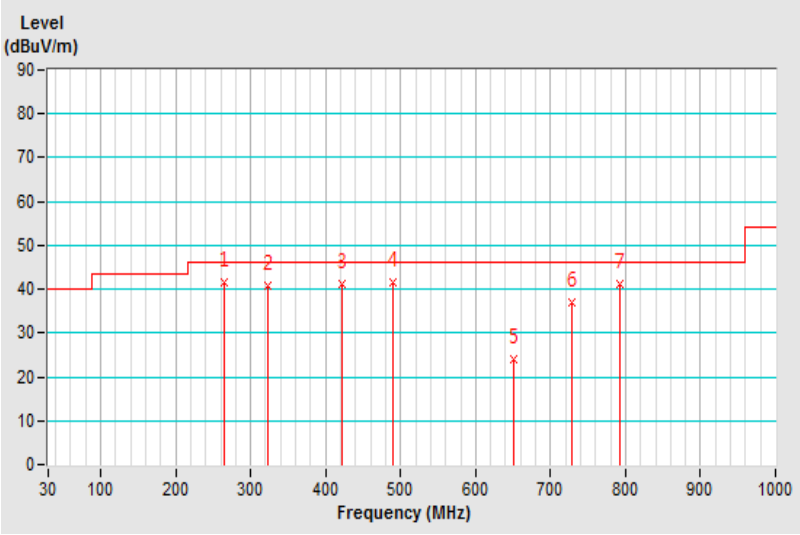
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

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	264.08	41.54 QP	46.00	-4.46	3.96 H	345	50.82	-9.28
2	323.82	40.81 QP	46.00	-5.19	3.85 H	324	48.20	-7.39
3	422.53	41.07 QP	46.00	-4.93	2.15 H	204	46.21	-5.14
4	**489.30**	**41.62 QP**	**46.00**	**-4.38**	**1.05 H**	**204**	**45.75**	**-4.13**
5	650.99	23.87 QP	46.00	-22.13	1.98 H	96	24.88	-1.01
6	728.27	37.10 QP	46.00	-8.90	2.99 H	117	36.86	0.24
7	791.86	41.20 QP	46.00	-4.80	1.14 H	301	39.64	1.56

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

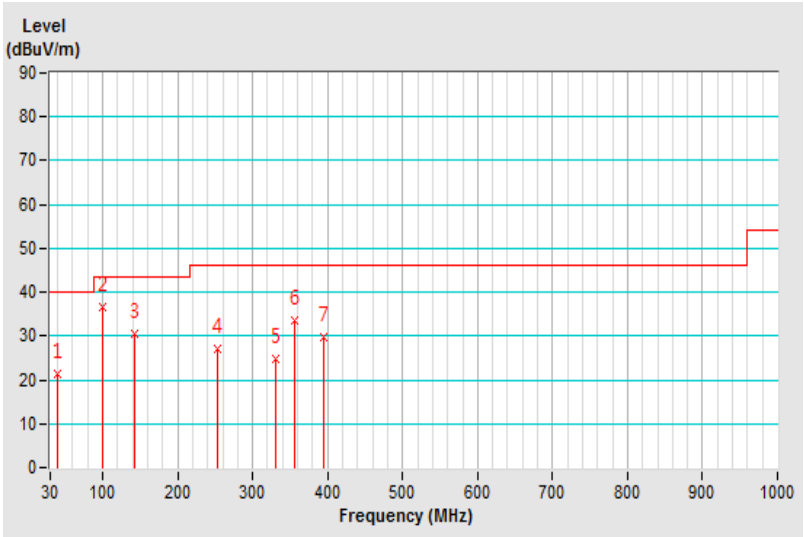


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

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	40.44	21.36 QP	40.00	-18.64	2.12 V	360	32.20	-10.84
2	99.48	36.58 QP	43.50	-6.92	1.15 V	113	50.95	-14.37
3	142.95	30.33 QP	43.50	-13.17	1.26 V	360	40.43	-10.10
4	253.10	27.12 QP	46.00	-18.88	1.08 V	360	36.80	-9.68
5	330.21	24.70 QP	46.00	-21.30	3.65 V	341	31.97	-7.27
6	356.77	33.50 QP	46.00	-12.50	3.85 V	347	40.50	-7.00
7	394.76	29.59 QP	46.00	-16.41	2.23 V	202	35.27	-5.68

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

Radiated Emissions Limits at 1.5 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
Above 18000	Avg: 66 Peak: 86	Avg: 60 Peak: 80	Avg: 66 Peak: 86	Avg: 60 Peak: 80

Radiated Emissions Limits at 1 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
Above 18000	Avg: 69.5 Peak: 89.5	Avg: 63.5 Peak: 83.5	Avg: 69.5 Peak: 89.5	Avg: 63.5 Peak: 83.5

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. 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

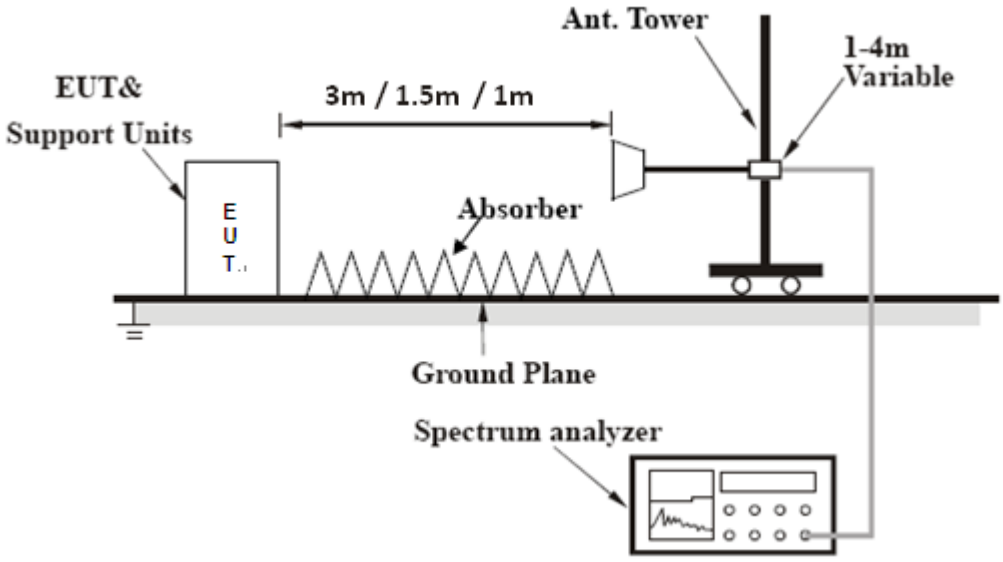
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber No. 7.
3. The Industry Canada Reference No. IC 7450E-7.
4. The VCCI Site Registration No. G-39
5. Tested Date: May 9, 2018

7.3 Test Arrangement

a. The EUT was placed on the horizontal metal ground plane at an accredited test facility, orientated for normal use, but separated from metallic contact with the reference metal ground plane by insulation.
b. The EUT was set 3 meters / 1.5 meter / 1 meter 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:

1. 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.
2. For measurement of frequency 1 GHz ~ 18 GHz, the EUT was set 3 meters away from the receiver antenna
3. For measurement of frequency 18 GHz ~ 40 GHz, the EUT was set 1.5 meter / 1 meter away from the receiver antenna



* :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.

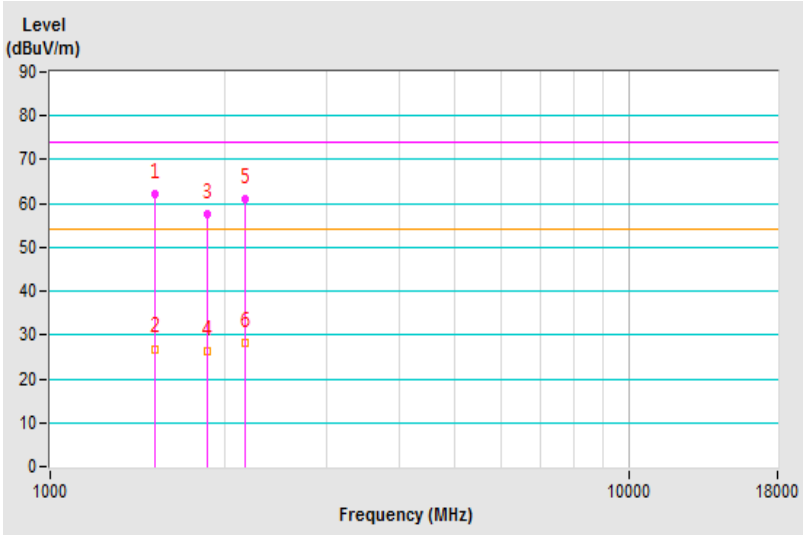
7.4 Test Results

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

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	**1519.41**	**62.29 PK**	**74.00**	**-11.71**	**2.00 H**	**146**	**65.56**	**-3.27**
2	1519.41	26.85 AV	54.00	-27.15	2.00 H	146	30.12	-3.27
3	1869.27	57.69 PK	74.00	-16.31	2.63 H	360	59.32	-1.63
4	1869.27	26.32 AV	54.00	-27.68	2.63 H	360	27.95	-1.63
5	2172.54	61.00 PK	74.00	-13.00	1.50 H	360	62.69	-1.69
6	2172.54	28.29 AV	54.00	-25.71	1.50 H	360	29.98	-1.69

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

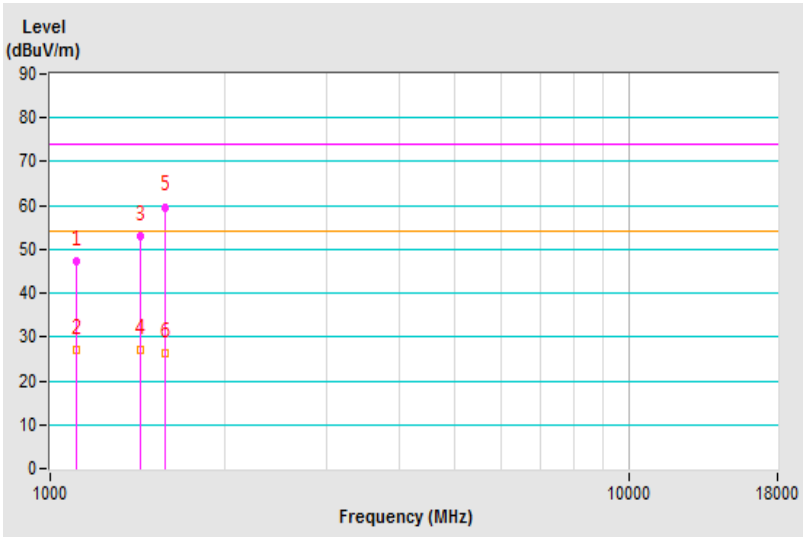


Frequency Range	1GHz ~ 18GHz	**Detector Function & Resolution Bandwidth**	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

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	1109.30	47.18 PK	74.00	-26.82	1.50 V	1	51.00	-3.82
2	1109.30	26.99 AV	54.00	-27.01	1.50 V	1	30.81	-3.82
3	1428.19	52.98 PK	74.00	-21.02	1.50 V	1	56.09	-3.11
4	1428.19	27.11 AV	54.00	-26.89	1.50 V	1	30.22	-3.11
5	1576.05	59.64 PK	74.00	-14.36	2.00 V	35	62.93	-3.29
6	1576.05	26.22 AV	54.00	-27.78	2.00 V	35	29.51	-3.29

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

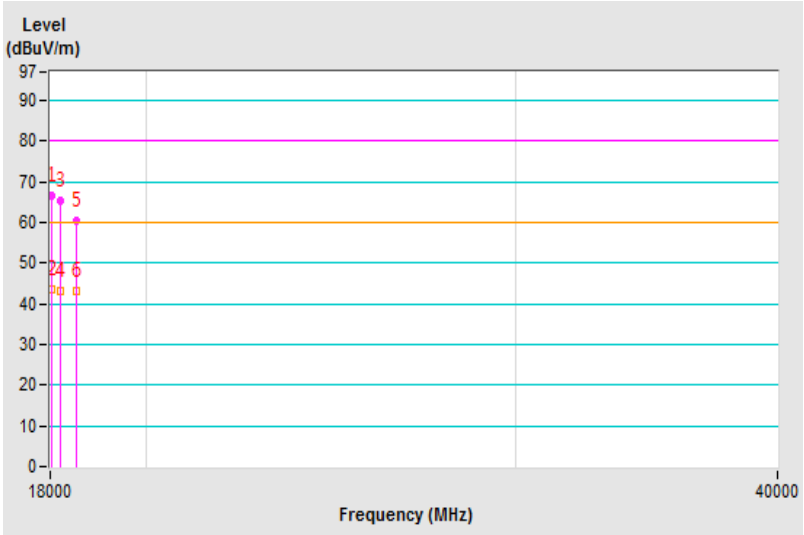


Frequency Range	18GHz ~ 25GHz	**Detector Function & Resolution Bandwidth**	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

Antenna Polarity & Test Distance : Horizontal at 1.5 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	18040.51	66.69 PK	80.00	-13.31	2.52 H	325	68.80	-2.11
2	18040.51	43.56 AV	60.00	-16.44	2.52 H	325	45.67	-2.11
3	18213.02	65.28 PK	80.00	-14.72	2.52 H	207	67.05	-1.77
4	18213.02	43.07 AV	60.00	-16.93	2.52 H	207	44.84	-1.77
5	18528.64	60.39 PK	80.00	-19.61	1.50 H	1	62.00	-1.61
6	18528.64	43.19 AV	60.00	-16.81	1.50 H	1	44.80	-1.61

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

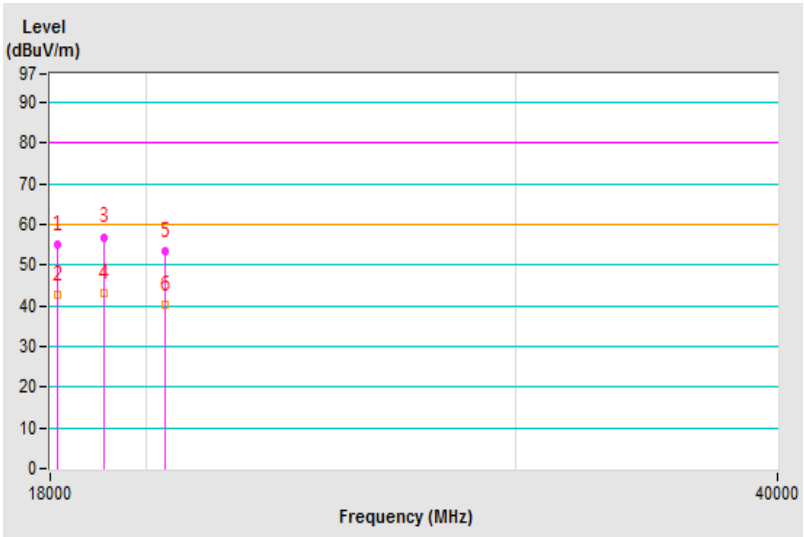


Frequency Range	18GHz ~ 25GHz	**Detector Function & Resolution Bandwidth**	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 72%RH
Tested by	Steven Lin		
Test Mode	Operating		

Antenna Polarity & Test Distance : Vertical at 1.5 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	18136.50	55.10 PK	80.00	-24.90	1.55 V	171	57.45	-2.35
2	18136.50	42.85 AV	60.00	-17.15	1.55 V	171	45.20	-2.35
3	19088.42	56.87 PK	80.00	-23.13	1.70 V	276	57.66	-0.79
4	19088.42	43.16 AV	60.00	-16.84	1.70 V	276	43.95	-0.79
5	20414.59	53.47 PK	80.00	-26.53	1.58 V	298	57.14	-3.67
6	20414.59	40.08 AV	60.00	-19.92	1.58 V	298	43.75	-3.67

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

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
Tel: 886-2-26052180
Fax: 886-2-26051924

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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