

FCC Test Report

Report No.: RF170309C20

FCC ID: GKRA30EIH30B03

Test Model: EIH3

Received Date: Mar. 09, 2017

Test Date: Mar. 20, 2017

Issued Date: Apr. 28, 2017

Applicant: Compal Electronics, INC.

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

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Release Control Record

Issue No.	Description	Date Issued
RF170309C20	Original Release	Apr. 28, 2017

1 Certificate of Conformity

Product: Smart IOT

Brand: Compal

Test Model: EIH3

Sample Status: Identical Prototype

Applicant: Compal Electronics, INC.

Test Date: Mar. 20, 2017

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)

ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

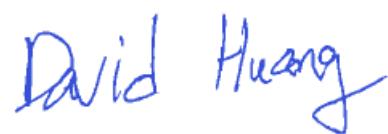
Prepared by :



, **Date:** Apr. 28, 2017

Rona Chen / Specialist

Approved by :



, **Date:** Apr. 28, 2017

David Huang / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -20.71dB at 0.26730 MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -18.35dB at 908.42 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart IOT
Brand	Compal
Test Model	EIH3
Status of EUT	Identical Prototype
Power Supply Rating	12 Vdc (Adapter)
Modulation Type	2FSK (9.6 kbps) 2GFSK (40 kbps / 100 kbps)
Transfer Rate	9.6 kbps, 40 kbps, 100 kbps
Operating Frequency	908.42MHz, 908.4MHz, 916MHz
Number of Channel	3
Antenna Type	Gain -2.17799 dBi
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	DVE	DSA-24PFM-12 FUS	I/P: 100-240 Vac, 0.8 A O/P: 12 Vdc, 2 A
BT/WLAN Module	AzureWave	AW-CM389NF	--

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

3 channels are provided for EUT:

Channel	Frequency (MHz)	Transfer Rate (kbps)
1	908.42	9.6
2	908.40	40
3	916.00	100

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE≥1G	RE<1G	PLC	
-	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1 GHz & Band-edge Measurement

RE<1G: Radiated Emission below 1 GHz

PLC: Power Line Conducted Emission

Radiated Emission Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Operating Frequency (MHz)	Modulation Type
-	1	908.42 MHz	2FSK
-	2	908.40 MHz	2GFSK
-	3	916.00 MHz	2GFSK

Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Operating Frequency (MHz)	Modulation Type
-	1	908.42 MHz	2FSK
-	2	908.40 MHz	2GFSK
-	3	916.00 MHz	2GFSK

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Operating Frequency (MHz)	Modulation Type
-	1	908.42 MHz	2FSK
-	2	908.40 MHz	2GFSK
-	3	916.00 MHz	2GFSK

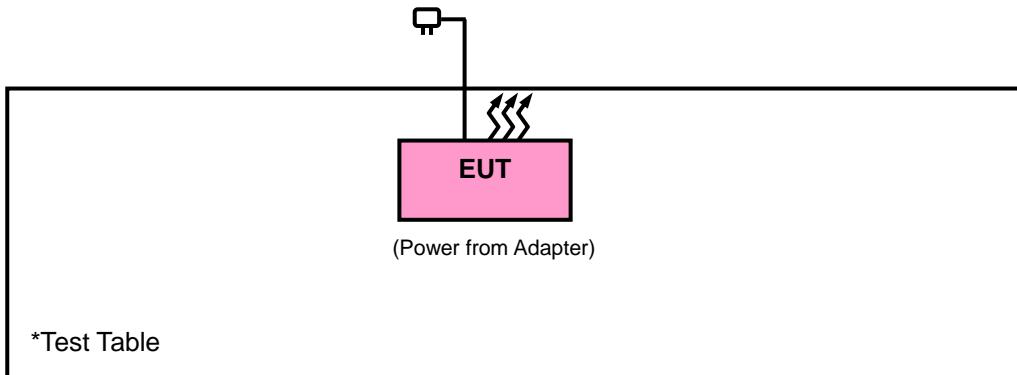
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
PLC	25 deg. C, 68 % RH	120 Vac, 60 Hz	Getaz Yang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.249)

ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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

NOTE:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 16, 2016	Dec. 15, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 26, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2016	Dec. 13, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
Preamplifier EMCI	EMC 012645	980115	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 184045	980116	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 330H	980112	Oct. 21, 2016	Oct. 20, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 21, 2016	Oct. 20, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 21, 2016	Oct. 20, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 21, 2016	Oct. 20, 2017
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC7450F-10.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

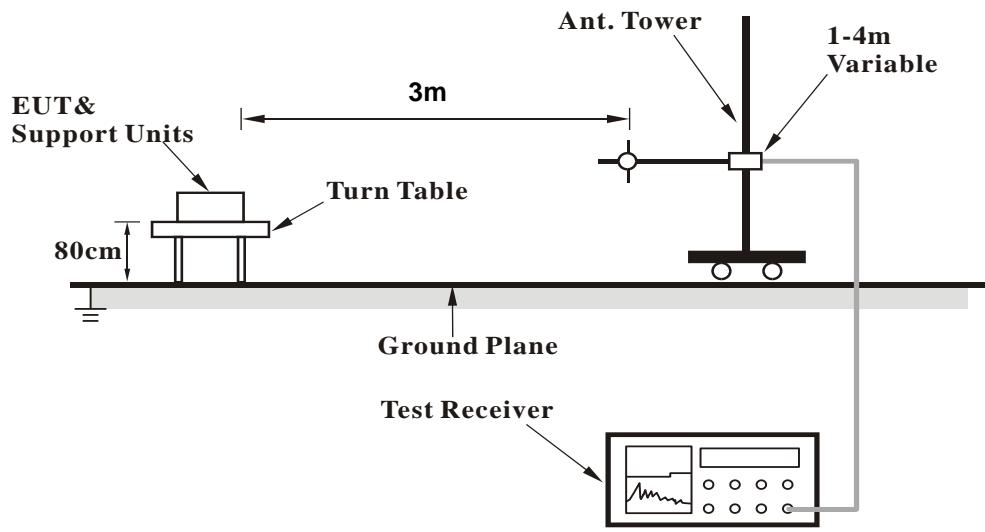
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle \geq 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

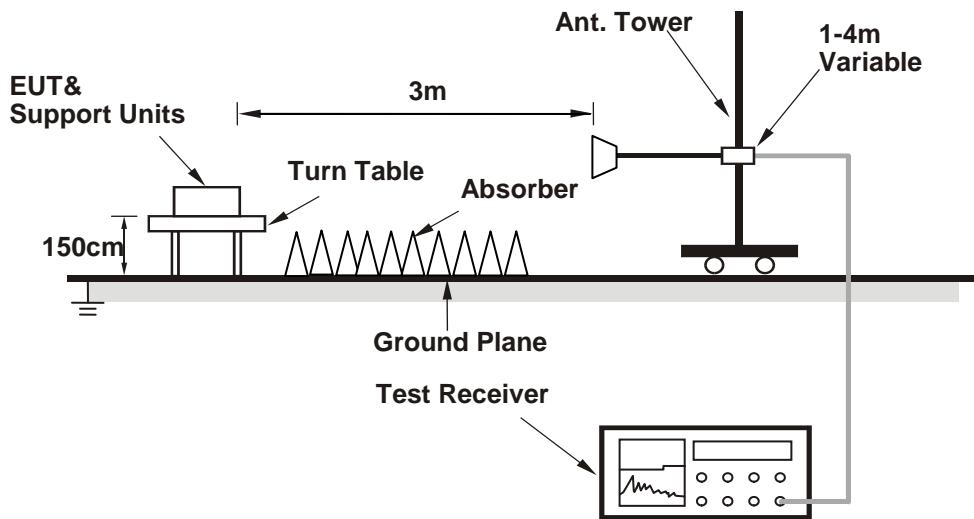
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



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

4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Z-Wave:

EUT Test Condition		Measurement Detail					
Channel	Channel 1 (908.42 MHz)	Frequency Range			Below 1000 MHz		
Input Power	120 Vac, 60 Hz	Detector Function			Peak (PK) Quasi-peak (QP)		
Environmental Conditions	25 deg. C, 65 % RH	Tested By			Gavin Wu		

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
908.42	73.46	79.19	94	-20.54	23.56	2.76	32.05	141	117	QP

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
908.42	75.65	81.38	94	-18.35	23.56	2.76	32.05	101	250	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail		
Channel		Channel 2 (908.40 MHz)		Frequency Range	Below 1000 MHz
Input Power		120 Vac, 60 Hz		Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions		25 deg. C, 65 % RH		Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
908.4	73.7	79.43	94	-20.3	23.56	2.76	32.05	137	120	QP
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
908.4	74.49	80.22	94	-19.51	23.56	2.76	32.05	104	249	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail		
Channel		Channel 3 (916.00 MHz)		Frequency Range	Below 1000 MHz
Input Power		120 Vac, 60 Hz		Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions		25 deg. C, 65 % RH		Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
916	74.27	79.91	94	-19.73	23.6	2.78	32.02	138	279	QP
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
916	75.6	81.24	94	-18.4	23.6	2.78	32.02	104	250	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Above 1 GHz WORST-CASE DATA:

EUT Test Condition		Measurement Detail					
Channel	Channel 1 (908.42 MHz)	Frequency Range			1 ~ 10 GHz		
Input Power	120 Vac, 60 Hz	Detector Function			Peak (PK) Average (AV)		
Environmental Conditions	25 deg. C, 65 % RH	Tested By			Gavin Wu		

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1816.84	29.07	52.94	54	-24.93	25.73	3.99	53.59	100	174	Average
1816.84	36.59	60.46	74	-37.41	25.73	3.99	53.59	100	174	Peak
2725.26	48.6	69.52	54	-5.4	27.76	4.86	53.54	205	79	Average
2725.26	52.13	73.05	74	-21.87	27.76	4.86	53.54	205	79	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1816.84	32.54	56.41	54	-21.46	25.73	3.99	53.59	100	189	Average
1816.84	40.05	63.92	74	-33.95	25.73	3.99	53.59	100	189	Peak
2725.26	48.47	69.39	54	-5.53	27.76	4.86	53.54	147	141	Average
2725.26	52.15	73.07	74	-21.85	27.76	4.86	53.54	147	141	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail			
Channel		Channel 2 (908.40 MHz)			Frequency Range	1 ~ 10 GHz
Input Power		120 Vac, 60 Hz			Detector Function	Peak (PK) Average (AV)
Environmental Conditions		25 deg. C, 65 % RH			Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1816.8	28.51	52.38	54	-25.49	25.73	3.99	53.59	100	185	Average
1816.8	36.17	60.04	74	-37.83	25.73	3.99	53.59	100	185	Peak
2725.2	49.07	69.99	54	-4.93	27.76	4.86	53.54	171	141	Average
2725.2	53.53	74.45	74	-20.47	27.76	4.86	53.54	171	141	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1816.8	32.96	56.83	54	-21.04	25.73	3.99	53.59	100	236	Average
1816.8	39.22	63.09	74	-34.78	25.73	3.99	53.59	100	236	Peak
2725.2	48.48	69.4	54	-5.52	27.76	4.86	53.54	171	141	Average
2725.2	51.52	72.44	74	-22.48	27.76	4.86	53.54	171	141	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
 Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail		
Channel		Channel 3 (916.00 MHz)		Frequency Range	1 ~ 10 GHz
Input Power		120 Vac, 60 Hz		Detector Function	Peak (PK) Average (AV)
Environmental Conditions		25 deg. C, 65 % RH		Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1832	27.88	51.75	54	-26.12	25.73	4	53.6	100	158	Average
1832	37.66	61.53	74	-36.34	25.73	4	53.6	100	158	Peak
2748	48.89	69.76	54	-5.11	27.85	4.88	53.6	157	336	Average
2748	51.55	72.42	74	-22.45	27.85	4.88	53.6	157	336	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
1832	33.4	57.27	54	-20.6	25.73	4	53.6	100	215	Average
1832	40.84	64.71	74	-33.16	25.73	4	53.6	100	215	Peak
2748	48.62	69.49	54	-5.38	27.85	4.88	53.6	100	252	Average
2748	50.16	71.03	74	-23.84	27.85	4.88	53.6	100	252	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Below 1 GHz WORST-CASE DATA:

EUT Test Condition			Measurement Detail						
Channel		Channel 1 (908.42 MHz)			Frequency Range		Below 1000 MHz		
Input Power		120 Vac, 60 Hz			Detector Function		Peak (PK) Quasi-peak (QP)		
Environmental Conditions		25 deg. C, 65 % RH			Tested By		Gavin Wu		

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
190.05	36.71	57.07	43.5	-6.79	10.05	1.26	31.67	118	298	QP
213.33	37.26	57.61	43.5	-6.24	9.93	1.35	31.63	107	176	QP
229.82	38.42	58.24	46	-7.58	10.62	1.42	31.86	102	261	QP
241.46	37.44	56.68	46	-8.56	11.11	1.46	31.81	125	123	QP
325.85	37.19	53.76	46	-8.81	13.57	1.7	31.84	128	34	QP
550.89	30.04	41.34	46	-15.96	18.48	2.18	31.96	115	317	QP

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
103.72	34.24	55.65	43.5	-9.26	9.43	1.07	31.91	132	164	QP
125.06	34.24	53.64	43.5	-9.26	11.35	1.14	31.89	100	12	QP
199.75	38.26	59.38	43.5	-5.24	9.36	1.29	31.77	125	71	QP
213.33	36.14	56.49	43.5	-7.36	9.93	1.35	31.63	119	305	QP
329.73	35.84	52.27	46	-10.16	13.66	1.72	31.81	122	224	QP
422.85	37.07	51.38	46	-8.93	15.79	1.94	32.04	116	213	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail			
Channel		Channel 2 (908.40 MHz)			Frequency Range	Below 1000 MHz
Input Power		120 Vac, 60 Hz			Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions		25 deg. C, 65 % RH			Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
125.06	32.59	51.99	43.5	-10.91	11.35	1.14	31.89	123	270	QP
197.81	36.81	57.78	43.5	-6.69	9.5	1.28	31.75	115	68	QP
213.33	38.24	58.59	43.5	-5.26	9.93	1.35	31.63	130	52	QP
236.61	39.23	58.68	46	-6.77	10.91	1.44	31.8	117	116	QP
312.27	39.7	56.73	46	-6.3	13.24	1.67	31.94	108	243	QP
321	37.22	53.96	46	-8.78	13.45	1.69	31.88	125	201	QP
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
101.78	36.08	57.71	43.5	-7.42	9.25	1.06	31.94	112	123	QP
125.06	36.19	55.59	43.5	-7.31	11.35	1.14	31.89	118	97	QP
207.51	37.84	58.46	43.5	-5.66	9.69	1.33	31.64	105	229	QP
239.52	39.95	59.25	46	-6.05	11.03	1.45	31.78	118	195	QP
325.85	37.82	54.39	46	-8.18	13.57	1.7	31.84	136	327	QP
411.21	36.72	51.23	46	-9.28	15.56	1.93	32	123	156	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT Test Condition			Measurement Detail			
Channel		Channel 3 (916.00 MHz)			Frequency Range	Below 1000 MHz
Input Power		120 Vac, 60 Hz			Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions		25 deg. C, 65 % RH			Tested By	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
170.65	36.5	55.4	43.5	-7	11.67	1.17	31.74	130	228	QP
312.27	37.89	54.92	46	-8.11	13.24	1.67	31.94	102	299	QP
325.85	36.96	53.53	46	-9.04	13.57	1.7	31.84	125	71	QP
500.45	37.07	49.27	46	-8.93	17.33	2.09	31.62	137	161	QP
578.05	34.02	44.81	46	-11.98	19.1	2.22	32.11	106	220	QP
696.39	32.96	41.55	46	-13.04	20.77	2.45	31.81	128	260	QP
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
125.06	36.97	56.37	43.5	-6.53	11.35	1.14	31.89	117	352	QP
207.51	38.07	58.69	43.5	-5.43	9.69	1.33	31.64	138	64	QP
325.85	36.93	53.5	46	-9.07	13.57	1.7	31.84	106	355	QP
468.44	36.2	49.39	46	-9.8	16.7	2.02	31.91	106	196	QP
599.39	30.73	41.12	46	-15.27	19.59	2.26	32.24	132	100	QP
683.78	32.54	41.34	46	-13.46	20.62	2.42	31.84	100	106	QP

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note:

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

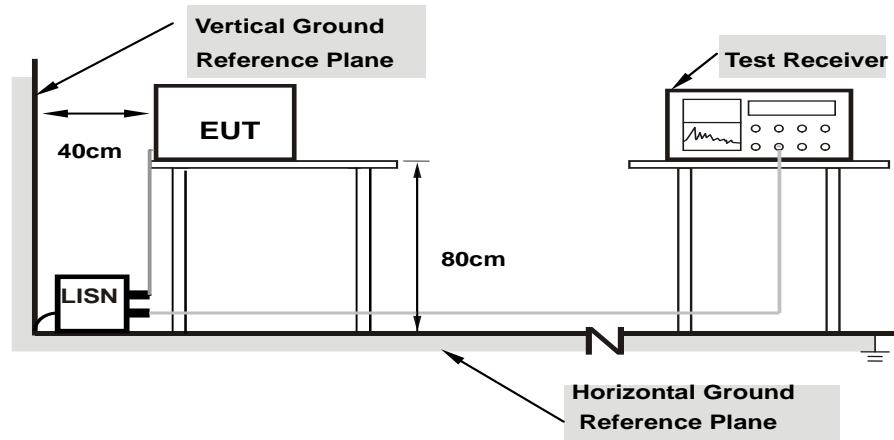
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz - 30 MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1. Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

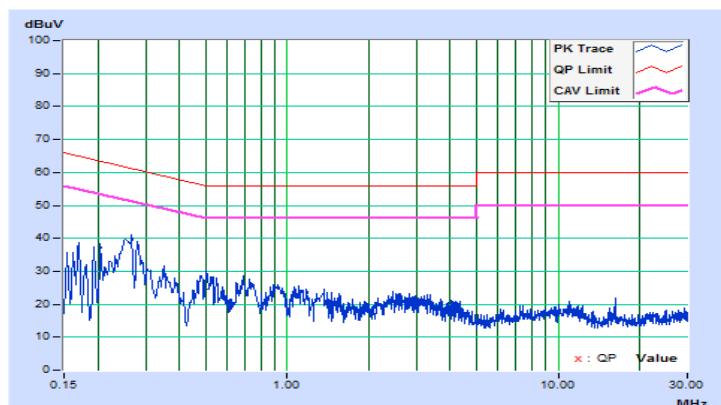
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/3/20

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	0.16955	10.35	29.97	12.50	40.32	22.85	64.98	54.98	-24.66	-32.13
2	0.20474	10.37	25.00	10.03	35.37	20.40	63.42	53.42	-28.05	-33.02
3	0.26730	10.38	28.24	20.11	38.62	30.49	61.20	51.20	-22.58	-20.71
4	0.34941	10.39	18.12	8.82	28.51	19.21	58.98	48.98	-30.47	-29.77
5	0.68564	10.40	15.21	8.33	25.61	18.73	56.00	46.00	-30.39	-27.27
6	16.22792	11.15	5.44	1.40	16.59	12.55	60.00	50.00	-43.41	-37.45

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

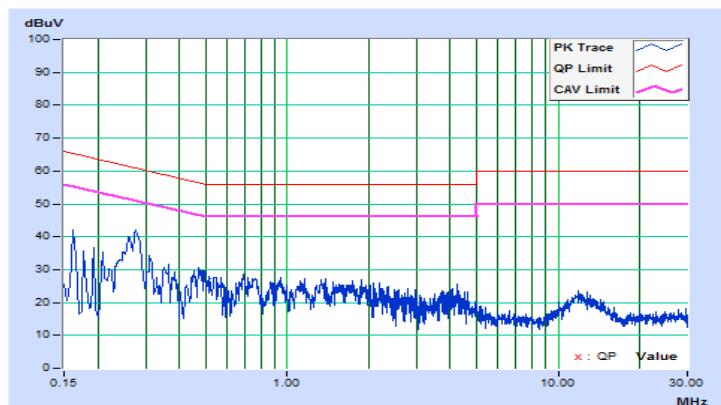


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/3/20

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	10.11	30.82	15.57	40.93	25.68	65.37	55.37	-24.44	-29.69
2	0.19301	10.14	24.22	9.29	34.36	19.43	63.91	53.91	-29.55	-34.48
3	0.27553	10.15	29.42	20.06	39.57	30.21	60.95	50.95	-21.38	-20.74
4	0.36505	10.16	18.41	9.80	28.57	19.96	58.61	48.61	-30.04	-28.65
5	1.38947	10.19	12.56	4.85	22.75	15.04	56.00	46.00	-33.25	-30.96
6	11.83327	10.62	8.27	3.16	18.89	13.78	60.00	50.00	-41.11	-36.22

Remarks:

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



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab

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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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