

FCC Test Report

Report No.: FC180919C04

Test Model: TA1124

FCC ID: 2AJOTTA1124

Received Date: Sep. 19, 2018

Test Date: Oct. 02, 2018

Issued Date: Nov. 09, 2018

Applicant: HMD Global Oy

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**FCC Registration /
Designation Number:** 328930 / TW1050



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Release Control Record

Issue No.	Description	Date Issued
FC180919C04	Original Release	Nov. 09, 2018

1 Certificate of Conformity

Product: Smart Phone

Brand: NOKIA

Test Model: TA1124

Sample Status: Engineering Sample

Applicant: HMD Global Oy

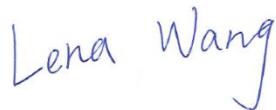
Test Date: Oct. 02, 2018

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:** Nov. 09, 2018
Lena Wang / Specialist



Approved by : _____, **Date:** Nov. 09, 2018
Carl Chen / Project Engineer

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 -10.79 dB at 2.27385 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -6.99 dB at 42.37 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -19.64 dB at 4731.49 MHz	Pass

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

2.1 Measurement Uncertainty

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

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	4.70 dB
Radiated Emissions above 1 GHz	Above 1 GHz	2.26 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 HMD Global Oy, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	Smart Phone
Brand	NOKIA
Test Model	TA1124
Status of EUT	Engineering Sample
Operating Software	Android 9
Power Supply Rating	5 Vdc / 9 Vdc (Adapter) 3.85 Vdc (Battery)
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT accessories list refers to EUT Photo.pdf.

3.3 Construction of EUT

EUT has been pre-tested under following configurations

Part	Specification	Brand	Model	Configuration	
				1	2
Battery	3.85Vdc	NOKIA	HE377	V	
	3.85Vdc	NOKIA	HE362		V
Photo Camera	8 M	Shine-Tech	8F813B	V	
	8 M	Truly	CMD537-B8BF-E		V
Video Camera	Dual 13M AF+5M FF	Shine-Tech	8DD05B	V	
	Dual 13M AF+5M FF	Truly	MV13A5F105A-E		V
eMMC	32GB	Kingston	32EMCP16-EL3GTA28-A20		V
	32GB	Samsung	KMQD60013M-B318	V	
RAM	2GB LPDDR3	Kingston	32EMCP16-EL3GTA28-A20		V
	2GB LPDDR3	Samsung	KMQD60013M-B318	V	
LCD Panel	5.99 inch	Innolux	GP0600JA0011S	V	V
Back cover	--	Tongda	MERHD01024A	V	V
Bezel	--	Tongda	MERHD61021A	V	V
CPU	--	Qualcomm	SDM439	V	V
BT/WLAN Module	--	Qualcomm	WCN3615	V	V
NFC chipset	--	Samsung	S3NRN81	V	V
USB Cable	1.0 meter	NOKIA	CA-18W-C	V	V

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

Test modes are presented in the report as below.

Mode	Config.	Test Condition
Conducted Emission		
1	1	GSM850 Link + BT Link + WLAN Link + GPS+GLONASS Rx + USB Cable + Earphone + Adapter 1 + NFC On
2	1	WCDMA1900 Link + BT Link + WLAN Link + FM Rx + USB Cable + Earphone + Adapter 2 + NFC On
3	1	LTE Band 12 Link + BT Link + WLAN Link + Front Camera + USB Cable + Earphone + Adapter 2 + NFC On
4	1	GSM1900 Idle + BT Link + WLAN Link + Back Camera + USB Cable + Earphone + Adapter 2 + NFC On
5	1	WCDMA850 Idle + BT Link + WLAN Link + MPEG4 + USB Cable + Earphone + USB Link + NFC On
6	1	GSM1900 Idle + BT Link + WLAN Link + Back Camera + USB Cable + Earphone + Adapter 3 + NFC On
7	2	GSM1900 Idle + BT Link + WLAN Link + Front Camera + USB Cable + Earphone + Adapter 2 + NFC On
8	2	GSM1900 Idle + BT Link + WLAN Link + Back Camera + USB Cable + Earphone + Adapter 2 + NFC On
Radiated Emission		
1	1	GSM850 Link + BT Link + WLAN Link + GPS+GLONASS Rx + USB Cable + Earphone + Adapter 1 + NFC On
2	1	WCDMA1900 Link + BT Link + WLAN Link + FM Rx + USB Cable + Earphone + Adapter 2 + NFC On
3	1	LTE Band 12 Link + BT Link + WLAN Link + Front Camera + USB Cable + Earphone + Adapter 1 + NFC On
4	1	GSM1900 Idle + BT Link + WLAN Link + Back Camera + USB Cable + Earphone + Adapter 1 + NFC On
5	1	WCDMA850 Idle + BT Link + WLAN Link + MPEG4 + USB Cable + Earphone + USB Link + NFC On
6	1	GSM850 Link + BT Link + WLAN Link + GPS+GLONASS Rx + USB Cable + Earphone + Adapter 3 + NFC On
7	2	GSM850 Link + BT Link + WLAN Link + USB Cable + Earphone + Adapter 1 + NFC On+ Front Camera
8	2	GSM850 Link + BT Link + WLAN Link + USB Cable + Earphone + Adapter 1 + NFC On+ Back Camera

Remark:

1. For conducted emission test, test mode 4 was the worst case and only this mode was presented in the report.
2. For radiated emission test, test mode 1 was the worst case and only this mode was presented in the report.

3.5 Test Program Used and Operation Descriptions

- a. The EUT linked with Bluetooth earphone
- b. The NFC function was turned on.
- c. The EUT played camera and sent audio signal to the earphone.
- d. The EUT communicated data with the Wideband Radio Communication Tester, GPS Simulator and Wireless AP, which acted as communication partners.

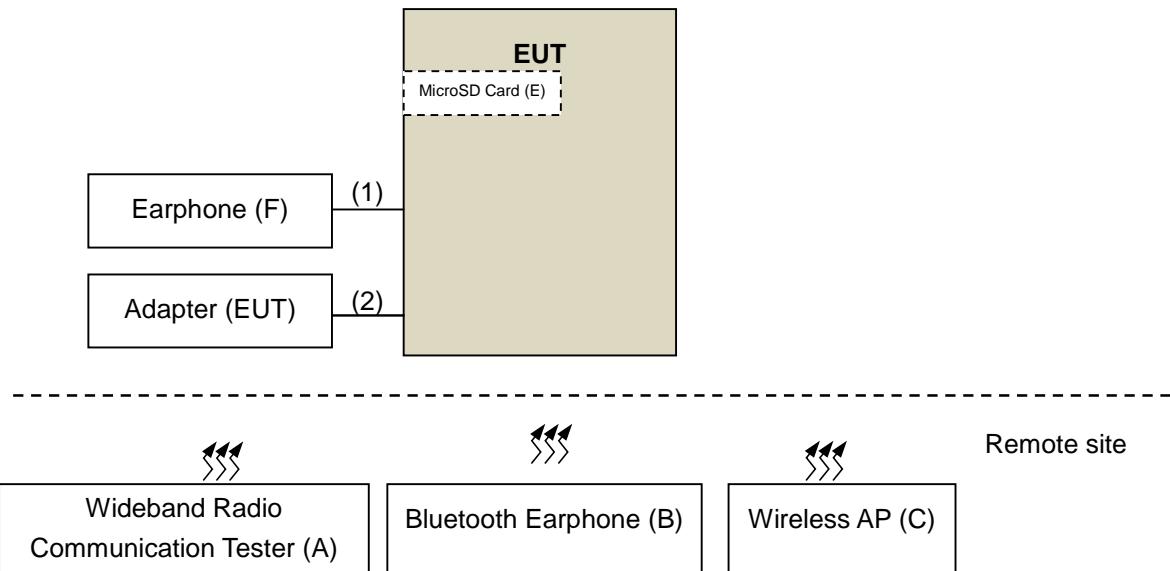
3.6 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 1950 MHz, provided by HMD Global Oy, for detailed internal source, please refer to the manufacturer's specifications.

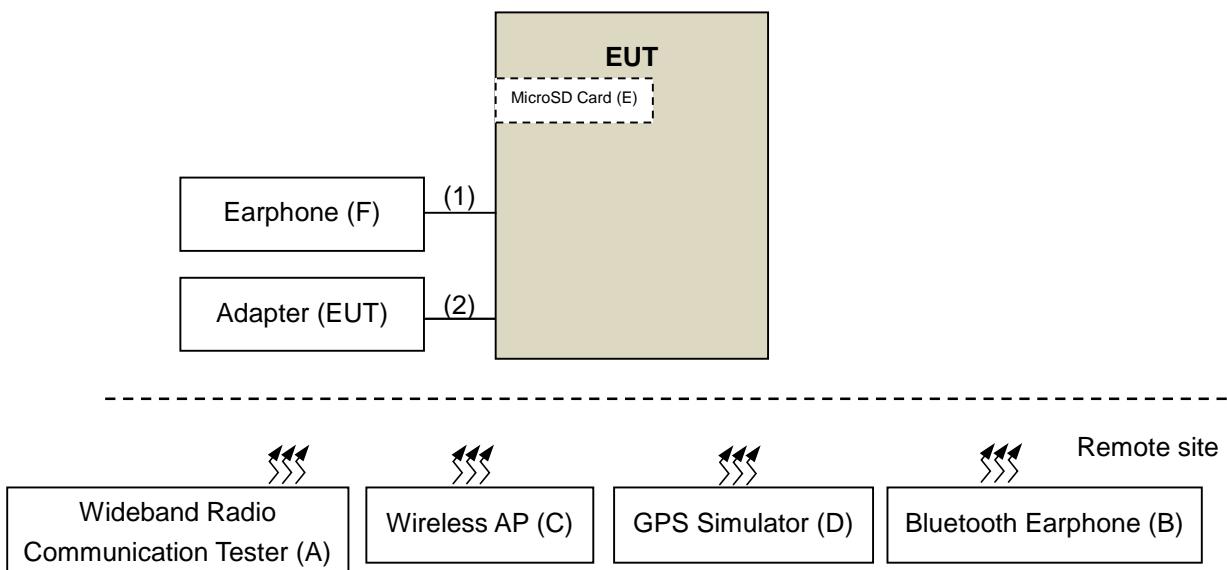
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

For Conducted Emission



For Radiated Emission



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Wideband Radio Communication Tester	R&S	CMW500	151084	N/A	--
B.	BLUETOOTH EARPHONE	ELECOM	LBT-MPHS400	N/A	N/A	--
C.	Wireless N Dual band Router	D-LINK	DIR-815	PVK21B5000399	KA21R815A1	--
D.	GPS simulator	T&E	GS-50	610493	N/A	--
E.	MicroSD Card	Transcend	N/A	N/A	N/A	8G
F.	Earphone	N/A	N/A	N/A	N/A	Provided by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A~D acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Audio Cable	1	1.5	N	0	Provided by client
2.	USB Cable	1	0.95	Y	0	Accessory of the EUT

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

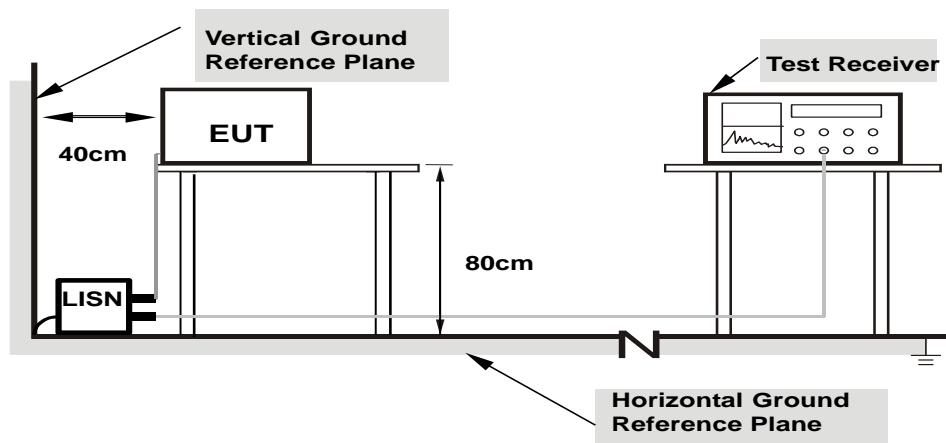
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
Software ADT	BV ADT_Cond_V7.3.7.4	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.

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/ 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 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 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

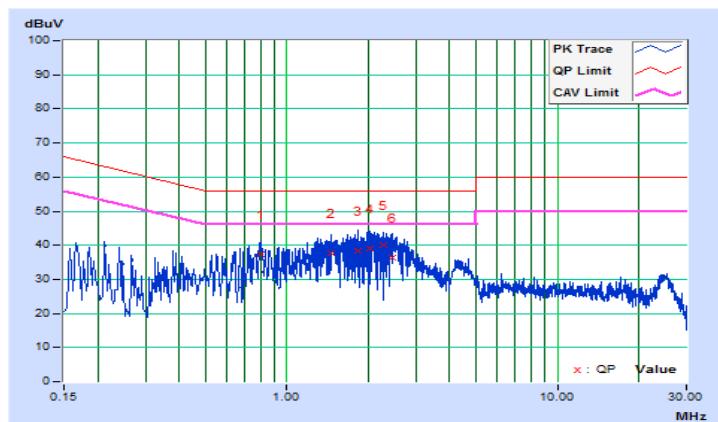
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Jim Lee	Test Date	2018/10/2
Test Mode	Mode 4		

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	0.80297	9.70	27.65	17.37	37.35	27.07	56.00	46.00	-18.65	-18.93
2	1.46376	9.71	27.88	15.27	37.59	24.98	56.00	46.00	-18.41	-21.02
3	1.82739	9.73	28.64	14.71	38.37	24.44	56.00	46.00	-17.63	-21.56
4	2.01898	9.74	29.47	14.51	39.21	24.25	56.00	46.00	-16.79	-21.75
5	2.28486	9.75	30.30	14.84	40.05	24.59	56.00	46.00	-15.95	-21.41
6	2.44126	9.75	26.59	12.93	36.34	22.68	56.00	46.00	-19.66	-23.32

Remarks:

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

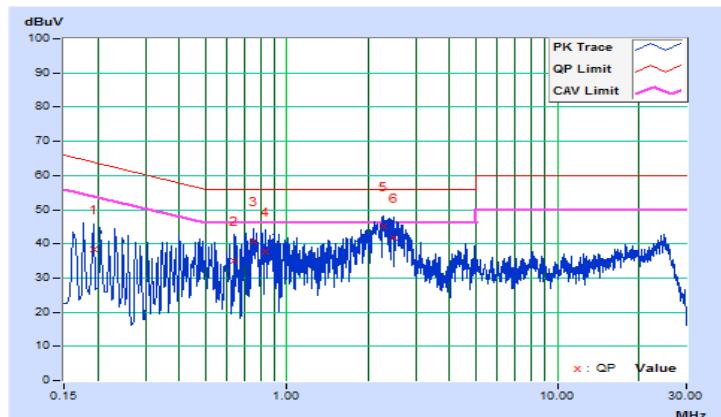


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Jim Lee	Test Date	2018/10/2
Test Mode	Mode 4		

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	0.19301	9.73	28.57	14.64	38.30	24.37	63.91	53.91	-25.61	-29.54
2	0.63875	9.74	25.24	10.15	34.98	19.89	56.00	46.00	-21.02	-26.11
3	0.75585	9.73	30.98	21.68	40.71	31.41	56.00	46.00	-15.29	-14.59
4	0.83425	9.73	28.00	15.73	37.73	25.46	56.00	46.00	-18.27	-20.54
5	2.27385	9.74	35.47	20.26	45.21	30.00	56.00	46.00	-10.79	-16.00
6	2.48427	9.75	32.14	17.53	41.89	27.28	56.00	46.00	-14.11	-18.72

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 (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
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 (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
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 (dB μ V/m) = 20 log Emission level (uV/m).
3. QP detector shall be applied if not specified.

6.2 Test Instruments

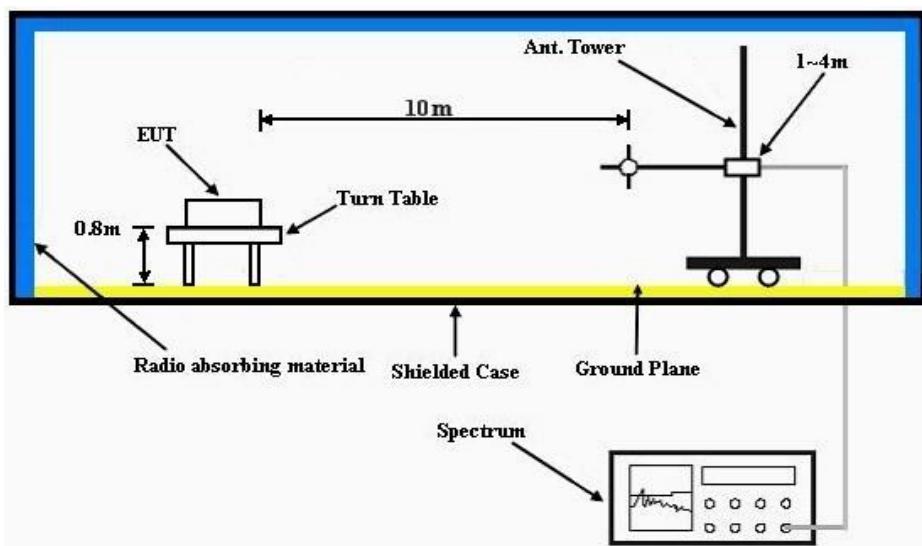
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ (V)	ESR	101240	Oct. 24, 2017	Oct. 23, 2018
Test Receiver ROHDE & SCHWARZ (H)	ESR	101264	Dec. 25, 2017	Dec. 24, 2018
BILOG Antenna SCHWARZBECK (V)	VULB9168	9168-160	Nov. 29, 2017	Nov. 28, 2018
BILOG Antenna SCHWARZBECK (H)	VULB9168	9168-156	Nov. 29, 2017	Nov. 28, 2018
Preamplifier Sonoma (V)	310N	352924	Jul. 12, 2018	Jul. 11, 2019
Preamplifier Sonoma (H)	310N	352923	Jul. 12, 2018	Jul. 11, 2019
RF signal cable (with 5dB PAD) Times (V)	LMR-600 (18M) +LMR-400 (7M)	CABLE-CH1 (VER) -01	Oct. 24, 2017	Oct. 23, 2018
RF signal cable (with 5dB PAD) Times (H)	LMR-600 (11.8M) +LMR-400 (7M)	CABLE-CH1 (HOR) -01	Oct. 24, 2017	Oct. 23, 2018
Software BV ADT	BV ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower (V)	MFA-440	9707	NA	NA
Antenna Tower (H)	MFA-440	970705	NA	NA
Turn Table	DS430	50303	NA	NA
Controller (V)	MF7802	074	NA	NA
Controller (H)	MF7802	08093	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 1.
 3. The IC Site Registration No. is IC 7450F-1.
 4. The VCCI Site Registration No. is R-1893.

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 120 kHz for quasi-peak detection (QP) at frequency below 1 GHz.



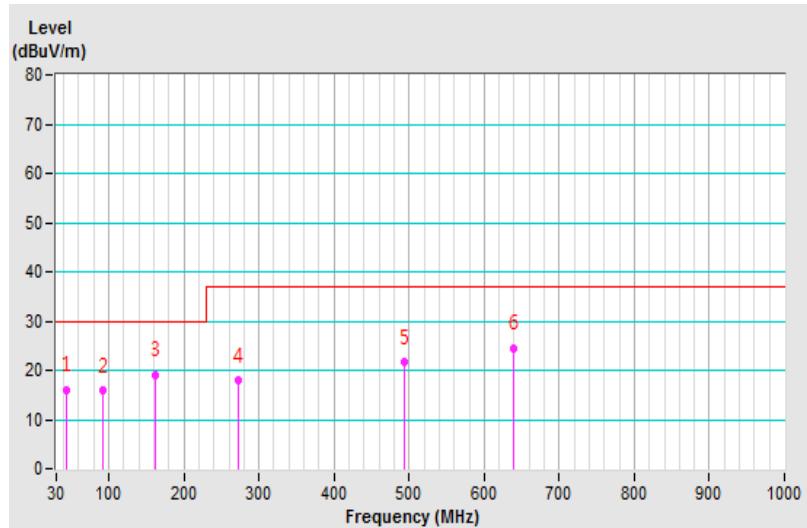
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Fox Chang	Environmental Conditions	23°C, 63%RH
Test Mode	Mode 1	Test Date	2018/10/2

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	43.19	15.93 QP	30.00	-14.07	4.00 H	258	29.87	-13.94
2	91.21	15.80 QP	30.00	-14.20	3.50 H	299	34.00	-18.20
3	161.83	18.98 QP	30.00	-11.02	4.00 H	123	32.00	-13.02
4	272.17	17.83 QP	37.00	-19.17	3.00 H	58	30.77	-12.94
5	494.17	21.57 QP	37.00	-15.43	4.00 H	244	28.43	-6.86
6	639.63	24.51 QP	37.00	-12.49	2.00 H	16	28.48	-3.97

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

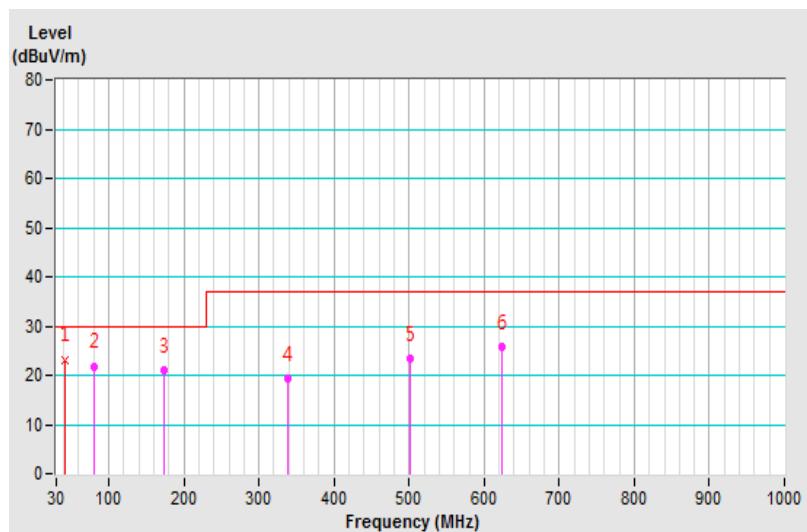


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Fox Chang	Environmental Conditions	23°C, 63%RH
Test Mode	Mode 1	Test Date	2018/10/2

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	42.37	23.01 QP	30.00	-6.99	1.50 V	60	36.87	-13.86
2	81.02	21.62 QP	30.00	-8.38	2.50 V	2	38.98	-17.36
3	174.05	20.91 QP	30.00	-9.09	1.50 V	219	34.28	-13.37
4	338.48	19.19 QP	37.00	-17.81	1.50 V	297	29.73	-10.54
5	501.35	23.24 QP	37.00	-13.76	1.00 V	256	29.79	-6.55
6	623.82	25.64 QP	37.00	-11.36	3.50 V	288	29.82	-4.18

Remarks:

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



7 Radiated Emissions above 1 GHz

7.1 Limits

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

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

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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
3. As shown in 15.35(b), 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 20 dB under any condition of modulation.

Frequency Range (For unintentional radiators)

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

7.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ (Above 1GHz)	ESR7	101471	Mar. 01, 2018	Feb. 28, 2019
Spectrum Analyzer Agilent	E4446A	MY51100039	Sep. 10, 2018	Sep. 09, 2019
RF signal cable (with 5dB PAD) Times	LMR-400 (18M)	CABLE-CH2-01	Apr. 27, 2018	Apr. 26, 2019
HORN Antenna (with 4dB PAD) SCHWARZBECK	BBHA 9120 D	9120D-405	Dec. 01, 2017	Nov. 30, 2018
Pre-Amplifier Agilent (Above 1GHz)	8449B	3008A01961	Oct. 16, 2017	Oct. 15, 2018
RF Coaxial Cable JUNFLON+EMC	JUNFLON+EMC10 4-SM-SM-6000	Cable-CH2- 02(MWX3221308G003+1307 10)	Jun. 11, 2018	Jun. 10, 2019
Software BV ADT	BV ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Controller BV ADT	SC100	SC93021702	NA	NA
RF Coaxial Cable EMCI	EMC102-KM-KM- 1000	170820	Aug. 28, 2018	Aug. 27, 2019
RF Coaxial Cable EMCI	EMC102-KM-KM- 3000	150929	Aug. 28, 2018	Aug. 27, 2019
Fix tool for Boresight antenna	BAF-01	2	NA	NA

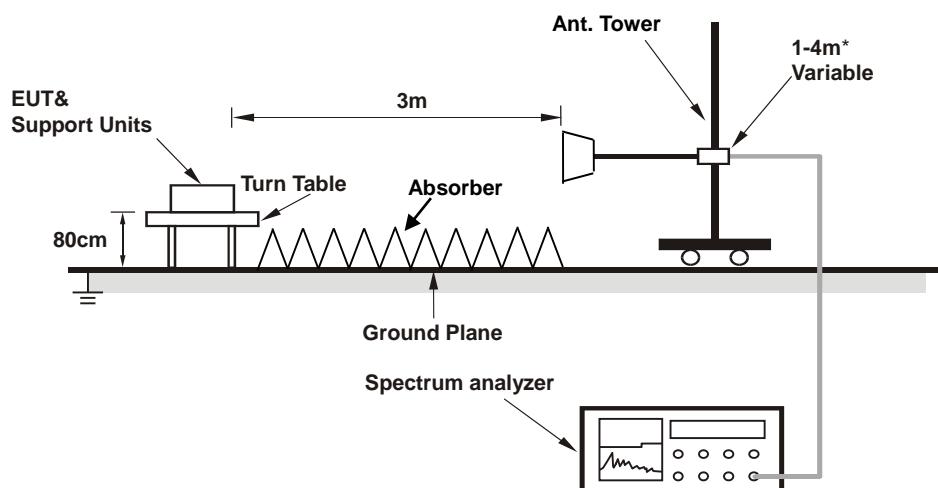
Note:

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 2.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The IC Site Registration No. is IC 7450F-2.
5. The VCCI Site Registration No. is G-10018.

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. For frequency range 1 GHz ~ 18 GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. 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 3 dB 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.
- e. 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.
- f. 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 1 MHz and video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1 GHz.



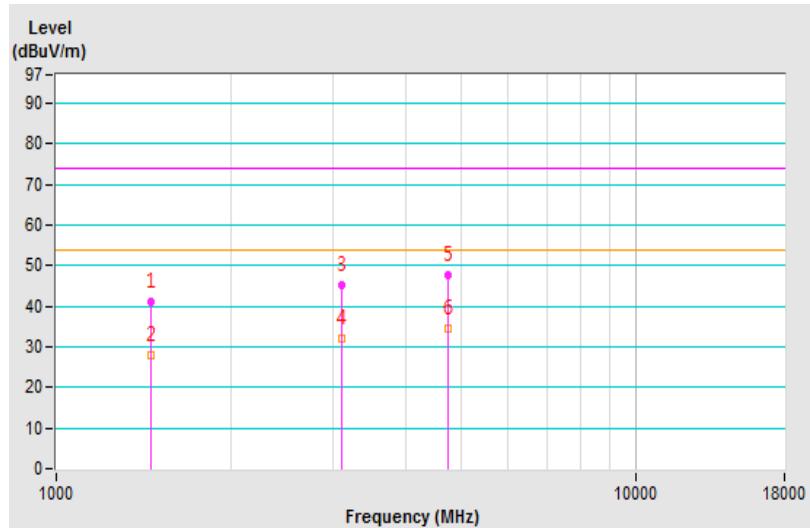
7.4 Test Results

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Pon Tsai	Environmental Conditions	20°C, 60%RH
Test Mode	Mode 1	Test Date	2018/10/2

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	1455.24	41.05 PK	74.00	-32.95	1.20 H	0	43.16	-2.11
2	1455.24	27.93 AV	54.00	-26.07	1.20 H	0	30.04	-2.11
3	3101.50	45.02 PK	74.00	-28.98	1.50 H	206	41.24	3.78
4	3101.50	31.94 AV	54.00	-22.06	1.50 H	206	28.16	3.78
5	4731.49	47.71 PK	74.00	-26.29	1.50 H	174	39.55	8.16
6	4731.49	34.36 AV	54.00	-19.64	1.50 H	174	26.20	8.16

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

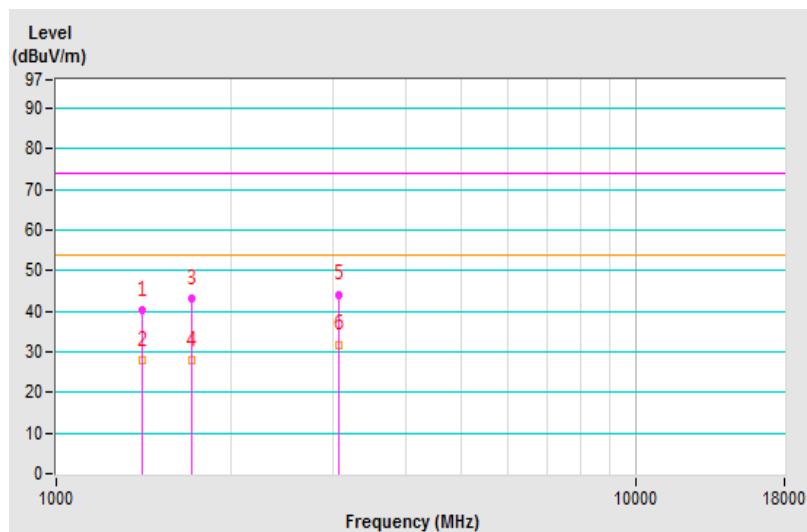


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Pon Tsai	Environmental Conditions	20°C, 60%RH
Test Mode	Mode 1	Test Date	2018/10/2

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	1408.75	40.30 PK	74.00	-33.70	1.19 V	352	42.00	-1.70
2	1408.75	27.78 AV	54.00	-26.22	1.19 V	352	29.48	-1.70
3	1716.03	43.04 PK	74.00	-30.96	1.20 V	128	44.42	-1.38
4	1716.03	27.85 AV	54.00	-26.15	1.20 V	128	29.23	-1.38
5	3071.78	44.14 PK	74.00	-29.86	1.50 V	51	40.39	3.75
6	3071.78	31.80 AV	54.00	-22.20	1.50 V	51	28.05	3.75

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



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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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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