FCC RADIO TEST REPORT

FCC ID	:	**HLZDMS1**
Equipment	:	**Interactive BIKE power trainer**
Brand Name	:	**Xplova**
Model Name	:	**NOZA S, NOZA S1**
Applicant	:	**Acer Incorporated** **8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)**
Manufacturer	:	**Xplova Inc.** **6F., No.68, Ruiguang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)**
Standard	:	**FCC Part 15 Subpart C §15.249**

The product was received on Jul. 16, 2019 and testing was started from Sep. 19, 2019 and completed on Oct. 16, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)
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FAX : 886-3-328-4978

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR971608B	01	Initial issue of report	Oct. 24, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	2.1049	20dB & 99% Occupied Bandwidth	Pass	-
3.2	15.249(a)	Field Strength of Fundamental Emissions	Pass	Max level 90.88 dBμV/m at 2457.280 MHz
3.2	15.249(a)(b)	Radiated Spurious Emission	Pass	Under limit 7.22 dB at 720.640 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 23.82 dB at 0.501 MHz
3.4	15.203	Antenna Requirement	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Ann Lee

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth and ANT+.

Product Specification subjective to this standard	
Antenna Type	Bluetooth: PCB Antenna ANT+: PCB Antenna

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH15-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.249
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part15, Subpart B/ICES-003, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode
AC Power Line Conducted Emissions	CTX
Bandwidth	CTX
Field Strength of Fundamental Emissions	CTX
Radiated Emissions	CTX

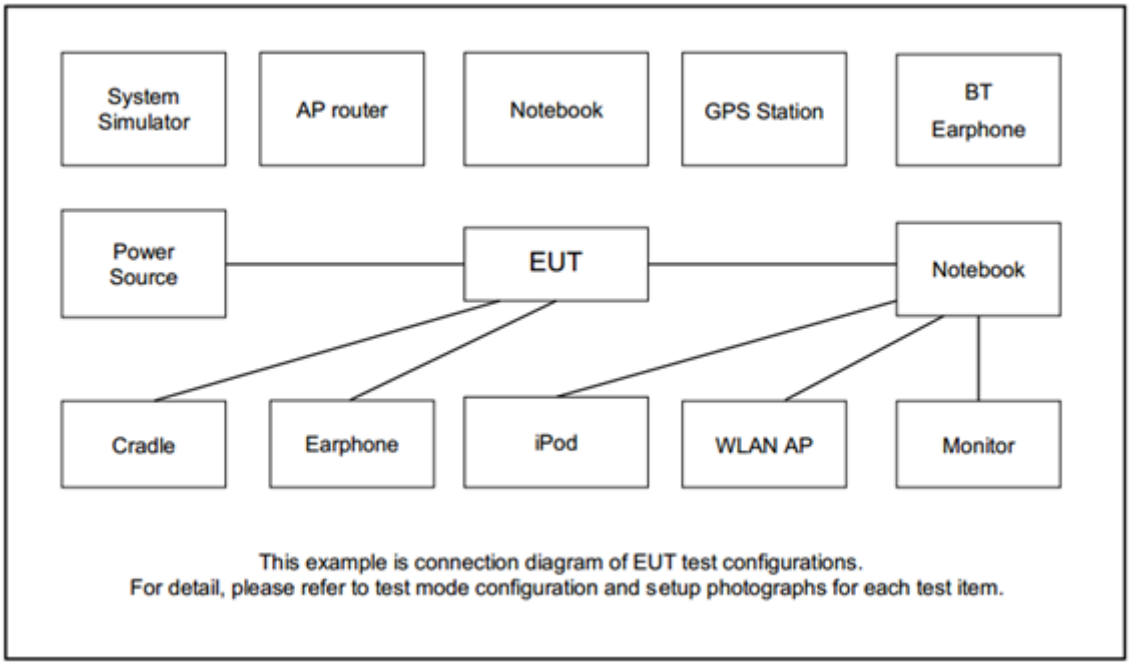
Note:

1. CTX=continuously transmitting.
2. The programmed RF utility, make the EUT get into the engineering modes to continuously transmit.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Test Cases	
AC Conducted Emission	Mode 1 : Bluetooth-LE Link + Adapter Mode 2 : Ant+ (2457MHz) Link + Adapter
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID: QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	Lenovo	L570	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

3 Test Result

3.1 20dB and 99% Bandwidth Measurement

3.1.1 Limit of 20dB and 99% Bandwidth

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band.

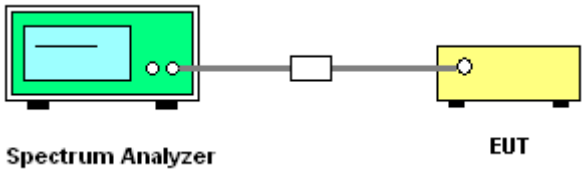
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to the spectrum analyzer.
2. Measured the spectrum width with highest power setting

3.1.4 Test Setup



3.1.5 Test Deviation

There is no deviation with the original standard.

3.1.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.1.7 Test Result of 20dB & 99% Bandwidth

Please refer to Appendix B.

3.2 Field Strength of Fundamental Emissions and Radiated Spurious Emissions

3.2.1 Limit

The field strength measured at 3 meters shall not exceed the limits in the following table:

Fundamental Frequencies(MHz)	Field Strength(millivolts/m)	
	Fundamental	Harmonics
2400~2483.5	50	500
5725~5875	50	500
24000-24250	250	2500

Measurement instrumentation employing an average detector. The provisions in Section 5.14 for limiting peak emissions apply.

Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Frequency (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

3.2.2 Measuring Instruments

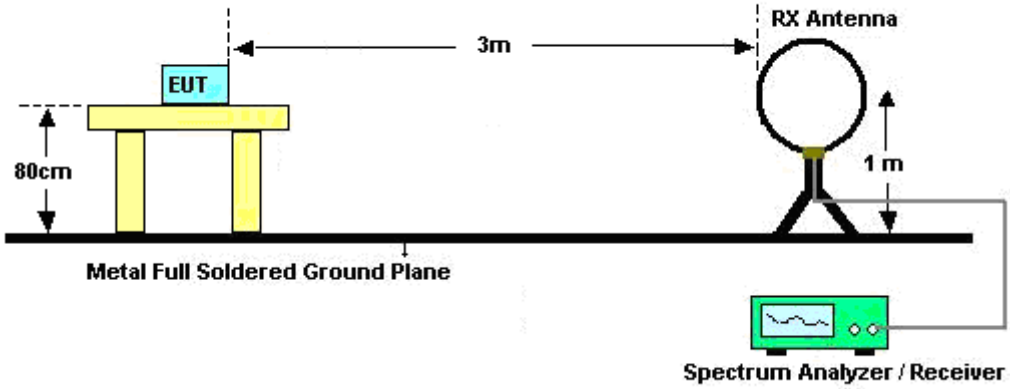
See list of measuring equipment of this test report.

3.2.3 Test Procedures

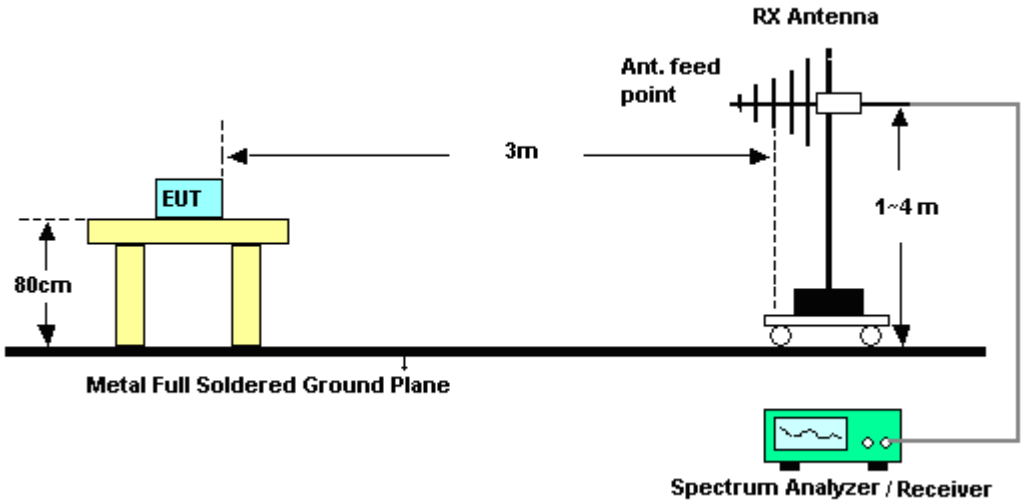
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=120 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement: VBW = 10 Hz.

3.2.4 Test Setup

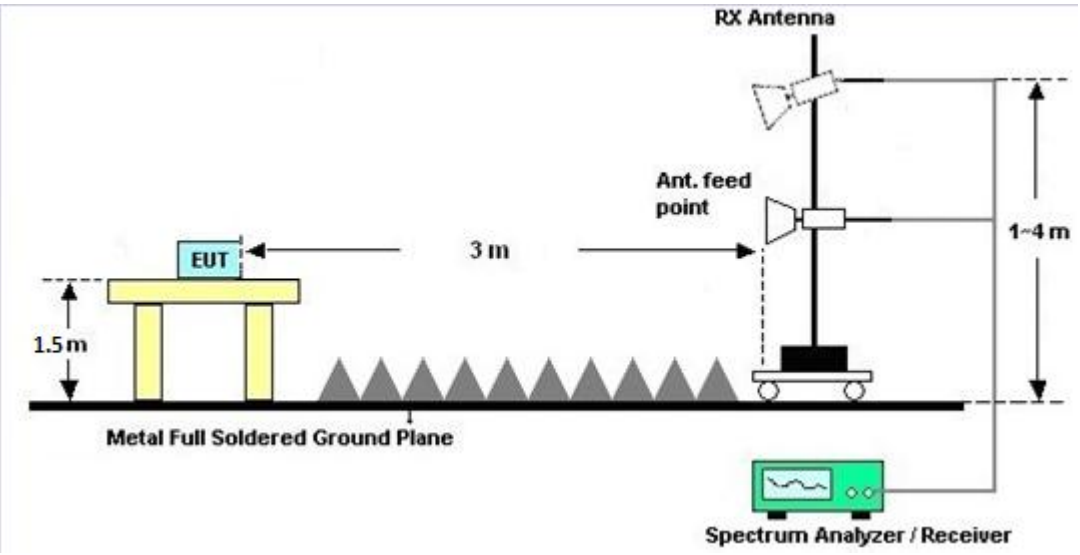
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.2.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.3 AC Conducted Emission Measurement

3.3.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

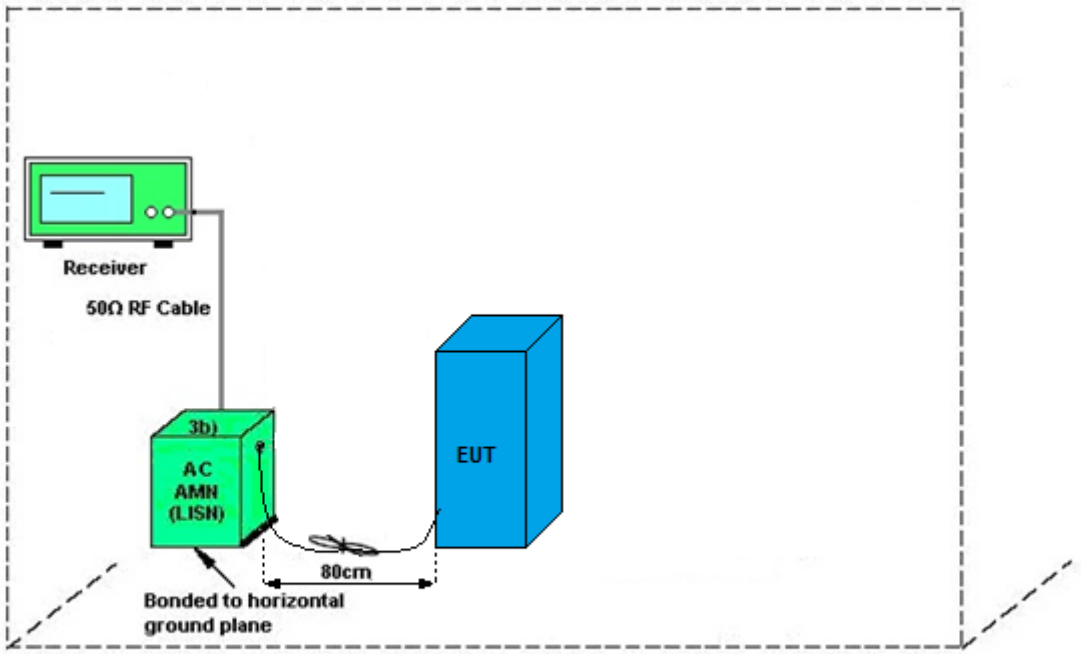
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.3.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.4 Antenna Requirements

3.4.1 Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

3.4.2 Antenna Connector Construction

Enbedded in Antenna.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	DARE	RPR3006W	13I00030SNO32	9kHz~6GHz	Dec. 03, 2018	Sep. 19, 2019~ Sep. 24, 2019	Dec. 02, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 13, 2018	Sep. 19, 2019~ Sep. 24, 2019	Nov. 12, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1208382	N/A	Mar. 27, 2019	Sep. 19, 2019~ Sep. 24, 2019	Mar. 26, 2020	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 26, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Sep. 26, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Sep. 26, 2019	Nov. 13, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Sep. 26, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Sep. 26, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Sep. 26, 2019	Dec. 30, 2019	Conduction (CO05-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Feb. 12, 2019	Oct. 03, 2019~ Oct. 16, 2019	Feb. 11, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Nov. 9, 2018	Oct. 03, 2019~ Oct. 16, 2019	Nov. 8, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	Oct. 03, 2019~ Oct. 16, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	17100018000550006	1GHz~18GHz	Jul. 09, 2019	Oct. 03, 2019~ Oct. 16, 2019	Jul. 08, 2020	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2018	Oct. 03, 2019~ Oct. 16, 2019	Aug. 22, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY54130085	20Hz ~ 8.4GHz	Nov. 01, 2018	Oct. 03, 2019~ Oct. 16, 2019	Oct. 31, 2019	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 29, 2019	Oct. 03, 2019~ Oct. 16, 2019	Apr. 28, 2020	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Oct. 03, 2019~ Oct. 16, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Oct. 03, 2019~ Oct. 16, 2019	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k5)	RK-000451	N/A	N/A	Oct. 03, 2019~ Oct. 16, 2019	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 15, 2019	Oct. 03, 2019~ Oct. 16, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4PE	30M-18G	Apr. 15, 2019	Oct. 03, 2019~ Oct. 16, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY802430/4	30M~18GHz	May 13, 2019	Oct. 03, 2019~ Oct. 16, 2019	May 12, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN4	1.53G Low Pass	Jul. 04, 2019	Oct. 03, 2019~ Oct. 16, 2019	Jul. 03, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3GHz High Pass Filter	Jul. 17, 2019	Oct. 03, 2019~ Oct. 16, 2019	Jul. 14, 2020	Radiation (03CH15-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.2**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.5**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

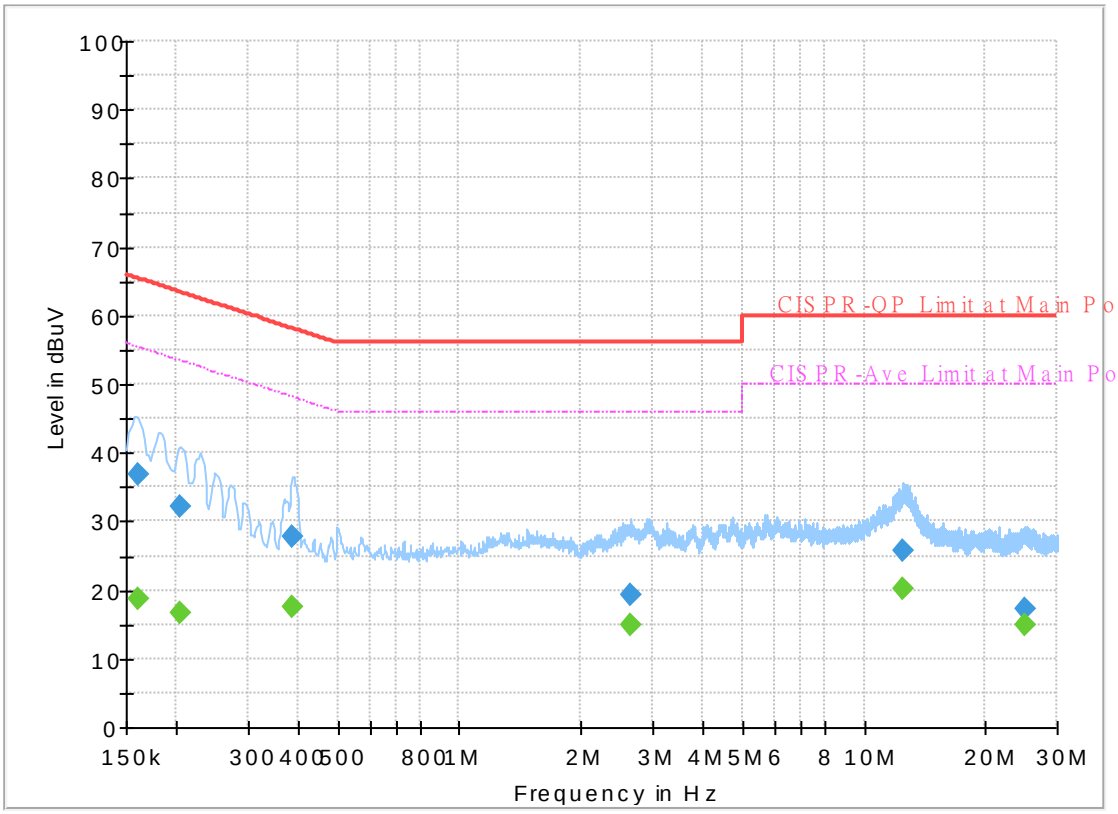
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	49~52%

EUT Information

Report NO :	971608
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



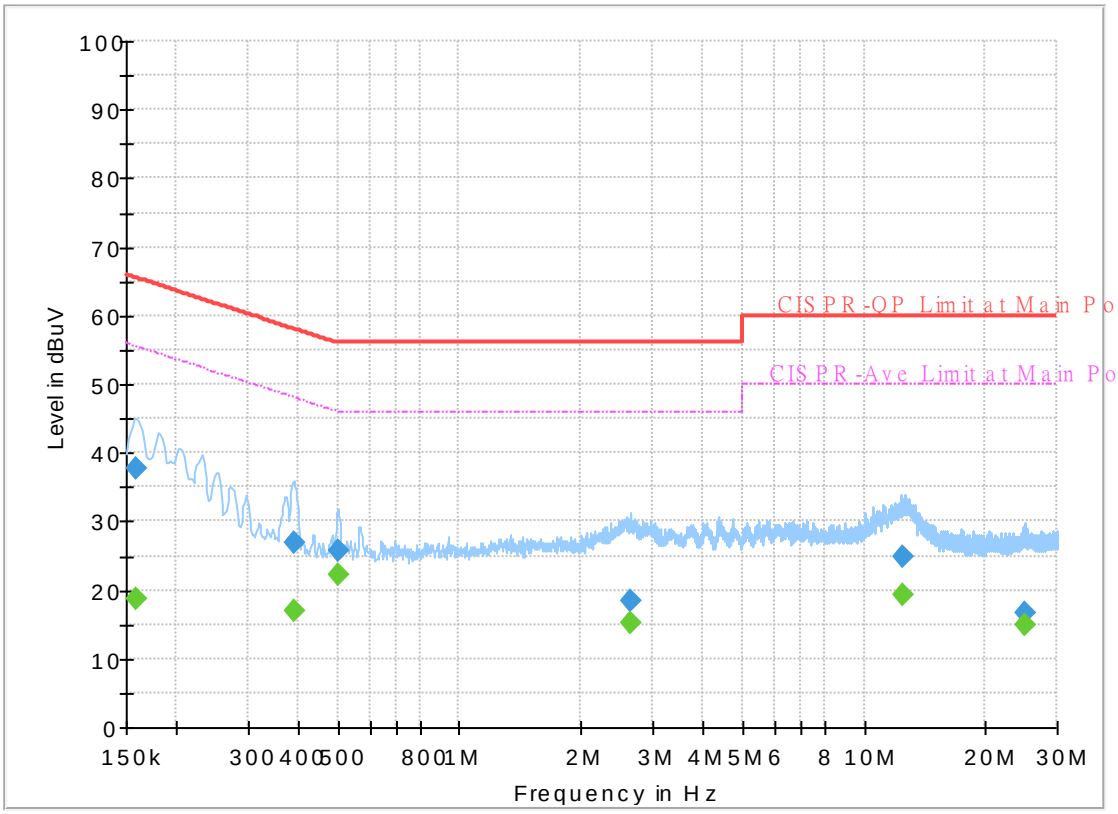
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	18.69	55.40	36.71	L1	OFF	19.4
0.161250	36.95	---	65.40	28.45	L1	OFF	19.4
0.204000	---	16.75	53.45	36.70	L1	OFF	19.4
0.204000	32.03	---	63.45	31.42	L1	OFF	19.4
0.386250	---	17.45	48.14	30.69	L1	OFF	19.4
0.386250	27.84	---	58.14	30.30	L1	OFF	19.4
2.654250	---	14.94	46.00	31.06	L1	OFF	19.5
2.654250	19.20	---	56.00	36.80	L1	OFF	19.5
12.439500	---	20.12	50.00	29.88	L1	OFF	19.6
12.439500	25.71	---	60.00	34.29	L1	OFF	19.6
25.046250	---	14.84	50.00	35.16	L1	OFF	19.7
25.046250	17.19	---	60.00	42.81	L1	OFF	19.7

EUT Information

Report NO :	971608
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



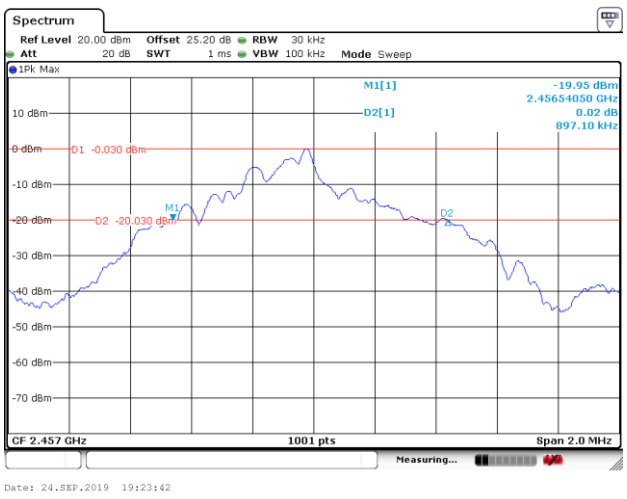
Final_Result

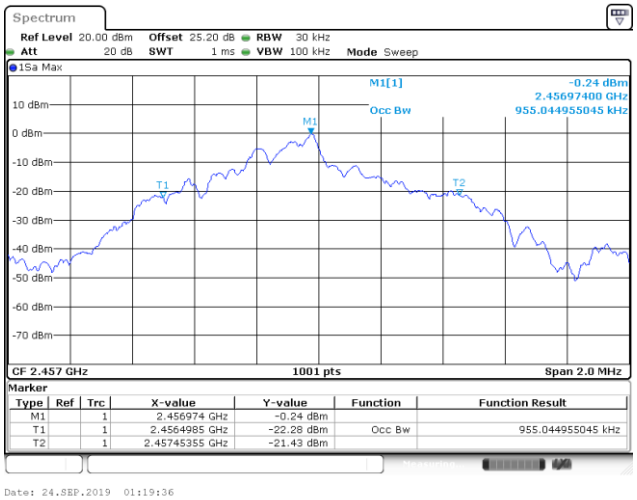
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	18.75	55.52	36.77	N	OFF	19.4
0.159000	37.78	---	65.52	27.74	N	OFF	19.4
0.390750	---	16.92	48.05	31.13	N	OFF	19.4
0.390750	27.01	---	58.05	31.04	N	OFF	19.4
0.501000	---	22.18	46.00	23.82	N	OFF	19.5
0.501000	25.81	---	56.00	30.19	N	OFF	19.5
2.649750	---	15.24	46.00	30.76	N	OFF	19.5
2.649750	18.35	---	56.00	37.65	N	OFF	19.5
12.509250	---	19.34	50.00	30.66	N	OFF	19.7
12.509250	24.92	---	60.00	35.08	N	OFF	19.7
24.920250	---	14.95	50.00	35.05	N	OFF	19.9
24.920250	16.73	---	60.00	43.27	N	OFF	19.9

Appendix B. Conducted Test Result

B1. Test Result of 20dB Spectrum Bandwidth

Test Site No.	TH05-HY	Temperature	21~25℃
Test Engineer	Derek Hsu	Humidity	51~54%





20dB Bandwidth (kHz)	897.10	99% OccupiedBW(kHz)	955.04

Appendix C. Radiated Spurious Emission

Test Engineer :	Leo Liao, Karl Hou and Bigshow Wang	Temperature :	23~26℃
		Relative Humidity :	50~65%

2.4GHz 2400~2483.5MHz

ANT+ (Band Edge @ 3m)

ANT+	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
ANT+ 2457MHz		2399.56	56.15	-17.85	74	43.52	27.6	16.17	31.14	233	79	P	H
	*	2457.28	90.88	-23.12	114	78.23	27.53	16.23	31.11	233	79	P	H
		2495.32	55.41	-18.59	74	42.83	27.4	16.27	31.09	233	79	P	H
		2398	44.89	-9.11	54	32.26	27.6	16.17	31.14	233	79	A	H
	*	2457	85.34	-8.66	94	72.69	27.53	16.23	31.11	233	79	A	H
		2484.76	44.81	-9.19	54	32.19	27.47	16.25	31.1	233	79	A	H
		2391.64	54.93	-19.07	74	42.31	27.6	16.16	31.14	170	115	P	V
	*	2457	85.83	-28.17	114	73.18	27.53	16.23	31.11	170	115	P	V
		2492.68	54.34	-19.66	74	41.77	27.4	16.26	31.09	170	115	P	V
		2395.6	44.8	-9.2	54	32.18	27.6	16.16	31.14	170	115	A	V
	*	2457	80.22	-13.78	94	67.57	27.53	16.23	31.11	170	115	A	V
		2484.88	44.71	-9.29	54	32.09	27.47	16.25	31.1	170	115	A	V

2.4GHz 2400~2483.5MHz

ANT+ (Harmonic @ 3m)

ANT+	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
ANT+ 2457MHz		4914	41.23	-32.77	74	58.44	31.33	9.59	58.13	100	0	P	H
		7371	44.3	-29.7	74	53.65	36.4	11.67	57.42	100	0	P	H
		4914	46.93	-27.07	74	64.14	31.33	9.59	58.13	100	0	P	V
		7371	43.72	-30.28	74	53.07	36.4	11.67	57.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

ANT+ (LF)

ANT+	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
ANT+ 2457MHz LF		42.61	26.22	-13.78	40	39.54	18.43	0.85	32.6	-	-	P	H
		177.44	23.38	-20.12	43.5	38.81	15.16	1.9	32.49	-	-	P	H
		345.25	21.02	-24.98	46	30.86	20.3	2.4	32.54	-	-	P	H
		478.14	24.94	-21.06	46	31.15	23.56	2.8	32.57	-	-	P	H
		562.53	26.8	-19.2	46	29.88	26.35	3.16	32.59	-	-	P	H
		720.64	38.78	-7.22	46	40.44	27.23	3.47	32.36	100	0	P	H
								0					H
								0					H
								0					H
								0					H
								0					H
								0					H
		42.61	32.02	-7.98	40	45.34	18.43	0.85	32.6	-	-	P	V
		85.29	22.83	-17.17	40	39.96	14.13	1.27	32.53	-	-	P	V
		123.12	28.31	-15.19	43.5	41.76	17.6	1.46	32.51	-	-	P	V
		195.87	19.49	-24.01	43.5	35.16	14.89	1.93	32.49	-	-	P	V
		287.05	19.35	-26.65	46	30.6	19.04	2.24	32.53	-	-	P	V
		731.31	36.21	-9.79	46	37.31	27.75	3.49	32.34	100	0	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

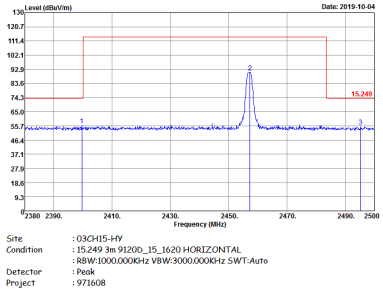
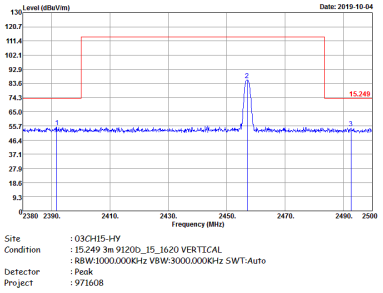
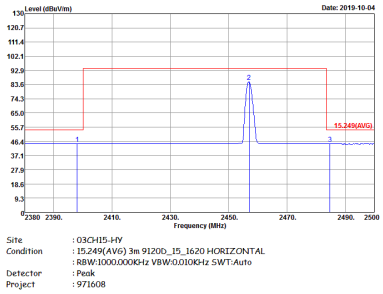
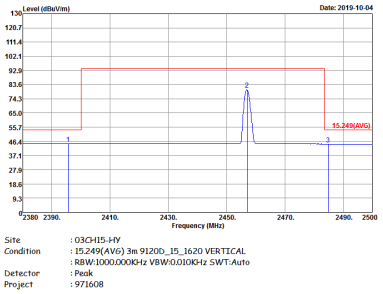
Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Leo Liao, Karl Hou and Bigshow Wang	**Temperature :**	23~26℃
		Relative Humidity :	50~65%

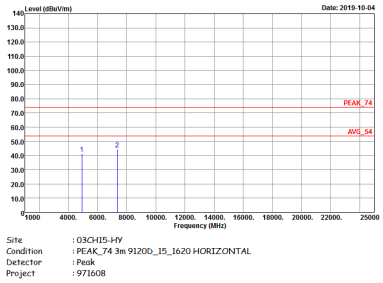
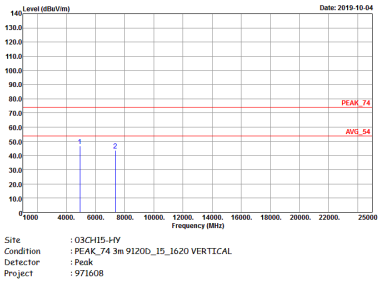
2.4GHz 2400~2483.5MHz

ANT+ (Fundamental and Band Edge @ 3m)

ANT+	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ANT 2457MHz	
	Horizontal	**Vertical**
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

ANT+ (Harmonic @ 3m)

ANT+	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	ANT+ 2457MHz	
	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz ANT+ (LF)

ANT+	2.4GHz 2400~2483.5MHz	
	ANT+ 2457MHz	
	Horizontal	Vertical
QP / Peak