

FCC Test Report

Product Name	ASUS All-in-One PC/Zen AiO
Model No.	Z272S,Z272SDK,Z272SDT,Z272SD
FCC ID.	MSQ-Z272S

Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt	Apr. 11, 2018
Issued Date	Aug. 02, 2018
Report No.	1860370R-RFUSP20V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Test Report

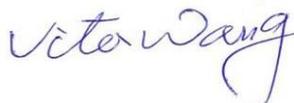
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Product Name	ASUS All-in-One PC/Zen AiO
Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	Z272S,Z272SDK,Z272SDT,Z272SD
FCC ID.	MSQ-Z272S
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



(Adm. Assistant / Vita Wang)

Tested By :



(Engineer / Anson lu)

Approved By :



(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	ASUS All-in-One PC/Zen AiO
Trade Name	ASUS
Model No.	Z272S,Z272SDK,Z272SDT,Z272SD
FCC ID.	MSQ-Z272S
Frequency Range	110-145kHz
Type of Modulation	ASK Modulation
Type of antenna	Coil Antenna
Power Adapter	MFR: ASUS, M/N: ADP-180MB-F Input: AC 100-240V~ 50-60Hz 2.34A Output: DC 19.5V, 9.23A Cable Out: Non-shielded, 1.50m

Frequency of Channel:

Channel	Frequency
Channel 1:	142KHz

Note:

1. The EUT is an ASUS All-in-One PC/Zen AiO with a built-in 110-145kHz transceiver.
2. The EUT is including four models for different marketing requirement.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.209
4. Only the higher Fundamental Radiated Emission channel was tested and recorded in this report.

Test Mode	Mode 1: Transmit
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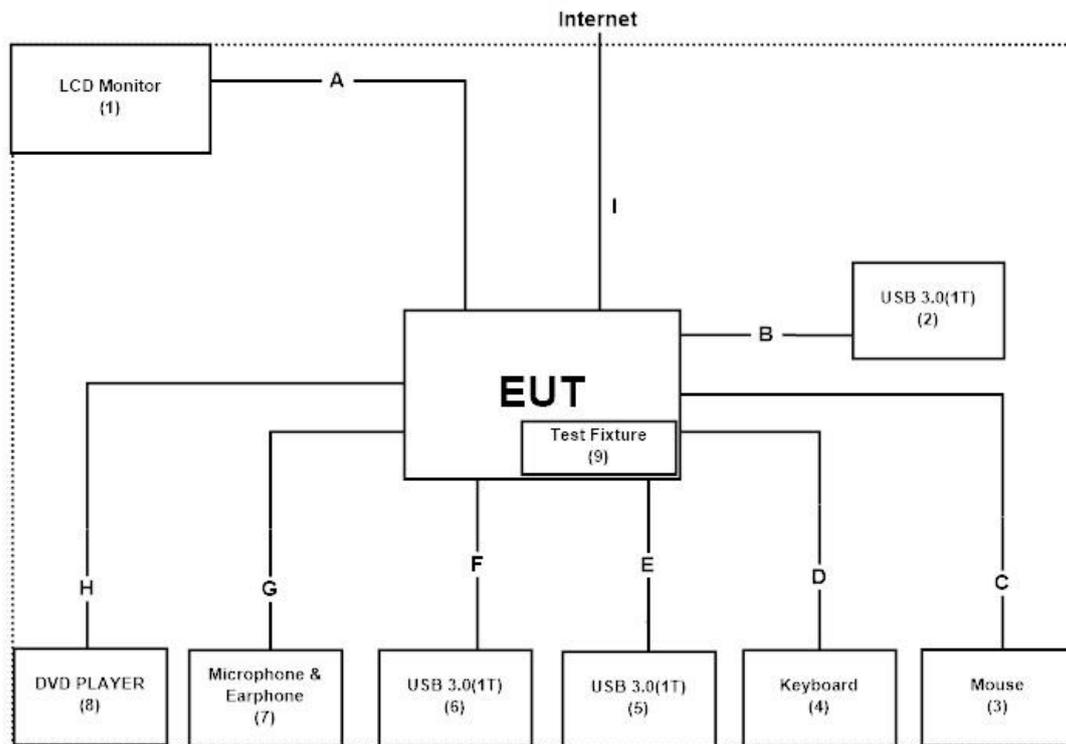
1.3. Test System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 LCD Monitor	ASUS	VS229HA	F4LMQS135395	Non-Shielded, 1.8m
2 USB 3.0(1T)	Transcend	TS1TSJ25M3	C13890-3746	Non-Shielded, 0.4m
3 Mouse	COMPAQ	M-S69	44J5	Non-Shielded, 1.8m
4 Keyboard	DELL	SK-8115	MY-0DJ325-71619-79D-0178	Non-Shielded, 1.8m
5 USB 3.0(1T)	Transcend	TS1TSJ25M3	C13890-3746	Non-Shielded, 0.4m
6 USB 3.0(1T)	Transcend	TS1TSJ25M3	C13890-3746	Non-Shielded, 0.4m
7 Microphone & Earphone	Ergotech	ET-E201	N/A	Non-Shielded, 1.65m
8 DVD PLAYER	Pioneer	DV-600AV	GJKD006378LS	Non-Shielded, 1.8m
9 Test Fixture	N/A	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A HDMI Cable	Non-shielded, 1.80m
B USB Cable	Non-shielded, 0.40m
C USB Cable	Non-shielded, 1.80m
D USB Cable	Non-shielded, 0.40m
E USB Cable	Non-shielded, 0.40m
F USB Cable	Non-shielded, 0.40m
G Signal Cable	Non-shielded, 1.65m
H HDMI Cable	Non-shielded, 1.80m
I Network Cable	Non-shielded, 1.65m

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Turn on the power of all equipment.
- (3) Start the continuous transmitter.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

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Accredited Number: 3023

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FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2018/02/12	2019/02/11
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2017/10/13	2018/10/12
	Peak Power Analyzer	Keysight	8990B	MY51000410	2018/08/01	2019/07/31
	Wideband Power Sensor	Keysight	N1923A	MY56080003	2018/07/25	2019/07/24
	Wideband Power Sensor	Keysight	N1923A	MY56080004	2018/07/25	2019/07/24
X	EMI Test Receiver	R&S	ESCS 30	100369	2017/11/07	2018/11/06
X	LISN	R&S	ESH3-Z5	836679/017	2018/02/09	2019/02/08
X	LISN	R&S	ENV216	100097	2018/02/09	2019/02/08
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2018/06/21	2019/06/20

For Radiated measurements /Site3/CB8

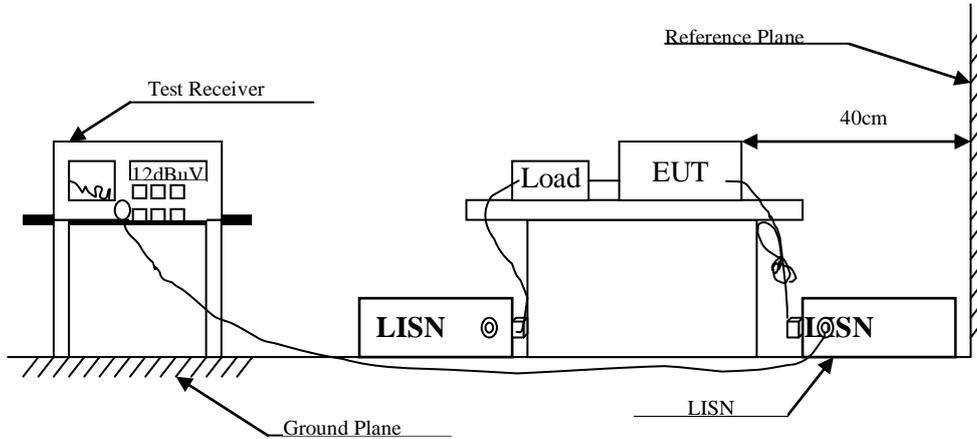
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2018/03/12	2019/03/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2018/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2018/06/24	2019/06/23
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2018/06/14	2019/06/13
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	170101000330 010	2018/06/14	2019/06/13
	Horn Antenna	ETS-Lindgren	3117	00135205	2018/05/03	2019/05/02
	Horn Antenna	SCHWARZBECK	9120D	576	2017/12/07	2018/12/06
	Pre-Amplifier	EMCI	EMC012630SE	980210	2018/04/10	2019/04/09
	Horn Antenna	Com-Power	AH-840	101043	2018/01/09	2019/01/08
	Amplifier + Cable	EMCI	EMC184045SE	980370	2018/03/21	2019/03/20
	Filter	MicroTRON	BRM50701	019	2017/11/21	2018/11/20
	Filter	Microwave Circuits	N0257881	36681	2018/01/22	2019/01/21

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version :Quietek EMI 2.0 V2.1.113.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 ^(註)	56-46 ^(註)
0.50-5.0	56	46
5.0 - 30	60	50

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : ASUS All-in-One PC/Zen AiO
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit
 Test Date : 2018/04/13

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.220	9.673	34.380	44.053	-19.947	64.000
0.341	9.681	36.400	46.081	-14.462	60.543
0.400	9.685	32.900	42.585	-16.272	58.857
0.576	9.696	32.640	42.336	-13.664	56.000
0.775	9.719	29.100	38.819	-17.181	56.000
3.517	9.860	29.970	39.829	-16.171	56.000
Average					
0.220	9.673	26.280	35.953	-18.047	54.000
0.341	9.681	26.020	35.701	-14.842	50.543
0.400	9.685	17.090	26.775	-22.082	48.857
0.576	9.696	21.110	30.806	-15.194	46.000
0.775	9.719	18.650	28.369	-17.631	46.000
3.517	9.860	14.230	24.089	-21.911	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : ASUS All-in-One PC/Zen AiO
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmit
 Test Date : 2018/04/13

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 2					
Quasi-Peak					
0.205	9.672	27.690	37.362	-27.067	64.429
0.232	9.674	31.000	40.674	-22.983	63.657
0.341	9.671	31.430	41.101	-19.442	60.543
0.892	9.716	28.250	37.966	-18.034	56.000
1.697	9.777	29.000	38.777	-17.223	56.000
3.502	9.849	29.440	39.289	-16.711	56.000
Average					
0.205	9.672	13.820	23.492	-30.937	54.429
0.232	9.674	20.440	30.114	-23.543	53.657
0.341	9.671	21.350	31.021	-19.522	50.543
0.892	9.716	20.050	29.766	-16.234	46.000
1.697	9.777	15.690	25.467	-20.533	46.000
3.502	9.849	12.340	22.189	-23.811	46.000

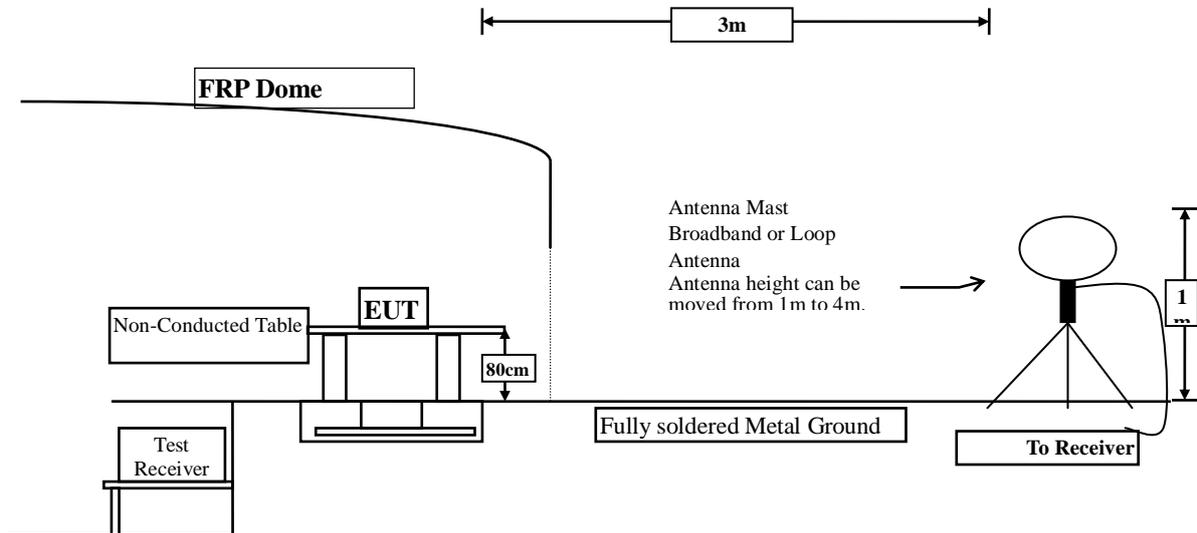
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

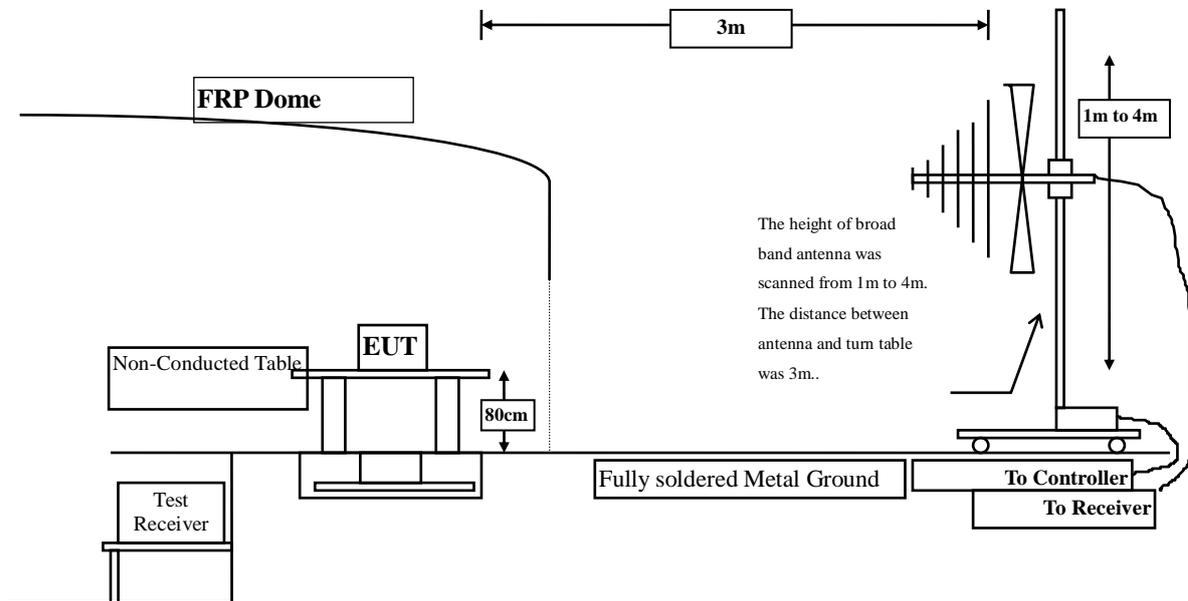
3. Radiated Emission

3.1. Test Setup

Under 30MHz Test Setup



Radiated Emission Below 1GHz



3.2. Limits

FCC Part 15 Subpart B Paragraph 15.209 Limits		
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400/F(kHz)	300
0.490– 1.705	24,000/F(kHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.209 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz. Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

3.5. Test Result of Radiated Emission

Product : ASUS All-in-One PC/Zen AiO
 Test Item : Fundamental Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/11
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
0.142	19.726	56.900	76.626	-27.932	104.558
Vertical					
0.142	19.726	43.100	62.826	-41.732	104.558

Note:

1. Limit=24.558 dBuV/300m + 40*Log (300(m)/3(m))= 104.558dBuV/3m (Quasi-Peak).
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. Measurement Level = Reading Level + Correct Factor.

Product : ASUS All-in-One PC/Zen AiO
 Test Item : Fundamental Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/07/28
 Test Mode : Mode 1: Transmit (9k-30M)

9kHz~30MHz

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
0.284	19.690	34.500	54.190	-54.480	108.670
0.426	19.680	32.200	51.880	-46.540	98.420
0.568	19.680	25.400	45.080	-28.025	73.105
0.710	19.680	21.200	40.880	-30.959	71.839
0.852	19.680	19.500	39.180	-31.393	70.573
0.994	19.670	20.900	40.570	-28.738	69.308
1.136	19.680	15.200	34.880	-33.162	68.042
1.278	19.680	11.200	30.880	-35.896	66.776
1.420	19.690	7.700	27.390	-38.120	65.510
Vertical					
0.284	19.690	21.100	40.790	-67.880	108.670
0.426	19.680	21.100	40.780	-57.640	98.420
0.568	19.680	16.200	35.880	-37.225	73.105
0.710	19.680	14.700	34.380	-37.459	71.839
0.852	19.680	9.100	28.780	-41.793	70.573
0.994	19.670	13.800	33.470	-35.838	69.308
1.136	19.680	8.600	28.280	-39.762	68.042
1.278	19.680	8.500	28.180	-38.596	66.776
1.420	19.690	6.700	26.390	-39.120	65.510

Note:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement Level = Reading Level + Correct Factor.
3. "█" means the worst emission level.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : ASUS All-in-One PC/Zen AiO
 Test Item : Fundamental Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/11
 Test Mode : Mode 1: Transmit (30M-1G)

9kHz~30MHz

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
97.900	16.812	16.017	32.829	-10.671	43.500
227.880	13.351	21.520	34.871	-11.129	46.000
454.860	22.021	15.640	37.661	-8.339	46.000
530.520	23.734	17.664	41.398	-4.602	46.000
741.980	26.199	11.201	37.400	-8.600	46.000
910.760	26.920	11.634	38.554	-7.446	46.000
Vertical					
95.960	16.554	19.883	36.437	-7.063	43.500
227.880	20.321	16.513	36.834	-9.166	46.000
350.100	17.364	23.046	40.410	-5.590	46.000
530.520	21.844	20.265	42.109	-3.891	46.000
741.980	24.429	15.897	40.326	-5.674	46.000
910.760	28.020	9.906	37.926	-8.074	46.000

Note:

- All Readings below 1GHz are Quasi-Peak.
- Measurement Level = Reading Level + Correct Factor.
- “ ” means the worst emission level.
- The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.