FCC TEST REPORT

Test report No:	EMC- FCC- R0048
FCC ID:	**ZFVAGW-300**
Type of equipment:	USN GATEWAY
Model Name:	AGW-300
Variant Model:	AGW-300R
Applicant:	ARTSYSTEM Co.,Ltd.
FCC Rule Part(s):	FCC Part 15 Subpart C Section 15.203, Section 15.209 Section 15.207, Section 15.249
Frequency Range:	2405 MHz ~ 2480 MHz
Test result:	**Complied**

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: May 11, 2011 ~ May 19 , 2011

Issued date: May 20, 2011

Tested by: KIM, CHANG MIN

Approved by: YOO, SUNG YOUNG.

82-1 Jeil-ri, Yangji-myun, Churingu, Yongin-city, Kyungki-do,Korea 449-825,
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1. Client information

Applicant:	ARTSYSTEM Co., Ltd.
Address:	501 IT Bldg., 573-13, Bokhyeon-dong, Buk-gu, Daegu-City, 702-832, Korea
Telephone number:	+82-53-958-6615
Facsimile number :	+82-53-958-6616
Contact person:	Hyunjun Cho/ hjcho@artsystem.co.kr

Manufacturer:	ARTSYSTEM Co., Ltd.
Address :	501 IT Bldg., 573-13, Bokhyeon-dong, Buk-gu, Daegu-City, 702-832, Korea

2. Laboratory information

Address
EMC Compliance Ltd.
82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGGI-DO,
KOREA 449-825
Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

Certificate
CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: KR0040
VCCI Registration No.: C-1713, R-1606, T-258

SITE MAP

3. Description of E.U.T.

3.1 Basic description

Applicant :	ARTSYSTEM Co.,Ltd.
Address of Applicant:	501 IT Bldg., 573-13, Bokhyeon-dong, Buk-gu, Daegu-City, 702-832, Korea
Manufacturer:	ARTSYSTEM Co.,Ltd.
Address of Manufacturer:	501 IT Bldg., 573-13, Bokhyeon-dong, Buk-gu, Daegu-City, 702-832, Korea
Type of equipment:	USN GATEWAY
Basic Model:	AGW-300
Variant	AGW-300R
Serial number:	Proto Type

3.2 General description

Frequency Range	2405 MHz ~ 2480 MHz
Type of Modulation	OQPSK
Number of Channels	16 channels (channel spacing: 5 MHz)
Type of Antenna	Helical Antenna
Antenna Gain	2.85 dBi
Transmit Power	Under 6 dBm (declared by the applicant)
Interface	LAN (Ethernat 10M/100M bps (1 port)
Update interface	24pin mobile connector
Power supply	DC 12 V
Working Current	Max. 900 mA (In recharging) Normally 340 mA
Case (Material)	Poly Carbonate
Dimension	150 x 107 x 36.5 (mm)

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3.3 Test frequency

	Frequency
Low frequency	**2405 MHz**
Middle frequency	**2440 MHz**
High frequency	**2480 MHz**

3.4 Test Voltage

mode	Voltage
Norminal voltage	**DC 12 V**

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4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Report Section	Test Result
15.203, 15.247(b)(4)	**Antenna Requirement**	**5.1**	**C**
15.249(a), (c), (d) 15.209(a)	**Spurious Emission, Band Edge, and Restricted bands**	**5.7**	**C**
15.207(a)	**Conducted Emissions**	**5.9**	**NA***

Note: C=complies
NC= Not complies
NT=Not tested
NA=Not Applicable

*The test is not applicable since the EUT is not the device that is designed to be connected to the public utility(AC) power line.

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = KUc (K = 2)
Conducted RF power	± 1.106 dB	± 3.120 dB
Radiated disturbance	+2.280dB / - 2.278 dB	+4.560dB / - 4.556 dB
Conducted disturbance	+1.883 dB / - 1.676 dB	+3.766dB / - 3.352 dB

5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

According to §15.203, 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 a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.1.2 Result

-Complied

The transmitter has an helical antenna. The directional gain of the antenna is 2.85 dBi.

5.2 SPURIOUS EMISSION, BAND EDGE, AND RESTRICTED BANDS

5.2.1 Regulation

According to §15.249(a), Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of Fundamental (millivolt/meter)	Field strength of Harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

According to §15.249(c), Field strength limits are specified at a distance of 3 meters.

According to §15.249(d), 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 in Section 15.209, whichever is the lesser attenuation.

According to §15.209(a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

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According to §15.209(a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength of Fundamental (millivolt/meter)	Field strength of Harmonics (microvolts/meter)
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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.,sections 15.231 and 15.241.

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5.2.2 Measurement Procedure

1) Spurious Radiated Emissions:

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 30 to 1000 MHz using the TRILOG broadband antenna, and from 1000 MHz to 18000 MHz using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 × 4 meter at the Open Area Test Site. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

5.2.3 Test Result

-complied

1. Band edge compliance of RF Radiated Emissions was shown in figure 1.
2. Measured value of the Field strength of spurious Emissions (Radiated)

5.2.3.1 Test Result

- **Low channel (2405 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz							
60.319	120	V	44.9	-16.8	28.1	40.0	11.9
303.775	120	H	48.3	-13.9	34.4	46.0	11.6
658.181	120	H	33.0	-5.9	27.1	46.0	18.9
708.799	120	H	44.8	-5.3	39.5	46.0	6.5
Peak DATA. Emissions above 1GHz							
2405.00	1000	V	94.6	-2.0	92.6	114.0	21.4
4810.00	1000	V	54.2	6.0	60.2	74.0	13.8
Average DATA. Emissions above 1GHz							
2405.00	1000	V	92.2	-2.0	90.2	94.0	3.8
4810.00	1000	V	42.3	6.0	48.3	54.0	5.7

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- **Middle channel (2440 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz							
61.951	120	V	41.4	-17.0	24.4	40.0	15.6
303.771	120	H	48.6	-13.9	34.7	46.0	11.3
708.797	120	H	48.2	-5.3	42.9	46.0	3.1
735.055	120	H	40.9	-4.9	36.0	46.0	10.0
748.063	120	H	39.1	-4.5	34.6	46.0	11.4
911.324	120	H	40.9	-1.8	39.1	46.0	6.9
Peak DATA. Emissions above 1GHz							
2440.00	1000	V	94.0	-1.9	92.1	114.0	21.9
4880.00	1000	V	51.2	6.4	57.6	74.0	16.4
Average DATA. Emissions above 1GHz							
2440.00	1000	V	91.3	-1.9	89.4	94.0	4.6
4880.00	1000	V	41.9	6.4	48.3	54.0	5.7

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- **High channel (2480 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz							
61.834	120	V	40.7	-17.0	23.7	40.0	16.3
303.776	120	H	48.4	-13.9	34.5	46.0	11.5
708.806	120	H	48.2	-5.3	42.9	46.0	3.1
783.694	120	H	40.5	-4.0	36.5	46.0	9.5
Peak DATA. Emissions above 1GHz							
1025.50	1000	H	58.8	-9.0	49.8	74.0	24.2
2480.00	1000	V	91.9	-1.7	90.2	114.0	23.8
4960.00	1000	V	51.9	6.8	58.7	74.0	15.3
Average DATA. Emissions above 1GHz							
1025.50	1000	H	40.2	-9.0	31.2	54.0	22.8
2480.00	1000	V	90.2	-1.7	88.5	94.0	5.5
4960.00	1000	V	42.9	6.8	49.7	54.0	4.3

Factor(dB) = ANT Factor+ Amp Gain + Cable Loss
Margin (dB) = Limit - Result
[Result = Reading – Factor]
1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss
* The spurious emission at the frequency does not fall in the restricted bands.
** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.
NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

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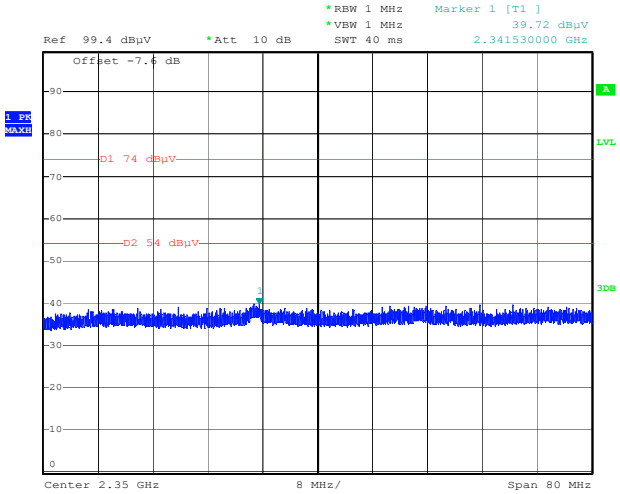
5.2.4 Test Plot

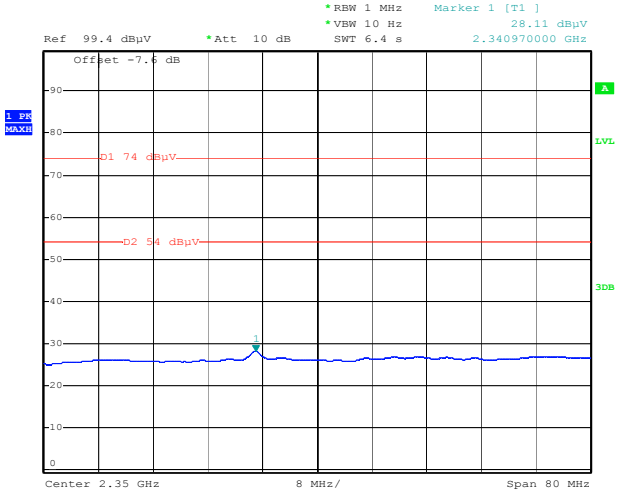
Figure 1. Plot of the Band Edge (Radiated)

- Worst case pol: Vertical

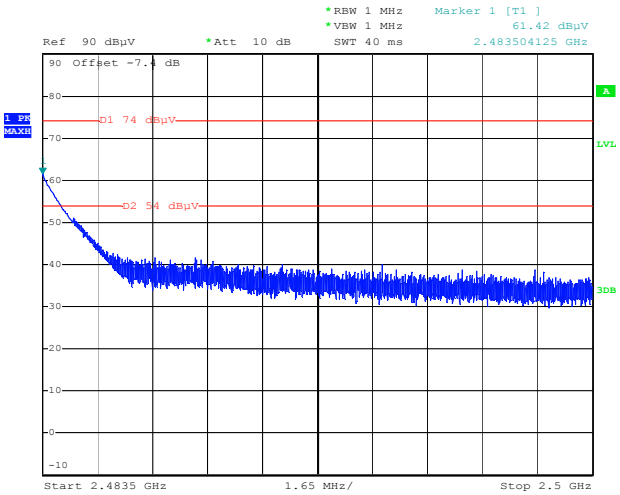
Lowest Channel(2405 MHz): PEAK



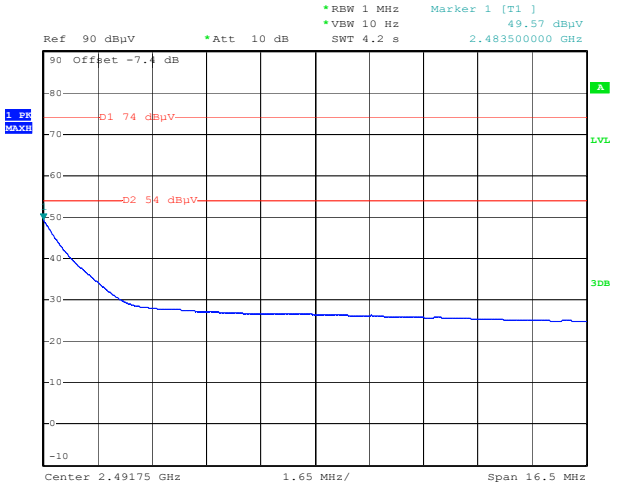
Lowest Channel(2405 MHz): AVERAGE



Highest Channel(2480 MHz): PEAK



Highest Channel(2480 MHz): AVERAGE



5.3 Conducted Emission (N/A)

5.3.1 Regulation

According to §15.207(a), for an intentional radiator 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, as measured using a 50μH/50Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.9.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
□	Temp & humidity chamber	taekwang	TK-04	TK001	11.12.11
□	Temp & humidity chamber	taekwang	TK-500	TK002	11.09.07
□	Power Meter	Agilent	E4416A	GB41292365	11.11.01
□	Frequency Counter	HP	5351B	3049A01295	11.11.01
■	Spectrum Analyzer	Agilent	E4407B	US39010142	11.11.01
■	Spectrum Analyzer	R & S	FSP40	100209	11.11.01
■	Signal Generator	HP	E4432B	GB39340611	11.11.01
□	Modulation Analyzer	HP	8901B	3538A05527	10.11.01
□	Audio Analyzer	HP	8903B	3729A19213	11.11.04
□	AC Power Supply	KIKUSUI	PCR2000W	GB001619	11.11.01
□	DC Power Supply	Tektronix	PS2520G	TW50517	12.02.18
■	DC Power Supply	Tektronix	PS2521G	TW53135	11.11.01
□	Dummy Load	BIRD	8141	7560	-
□	Dummy Load	BIRD	8401-025	799	-
■	EMI Test Receiver	R&S	ESCI	100001	11.08.17
□	Attenuator	HP	8494A	2631A09825	11.11.03
□	Attenuator	HP	8496A	3308A16640	11.11.03
□	Attenuator	R&S	RBS1000	D67079	11.11.03
□	Power sensor	Agilent	E9321A	US40390422	11.11.08
□	Power sensor	Agilent	E9325A	US40420186	11.11.08
□	LOOP Antenna	EMCO	EMCO6502	9205-2745	11.05.22
■	BILOG Antenna	Schwarzbeck	VULB 9168	375	11.11.30
■	HORN Antenna	ETS	3115	00062589	11.12.22
■	HORN Antenna	ETS	3116	00086632	11.12.17
□	Power Divider	HP	11636A	05441	11.08.25
■	Signal Generator	HP	E4432B	GB39340611	11.11.01
□	Power Divider	Weinschel	1580-1	NX375	11.09.27
□	Power Divider	Weinschel	1580-1	NX380	11.08.25
□	Power Divider	Weinschel	1594	671	11.09.02
□	Test Receiver	R&S	ESHS30	844827/011	11.08.16
□	LISN	R&S	ESH3-Z5	846125/024	11.08.04
□	LISN	PMM	L3-32	0120J20305	-

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