

# FCC NFC REPORT

## FCC Certification

**Applicant Name:**  
KAONMEDIA Co., Ltd.

**Address:**  
KAONMEDIA Building, 884-3, Seongnam-daero,  
Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea

**Date of Issue:**  
April 24, 2018

**Test Site/Location:**  
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-  
myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

**Report No.:** HCT-RF-1804-FC054

**FCC ID:**                      **WQTVM3000G**

**APPLICANT:**              **KAONMEDIA Co., Ltd.**

**Model:** VM3000G  
**EUT Type:** Layer3 TV  
**RF Output Field Strength:** 8.84 dBuV/m @30 m  
**Frequency of Operation:** 13.5599 MHz  
**Modulation type:** ASK  
**FCC Classification:** Low Power Communication Device – Transmitter  
**FCC Rule Part(s):** FCC Part 15.225 Subpart C

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)



**Report prepared by : Se Wook Park**  
**Engineer of Telecommunication testing center**



**Approved by : Jong Seok Lee**  
**Manager of Telecommunication testing center**

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## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1804-FC054	April 24, 2018	- First Approval Report

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## 1. GENERAL INFORMATION

**Applicant:** KAONMEDIA Co., Ltd.  
**Address:** KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si,  
Gyeonggi-do, South Korea  
**FCC ID:** WQTVM3000G  
**EUT Type:** Layer3 TV  
**Model:** VM3000G  
**Date(s) of Tests:** February 22, 2018 ~ April 18, 2018  
**Place of Tests:** HCT Co., Ltd.  
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

## 2. EUT DESCRIPTION

<b>Model:</b>	VM3000G
<b>EUT Type</b>	Layer3 TV
<b>Power Supply</b>	DC 12 V
<b>Frequency of Operation</b>	13.5599 MHz
<b>Transmit Power</b>	8.84 dBuV/m @30 m
<b>Modulation Type</b>	ASK
<b>Antenna Specification</b>	Antenna type: FPCB Type Antenna

### **3. TEST METHODOLOGY**

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) is used in the measurement of the test device.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.225 under the FCC Rules Part 15 Subpart C.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2013).

#### **3.4 DESCRIPTION OF TEST MODES**

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

## **4. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

The 10 m semi anechoic chamber used to collect the Conducted and Radiated data is located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4 (Version: 2014). Detailed description of test facilities was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned loop, dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## **6. ANTENNA REQUIREMENTS**

### **According to FCC 47 CFR §15.203:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203

## 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence.

Parameter	Expanded Uncertainty ( $\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70

## 8. TEST SUMMARY

The results in this report apply only to sample tested

Regulation	Test Type	Range	Result
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(a)	Radiated Electric Field Emissions	13.553MHz to 13.567MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(b)	Radiated Electric Field Emissions	13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(c)	Radiated Electric Field Emission	13.110 MHz to 13.410 MHz and 13.710 MHz to 14.010 MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209 (d)	Radiated Electric Field Emissions	9kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209	Radiated Electric Field Emissions	30MHz to 1GHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.207	AC power conducted emissions	150kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(e)	Frequency Stability	0.01% of nominal	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.215(c)	20 dB Bandwidth	-	Pass



## 9. RADIATED EMISSION MEASUREMENT

### Requirement(s): 15.209, 15.225

Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

**Minimum Standard: FCC Part 15.225 / 15.209**

Rule Part	Frequency (MHz)	Limit
Part 15.209	0.009 ~ 0.490	2400/F(kHz) uV/m@300 m
	0.490 ~1.705	24000/F(kHz) uV/m@30 m
	1.705 ~ 30	30 uV/m@30 m
	30 ~ 88	100 ** uV/m@3 m
	88 ~ 216	150 ** uV/m@3 m
	216 ~ 960	200 ** uV/m@3 m
	Above 960	500 uV/m@3 m

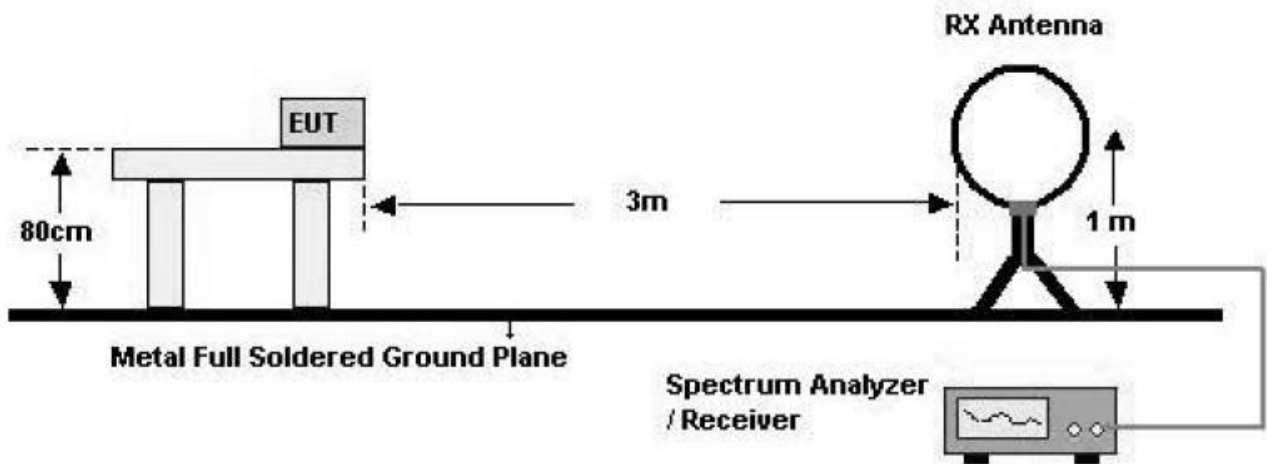
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

### 15.225 Operation within the band 13.110 MHz – 14.010 MHz

- (a) The field strength of any emissions within the band 13.553 MHz-13.567 MHz shall not exceed 15,848 microvolts/meter (= 84 dBuV/m) at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567 MHz-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (=50.5dBuV/m) at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710 MHz-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (=40.5 dBuV/m) at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 MHz-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.
- (e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.
- (f) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

## 9.1. RADIATED EMISSION 9 kHz – 30 MHz

### Test Set-up



### Test Procedure

The EUT was placed on a non-conductive table located on semi-anechoic chamber. The loop antenna was placed at a location 3m from the EUT. Radiated emissions were measured with the loop antenna both parallel and perpendicular to the plane of the EUT loop antenna and with x, y, z planes in EUT.

The limit is converted from microvolts/meter to decibel microvolts/meter. Sample Calculation:

Corrected Amplitude = Raw Amplitude(dB $\mu$ V/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 1 GHz

RBW = 9 kHz (9 kHz ~ 30 MHz)

= 100 kHz (30 MHz ~ 1 GHz)

Trace Mode = max hold

Detector Mode = peak / Quasi-peak

Sweep time = auto

**■ Test Results (Worst case : Y-H)**

13.553 MHz-13.567 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5599	29.3	19.54	-40	8.84	84	75.16
13.5604	26.33	19.54	-40	5.87	84	78.13

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.553	17.5	19.54	-40	-2.96	50.47	53.43
13.567	16.55	19.54	-40	-3.91	50.47	54.38

13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.2036	8.94	19.54	-40	-11.52	40.51	52.03
13.7496	8.43	19.54	-40	-12.03	40.51	52.54

9 kHz -30 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
8.7866	9.92	19.54	-40	-10.54	29.54	40.08
9.9657	8.63	19.54	-40	-11.83	29.54	41.37
26.9601	6.95	19.99	-40	-13.06	29.54	42.6
28.8487	7.92	19.99	-40	-12.09	29.54	41.63

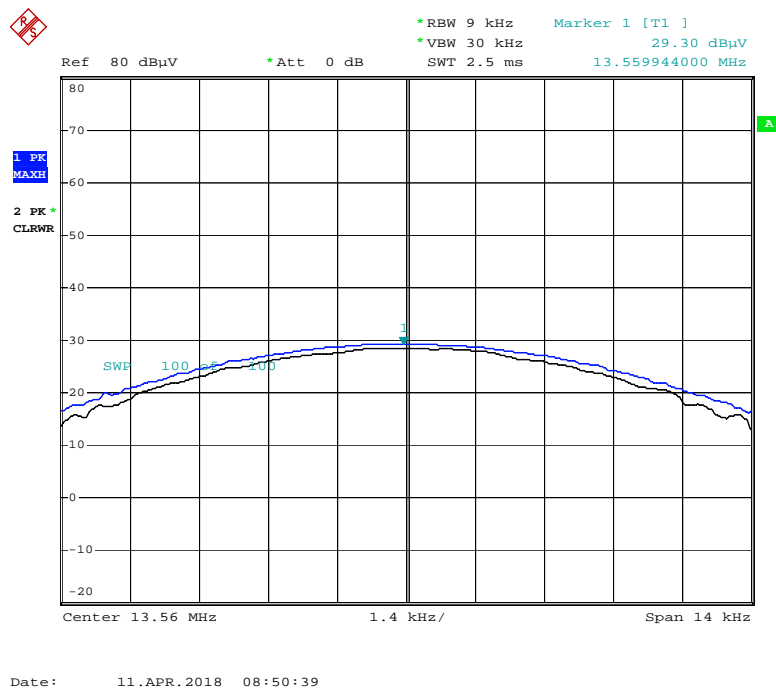
Note : The test results for below 30 MHz is correlated to an open site.

The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

1. Distance Correction Below 30 MHz =  $40\log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$   
Measurement Distance : 3 m (Below 30 MHz)
2. Factor = Antenna Factor + Cable Loss
3. Result Level = Read Level + Factor + Distance Correction
4. Margin = Limit – Result Level
5. We have done x, y, z planes in EUT
6. Antenna rotated about its vertical/horizontal axis for maximum response at each azimuth position around the EUT.
7. Worst case of operating mode is type A, analog mode and 106 kbps.

## RESULT PLOTS

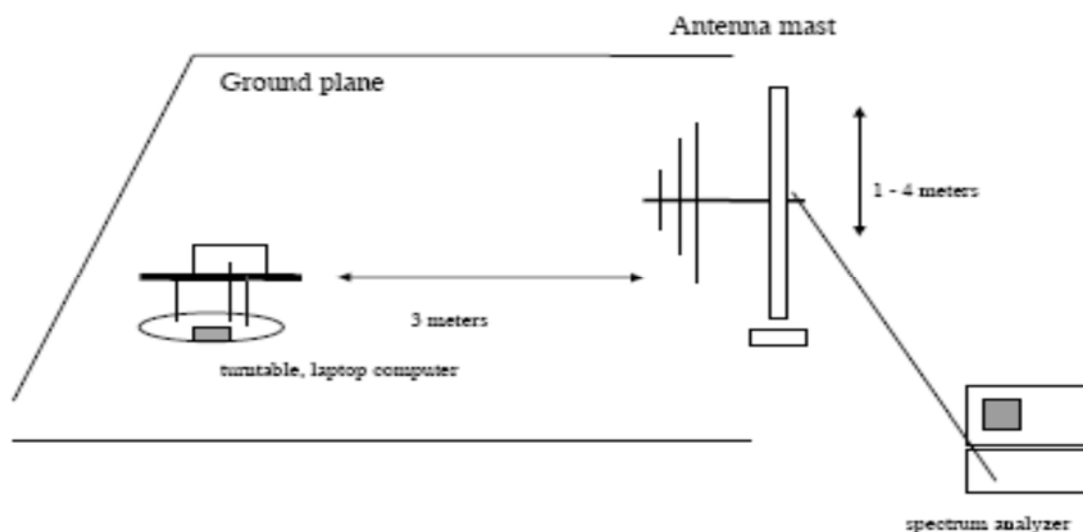
### Worst Plot for Radiated Emissions



**Note : Only the worst case plots for Radiated Emissions.**

## 9.2. RADIATED EMISSION 30 MHz – 1000 MHz

### Test Set-up



Test Procedures: Radiated emissions were measured according to ANSI C63.10.

The EUT was set to transmit at the highest output power.

The EUT was set 3 meter away from the measuring antenna.

### Test Results

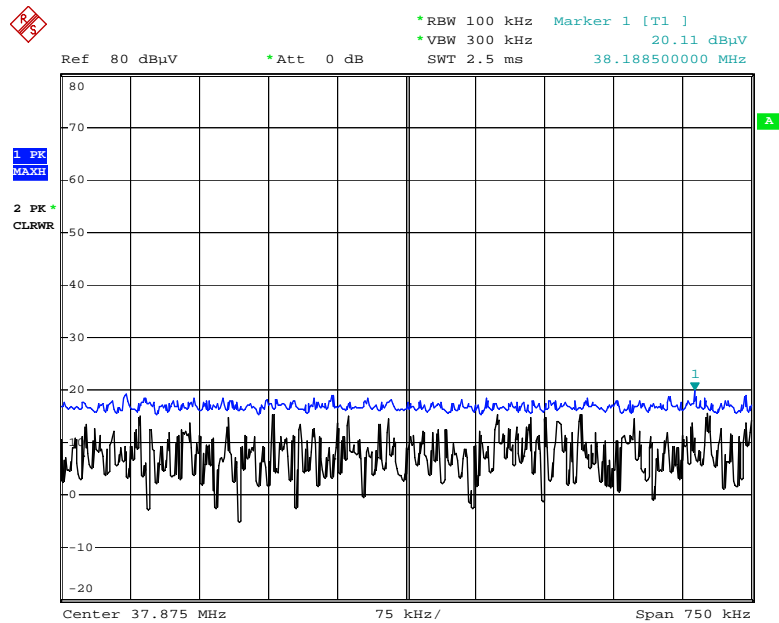
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
32.64	18.52	11.24	0.435	H	30.195	40	9.805
38.1885	20.11	11.9	0.49	H	32.5	40	7.5
96.36	17.31	7.96	0.7	V	25.97	40	14.03
114.1336	17.25	10.46	0.78	H	28.49	43.5	15.01
133.53	17.09	12.24	0.85	H	30.18	43.5	13.32
170.29	17.99	10.62	0.96	V	29.57	43.5	13.93

### Remark

1. Result Level = Read Level + (Antenna Factor+ Cable Loss)
2. Margin = Limit – Result Level
3. '\*' is the result for restricted band.

## RESULT PLOTS

### Worst Plot for Radiated Emissions



Date: 11.APR.2018 09:18:39

**Note : Only the worst case plots for Radiated Emissions.**

## 10. EMISSION BANDWIDTH PLOT

### Requirement(s):

Test Set-up: The EUT was connected to a spectrum analyzer.

Test Procedure: The 20 dB bandwidth was measured by using a spectrum analyzer.

RBW = Auto

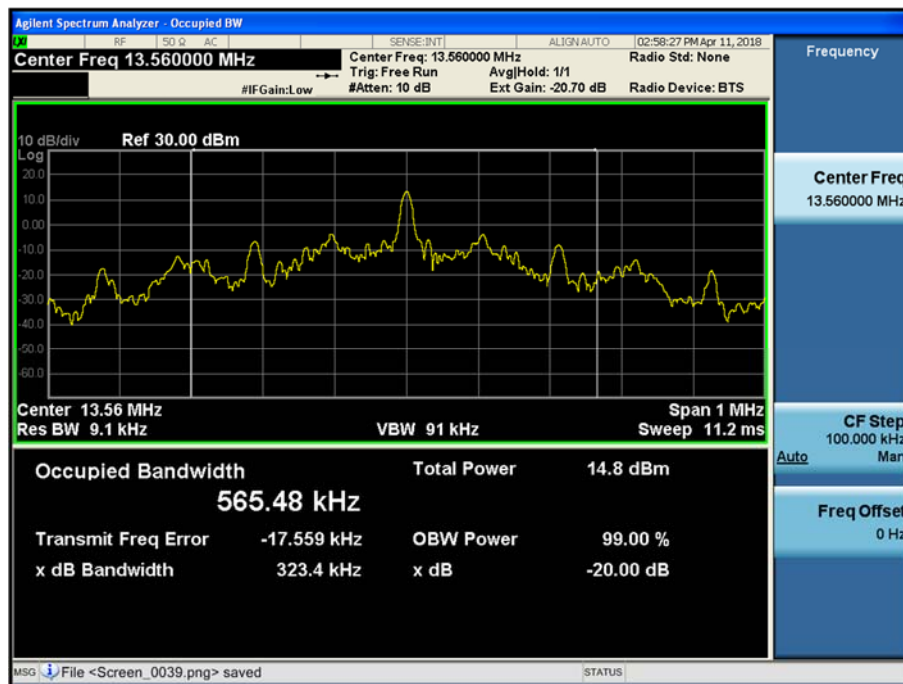
VBW = Auto

Span = Adequately in the operating Tx.

Detector = Peak

Trace mode = Max hold

Allow the trace to stabilize



## 11. FREQUENCY TOLERANCE

Procedure: Part 15.225, ANSI 63.10 (Version : 2013)

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

- a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.
- b) For battery operated equipment, the equipment tests shall be performed using a new battery.
- c) Test Procedure
  - Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
  - Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
  - While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- d) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Note : Below the measurement result is worst value of the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized



## Startup

Measurement Result:

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 12 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	12	-20	13.560136	136	0.0010029
100%		-10	13.560124	124	0.0009145
100%		0	13.560119	119	0.0008776
100%		+10	13.560087	87	0.0006416
100%		+20(Ref.)	13.560065	65	0.0004794
100%		+30	13.560078	78	0.0005752
100%		+40	13.560084	84	0.0006195
100%		+50	13.560087	87	0.0006416
High	10.2	+20	13.560100	100	0.0007375
Low	13.8	+20	13.560105	105	0.0007743

## 2 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 12 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	12	-20	13.560174	174	0.0012832
100%		-10	13.560167	167	0.0012316
100%		0	13.560153	153	0.0011283
100%		+10	13.560138	138	0.0010177
100%		+20(Ref.)	13.560133	133	0.0009808
100%		+30	13.560127	127	0.0009366
100%		+40	13.560139	139	0.0010251
100%		+50	13.560117	117	0.0008628
High	10.2	+20	13.560159	159	0.0011726
Low	13.8	+20	13.560127	127	0.0009366

## 5 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 12 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	12	-20	13.560158	158	0.0011652
100%		-10	13.560168	168	0.0012389
100%		0	13.560179	179	0.0013201
100%		+10	13.560154	154	0.0011357
100%		+20(Ref.)	13.560126	126	0.0009292
100%		+30	13.560135	135	0.0009956
100%		+40	13.560107	107	0.0007891
100%		+50	13.560117	117	0.0008628
High	10.2	+20	13.560134	134	0.0009882
Low	13.8	+20	13.560151	151	0.0011136

## 10 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 12 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	12	-20	13.560186	186	0.0013717
100%		-10	13.560174	174	0.0012832
100%		0	13.560162	162	0.0011947
100%		+10	13.560159	159	0.0011726
100%		+20(Ref.)	13.560132	132	0.0009735
100%		+30	13.560144	144	0.0010619
100%		+40	13.560153	153	0.0011283
100%		+50	13.560148	148	0.0010914
High	10.2	+20	13.560159	159	0.0011726
Low	13.8	+20	13.560145	145	0.0010693

## 12. POWERLINE CONDUCTE EMISSIONS

### LIMIT

For an intentional radiator which 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 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. The EUT is the device operating below 30 MHz.
  - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
  - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

### Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

## Test Plots

### Unterminate the Antenna

### Conducted Emissions (Line 1)

EMI Auto Test(21)

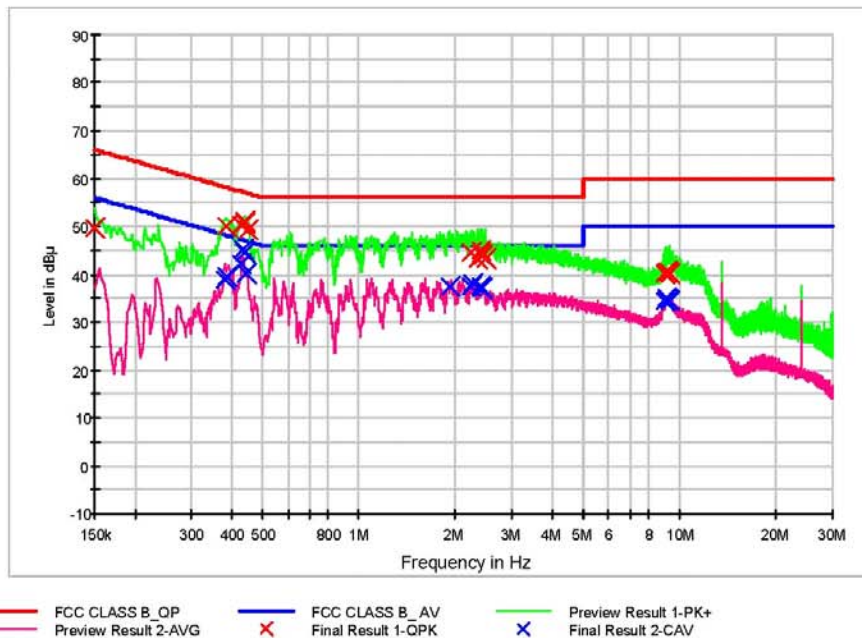
1 / 2

## HCT TEST Report

### Common Information

EUT: VM3000G  
 Manufacturer: 가온미디어  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC INTERMINATION MODE

FCC CLASS B



### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.7	9.000	Off	N	9.6	16.3	66.0
0.386000	50.0	9.000	Off	N	9.6	8.1	58.1
0.432000	50.2	9.000	Off	N	9.6	7.0	57.2
0.438000	51.2	9.000	Off	N	9.6	5.9	57.1
0.442000	50.8	9.000	Off	N	9.6	6.3	57.0
0.450000	49.5	9.000	Off	N	9.6	7.4	56.9
2.248000	44.7	9.000	Off	N	9.7	11.3	56.0
2.336000	43.2	9.000	Off	N	9.7	12.8	56.0
2.400000	44.3	9.000	Off	N	9.7	11.7	56.0
2.408000	44.8	9.000	Off	N	9.7	11.2	56.0
2.436000	44.0	9.000	Off	N	9.7	12.0	56.0
2.472000	43.1	9.000	Off	N	9.7	12.9	56.0
9.046000	40.1	9.000	Off	N	10.0	19.9	60.0
9.064000	40.5	9.000	Off	N	10.0	19.5	60.0
9.152000	40.6	9.000	Off	N	10.0	19.4	60.0
9.176000	40.4	9.000	Off	N	10.0	19.6	60.0
9.236000	40.4	9.000	Off	N	10.0	19.6	60.0
9.290000	40.3	9.000	Off	N	10.0	19.7	60.0

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EMI Auto Test(21)

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## Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.384000	38.9	9.000	Off	N	9.6	9.3	48.2
0.388000	39.5	9.000	Off	N	9.6	8.6	48.1
0.432000	42.2	9.000	Off	N	9.6	5.0	47.2
0.436000	45.3	9.000	Off	N	9.6	1.8	47.1
0.440000	44.5	9.000	Off	N	9.6	2.5	47.1
0.446000	40.1	9.000	Off	N	9.6	6.8	46.9
1.922000	37.5	9.000	Off	N	9.7	8.5	46.0
2.248000	37.4	9.000	Off	N	9.7	8.6	46.0
2.258000	38.1	9.000	Off	N	9.7	7.9	46.0
2.400000	37.0	9.000	Off	N	9.7	9.0	46.0
2.408000	37.5	9.000	Off	N	9.7	8.5	46.0
2.436000	37.0	9.000	Off	N	9.7	9.0	46.0
9.046000	34.5	9.000	Off	N	10.0	15.5	50.0
9.064000	34.6	9.000	Off	N	10.0	15.4	50.0
9.152000	34.9	9.000	Off	N	10.0	15.1	50.0
9.198000	34.7	9.000	Off	N	10.0	15.3	50.0
9.236000	34.6	9.000	Off	N	10.0	15.4	50.0
9.290000	34.5	9.000	Off	N	10.0	15.5	50.0

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## Conducted Emissions (Line 2)

EMI Auto Test(21)

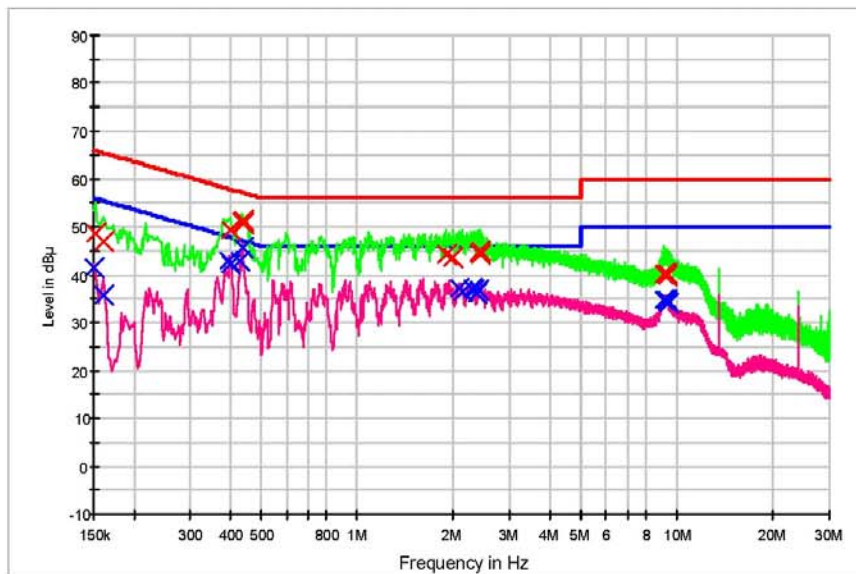
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## HCT TEST Report

### Common Information

EUT: VM3000G  
 Manufacturer: 가온미디어  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC INTERMEDIATION MODE

FCC CLASS B



— FCC CLASS B\_QP — FCC CLASS B\_AV — Preview Result 1-PK+  
 — Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	48.8	9.000	Off	L1	9.6	17.1	65.9
0.160000	46.9	9.000	Off	L1	9.6	18.5	65.5
0.402000	49.3	9.000	Off	L1	9.6	8.6	57.8
0.434000	51.1	9.000	Off	L1	9.6	6.1	57.2
0.438000	51.2	9.000	Off	L1	9.6	5.9	57.1
0.442000	50.7	9.000	Off	L1	9.6	6.3	57.0
1.894000	44.4	9.000	Off	L1	9.7	11.6	56.0
1.998000	43.6	9.000	Off	L1	9.7	12.4	56.0
2.398000	44.5	9.000	Off	L1	9.7	11.5	56.0
2.418000	44.8	9.000	Off	L1	9.7	11.2	56.0
2.426000	44.2	9.000	Off	L1	9.7	11.8	56.0
2.432000	44.1	9.000	Off	L1	9.7	11.9	56.0
9.120000	40.3	9.000	Off	L1	9.9	19.7	60.0
9.204000	40.3	9.000	Off	L1	9.9	19.7	60.0
9.208000	40.3	9.000	Off	L1	9.9	19.7	60.0
9.262000	40.0	9.000	Off	L1	9.9	20.0	60.0
9.284000	40.3	9.000	Off	L1	9.9	19.7	60.0
9.356000	40.1	9.000	Off	L1	9.9	19.9	60.0

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EMI Auto Test(21)

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## Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	41.6	9.000	Off	L1	9.6	14.4	56.0
0.160000	35.8	9.000	Off	L1	9.6	19.6	55.5
0.398000	42.9	9.000	Off	L1	9.6	4.9	47.9
0.402000	42.2	9.000	Off	L1	9.6	5.6	47.8
0.432000	42.8	9.000	Off	L1	9.6	4.4	47.2
0.438000	45.5	9.000	Off	L1	9.6	1.6	47.1
2.080000	37.2	9.000	Off	L1	9.7	8.8	46.0
2.126000	36.6	9.000	Off	L1	9.7	9.4	46.0
2.286000	37.0	9.000	Off	L1	9.7	9.0	46.0
2.308000	36.7	9.000	Off	L1	9.7	9.3	46.0
2.368000	36.1	9.000	Off	L1	9.7	9.9	46.0
2.398000	36.8	9.000	Off	L1	9.7	9.2	46.0
9.120000	34.7	9.000	Off	L1	9.9	15.3	50.0
9.204000	34.7	9.000	Off	L1	9.9	15.3	50.0
9.208000	34.8	9.000	Off	L1	9.9	15.2	50.0
9.284000	34.7	9.000	Off	L1	9.9	15.3	50.0
9.354000	34.3	9.000	Off	L1	9.9	15.7	50.0
9.440000	33.9	9.000	Off	L1	9.9	16.1	50.0

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## Terminate the Antenna Conducted Emissions (Line 1)

EMI Auto Test(21)

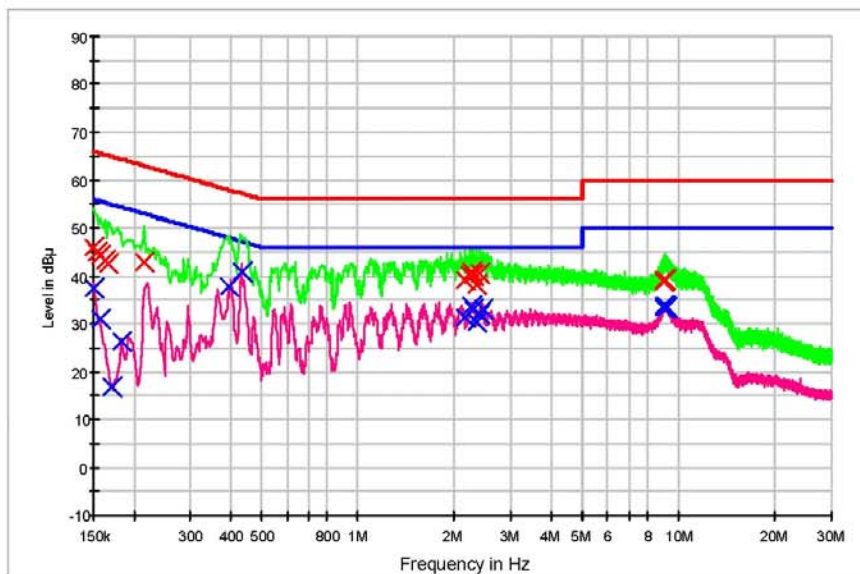
1 / 2

## HCT TEST Report

### Common Information

EUT: VM3000G  
 Manufacturer: 가우미디어  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC TERMINATION MODE

FCC CLASS B



— FCC CLASS B\_OP — FCC CLASS B\_AV — Preview Result 1-PK+  
 — Preview Result 2-AVG — Final Result 1-OPK — Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	46.0	9.000	Off	N	9.6	20.0	66.0
0.154000	44.8	9.000	Off	N	9.6	21.0	65.8
0.158000	44.3	9.000	Off	N	9.6	21.3	65.6
0.162000	43.4	9.000	Off	N	9.6	22.0	65.4
0.166000	42.6	9.000	Off	N	9.6	22.6	65.2
0.216000	42.8	9.000	Off	N	9.6	20.2	63.0
2.152000	39.2	9.000	Off	N	9.7	16.8	56.0
2.236000	40.1	9.000	Off	N	9.7	15.9	56.0
2.270000	40.8	9.000	Off	N	9.7	15.2	56.0
2.276000	40.3	9.000	Off	N	9.7	15.7	56.0
2.348000	38.0	9.000	Off	N	9.7	18.0	56.0
2.396000	40.4	9.000	Off	N	9.7	15.6	56.0
8.994000	38.9	9.000	Off	N	10.0	21.1	60.0
9.030000	39.1	9.000	Off	N	10.0	20.9	60.0
9.056000	39.2	9.000	Off	N	10.0	20.8	60.0
9.106000	39.3	9.000	Off	N	10.0	20.7	60.0
9.114000	39.2	9.000	Off	N	10.0	20.8	60.0
9.134000	39.2	9.000	Off	N	10.0	20.8	60.0

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EMI Auto Test(21)

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## Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	37.6	9.000	Off	N	9.6	18.4	56.0
0.158000	31.1	9.000	Off	N	9.6	24.5	55.6
0.170000	16.8	9.000	Off	N	9.6	38.2	55.0
0.182000	26.3	9.000	Off	N	9.6	28.1	54.4
0.394000	38.0	9.000	Off	N	9.6	10.0	48.0
0.434000	40.7	9.000	Off	N	9.6	6.5	47.2
2.152000	31.3	9.000	Off	N	9.7	14.7	46.0
2.268000	33.7	9.000	Off	N	9.7	12.3	46.0
2.276000	33.2	9.000	Off	N	9.7	12.8	46.0
2.348000	30.4	9.000	Off	N	9.7	15.6	46.0
2.396000	32.1	9.000	Off	N	9.7	13.9	46.0
2.442000	33.0	9.000	Off	N	9.7	13.0	46.0
8.994000	33.4	9.000	Off	N	10.0	16.6	50.0
9.006000	33.3	9.000	Off	N	10.0	16.7	50.0
9.032000	33.6	9.000	Off	N	10.0	16.4	50.0
9.068000	33.5	9.000	Off	N	10.0	16.5	50.0
9.134000	33.6	9.000	Off	N	10.0	16.4	50.0
9.178000	33.5	9.000	Off	N	10.0	16.5	50.0

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## Conducted Emissions (Line 2)

EMI Auto Test(21)

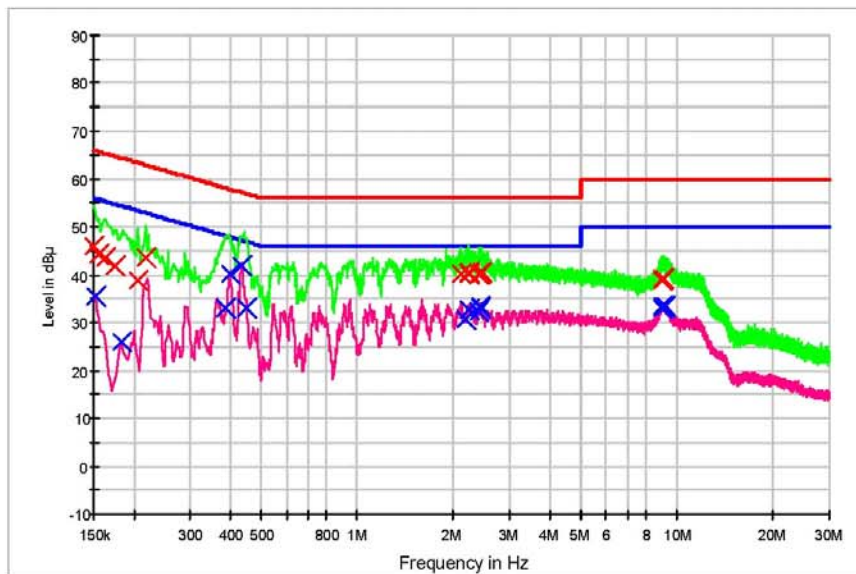
1 / 2

## HCT TEST Report

### Common Information

EUT: VN3000G  
 Manufacturer: 가온미디어  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC TERMINATION MODE

FCC CLASS B



— FCC CLASS B\_QP — FCC CLASS B\_AV — Preview Result 1-PK+  
 — Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	45.9	9.000	Off	L1	9.6	20.1	66.0
0.156000	44.3	9.000	Off	L1	9.6	21.4	65.7
0.162000	43.4	9.000	Off	L1	9.6	21.9	65.4
0.174000	41.9	9.000	Off	L1	9.6	22.8	64.8
0.206000	38.7	9.000	Off	L1	9.6	24.7	63.4
0.218000	43.5	9.000	Off	L1	9.6	19.4	62.9
2.104000	40.1	9.000	Off	L1	9.7	15.9	56.0
2.224000	40.2	9.000	Off	L1	9.7	15.8	56.0
2.246000	40.4	9.000	Off	L1	9.7	15.6	56.0
2.392000	40.1	9.000	Off	L1	9.7	15.9	56.0
2.426000	40.1	9.000	Off	L1	9.7	15.9	56.0
2.444000	40.5	9.000	Off	L1	9.7	15.5	56.0
8.996000	38.8	9.000	Off	L1	9.9	21.2	60.0
9.030000	39.0	9.000	Off	L1	9.9	21.0	60.0
9.034000	39.0	9.000	Off	L1	9.9	21.0	60.0
9.052000	39.2	9.000	Off	L1	9.9	20.8	60.0
9.070000	39.1	9.000	Off	L1	9.9	20.9	60.0
9.132000	39.2	9.000	Off	L1	9.9	20.8	60.0

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EMI Auto Test(21)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	35.4	9.000	Off	L1	9.6	20.5	55.9
0.184000	26.0	9.000	Off	L1	9.6	28.3	54.3
0.386000	33.2	9.000	Off	L1	9.6	15.0	48.1
0.400000	40.3	9.000	Off	L1	9.6	7.6	47.9
0.436000	41.8	9.000	Off	L1	9.6	5.3	47.1
0.450000	33.2	9.000	Off	L1	9.6	13.7	46.9
2.184000	30.5	9.000	Off	L1	9.7	15.5	46.0
2.244000	32.6	9.000	Off	L1	9.7	13.4	46.0
2.398000	32.4	9.000	Off	L1	9.7	13.6	46.0
2.414000	33.4	9.000	Off	L1	9.7	12.6	46.0
2.426000	33.0	9.000	Off	L1	9.7	13.0	46.0
2.440000	33.1	9.000	Off	L1	9.7	12.9	46.0
8.948000	33.1	9.000	Off	L1	9.9	16.9	50.0
9.030000	33.3	9.000	Off	L1	9.9	16.7	50.0
9.034000	33.4	9.000	Off	L1	9.9	16.6	50.0
9.080000	33.5	9.000	Off	L1	9.9	16.5	50.0
9.134000	33.5	9.000	Off	L1	9.9	16.5	50.0
9.210000	33.4	9.000	Off	L1	9.9	16.6	50.0

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### 13. LIST OF TEST EQUIPMENT

#### 13.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/20/2017	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/27/2017	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/30/2018	Annual	0093008124
Agilent	N9020A / Signal Analyzer	06/13/2017	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/22/2017	Annual	MY49431210
Agilent	N1911A / Power Meter	04/16/2018	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/16/2018	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/20/2017	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/12/2017	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/30/2017	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2017	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A
Rohde & Schwarz	CBT / Bluetooth Tester	05/16/2017	Annual	100422

### 13.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	11/21/2017	Biennial	9120D-1191
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/21/2017	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/27/2017	Annual	101068-SZ
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	08/01/2017	Annual	4
Wainwright Instruments	WHKX8-6090-7000-18000-40SS / High Pass Filter	07/11/2017	Annual	5
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/30/2017	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2018	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/12/2017	Annual	2
WEINSCHL	56-10 / Attenuator(10 dB)	10/13/2017	Annual	72316
CERNEX	CBLU1183540 / Broadband Low Noise Amplifier	01/03/2018	Annual	24613
CERNEX	CBL06185030 / Broadband Low Noise Amplifier	01/03/2018	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/27/2018	Annual	3000C000276