



HCT CO., LTD.

PRODUCT COMPLIANCE DIVISION
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA
TEL : +82 31 639 8539 FAX : +82 31 639 8525 www.hct.co.kr

EMI VERIFICATION REPORT

Applicant:

JUNI KOREA

E603 Bundang Techno Park 151 Yatap-Dong
Bundang-Gu Seongnam-Si Gyeonggi-Do, Korea

Date of Issue: January 27, 2011

Test Report No.: HCTE1101FE44

Test Site: HCT CO., LTD.

HCT FRN: 0005-8664-21

MODEL:

JFW-600

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B / CISPR 22 Class B

Equipment Type : WiMAX Femto

Trade Name : JUNI KOREA

Port / Connector(s) : DC In Port / Headset Port

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Report prepared by
: Kyoung Hee Yoon
Test Engineer of EMC Tech. Part

Approved by
: Sang Jun Lee
Manager of EMC Tech. Part

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1. GENERAL INFORMATION

1.1 Product Description

Equipment Under Test (E.U.T) is **WiMAX Femto, Model: JFW-600** manufactured by **JUNI KOREA**. Its basic purpose is used for communications.

Model (s)	JFW-600
E.U.T Type	WiMAX Femto
TX/RX Frequency	2 508.5 MHz to 2 684 MHz , 2412 ~2462MHz, 2422~2452MHz

1.2 Related Submittal(s) / Grant(s)

Original submittal only.

1.3 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Manufacturer	Model Number/ Serial Number	FCC ID / DoC	Connected To
WiMAX Femto	JUNI KOREA	JFW-600	-	TA
Travel adaptor	LG NORTEL	SA-B019 RA9X001977	-	E.U.T
Notebook PC	H.P	Compaq 6730b CNU8390H5T	DoC	E.U.T
Notebook PC adaptor	Hipro Eletronics (Suzgou) Co.,Ltd	PPP012L-S 9800595405	-	Notebook PC
Mouse	Microsoft	Intellimouse optical USB and PS/2 compatible 3902B008	DoC	Notebook PC
GPS antenna	-	107457	-	E.U.T
WiMAX antenna (1,2)	-	-	-	E.U.T
WLAN antenna (1,2)	-	-	-	E.U.T
LAN (1,2,3,4)	-	125 Ω Term.	-	E.U.T
WAN	-	125 Ω Term.	-	E.U.T

1.4 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
WiMAX Femto	DC in	N	-	(P)1.8
	AC in	N	-	(P)1.8
	LAN 1	Not applicable	N	(D)1.2
	LAN 2	Not applicable	N	(D)1.2
	LAN 3	Not applicable	N	(D)1.2
	LAN 4	Not applicable	N	(D)1.2
	WLAN	Not applicable	Y	(D)1.2
	GPS antenna	Not applicable	Y	(D)3.0
Notebook PC	DC in	N	-	(P)1.8
Notebook PC adaptor	AC in	N	-	(P)1.8

* The marked "(D)" means the data cable and "(P)" means the power cable.

1.5 Noise Suppression Parts on Cable. (I/O cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
WiMAX Femto	DC in	Y	E.U.T end	Y	E.U.T end
	AC in	N	Not applicable	Y	Both end
	LAN 1	N	Not applicable	Y	E.U.T end
	LAN 2	N	Not applicable	Y	E.U.T end
	LAN 3	N	Not applicable	Y	E.U.T end
	LAN 4	N	Not applicable	Y	E.U.T end
	WLAN	Y	E.U.T end	Y	Both end
	GPS antenna	Y	E.U.T end	Y	Both end
Notebook PC	DC in	Y	Notebook PC End	Y	Notebook PC End
Notebook PC adaptor	AC in	N	-	Y	Notebook PC adaptor End

1.6 Test Methodology

Both Conducted and Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to E.U.T distance of 3 m

1.7 Test Facility

The 10 m semi anechoic chamber used to collect the radiated data is located at the 105-1, Jangam-Ri, Majang-Myeon, Icheon-Si, Kyongki-Do, South Korea, and the conducted measurement facility used to measure the conducted data are located at San 136-1, Ami-Ri Bubal-Eup, Icheon-Si, Kyongki-Do, 467-701, South Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facilities was submitted to the Commission and accepted dated Sep. 03, 2010 (Registration Number: 90661)

1.8 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

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 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

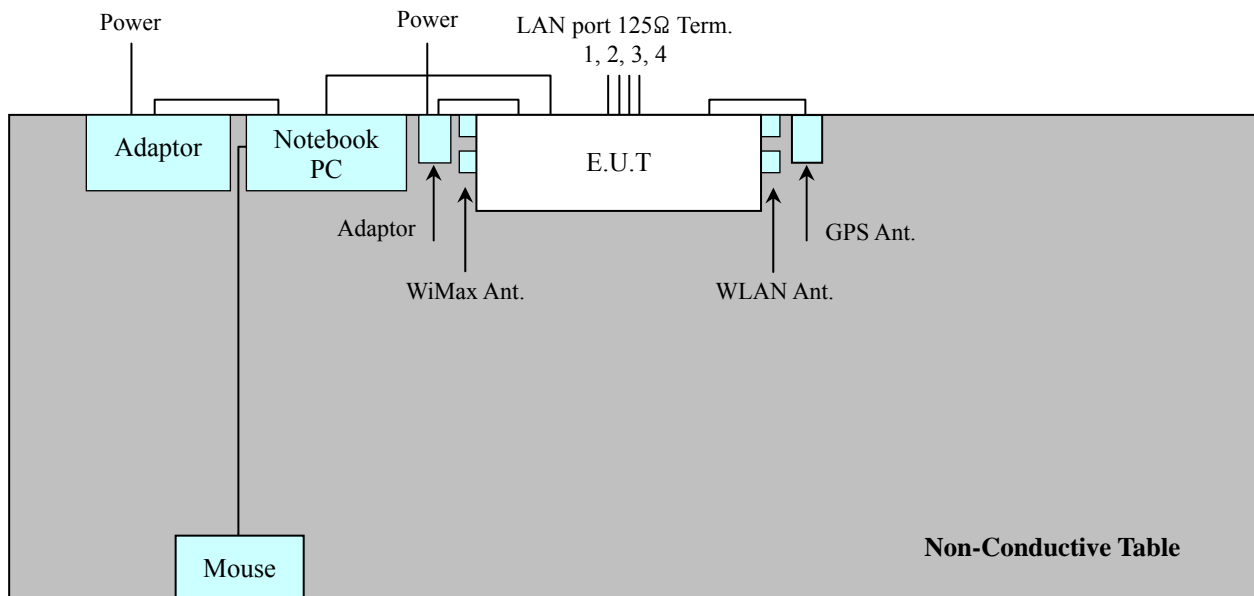
2. SYSTEM TEST CONFIGURATION

2.1 Configuration of Test System

Power Line Conducted test : E.U.T was connected to LISN, all other peripheral equipment were connected to another LISN. Preliminary Power Line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

Radiated Emission test : Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition. Final Radiated Emission tests were performed at 3 m semi-anechoic chamber.

[Configuration of Tested System]



Power Line: 110 VAC

3. PRELIMINARY TEST

3.1 Conducted Emission Test

During preliminary tests, the following operating mode was investigated:

Operation Mode	The Worst Operating Condition
Idle	<input type="radio"/>
Data Communication	<input type="radio"/>

3. 2 Radiated Emission Test

During preliminary tests, the following operating mode was investigated:

Operation Mode	The Worst Operating Condition
Idle	<input type="radio"/>
Data Communication	<input type="radio"/>

4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit apply to	: CISPR 22 Class B
Detector	: Quasi-Peak, Average (6 dB Bandwidth: 9 kHz)
Operating condition	: Normal mode
Temperature	: 24.7 °C
Humidity level	: 44.8 %
Test date	: January 17, 2011

※ **NOTE:** Refer to page 11 to page 14 for details

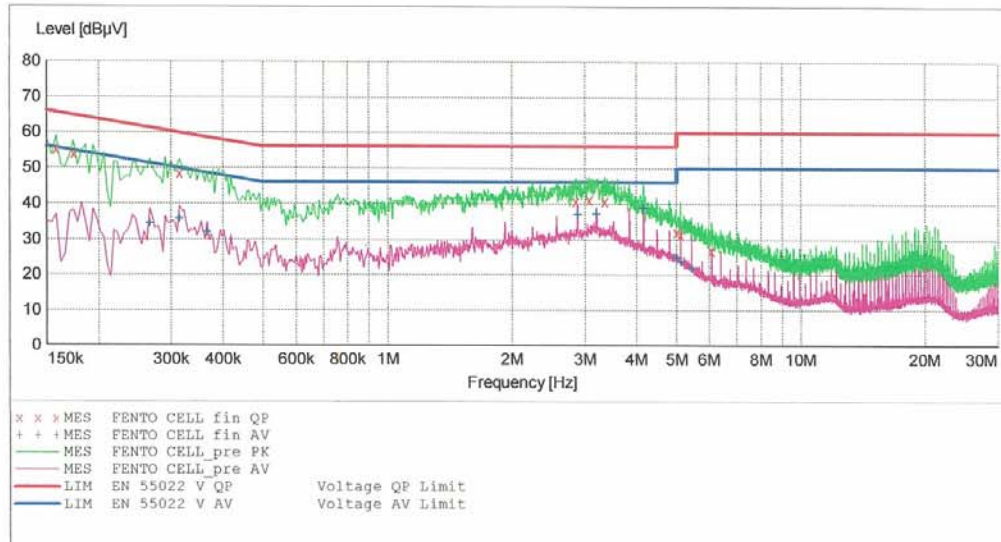
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EUT: JFW-600
Manufacturer: JUNI
Operating Condition: NORMAL MODE
Test Site: SHIELD ROOM
Operator: KH, YOON
Test Specification: CISPR22 CLASS B
Comment: H

SCAN TABLE: "CISPR22 CLASS B"

Short Description:			CISPR 22 CLASS B			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "FENTO CELL_fin QP"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.158010	55.10	10.1	66	10.5	---	---
0.174010	53.80	10.1	65	11.0	---	---
0.314010	48.50	10.1	60	11.4	---	---
2.856000	40.80	10.3	56	15.2	---	---
3.080000	41.20	10.3	56	14.8	---	---
3.356000	40.70	10.4	56	15.3	---	---
5.000000	32.10	10.5	56	23.9	---	---
5.124000	31.60	10.5	60	28.4	---	---
6.088000	26.90	10.6	60	33.1	---	---

MEASUREMENT RESULT: "FENTO CELL_fin AV"

1/17/2011 4:37PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.266010	34.40	10.1	51	16.9	---	---
0.314010	35.80	10.1	50	14.0	---	---
0.366010	32.00	10.1	49	16.6	---	---
2.888000	37.10	10.3	46	8.9	---	---
3.208000	37.20	10.4	46	8.8	---	---
4.168000	38.80	10.4	46	7.2	---	---
5.000000	25.00	10.5	46	21.0	---	---
5.128000	23.70	10.5	50	26.3	---	---
5.448000	21.80	10.5	50	28.2	---	---

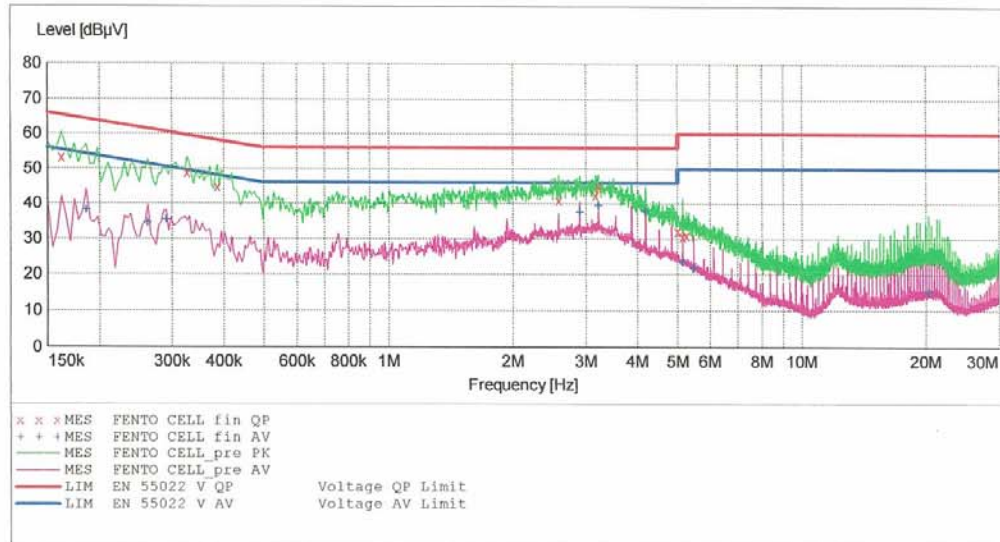
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EMC

EUT: JFW-600
Manufacturer: JUNI
Operating Condition: NORMAL MODE
Test Site: SHIELD ROOM
Operator: KH, YOON
Test Specification: CISPR22 CLASS B
Comment: N

SCAN TABLE: "CISPR22 CLASS B"

Short Description:			CISPR 22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "FEMTO CELL_fin QP"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.162010	53.30	10.1	65	12.0	---	---
0.326010	48.90	10.1	60	10.6	---	---
0.386010	44.80	10.1	58	13.3	---	---
2.584000	41.10	10.3	56	14.9	---	---
3.176000	42.50	10.4	56	13.5	---	---
3.224000	44.80	10.4	56	11.2	---	---
5.000000	32.20	10.5	56	23.8	---	---
5.156000	30.80	10.5	60	29.2	---	---
5.264000	31.00	10.5	60	29.0	---	---

MEASUREMENT RESULT: "FENTO CELL_fin AV"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.186010	38.20	10.1	54	16.0	---	---
0.262010	34.40	10.1	51	16.9	---	---
0.290010	35.40	10.1	51	15.1	---	---
2.904000	37.60	10.3	46	8.4	---	---
3.224000	39.40	10.4	46	6.6	---	---
4.192000	37.90	10.4	46	8.1	---	---
5.156000	23.40	10.5	50	26.6	---	---
5.476000	21.80	10.5	50	28.2	---	---
20.272000	15.30	11.6	50	34.7	---	---

4.2 Radiated Emission Test

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

Limit apply to	: FCC PART 15 Subpart B
Detector	: Quasi-Peak (6 dB Bandwidth: 120 kHz)
Operating condition	: Normal mode
Temperature	: 13.0 °C
Humidity level	: 28.0 %
Test date	: January 24, 2011

Frequency	Reading	Ant. Factor	Cable Loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB/m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
95.8	28.1	8.4	1.3	V	37.8	43.5	5.7
136.0	22.0	12.4	1.4	V	35.8	43.5	7.7
180.0	26.4	11.6	1.8	V	39.8	43.5	3.7
180.0	26.4	11.6	1.8	H	39.8	43.5	3.7
200.0	28.0	9.9	1.5	V	39.4	43.5	4.1
400.0	21.5	15.6	2.6	H	39.7	46.0	6.3
800.0	14.3	22.6	3.9	H	40.8	46.0	5.2

※ **NOTE:**

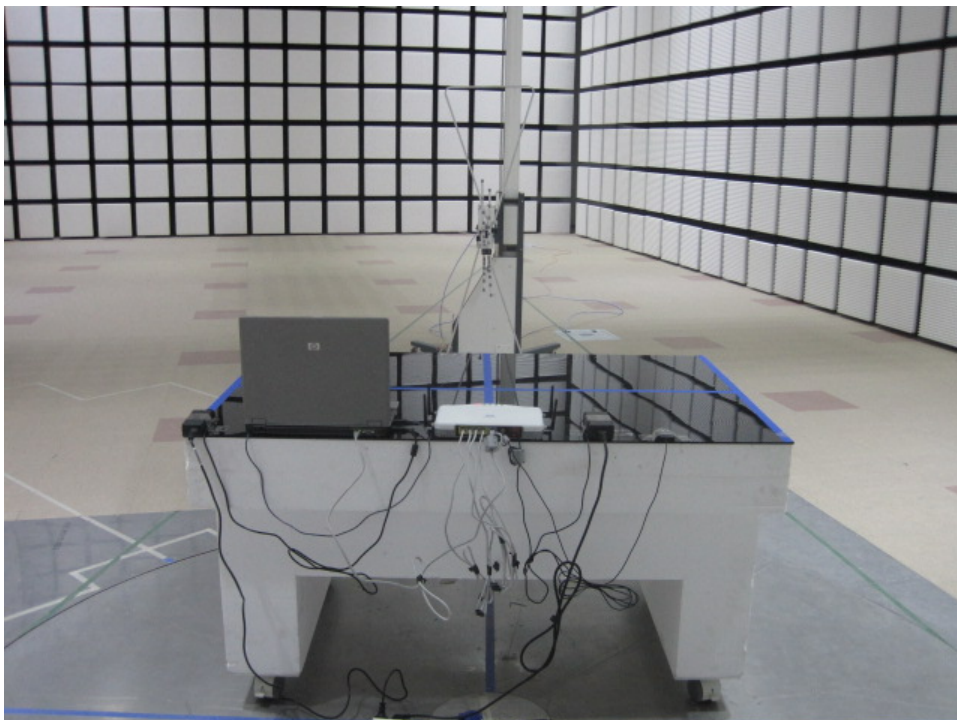
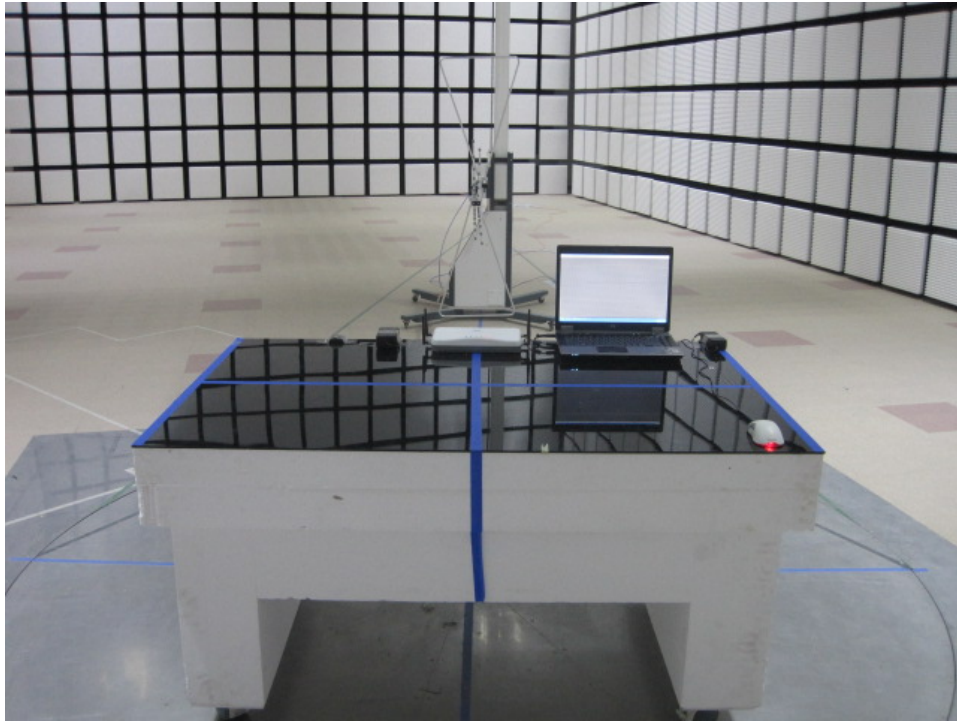
1. This test only got data for noise.
2. For measurement above 1 GHz, noise level is more than 10 dB below the limit, specified in FCC Part 15.35

4.3 Test Setup Photos

[Conducted Emission]



[Radiated Emission]



5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dB μ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB μ V/m value is mathematically converted to its corresponding level in μ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dB}\mu\text{V/m}$$

[Radiated Emission 10 m Limits]

Frequency of Emission (MHz)	Field Strength	
	μ V/m	dB μ V/m
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

6. TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number</u>	<u>Next CAL Date</u>
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Conducted Emission

<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	2011.02.19
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	2011.02.05
<input type="checkbox"/> LISN	Rohde & Schwarz	ENV216	3560.6550.02	2011.04.06
<input checked="" type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.52	2011.10.25

Radiated Emission

<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	2011.10.29
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU26	100241	2011.09.01
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2012.09.13
<input checked="" type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	-
<input checked="" type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	-
<input checked="" type="checkbox"/> Communication Antenna	Schwarzbeck	USLP9142	9142-248	-
<input type="checkbox"/> RF-Amplifier	MITEQ	AMF-6D-0010 1800-35.20P.PS	-	2011.05.20
<input type="checkbox"/> Base Station	Rohde & Schwarz	CMU 200	1100000802	2011.02.17

7. CONCLUSION

The data collected shows that the **JUNI KOREA, WiMAX Femto, Model: JFW-600** complies with §15.107 and §15.109 of the FCC rules.