



HCT CO., LTD.

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CERTIFICATE OF COMPLIANCE

FCC PART 27 Certification

Applicant Name:

SAMSUNG Electronics Co., Ltd.
416, Maetan-3Dong, Yeongtong-gu, Suwon-si,
Kyungki-do, Korea

Date of Issue: March 23, 2010**Test Site/Location:**

HCT, San 136-1 Ami-ri, Bubal-eup, Icheon-si,
Kyungki-do, Korea

Test Report No.: HCTR1003FR17**FCC ID : A3LSPI-2L10022500****APPLICANT : SAMSUNG Electronics Co., Ltd.**

EUT Type : Mobile WiMAX Outdoor RAS
Manufacturer : SAMSUNG Electronics Co., Ltd.
Model name : SPI-2L10022500
Frequency of Operation : 2496 MHz ~ 2690 MHz

FCC Rule Part(s) : FCC Part 27
Test Procedure(s) : ANSI/TIA-603C-C-2004
Application Type : Original Equipment
Data of issue : March 23, 2010

Engineering Statement:

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. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of FCC Part 27 of the FCC Rules under normal use and maintenance.

Report prepared by
: Jong Seok Lee
Test engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

FCC PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 1 of 70

C O N T E N T S

1. GENERAL INFORMATION	4
1.1. CLIENT INFORMATION	4
1.2. PRODUCT INFORMATION	4
1.3. INTRODUCTION OF EUT.....	5
2. TEST SUMMARY	6
2.1. STANDARDS	6
2.2. MODE OF OPERATION DURING THE TEST	6
3. STANDARDS ENVIRONMENTAL TEST CONDITIONS	7
4. TEST EQUIPMENT	8
5. CONDUCTED OUTPUT POWER.....	9
5.1. Applicable Standard	9
5.2. Test Equipment List and Details	9
5.3. Test Procedure.....	10
5.3.1. Environmental Conditions:	10
5.4. Test Result	11
5.4.1. Test Data at Output Port A.....	11
5.4.2. Combined Test Data at Output Port.....	11
5.4.3. Plot Data for Output Port A (Conducted Output Power).....	12
5.4.4. Combined Plot Data for Output (Conducted Output Power).....	17
6. OCCUPIED BANDWIDTH	22
6.1. Applicable Standard	22
6.2. Test Equipment List and Details	22
6.3. Test Procedure.....	23
6.3.1. Environmental Conditions:	23
6.4. Test Result	23
6.4.1. Test Data at Output Port A.....	24
6.4.2. Combined Test Data at Output Port.....	24
6.4.3. Test Plot at Output Port A.....	25
6.4.4. Combined Test Plot at Output Port.....	30
7. CHANNEL EDGES	35
7.1. Applicable Standard	35
7.2. Test Equipment List and Details	35

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 2 of 70

7.3. Test Procedure.....	35
7.3.1. Environmental Conditions.....	36
7.4. Test Result	36
7.4.1. Test data at Output Port A	36
7.4.2. Combined Test data at Output	36
7.4.3. Plot Data at Output Port A	37
7.4.4. Combined Plot Data at Output	40
8. SPURIOUS EMISSION AT ANTENNA TERMINAL	43
8.1. Applicable Standard: CFR 47§2.1051, §27.53(m)	43
8.2. Test Equipment List and Details	43
8.3. Test Procedure.....	43
8.3.1 Environmental Conditions:	44
8.4. Test Result	44
8.4.1. Plot Data at Output Port A	45
8.4.2. Combined Plot Data at Output	54
9. RADIATED SPURIOUS EMISSION	63
9.1 Applicable Standard.....	63
9.2 Test Equipment List and Details	63
9.3 Test Procedure.....	64
9.3.1 Radiated Spurious Emissions Test Setup	64
9.3.2 Environmental Conditions:	64
9.4 Test Result	64
10. FREQUENCY STABILITY	65
10.1 Applicable Standard	65
10.2 Test Equipment List and Details	65
10.3 Test Procedure.....	65
10.3.1. Environmental conditions	66
10.4. Test Result	66
10.4.1. Frequency Stability over Temperature and Voltage variation.....	67
11. RF EXPOSURE STATEMENT	69

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 3 of 70

1. GENERAL INFORMATION

1.1. CLIENT INFORMATION

Company	Samsung Electronics Co., Ltd.
Contact Point	416, Maetan-3Dong, Yeongtong-gu, Suwon-si, Kyungki-do, Korea
Contact person	Name: JOON-HO LEE / Senior Research Engineer E-mail : joonho@samsung.com Tel: +82-31-279-3552 Fax: +82-31-279-7576

1.2. PRODUCT INFORMATION

EUT TYPE	Mobile WiMAX Outdoor RAS
EMISSION DESIGNATOR	9M14G7D (QPSK), 9M15W7D(16QAM/64QAM)
OPERATING FREQUENCY	2496 MHz ~ 2690 MHz
TX OUTPUT POWER	2 W (33 dBm) / Path 4 W (36 dBm) / Sector
CHANNEL BANDWIDTH	10 MHz
MODULATION TYPE	OFDMA(QPSK, 16QAM, 64QAM)
NUMBER OF CARRIERS/SECTORS	2 Carriers per RAS
CHANNEL CARD CAPACITY	2 Carrier / 1 Sector
SYSTEM INPUT VOLTAGE	DC -48V

1.3. INTRODUCTION OF EUT

The outdoor SPI-2L100, RAS of Mobile WiMAX, is controlled by ACR and connects Mobile WiMAX calls to MS.

The outdoor SPI-2L100 interfaces with MS via a wireless channel observing the Mobile WiMAX standard (IEEE 802.16) and provides high-speed data service and multimedia service in wireless broadband.

To this end, the outdoor SPI-2L100 provides the following functions: modulation/demodulation of packet traffic signal, scheduling and radio bandwidth allocation to manage air resources efficiently and ensure Quality of Service (QoS), Automatic Repeat request (ARQ) processing, ranging function, connection control function to transmit the information on the outdoor SPI-2L100 and set/hold/disconnect the packet call connection, handover control and ACR interface function and system operation management function.

The outdoor SPI-2L100 interfaces with ACR in one way of Fast Ethernet/Gigabit Ethernet and can exchange various control signals and traffic signals stably.

The outdoor SPI-2L100 is installed in the outdoor environment and managed in the omni or sector method according to the property of the installed area. In addition, the outdoor SPI-2L100 supports the capacity of the maximum 2Carrier/1Sector and MIMO only with the basic cabinet.

The characteristics of the outdoor SPI-2L100 are as follows:

- Application of the OFDMA Method
- Support of Broadband Channel Bandwidth
- Support of 2Carrier/1Sector
- Support of MIMO
- Support of 2-Branch Rx Diversity (Optional)
- Support of Various Frequency Allocation

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 5 of 70

2. TEST SUMMARY

2.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance With **FCC Part 27**

SECTION	TEST ITEMS	RESULTS
2.1046, 27.50(h)	Conducted Output Power	Compliant
2.1049, 27.53(m)	Occupied Bandwidth	Compliant
2.1051, 27.53(m)	Spurious Emissions at Antenna Terminals	Compliant
2.1051, 27.53(m)	Channel edge	Compliant
2.1053, 27.53(m)	Spurious Radiated Emissions.	Compliant
2.1055, 27.54	Frequency Stability over Temperature and Voltage variation	Compliant

2.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission. All Modulation (QPSK, 16QAM, and 64QAM) modes were tested, and the worst data was recorded in this test report.

The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 6 of 70

3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 °C to + 35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1060 mbar

4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	147	03/26/2010
Schwarzbeck	VULB 9160 / TRILOG Antenna	9160-3150	12/18/2010
Schwarzbeck	VULB 9160 / TRILOG Antenna	3125	05/06/2011
HD	MA240 / Antenna Position Tower	556	N/A
EMCO	1050 / Turn Table	114	N/A
HD GmbH	HD 100 / Controller	13	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A
MITEQ	AMF-60-0010 1800-35-20P	1200937	05/20/2010
Schwarzbeck	BBHA9170 / SHF-EHF Horn Antenna	BBHA9170342	03/20/2011
R&S	ESI40 / EMI TEST Receiver	831564/003	10/30/2010
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	1	06/29/2010
Nang-Yeul	NY-THR18750 / Temp	NY-200912201A	12/28/2010
Agilent	11636B/ Power Divider	11377	12/24/2010
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
WEINSCHL	AF117A-69-43 / STEP ATTENUATOR	21207	01/06/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

5. CONDUCTED OUTPUT POWER

5.1. Applicable Standard

According to FCC §2.1046 & 27.50(h)

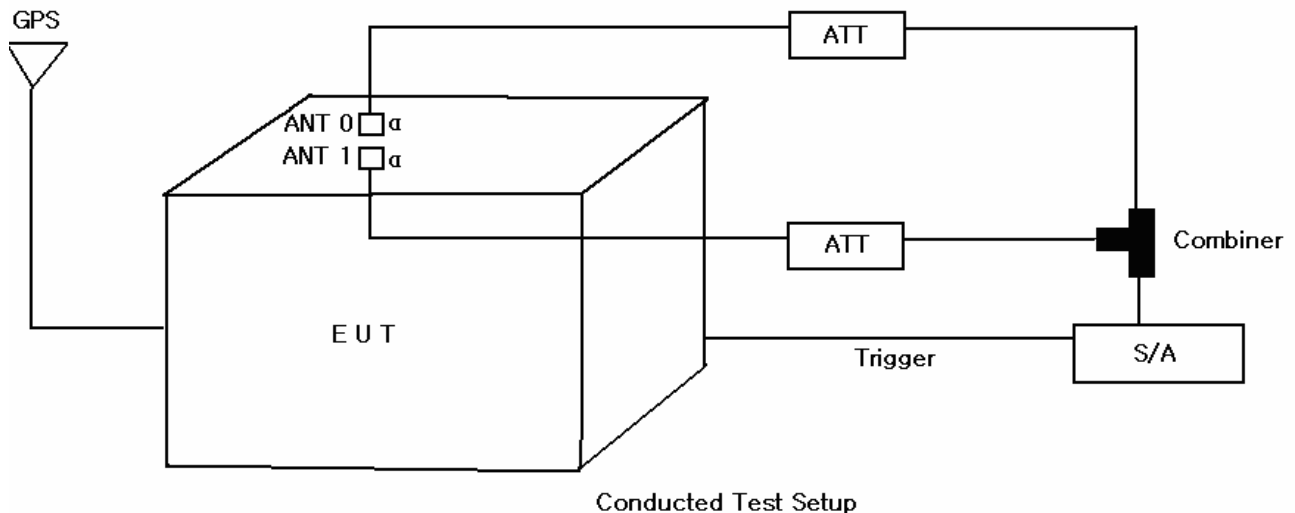
1) *Main, booster and base stations.* (i) The maximum EIRP of a main, booster or base station shall not exceed $33 \text{ dBW} + 10\log(X/Y) \text{ dBW}$, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

5.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	11636B/ Power Divider	11377	12/24/2010
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	21207	01/06/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

5.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



According to FCC §2.1046 (A), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

- 1) The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- 2) The spectrum analyzer was set to RMS Detector function and Maximum hold mode.
- 3) The resolution bandwidth of the spectrum analyzer was comparable to the emission bandwidth.
- 4) PAR is measured by using CCDF function of Spectrum Analyzer. Info BW is equal to EUT's emission bandwidth.

5.3.1. Environmental Conditions:

Temperature:	23 °C
Relative Humidity:	36 %

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 10 of 70

5.4. Test Result

: PASS

5.4.1. Test Data at Output Port A

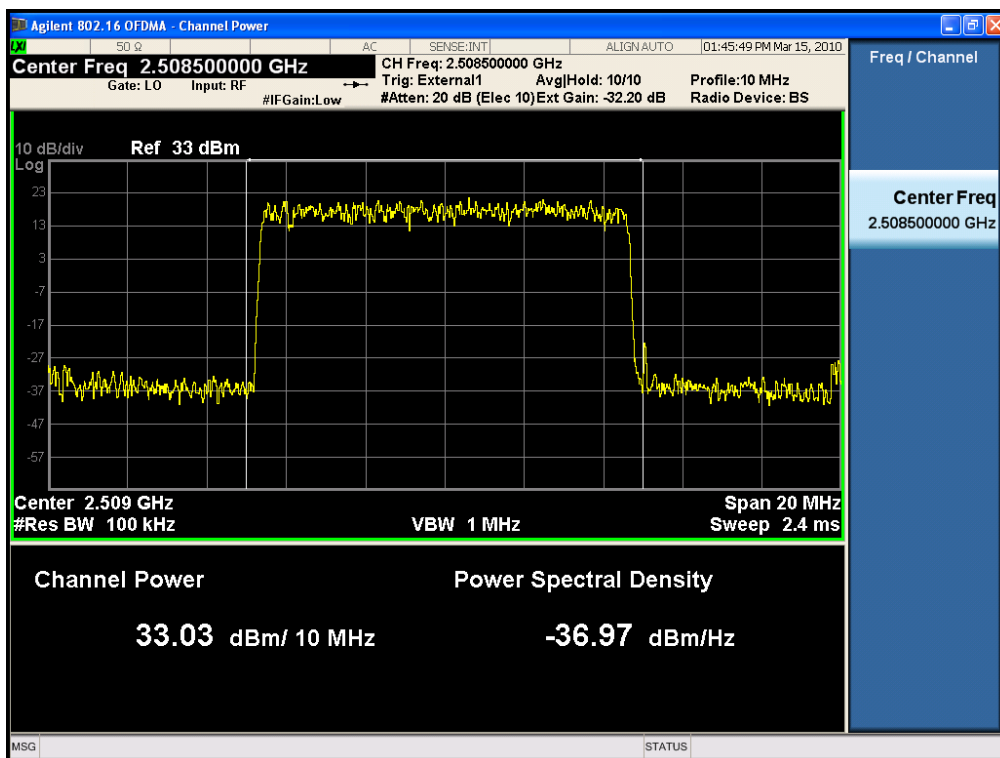
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	2508.5	33.03	2.01
	Middle	2590.0	33.13	2.06
	High	2683.5	33.20	2.09
16QAM	Low	2508.5	32.95	1.97
	Middle	2590.0	33.21	2.09
	High	2683.5	33.28	2.13
64QAM	Low	2508.5	32.98	1.99
	Middle	2590.0	33.10	2.04
	High	2683.5	33.32	2.15

5.4.2. Combined Test Data at Output Port

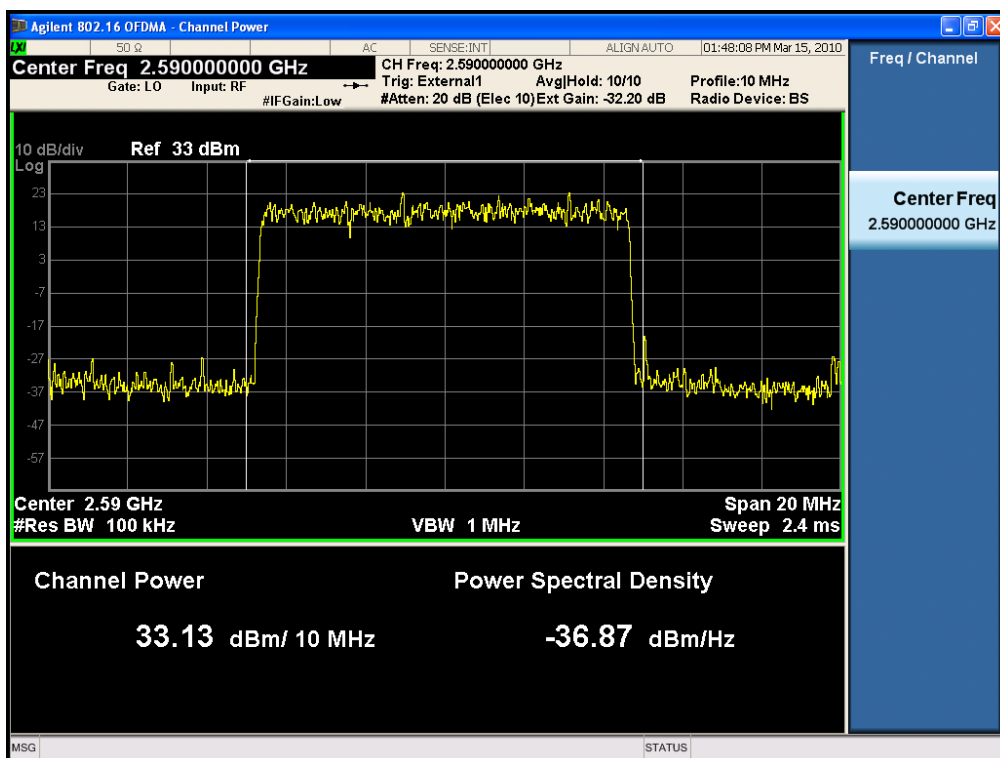
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	2508.5	36.09	4.06
	Middle	2590.0	35.86	3.85
	High	2683.5	35.95	3.94
16QAM	Low	2508.5	36.20	4.17
	Middle	2590.0	36.03	4.01
	High	2683.5	36.18	4.15
64QAM	Low	2508.5	36.01	3.99
	Middle	2590.0	35.95	3.94
	High	2683.5	36.00	3.98

5.4.3. Plot Data for Output Port A (Conducted Output Power)

(QPSK Low Channel)

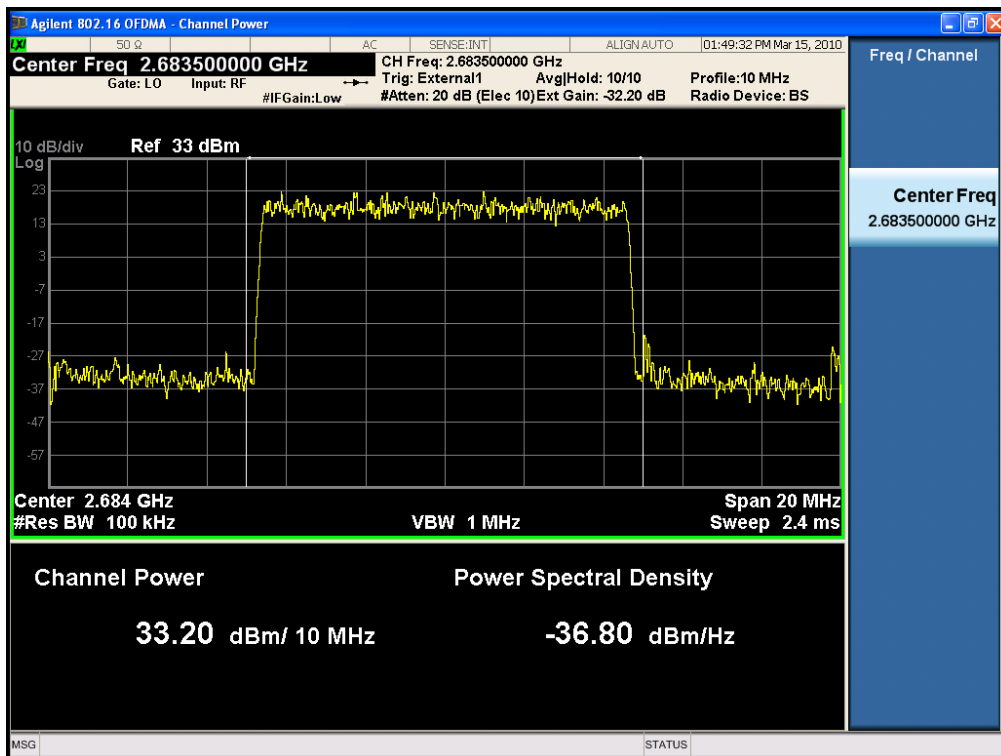


(QPSK Middle Channel)

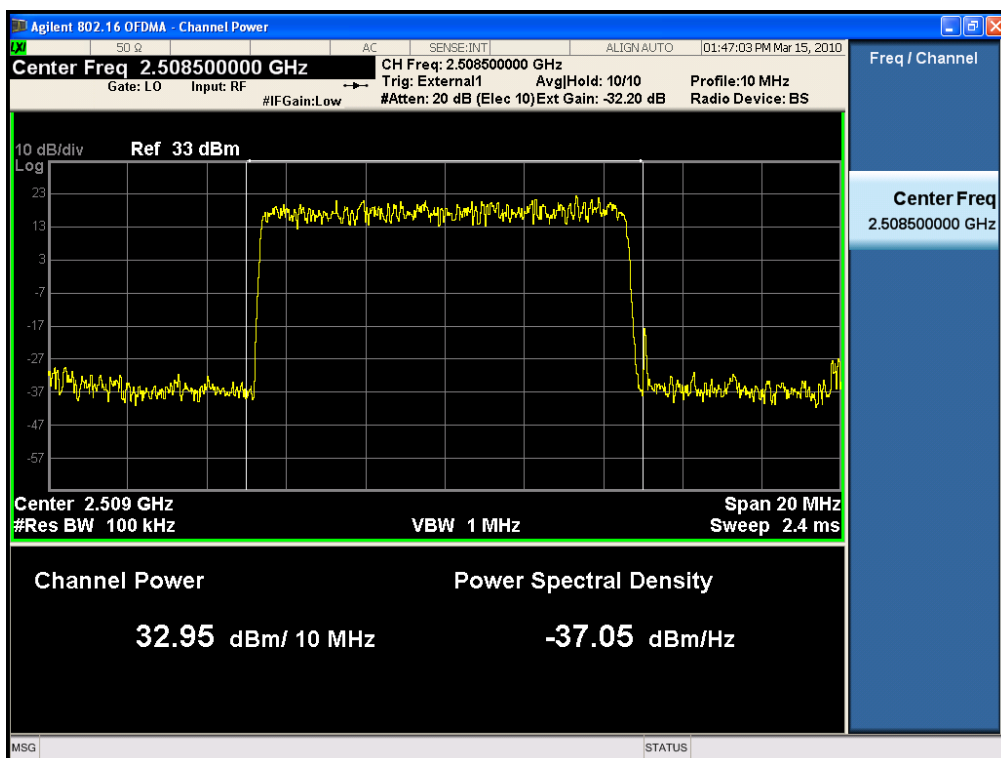


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 12 of 70

(QPSK High Channel)

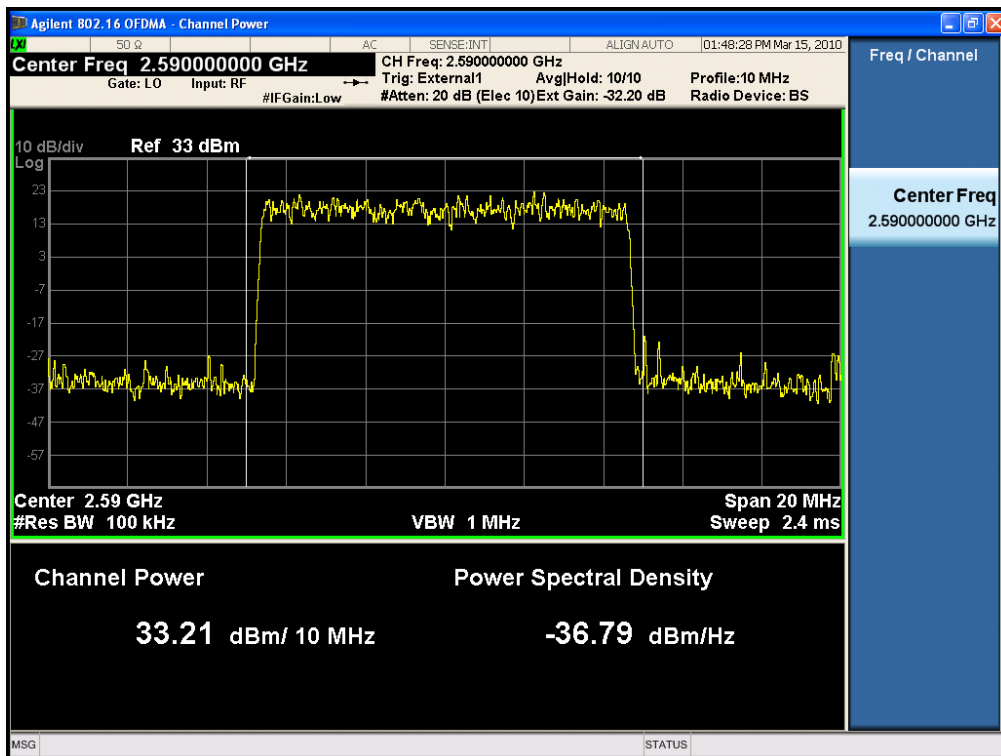


(16QAM Low Channel)

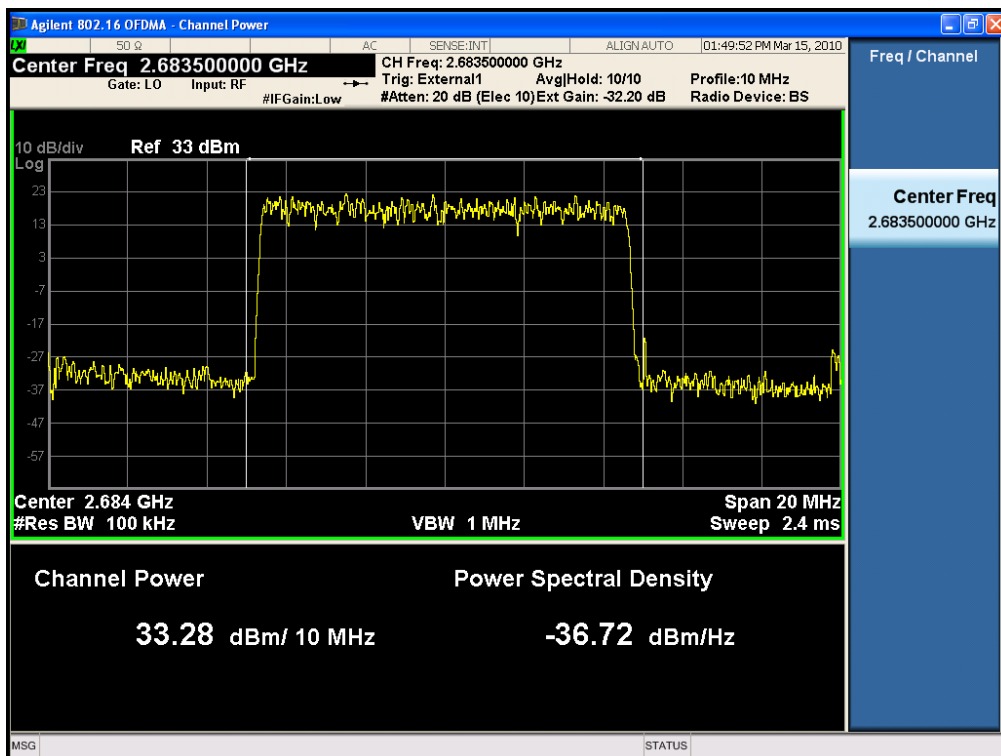


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 13 of 70

(16QAM Middle Channel)

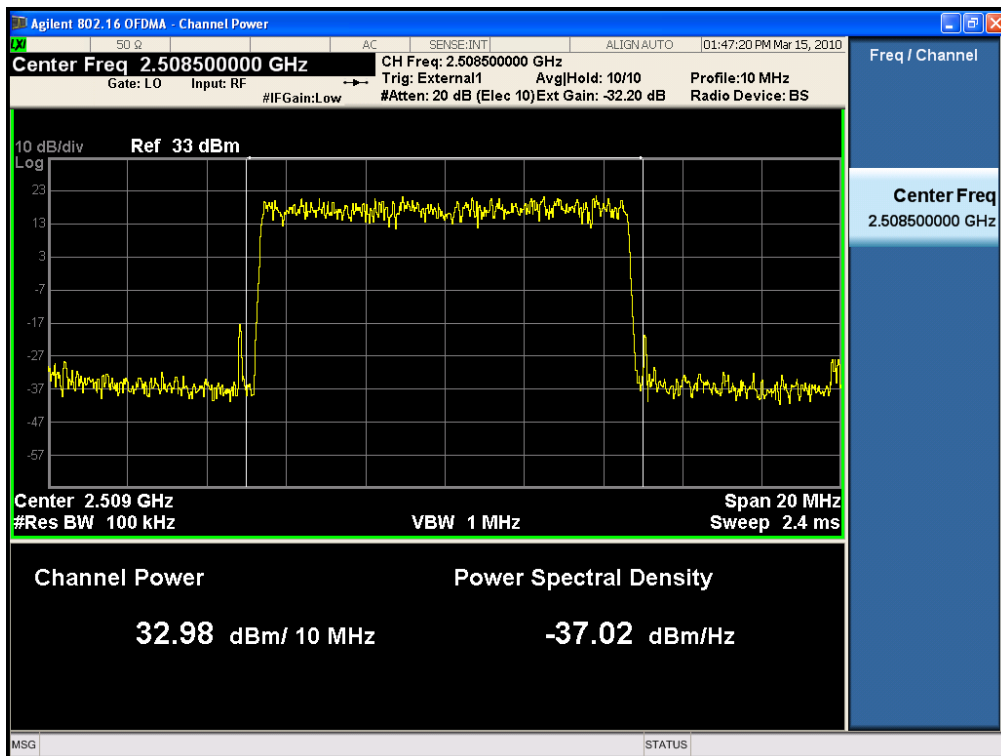


(16QAM High Channel)

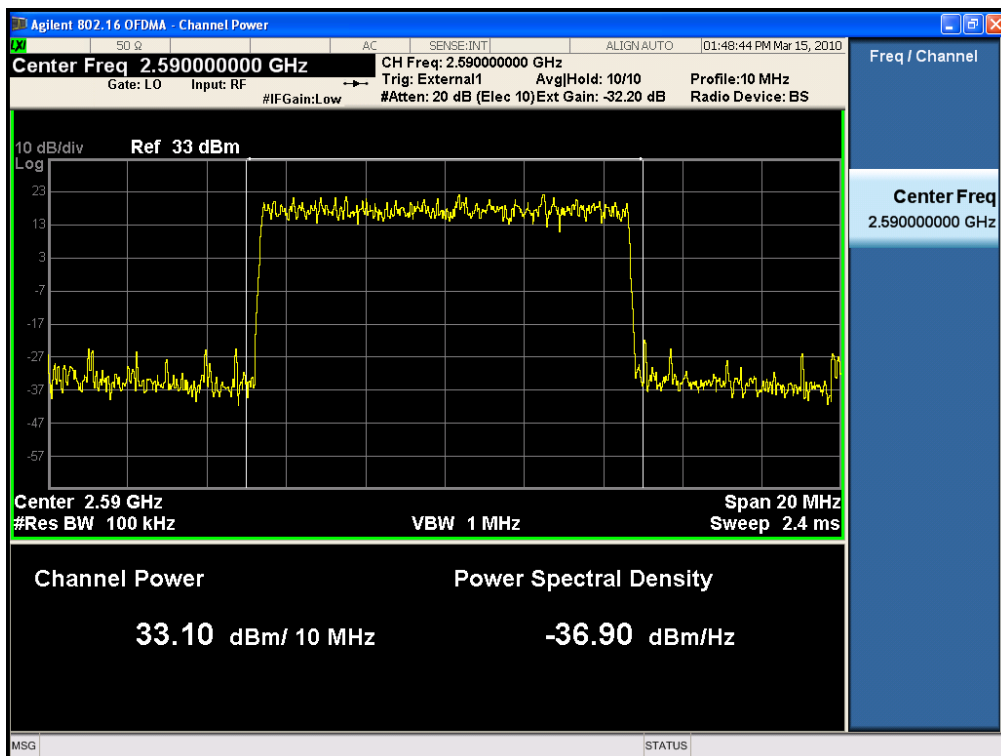


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 14 of 70

(64QAM Low Channel)

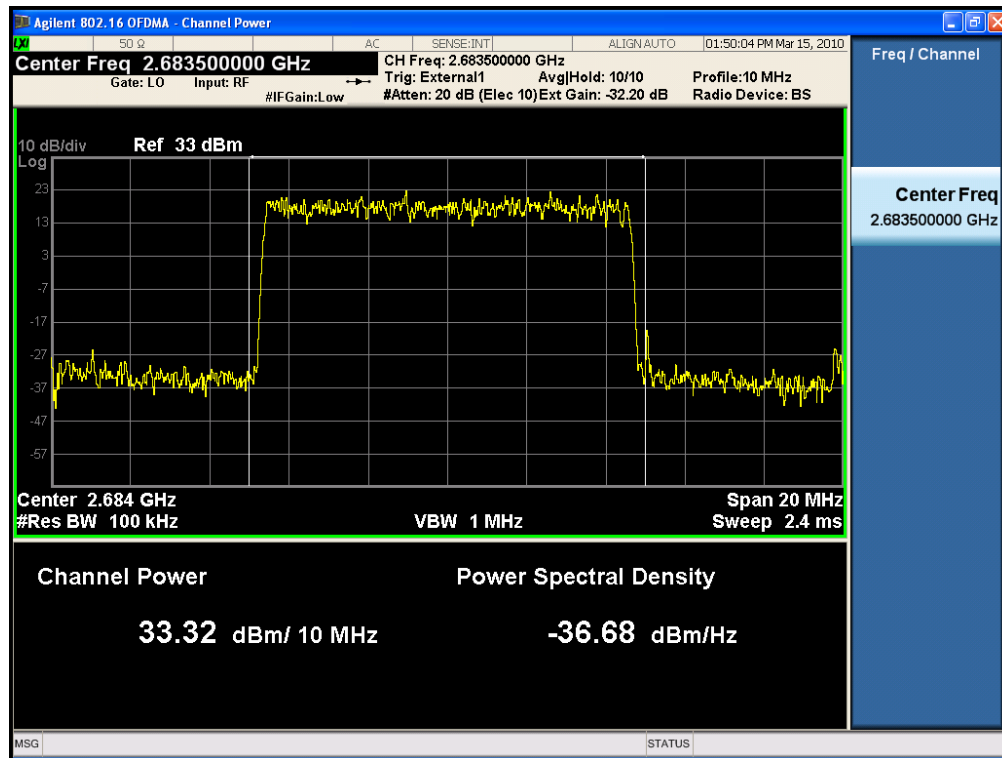


(64QAM Middle Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 15 of 70

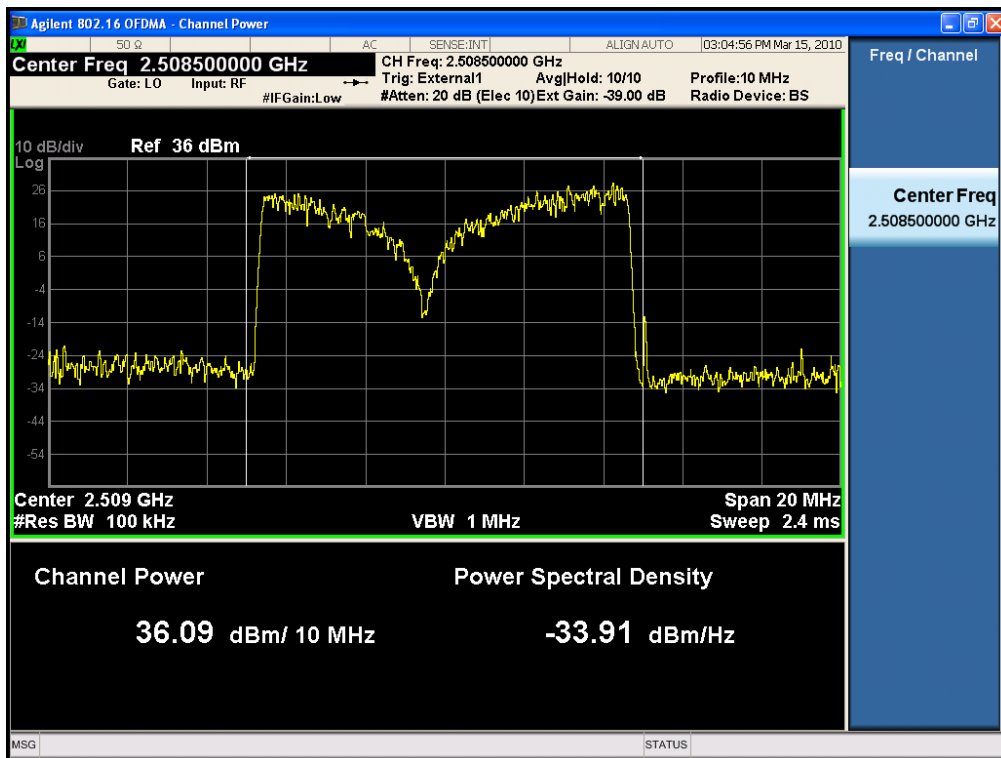
(64QAM High Channel)



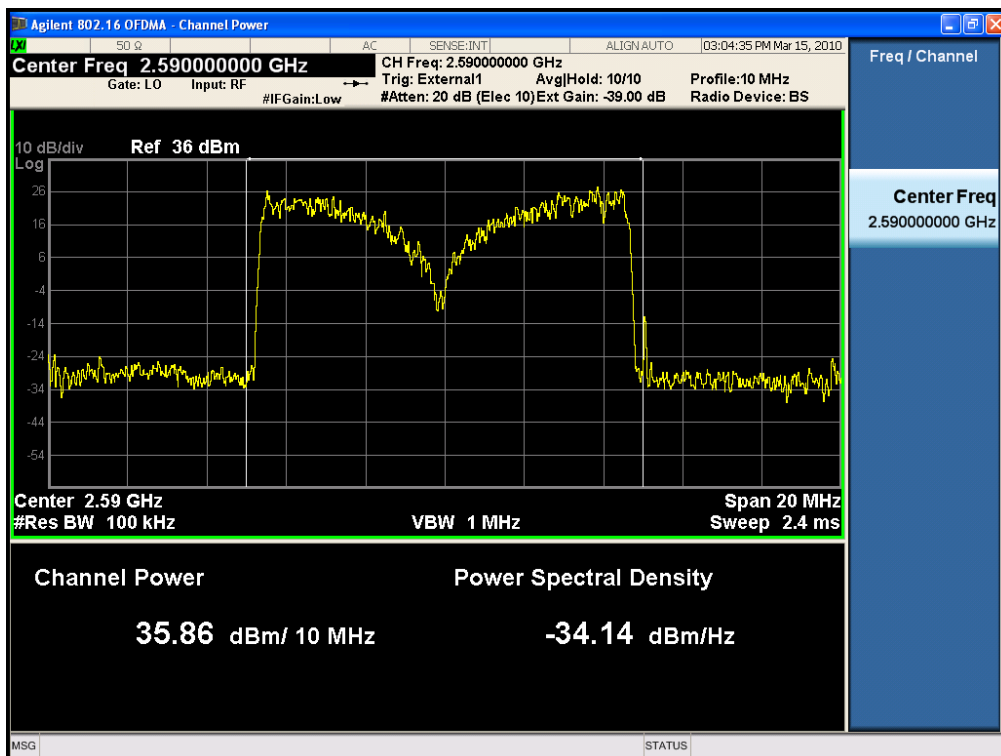
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 16 of 70

5.4.4. Combined Plot Data for Output (Conducted Output Power)

(QPSK Low Channel)

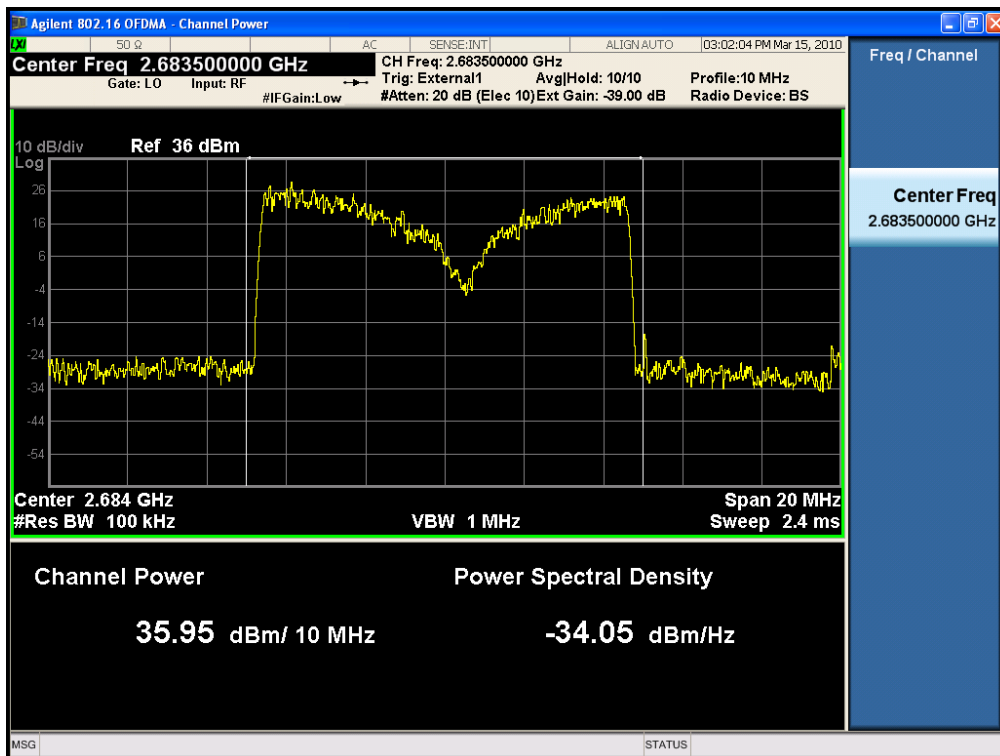


(QPSK Middle Channel)

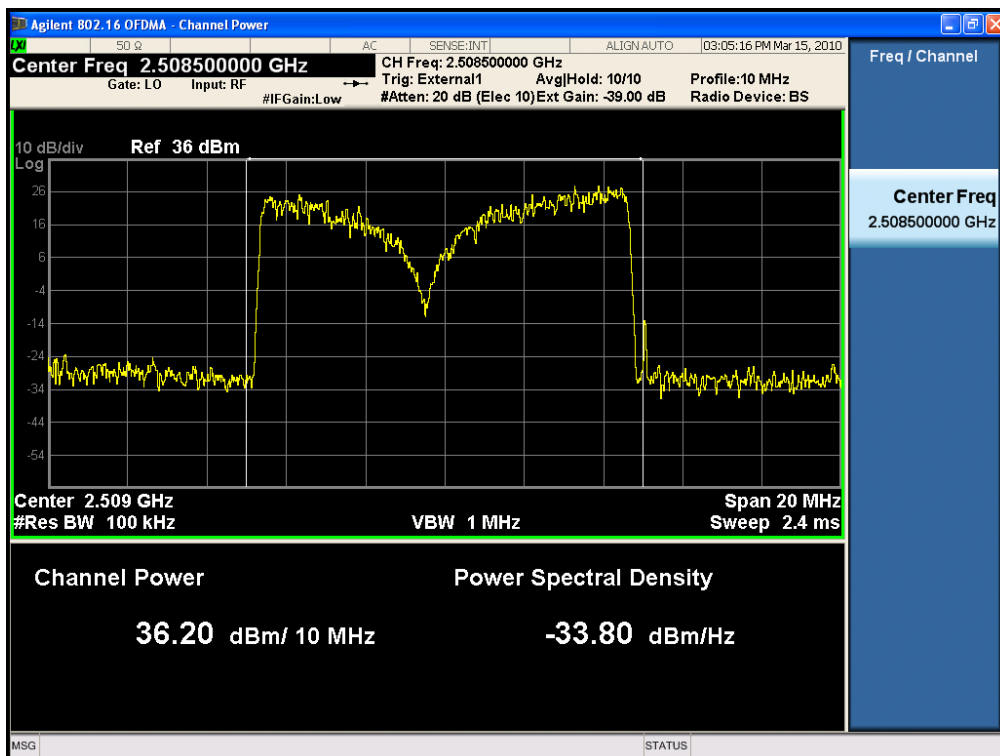


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 17 of 70

(QPSK High Channel)

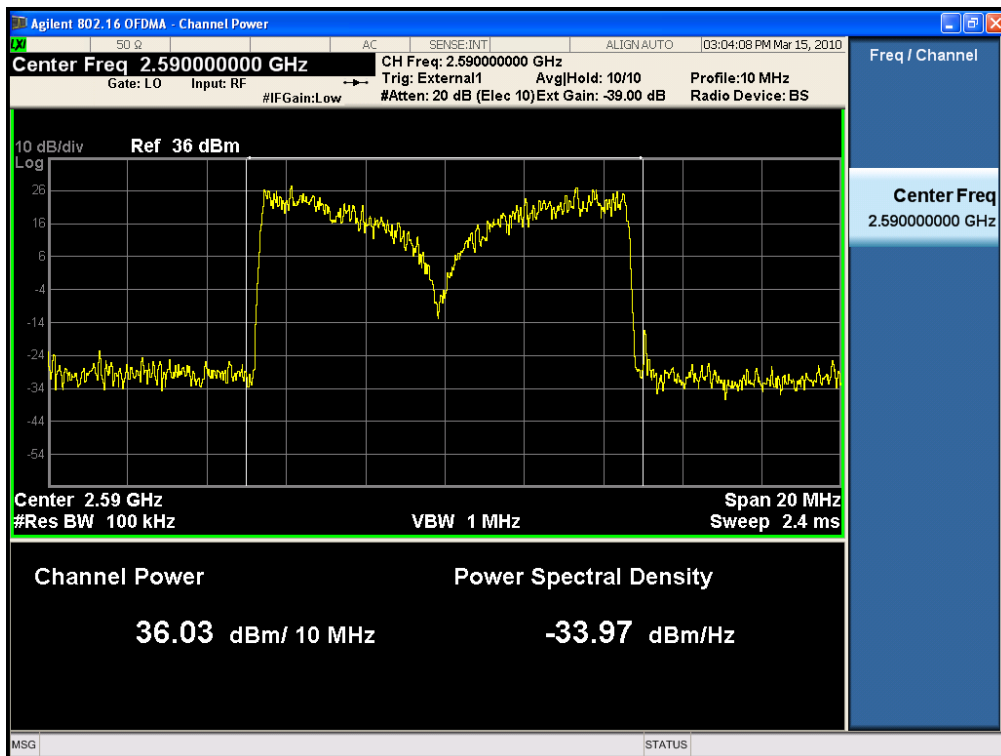


(16QAM Low Channel)

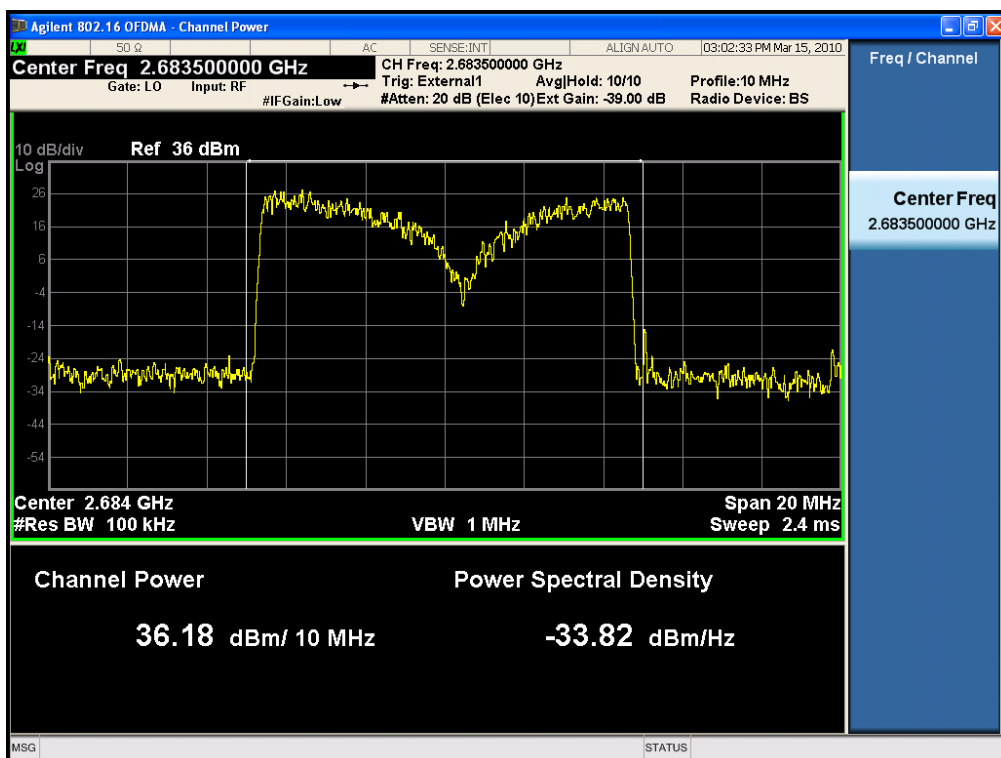


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 18 of 70

(16QAM Middle Channel)

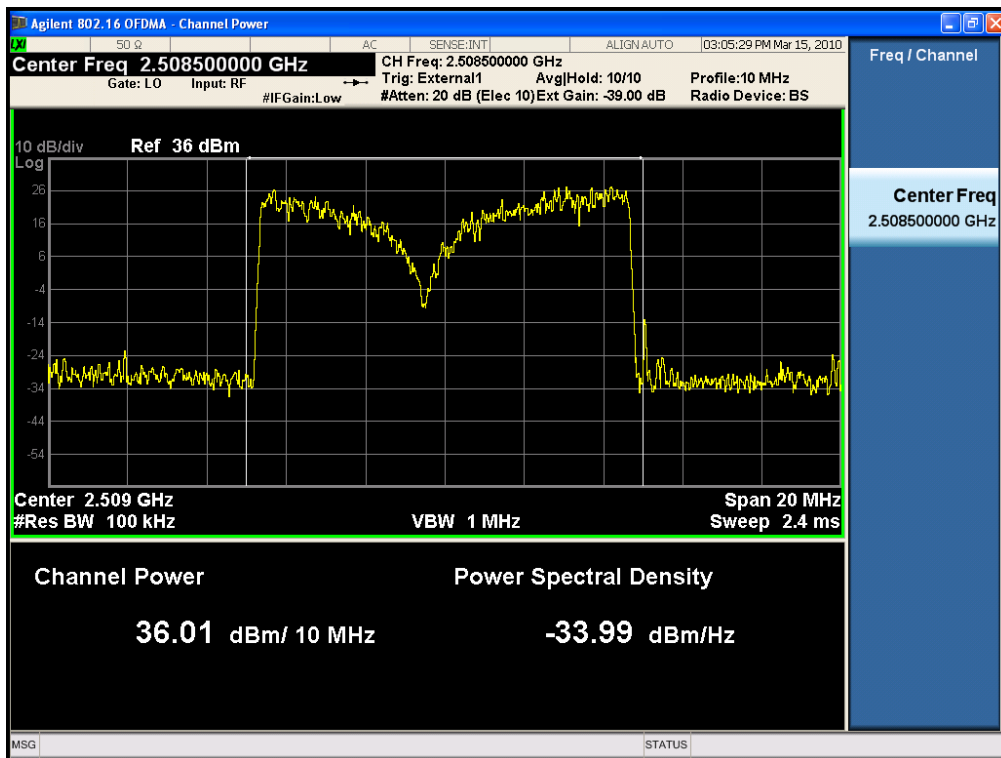


(16QAM High Channel)

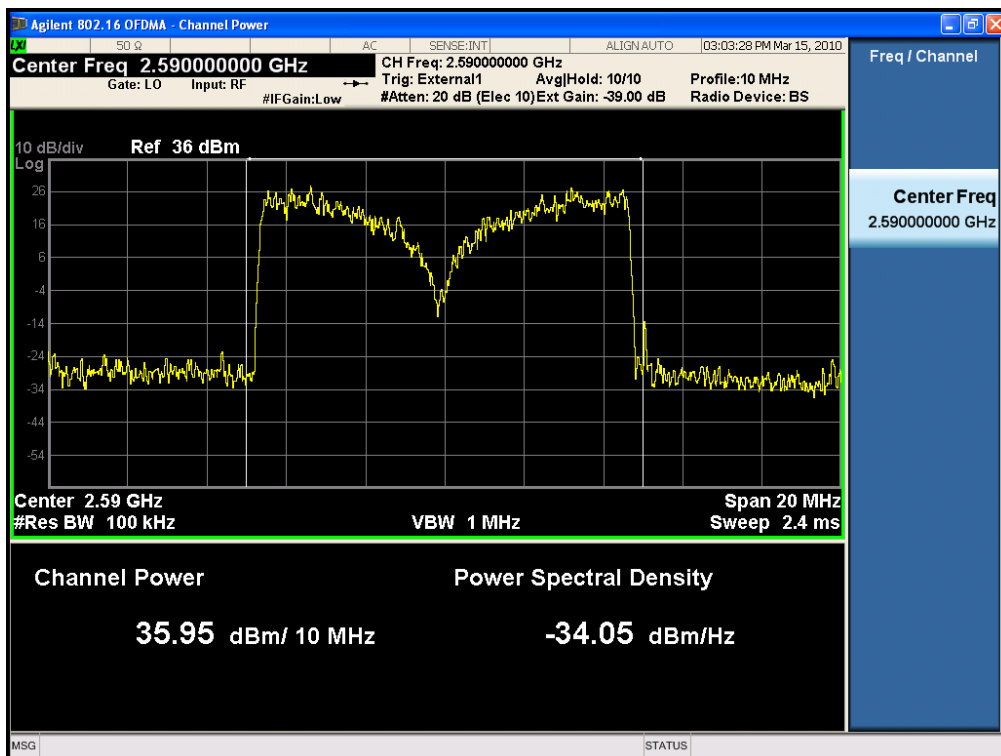


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 19 of 70

(64QAM Low Channel)

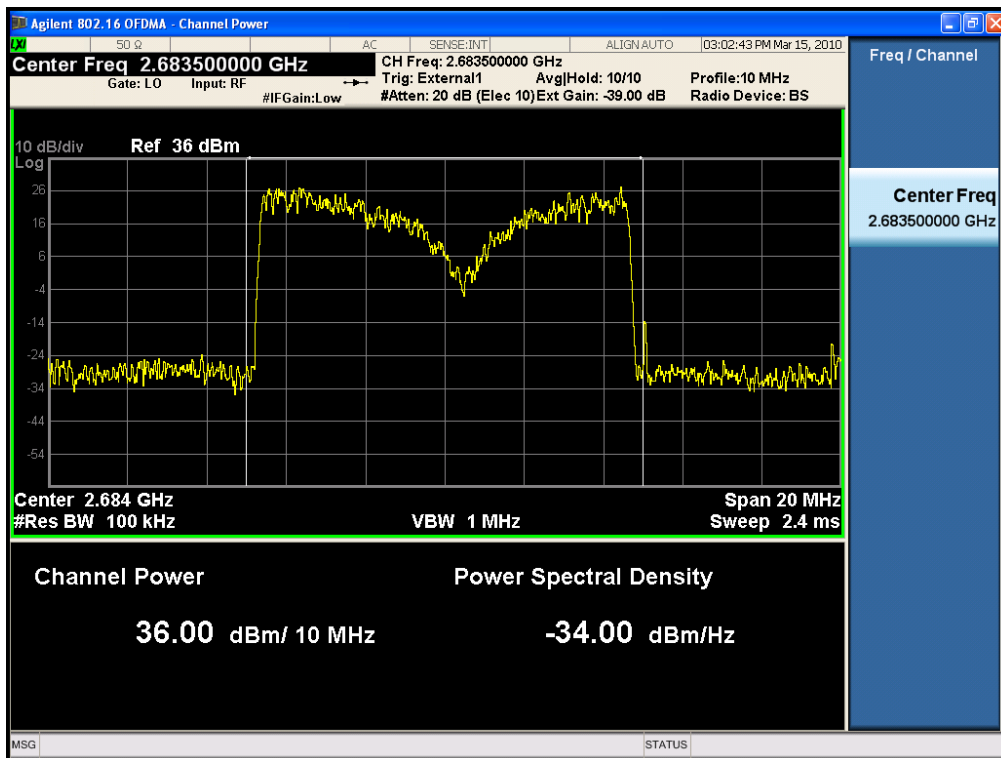


(64QAM Middle Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 20 of 70

(64QAM High Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 21 of 70

6. OCCUPIED BANDWIDTH

6.1. Applicable Standard

Requirements: CFR 47, Section 27.53(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

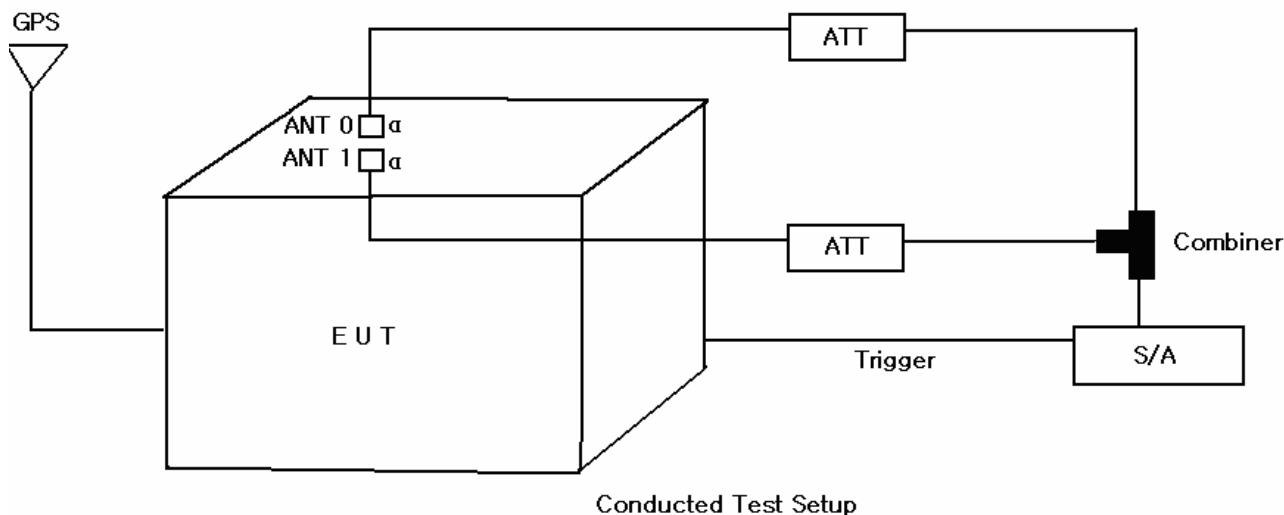
6.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	11636B/ Power Divider	11377	12/24/2010
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	21207	01/06/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 22 of 70

6.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



[Conducted Test Setup]

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function via its antenna port. Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The occupied bandwidth was measured using the built in occupied bandwidth function of the spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

6.3.1. Environmental Conditions:

Temperature:	24 °C
Relative Humidity:	37 %

6.4. Test Result

: PASS

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 23 of 70

6.4.1. Test Data at Output Port A

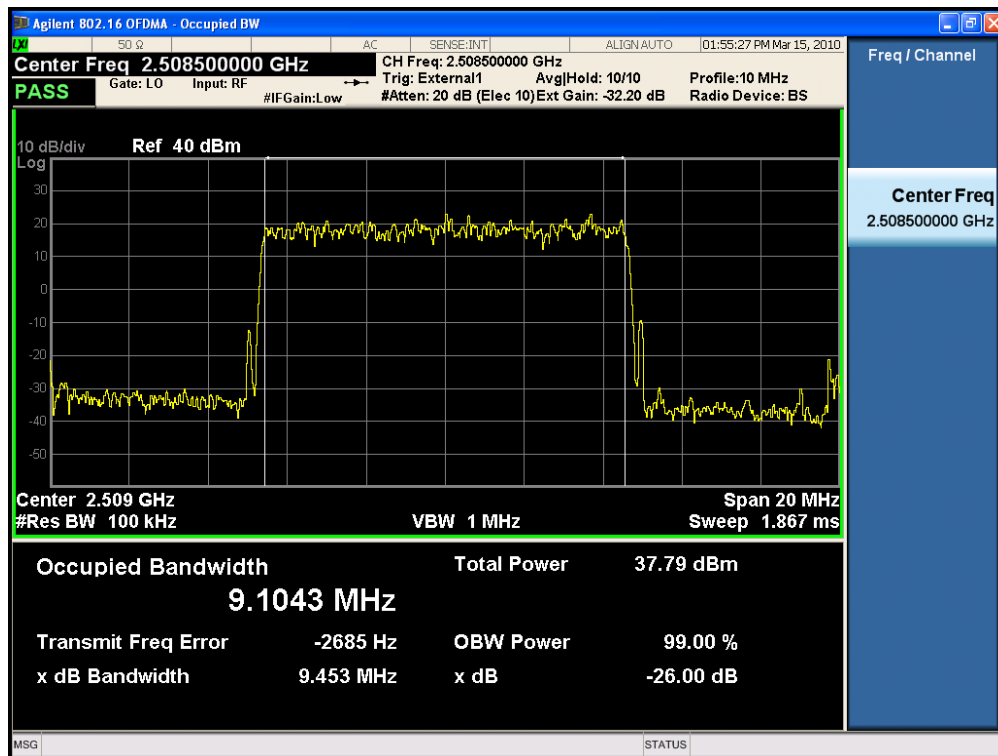
Modulation	Channel	Frequency	Measured Bandwidth
			99 %
QPSK	Low	2508.5	9.10
	Middle	2590.0	9.14
	High	2683.5	9.12
16QAM	Low	2508.5	9.13
	Middle	2590.0	9.11
	High	2683.5	9.15
64QAM	Low	2508.5	9.13
	Middle	2590.0	9.13
	High	2683.5	9.12

6.4.2. Combined Test Data at Output Port

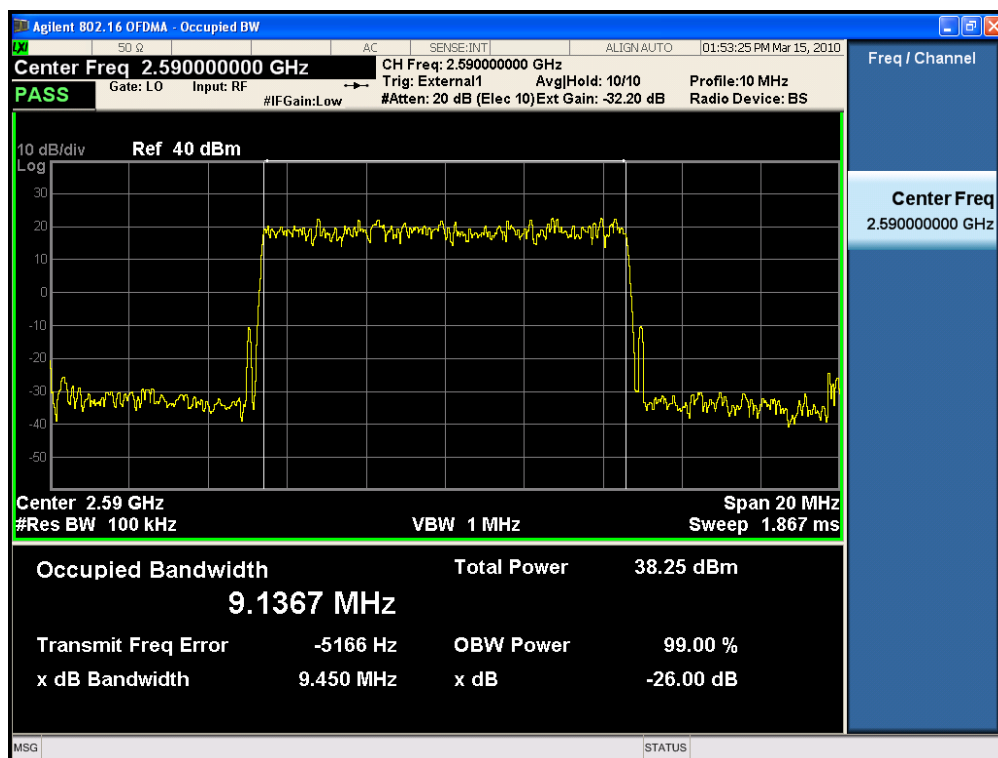
Modulation	Channel	Frequency	Measured Bandwidth
			99 %
QPSK	Low	2508.5	9.20
	Middle	2590.0	9.18
	High	2683.5	9.18
16QAM	Low	2508.5	9.16
	Middle	2590.0	9.21
	High	2683.5	9.16
64QAM	Low	2508.5	9.18
	Middle	2590.0	9.20
	High	2683.5	9.18

6.4.3. Test Plot at Output Port A

(QPSK Low Channel)

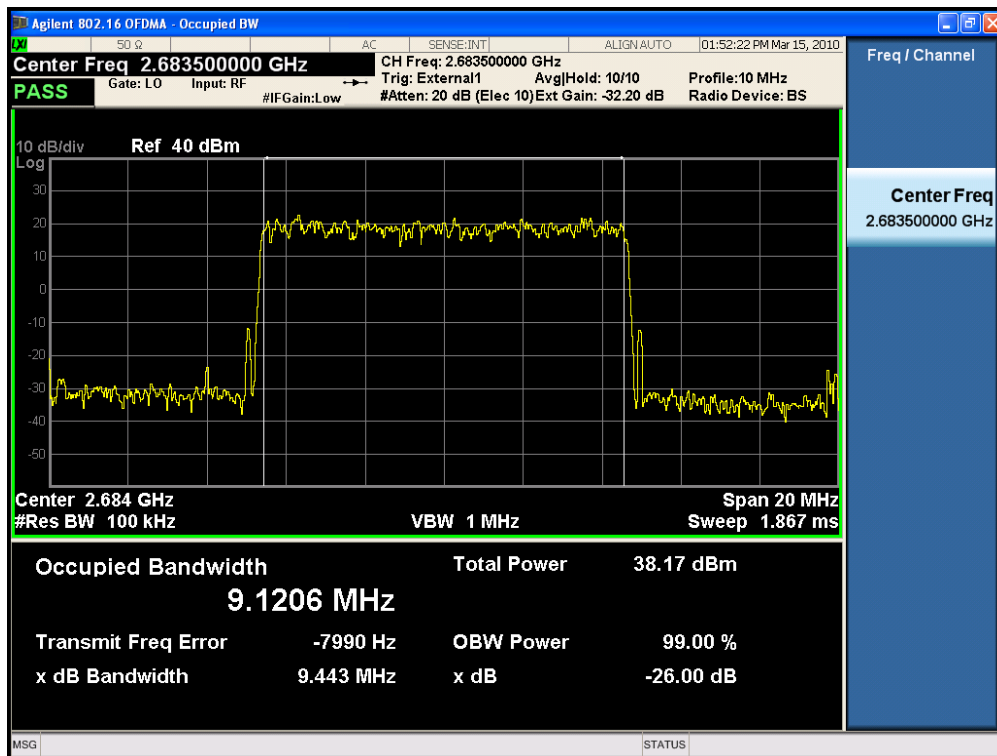


(QPSK Middle Channel)

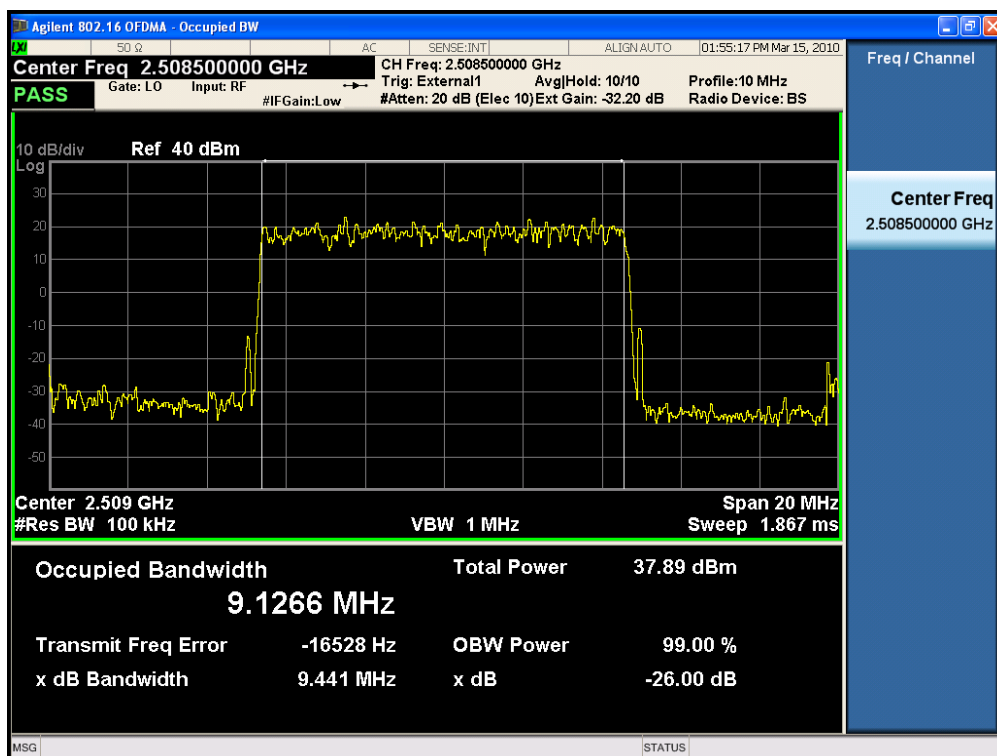


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 25 of 70

(QPSK High Channel)

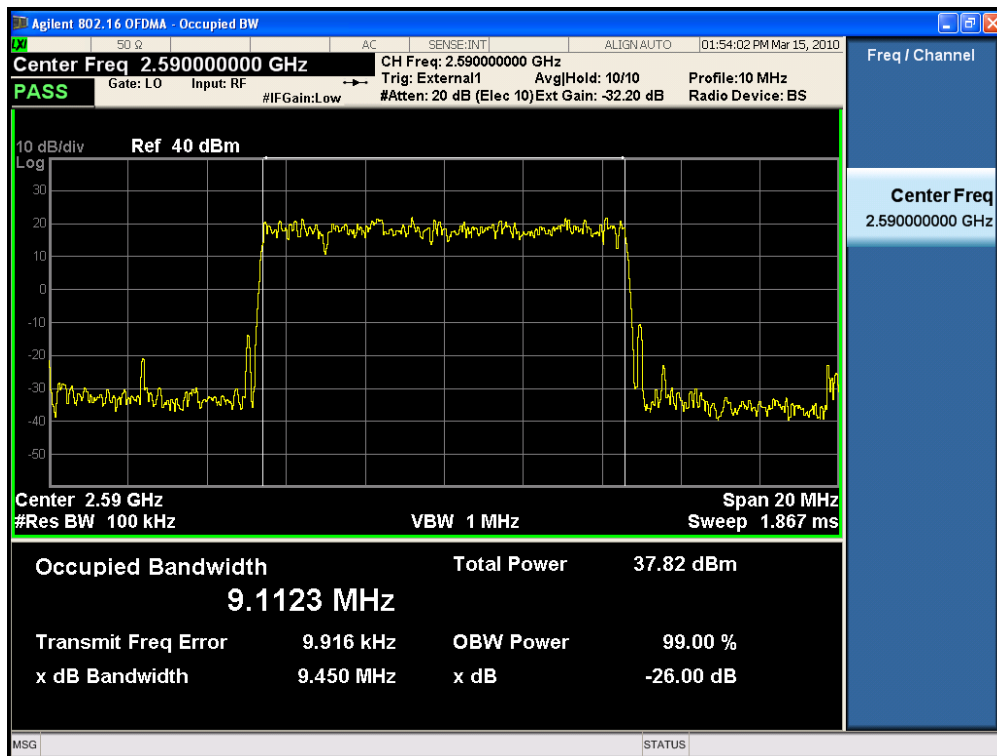


(16QAM Low Channel)

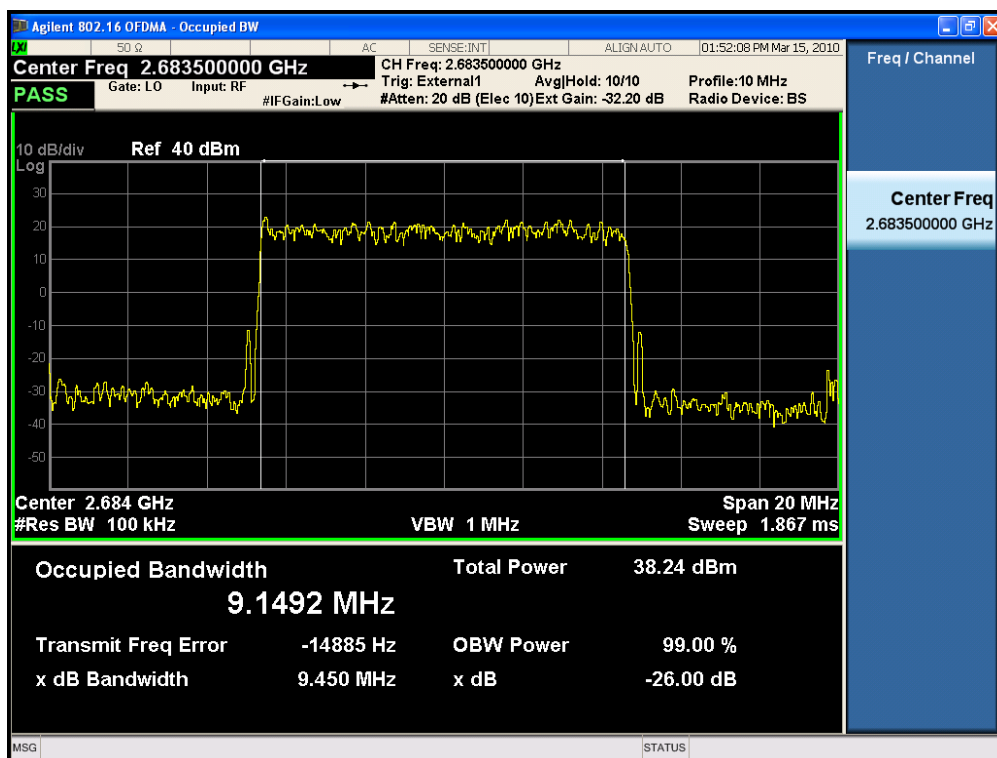


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 26 of 70

(16QAM Middle Channel)

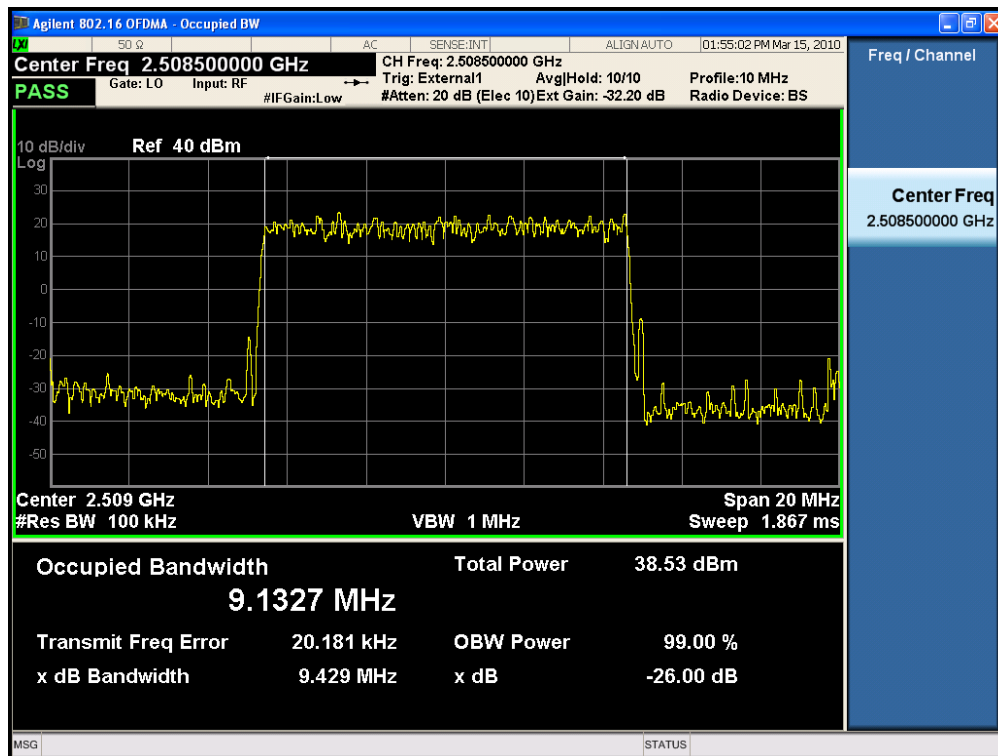


(16QAM High Channel)

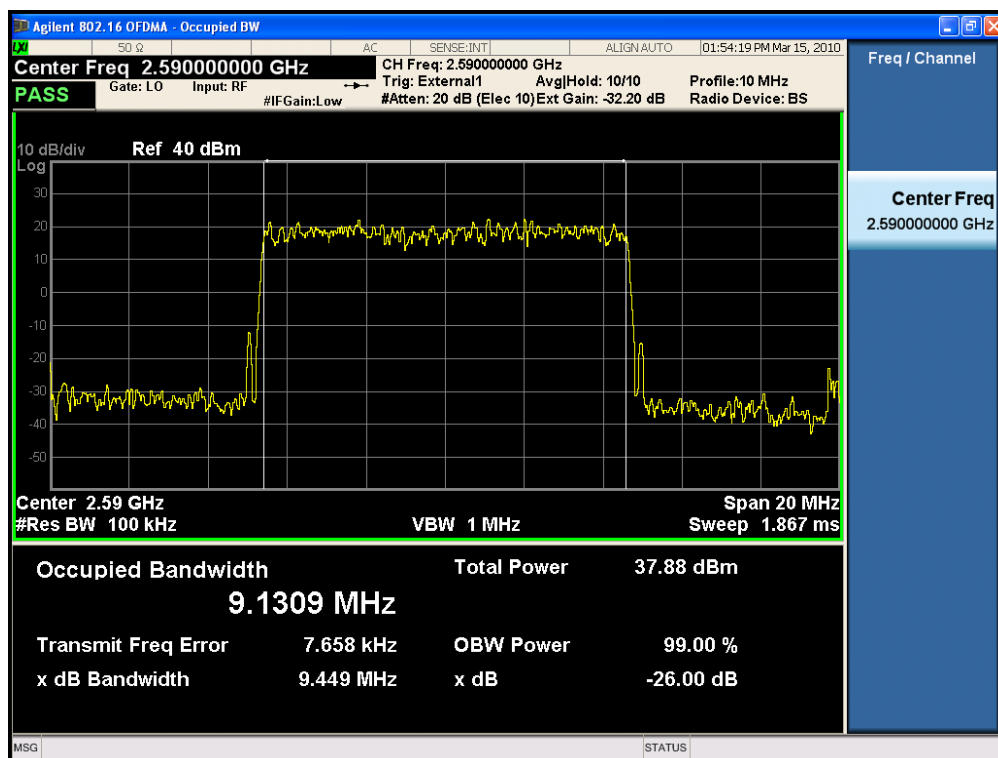


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 27 of 70

(64QAM Low Channel)

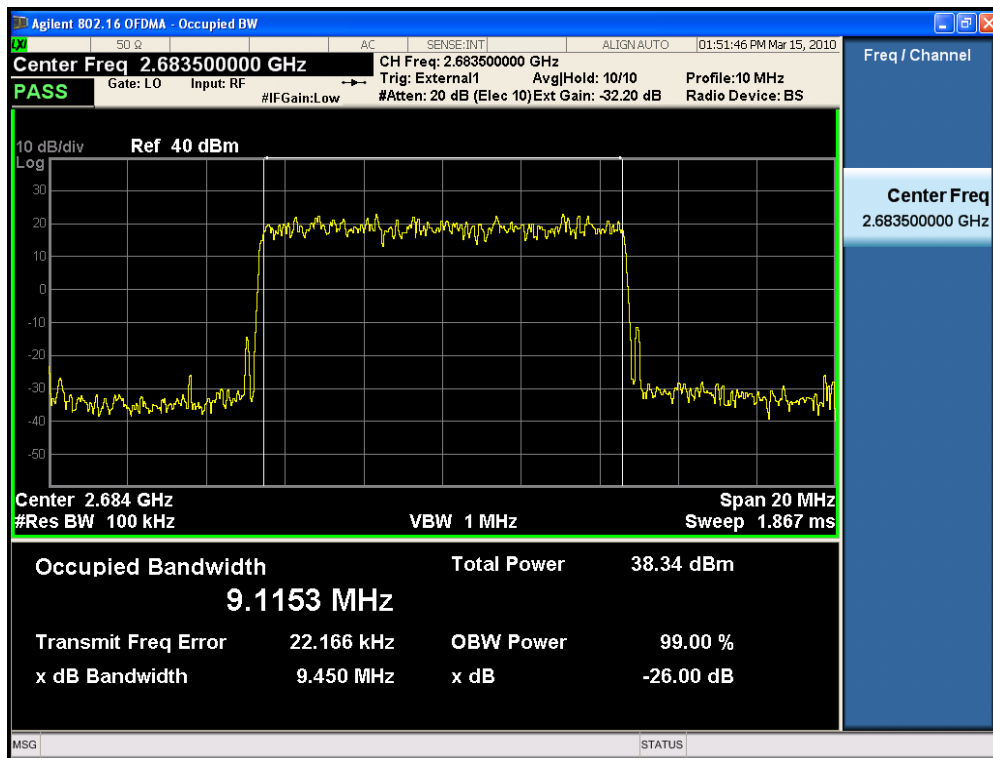


(64QAM Middle Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 28 of 70

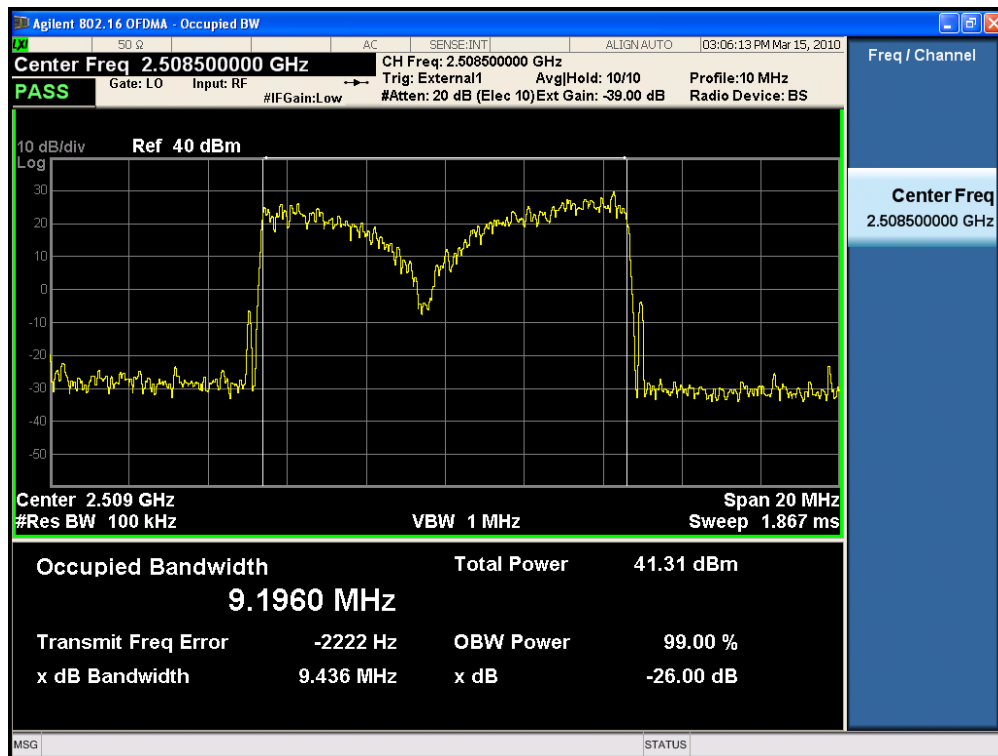
(64QAM High Channel)



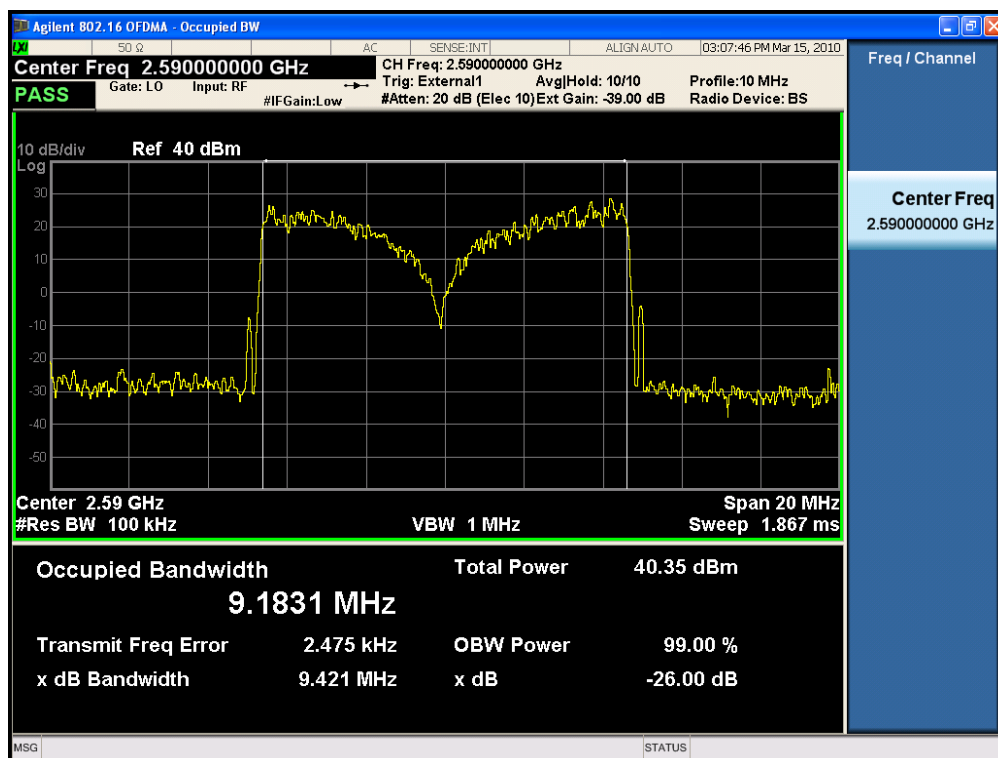
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 29 of 70

6.4.4. Combined Test Plot at Output Port

(QPSK Low Channel)

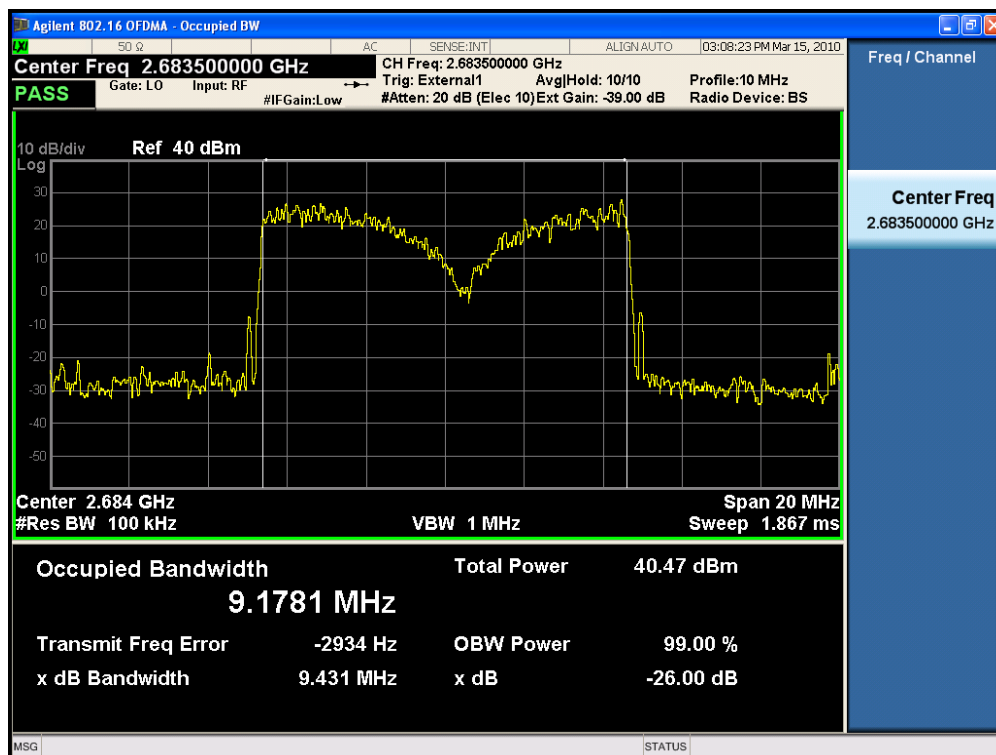


(QPSK Middle Channel)

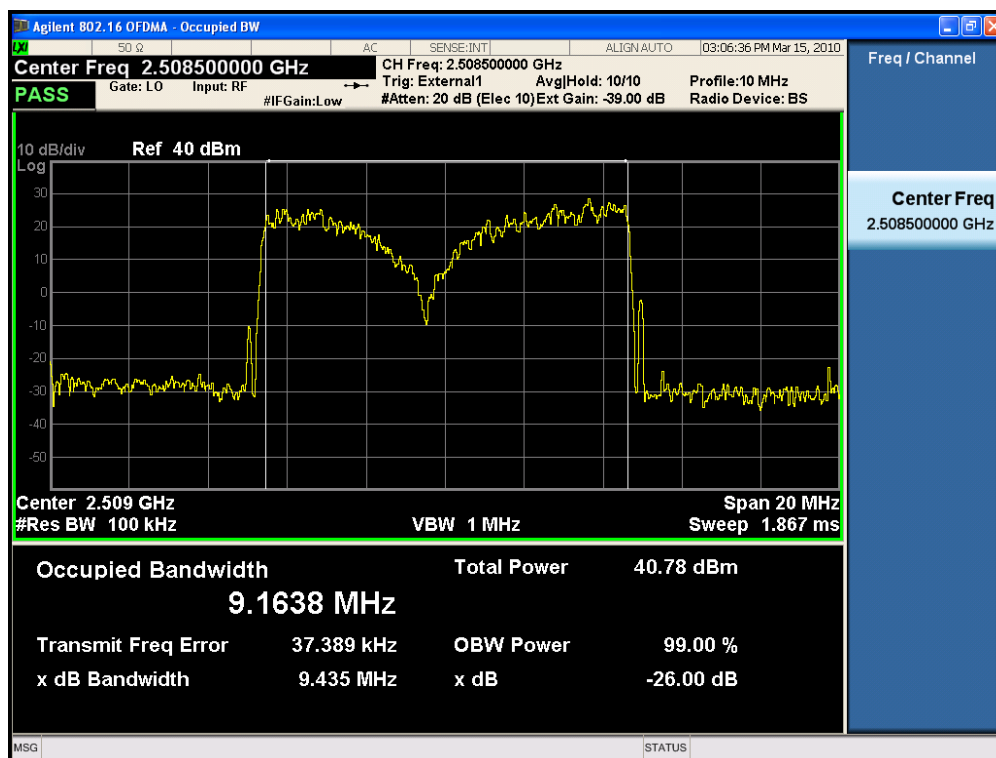


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 30 of 70

(QPSK High Channel)

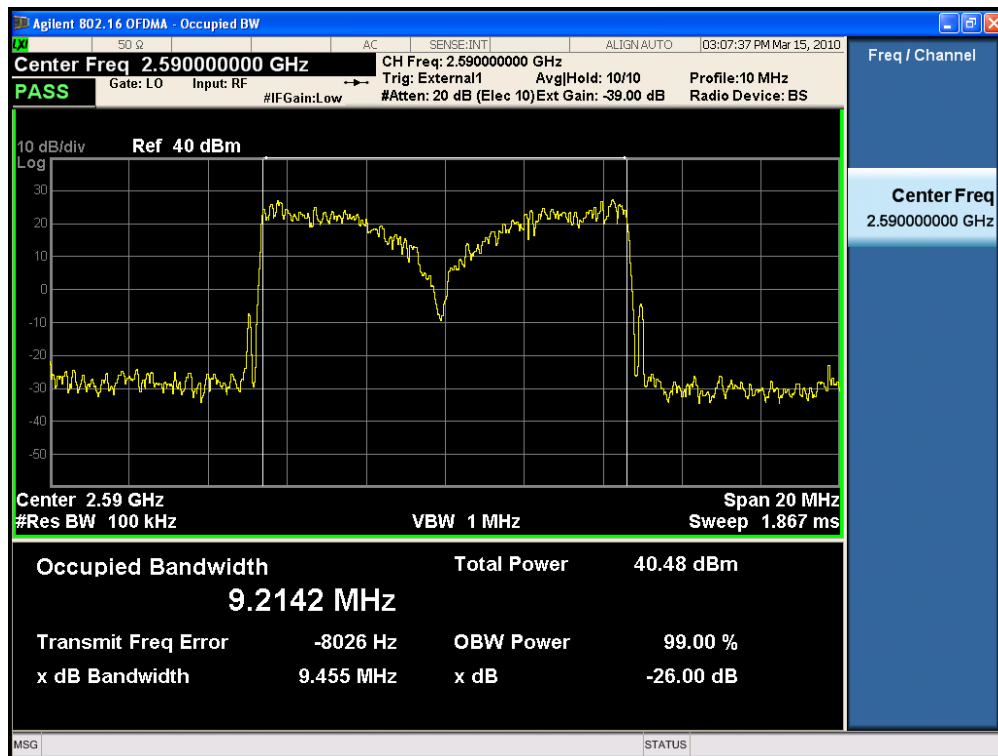


(16QAM Low Channel)

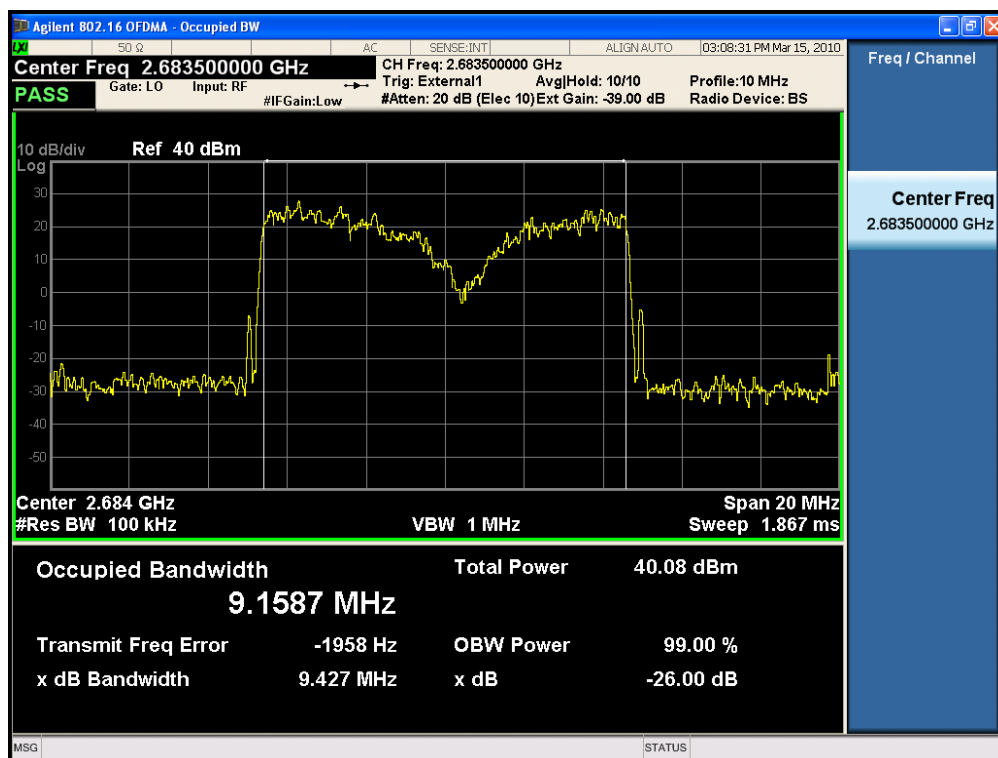


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 31 of 70

(16QAM Middle Channel)

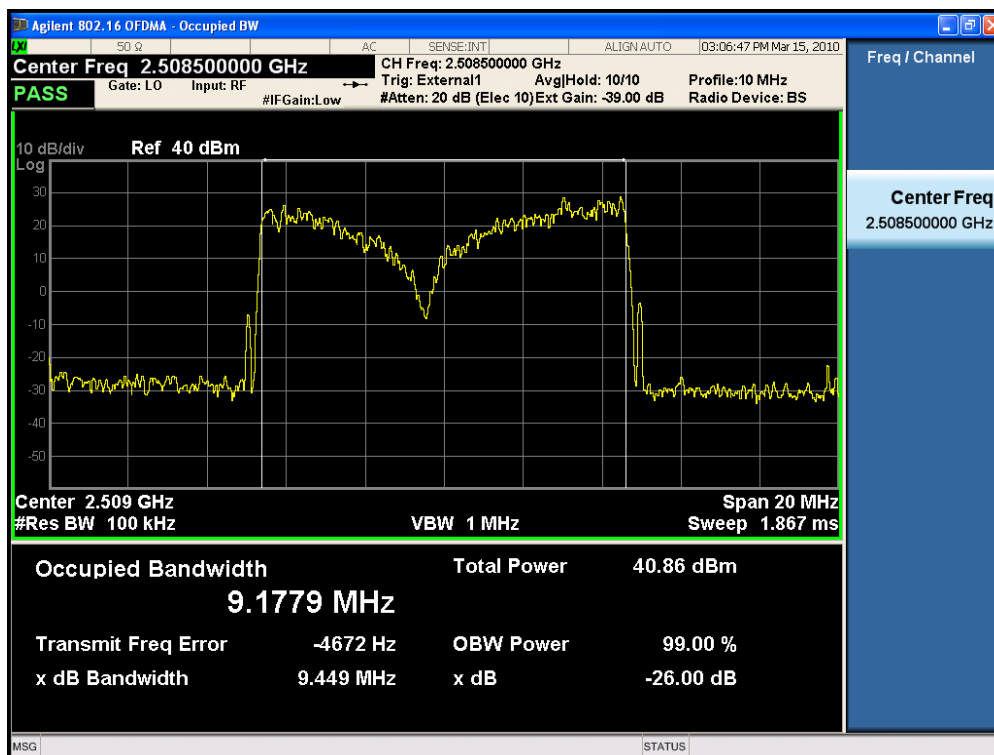


(16QAM High Channel)

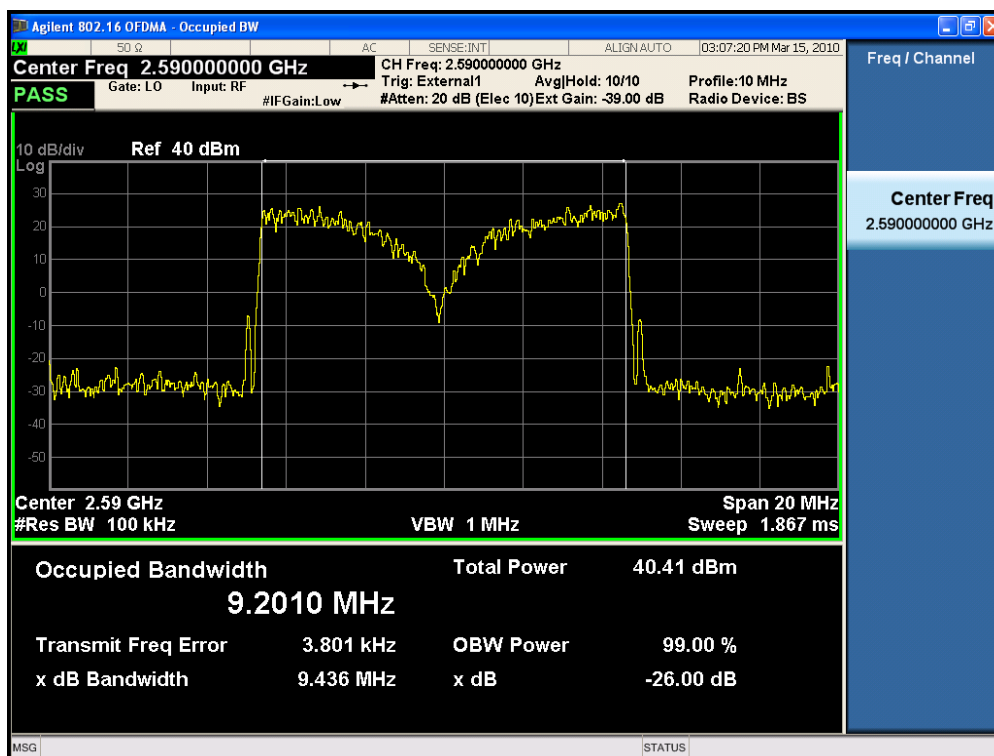


HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 32 of 70

(64QAM Low Channel)

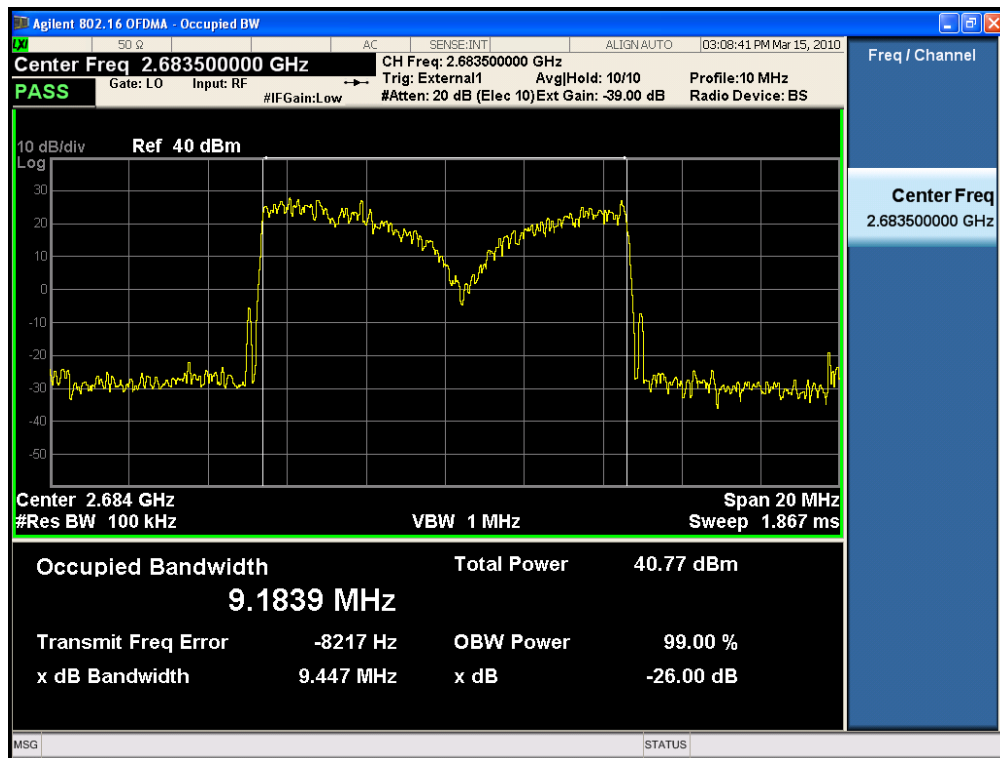


(64QAM Middle Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 33 of 70

(64QAM High Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 34 of 70

7. CHANNEL EDGES

7.1. Applicable Standard

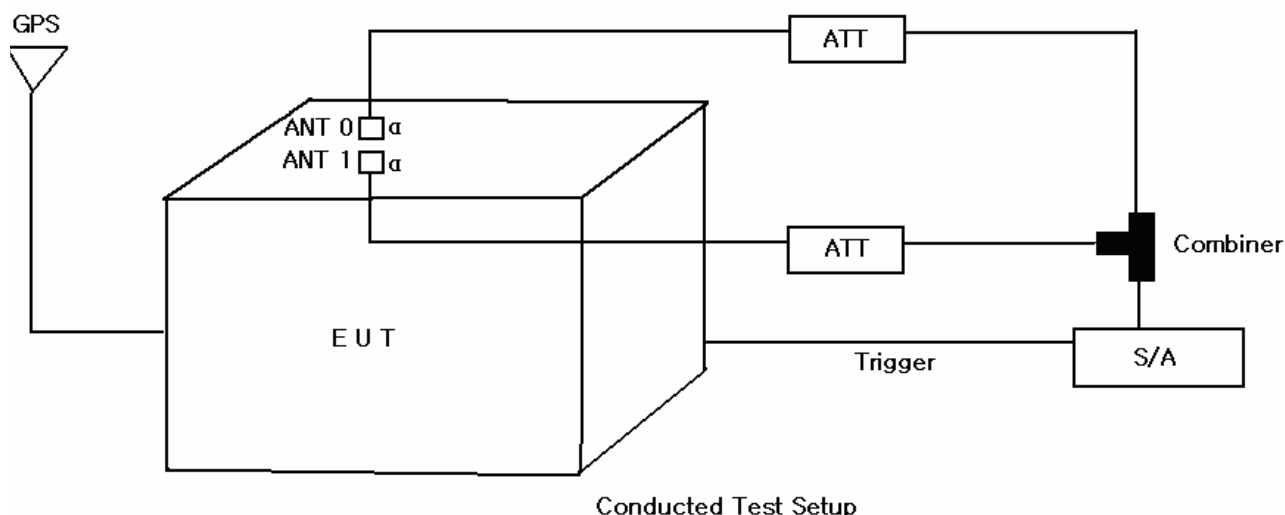
According to §27.53(m)(2), the attenuation shall be not less than $43 + 10 \log(p)$ dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area.

7.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	11636B/ Power Divider	11377	12/24/2010
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	21207	01/06/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

7.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 35 of 70

The center of the spectrum analyzer was set to block edge frequency.

The EUT provides the MIMO function which is able to transmit on the same channel with same data simultaneously therefore a combiner is used to sum the individual transmitter output power.

The test data is shown as a combined output in the report.

7.3.1. Environmental Conditions

Temperature:	25 °C
Relative Humidity:	39 %

7.4. Test Result

: PASS

7.4.1. Test data at Output Port A

- Plots of the EUT's Channel Edge are shown Page 37 ~ 39.

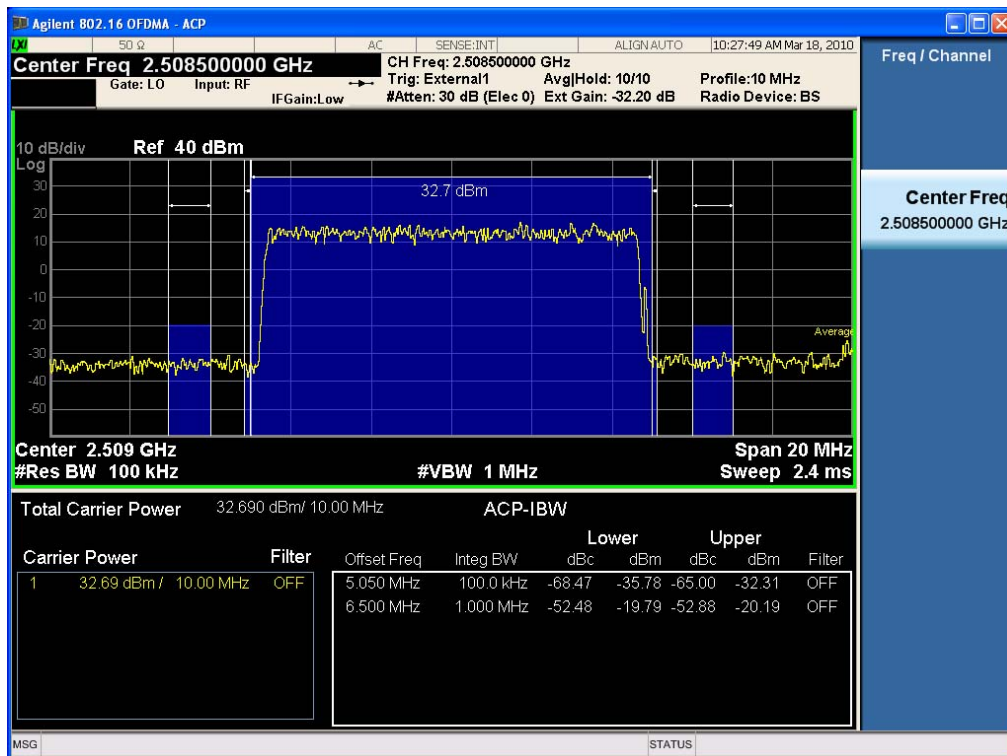
7.4.2. Combined Test data at Output

- Plots of the EUT's Channel Edge are shown Page 40 ~ 42.

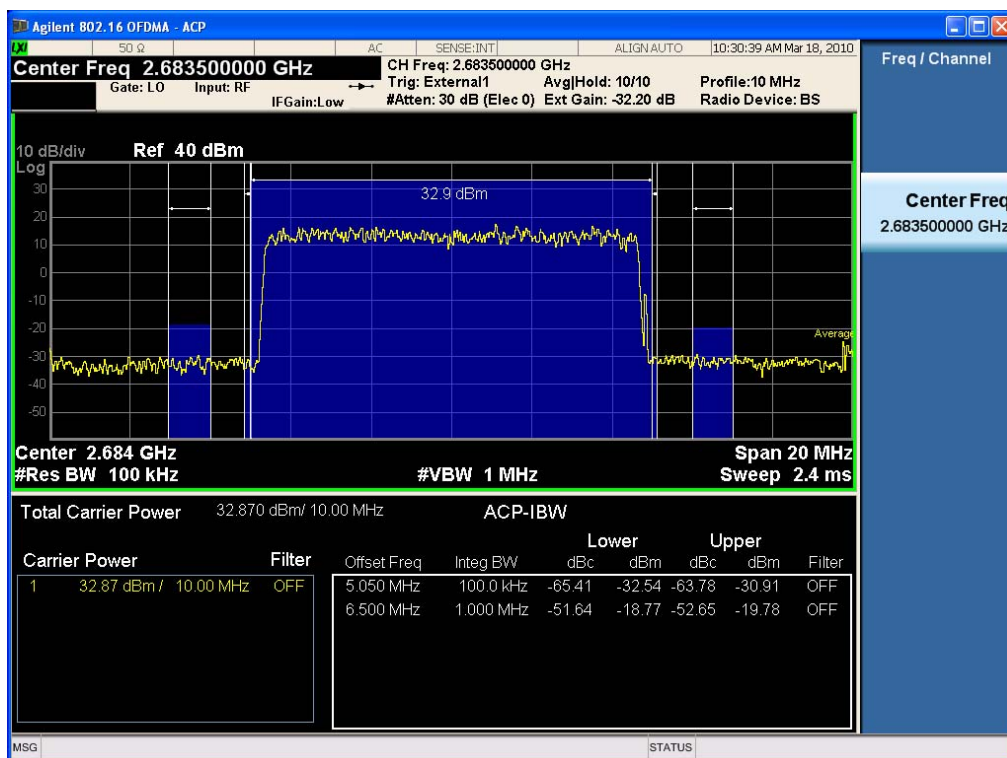
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 36 of 70

7.4.3. Plot Data at Output Port A

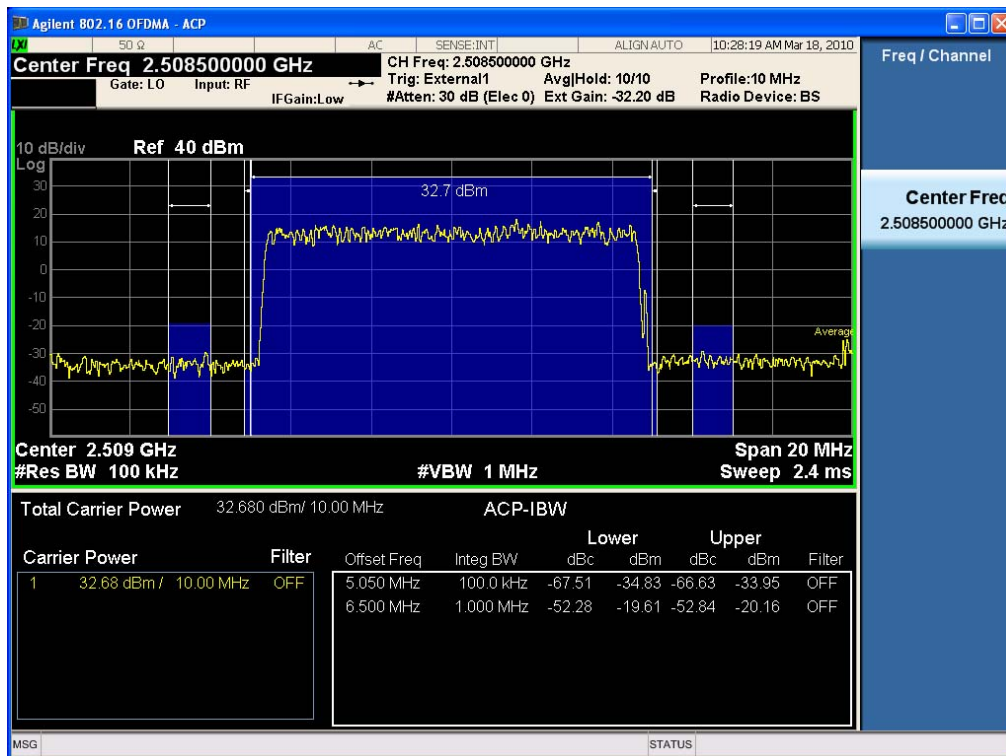
(QPSK Low Channel)



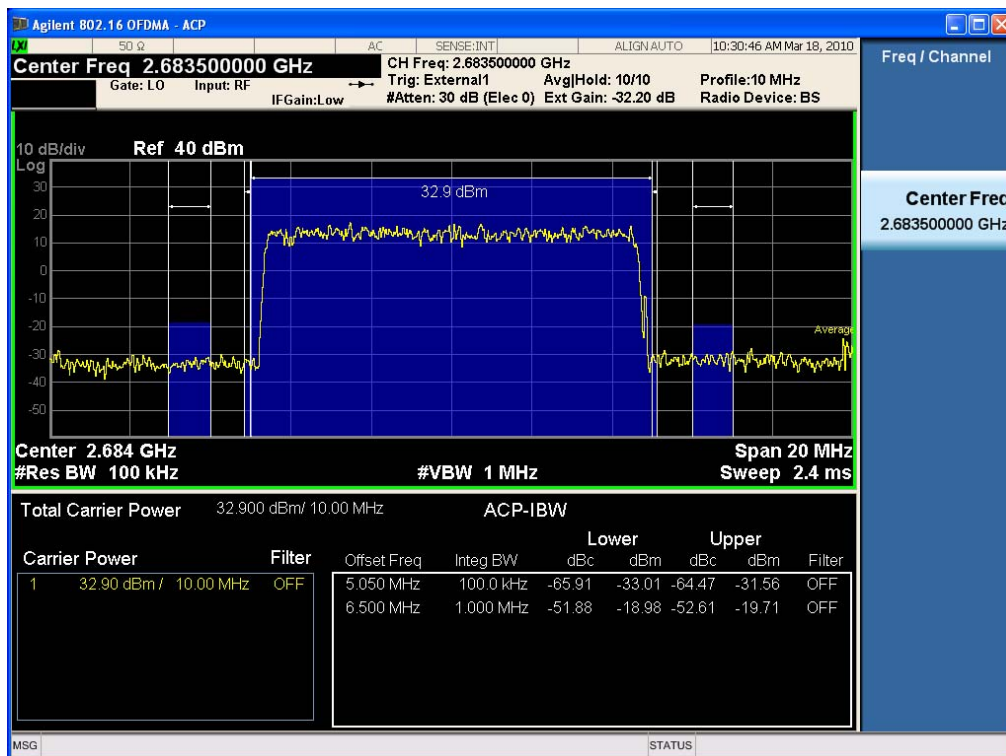
(QPSK High Channel)



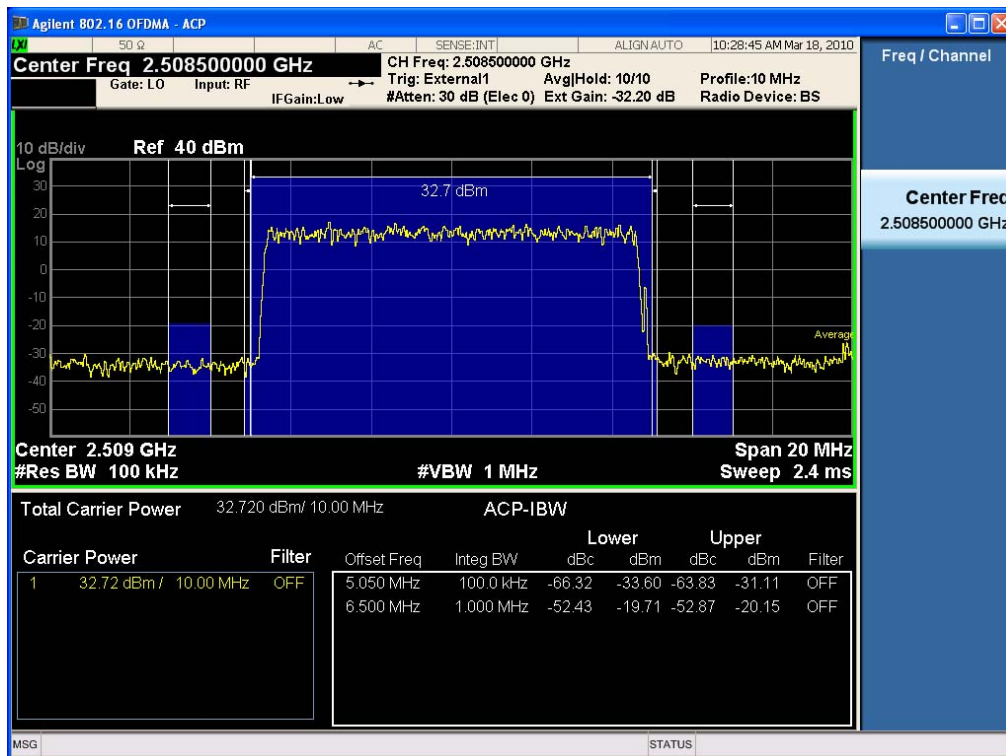
(16QAM Low Channel)



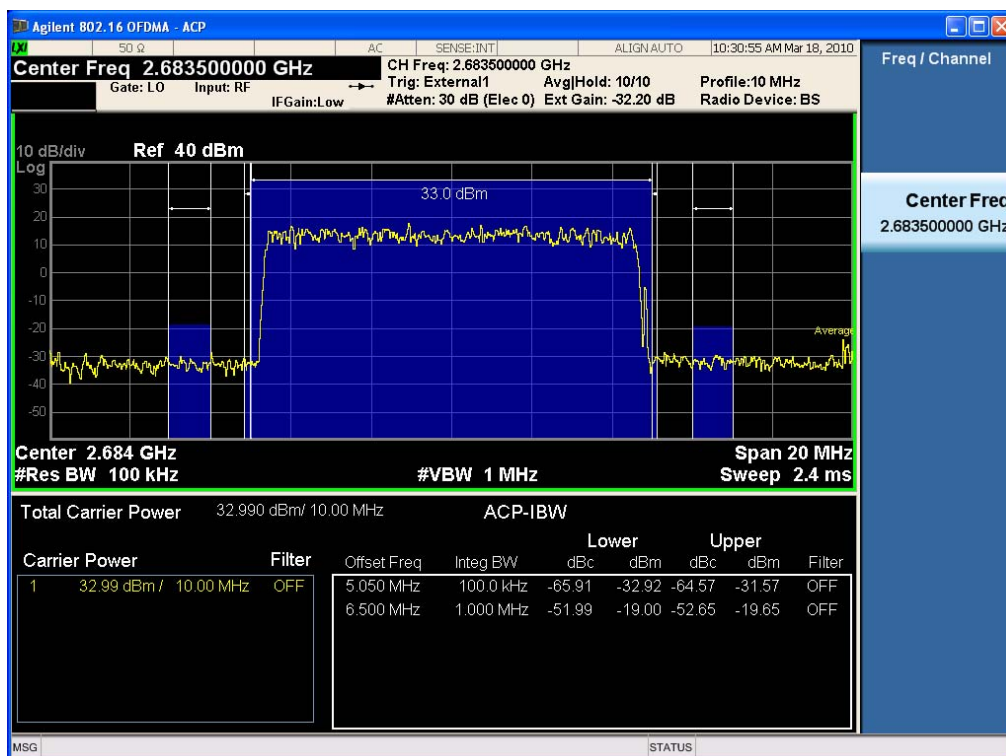
(16QAM High Channel)



(64QAM Low Channel)

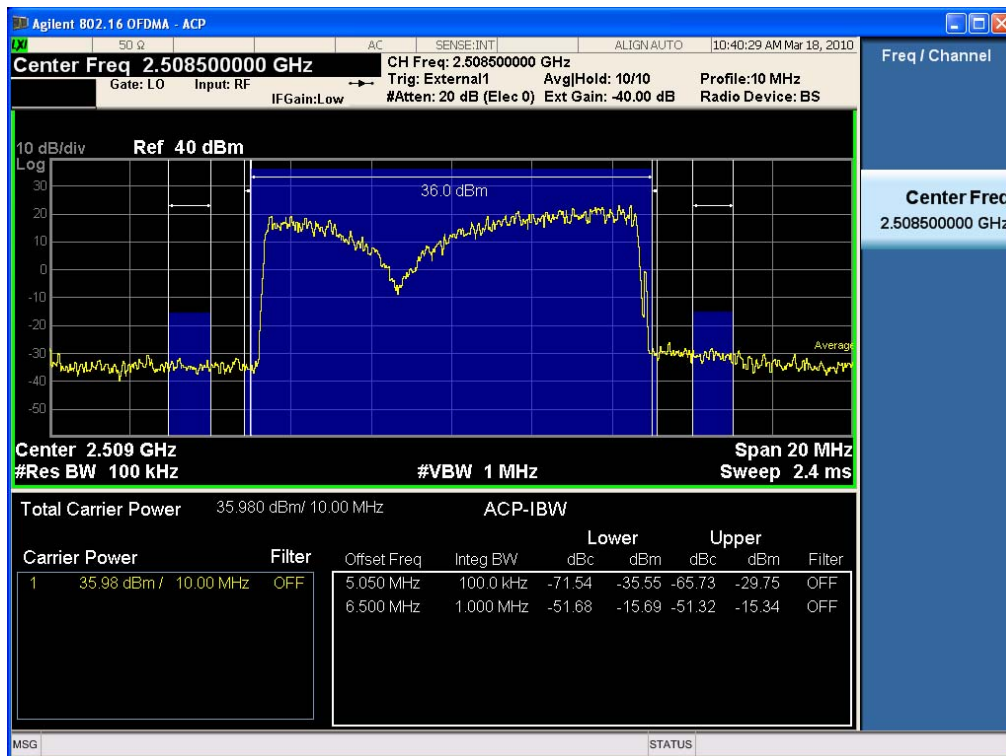


(64QAM High Channel)



7.4.4. Combined Plot Data at Output

(QPSK Low Channel)



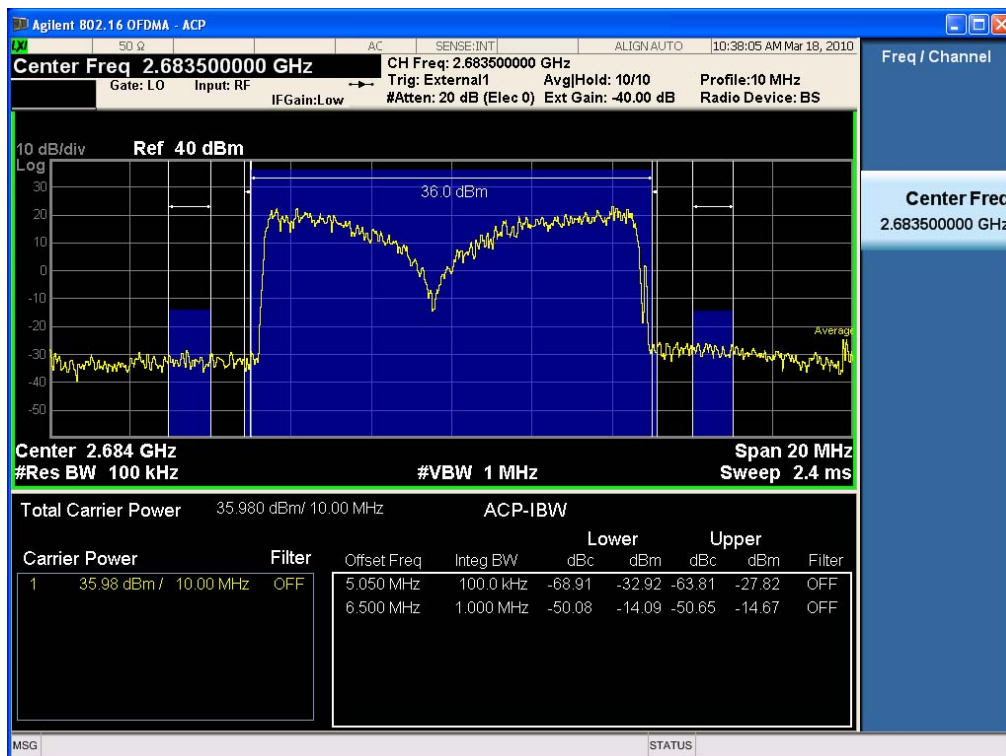
(QPSK High Channel)



(16QAM Low Channel)



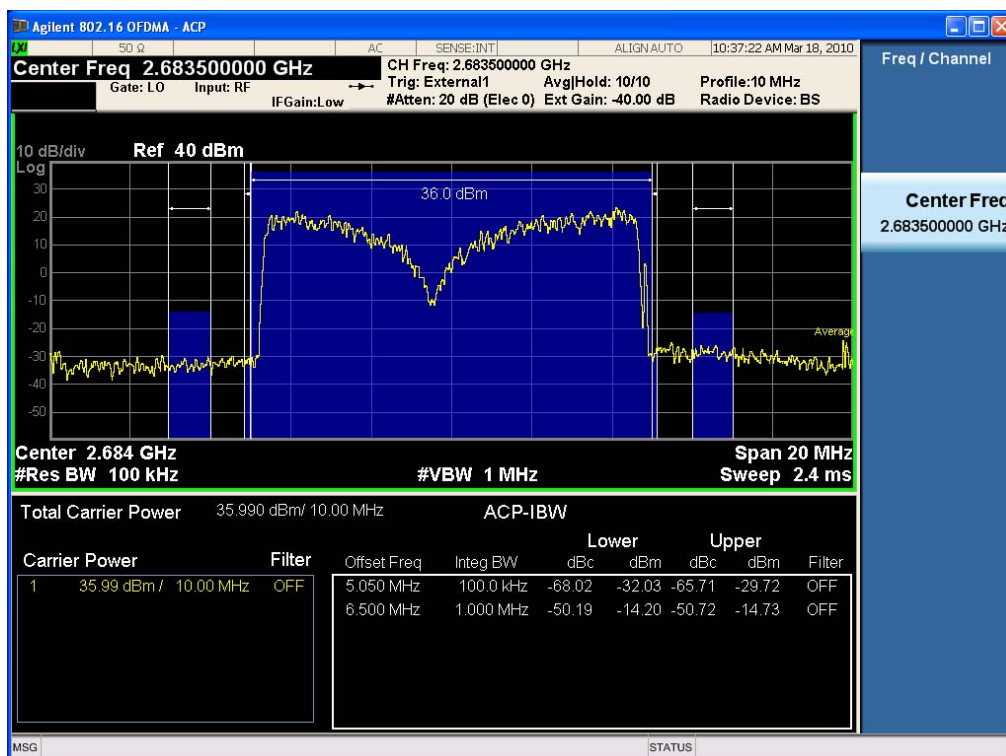
(16QAM High Channel)



(64QAM Low Channel)



(64QAM High Channel)



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 42 of 70

8. SPURIOUS EMISSION AT ANTENNA TERMINAL

8.1. Applicable Standard: CFR 47§2.1051, §27.53(m)

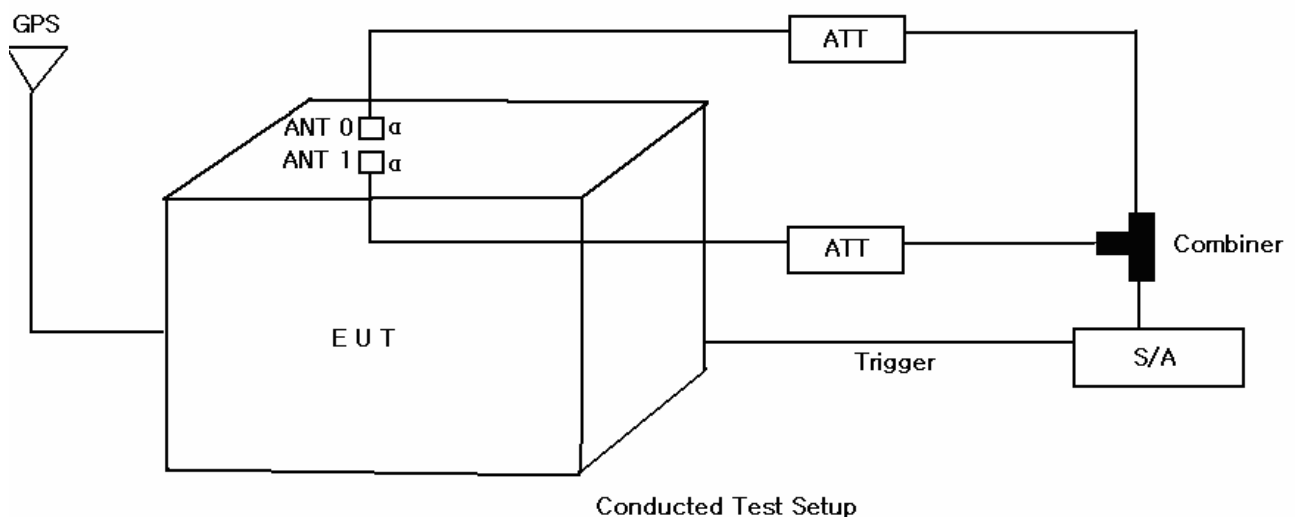
The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1051

8.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	11636B/ Power Divider	11377	12/24/2010
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	21207	01/06/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2010

8.3. Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 43 of 70

The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

The EUT provides the MIMO function which is able to transmit on the same channel with same data simultaneously therefore a combiner is used to sum the individual transmitter output power.

The test data is shown as a combined output in the report.

8.3.1 Environmental Conditions:

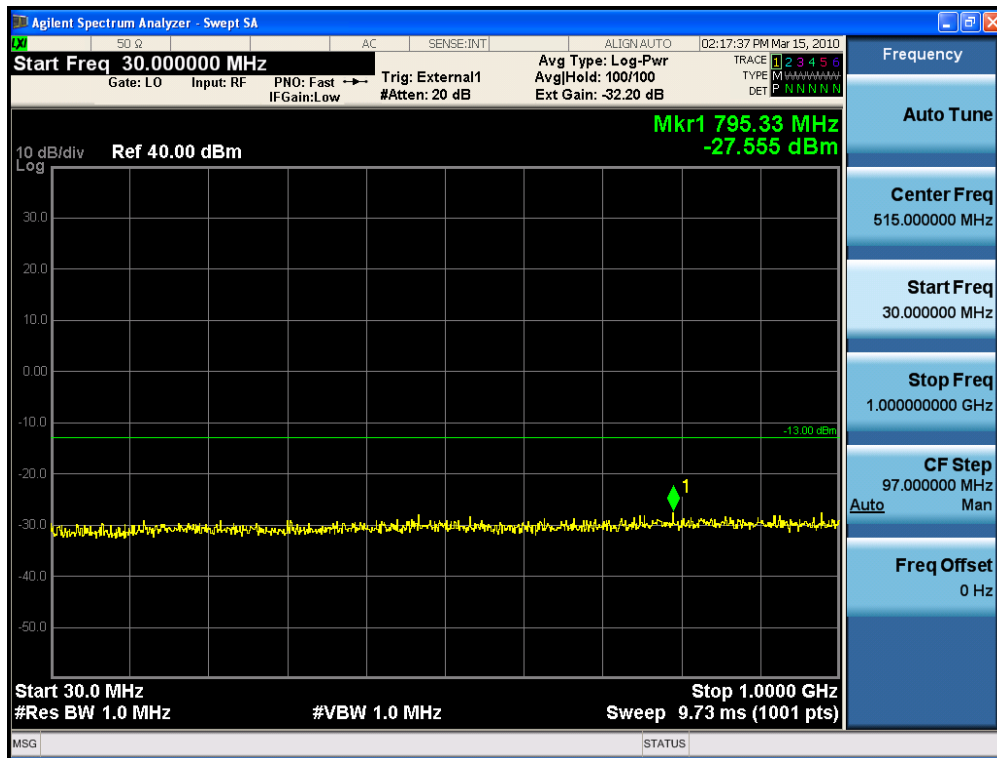
Temperature:	26 °C
Relative Humidity:	42 %

8.4. Test Result

: Pass

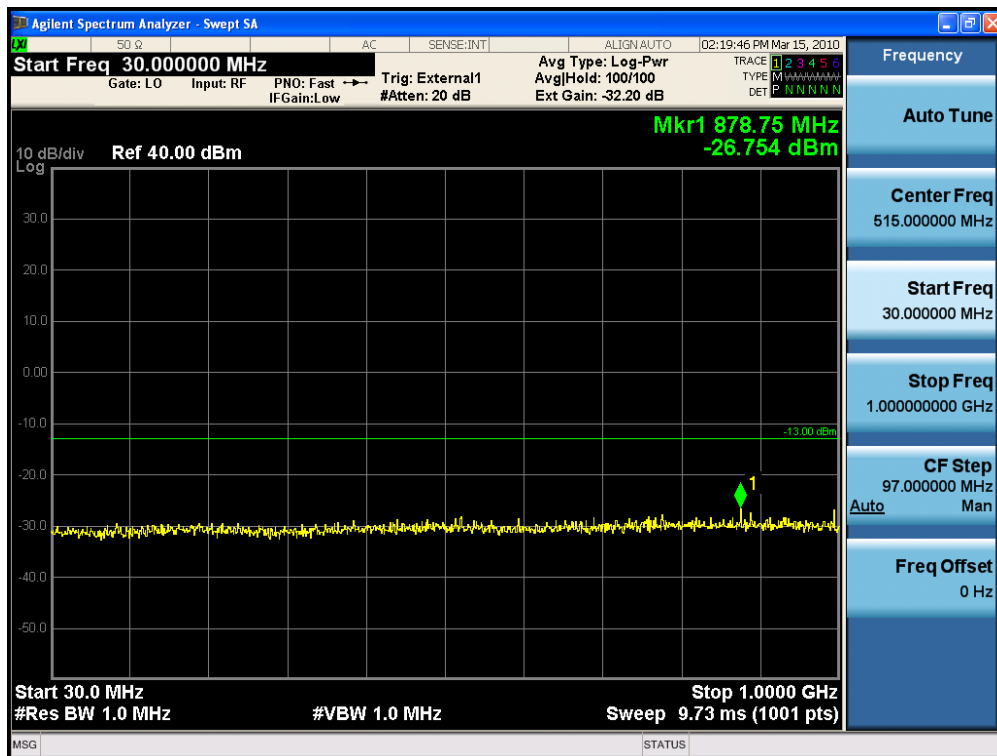
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 44 of 70

8.4.1. Plot Data at Output Port A (QPSK Low Channel)



(30 MHz ~ 1 GHz)

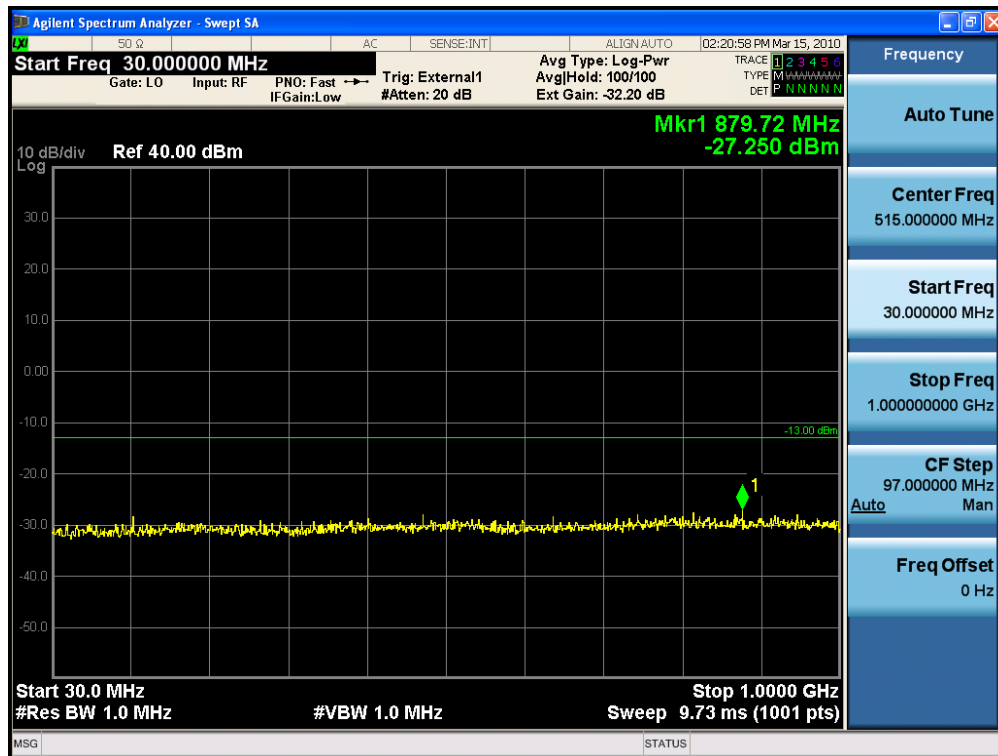
(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

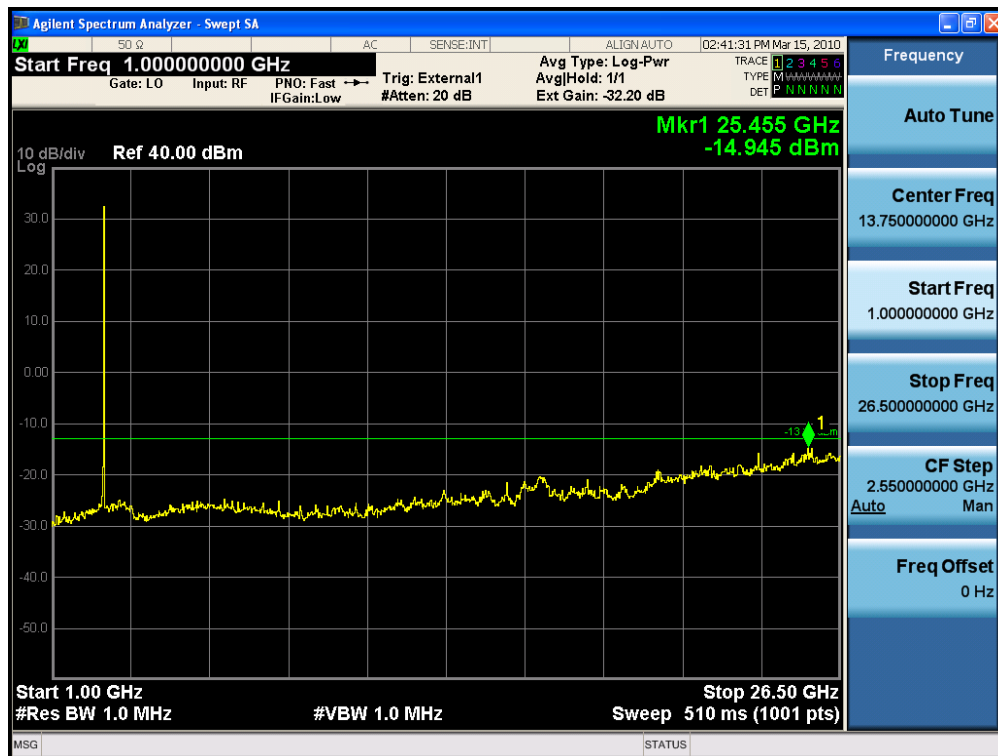
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 45 of 70

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)



(1 GHz ~ 26.5 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 46 of 70

(QPSK Middle Channel)



(1 GHz ~ 26.5 GHz)

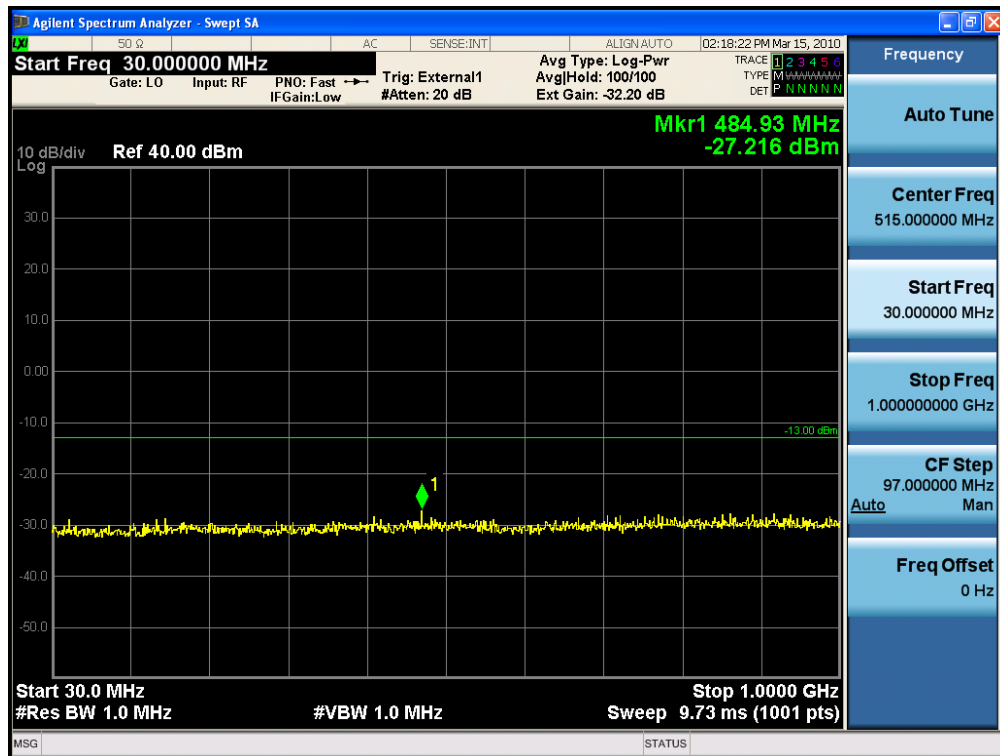
(QPSK High Channel)



(1 GHz ~ 26.5 GHz)

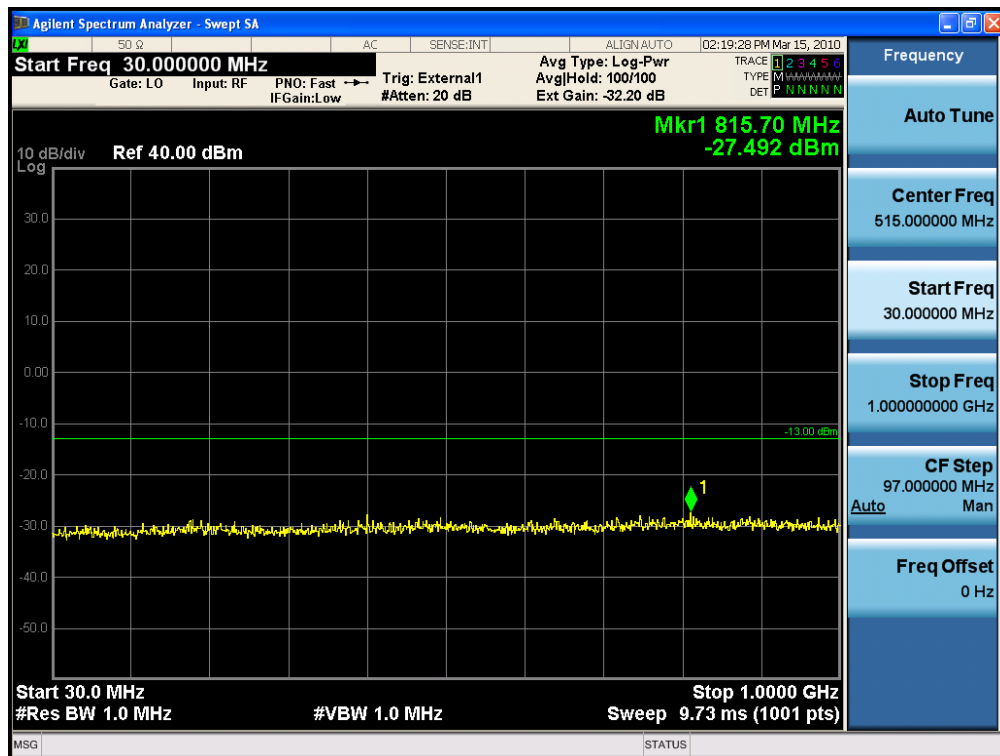
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 47 of 70

(16QAM LOW Channel)



(30 MHz ~ 1 GHz)

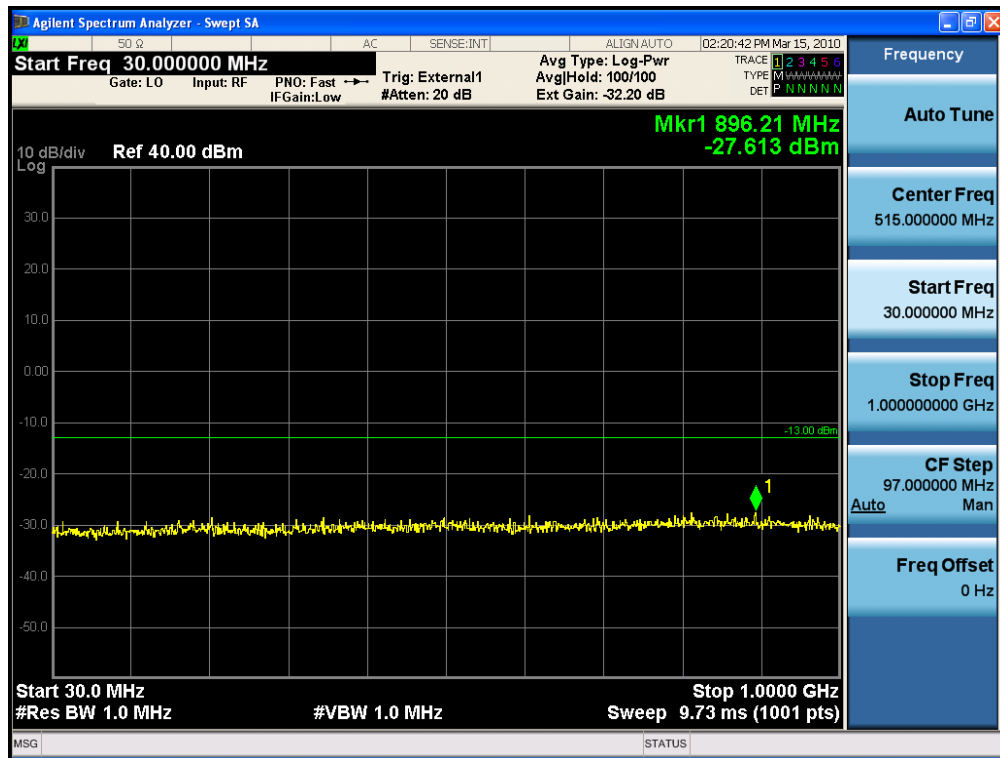
(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

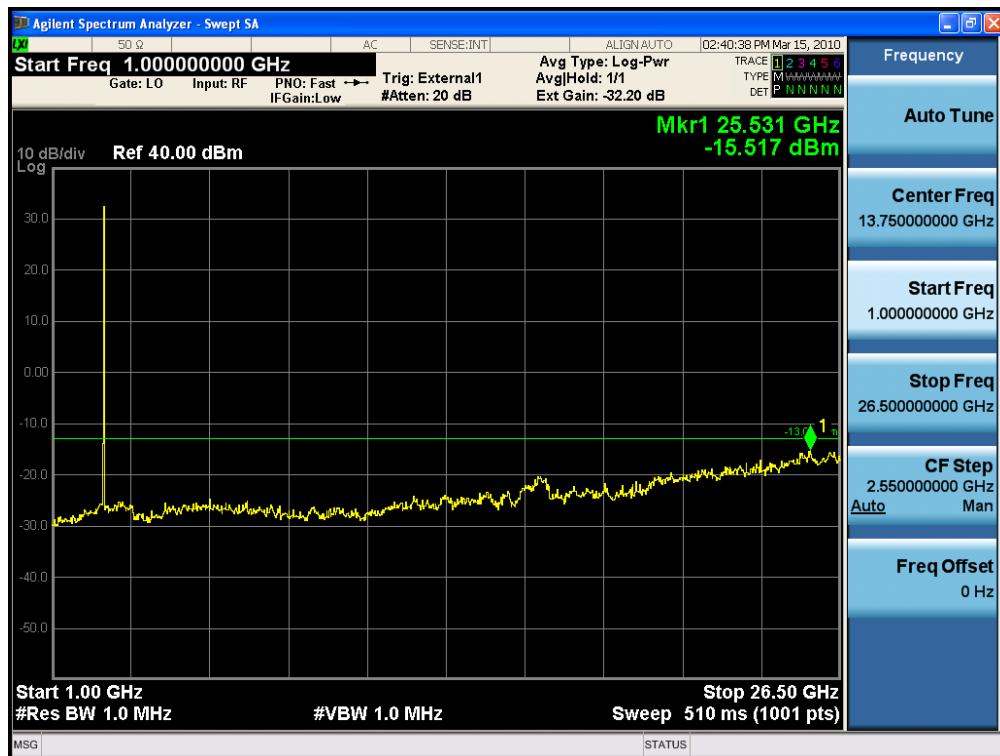
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 48 of 70

(16QAM High Channel)



(30 MHz ~ 1 GHz)

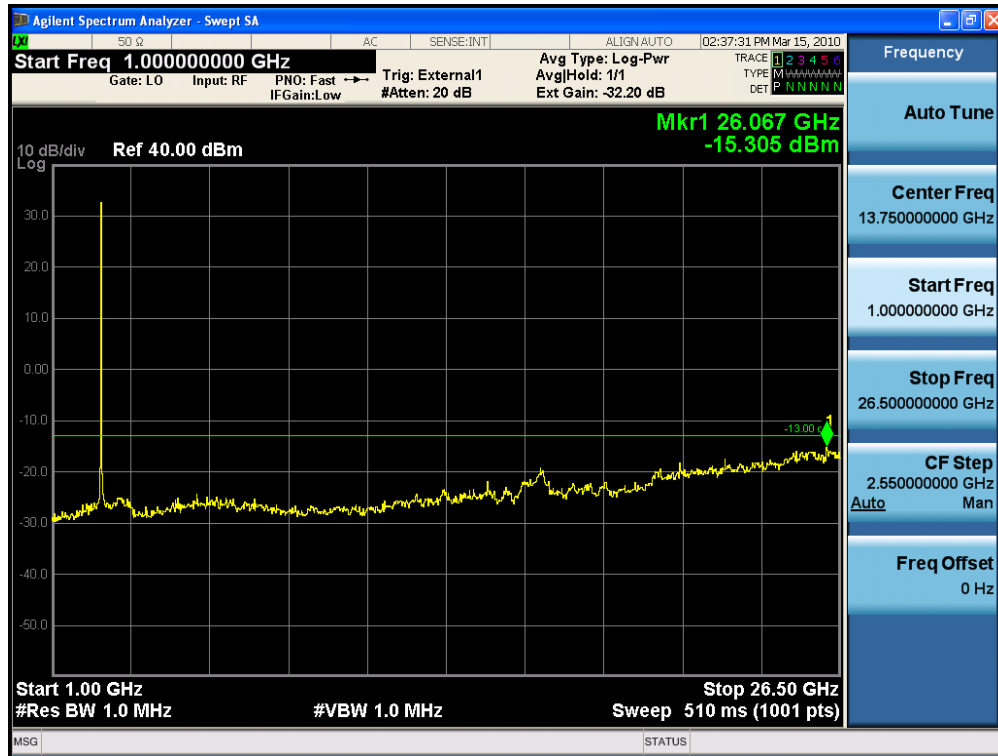
(16QAM LOW Channel)



(1 GHz ~ 26.5 GHz)

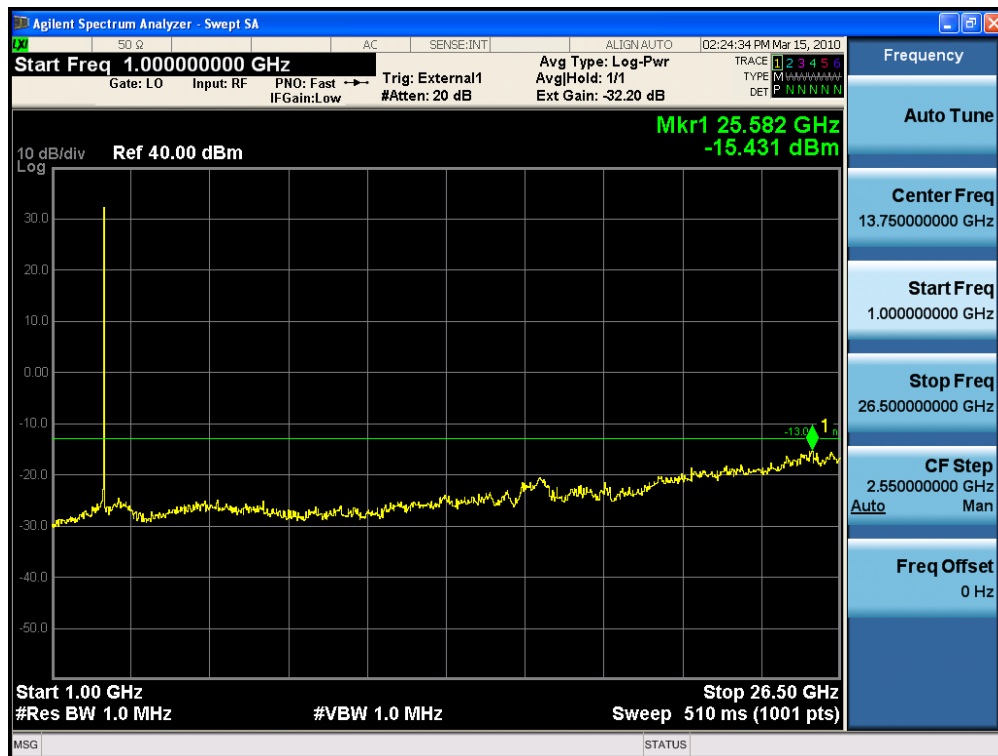
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 49 of 70

(16QAM Middle Channel)



(1 GHz ~ 26.5 GHz)

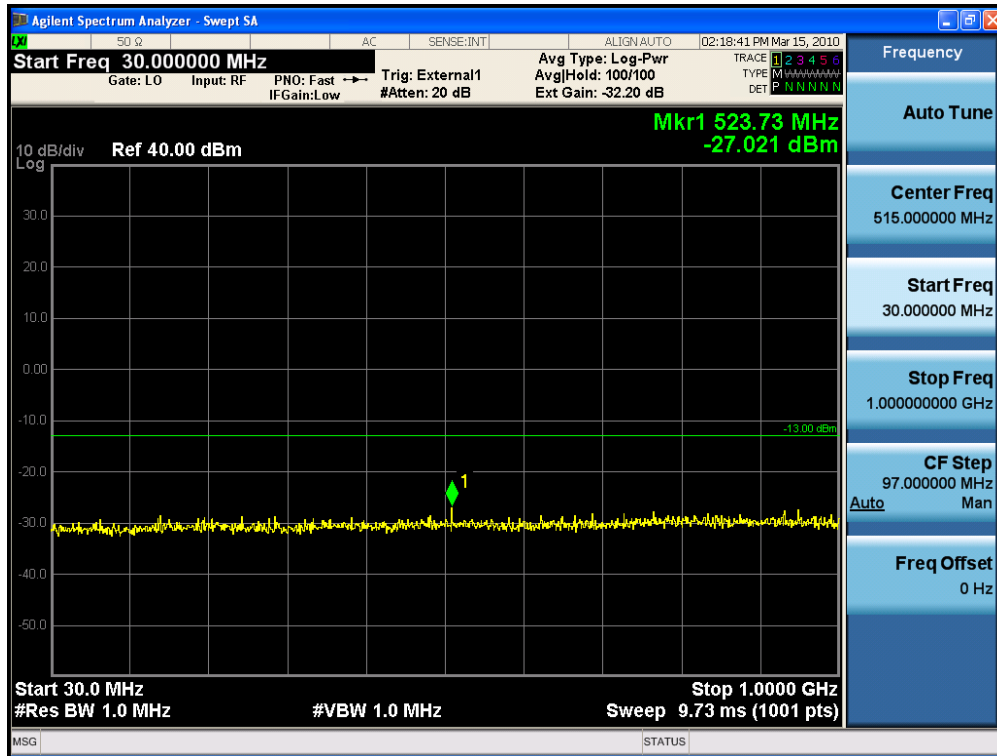
(16QAM High Channel)



(1 GHz ~ 26.5 GHz)

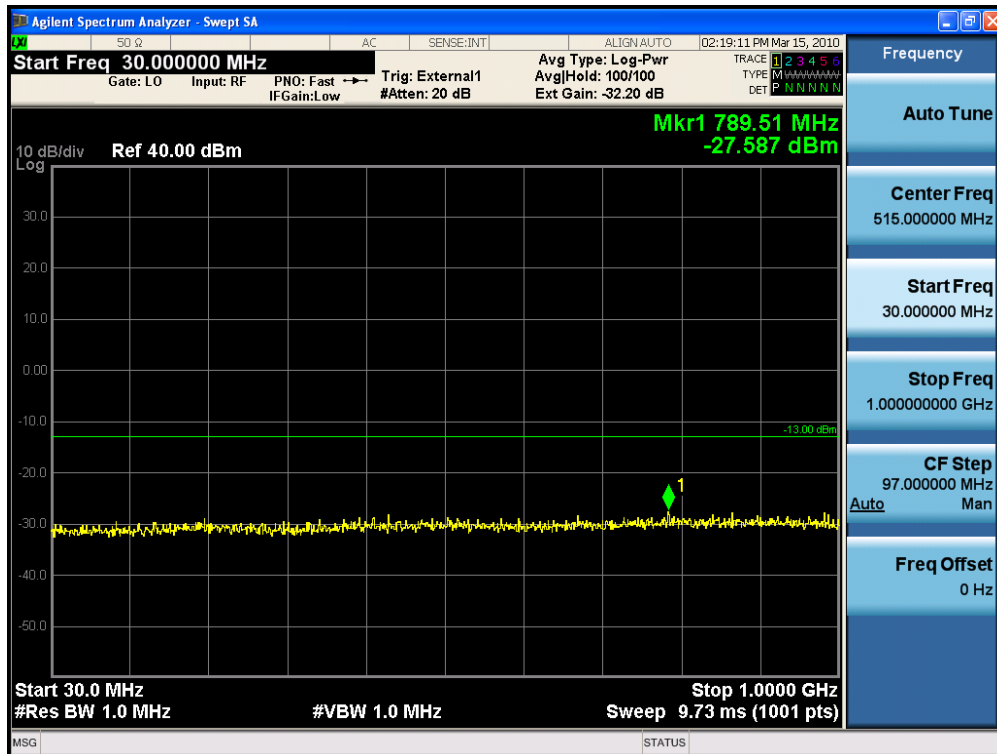
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 50 of 70

(64QAM Low Channel)



(30 MHz ~ 1 GHz)

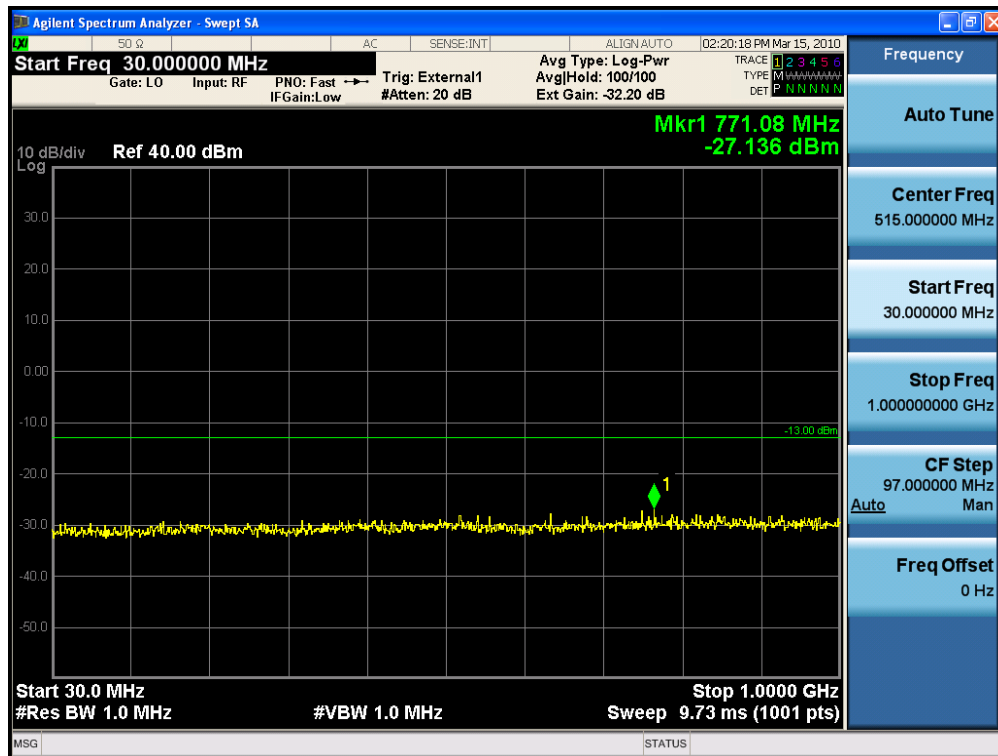
(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

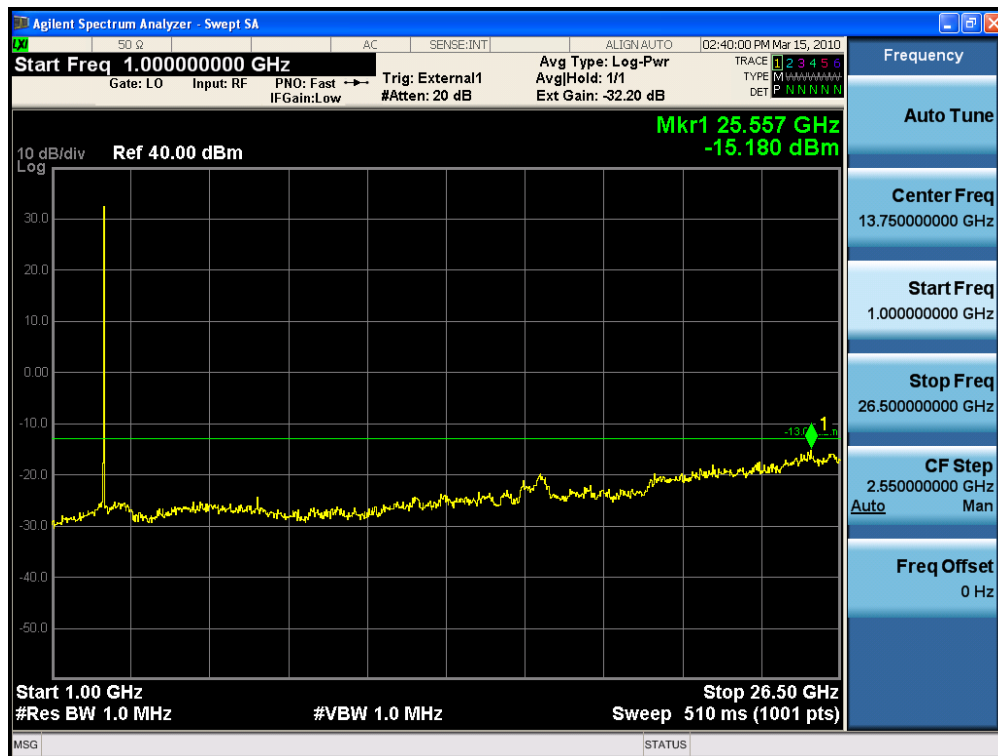
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 51 of 70

(64QAM High Channel)



(30 MHz ~ 1 GHz)

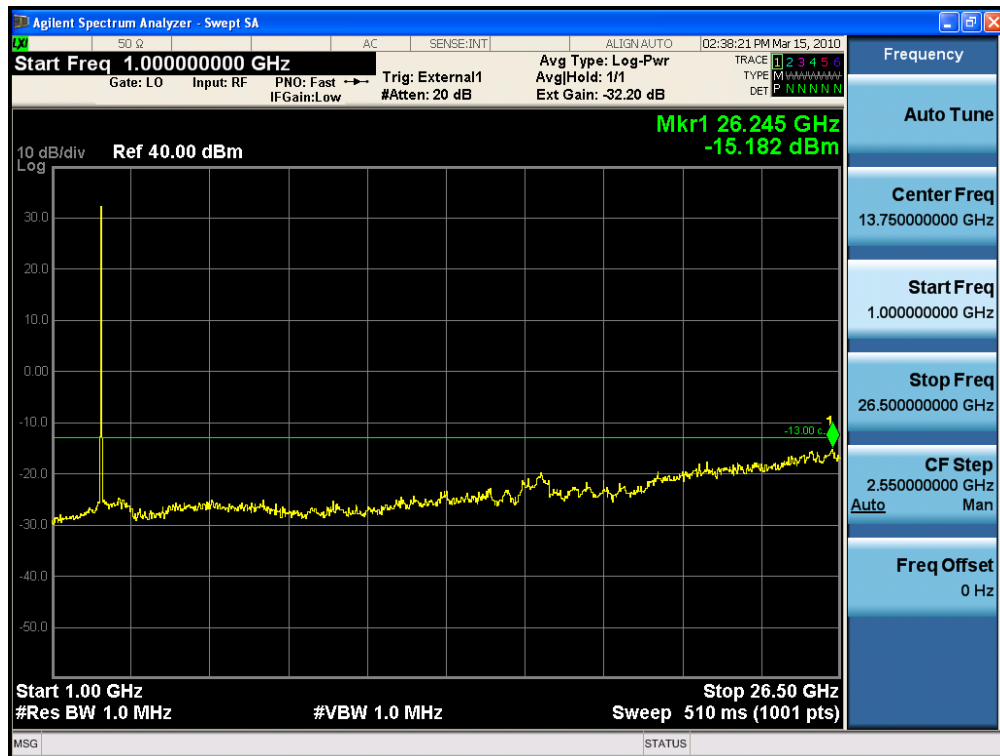
(64QAM Low Channel)



(1 GHz ~ 26.5 GHz)

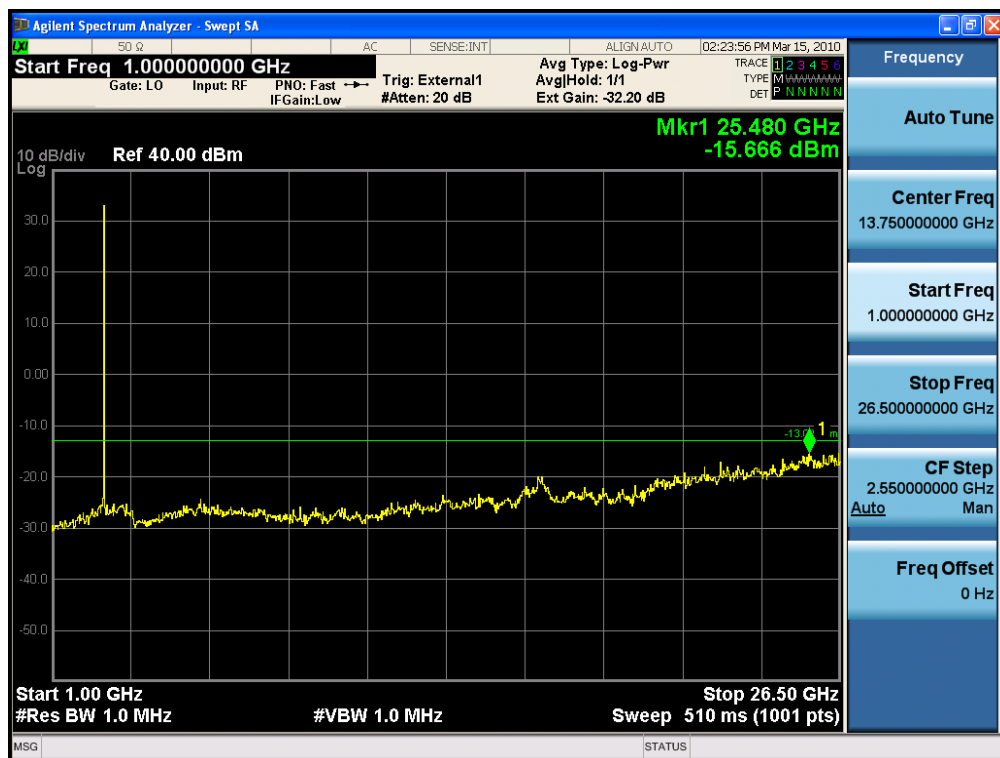
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 52 of 70

(64QAM Middle Channel)



(1 GHz ~ 26.5 GHz)

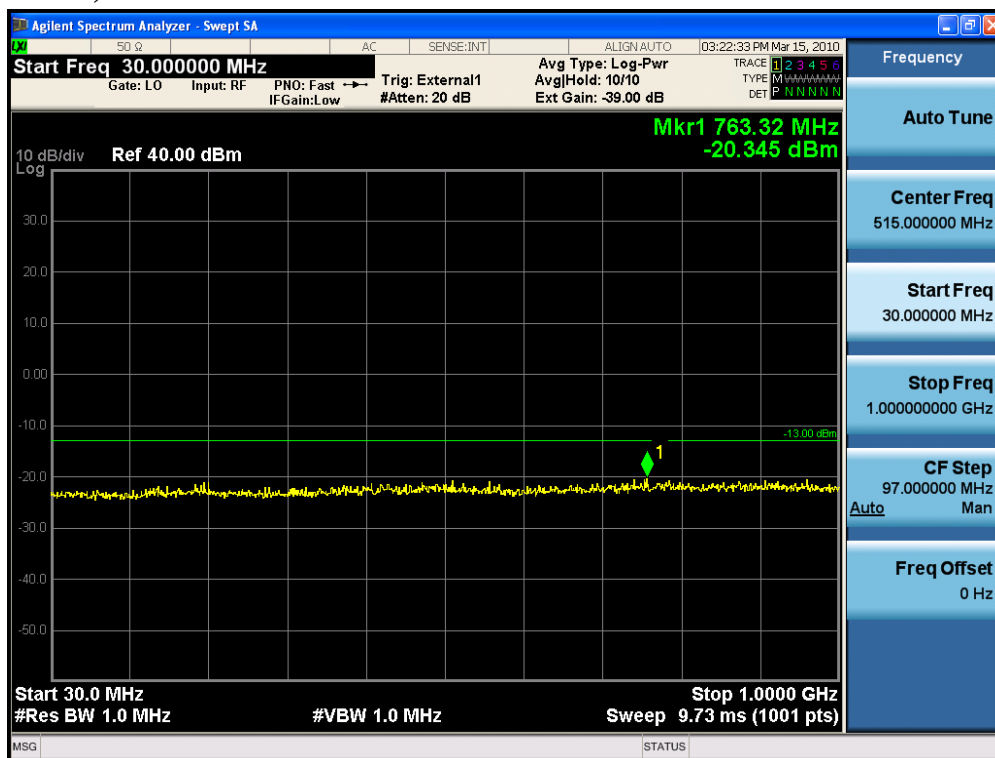
(64QAM High Channel)



(1 GHz ~ 26.5 GHz)

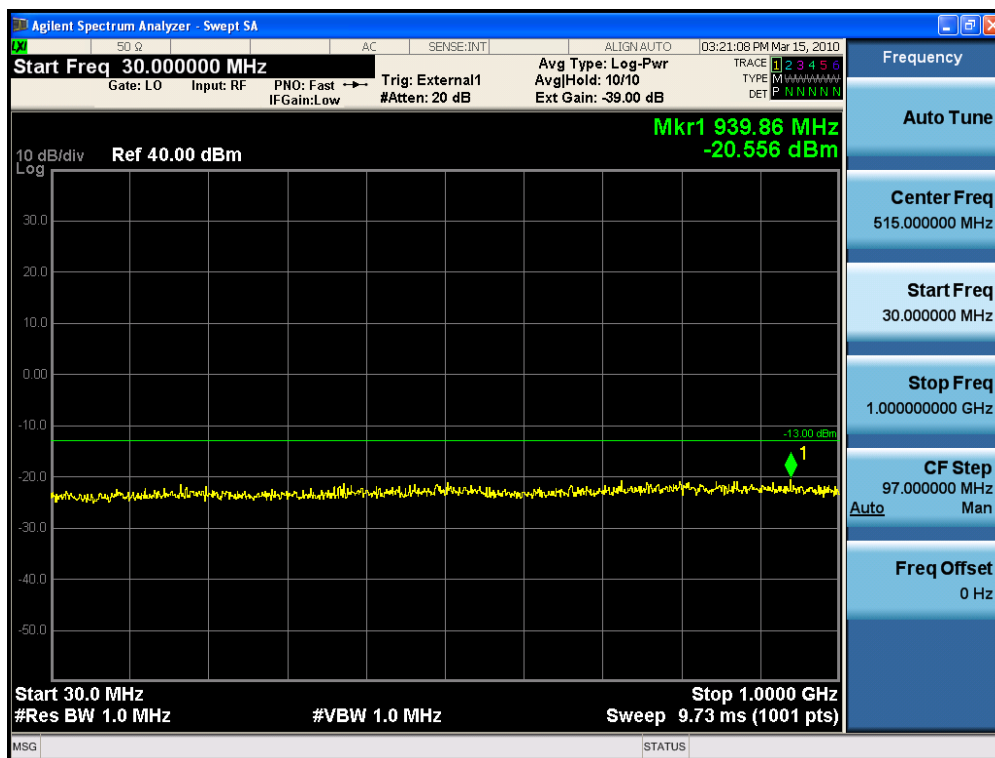
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 53 of 70

8.4.2. Combined Plot Data at Output (QPSK Low Channel)



(30 MHz ~ 1 GHz)

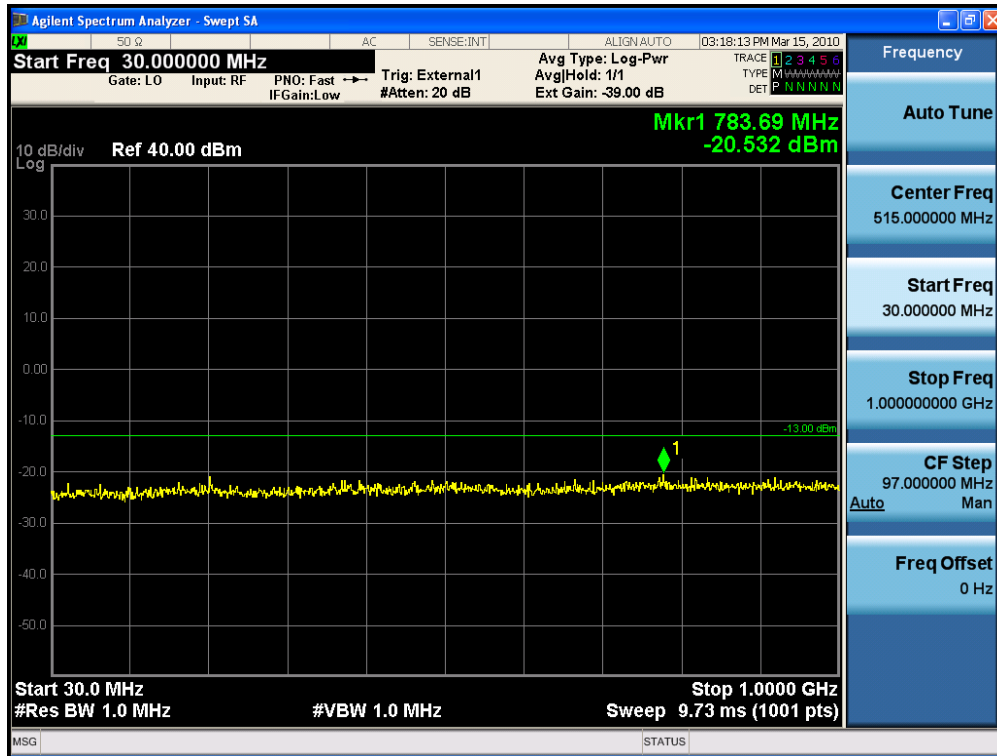
(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 54 of 70

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)



(1 GHz ~ 26.5 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 55 of 70

(QPSK Middle Channel)



(1 GHz ~ 26.5 GHz)

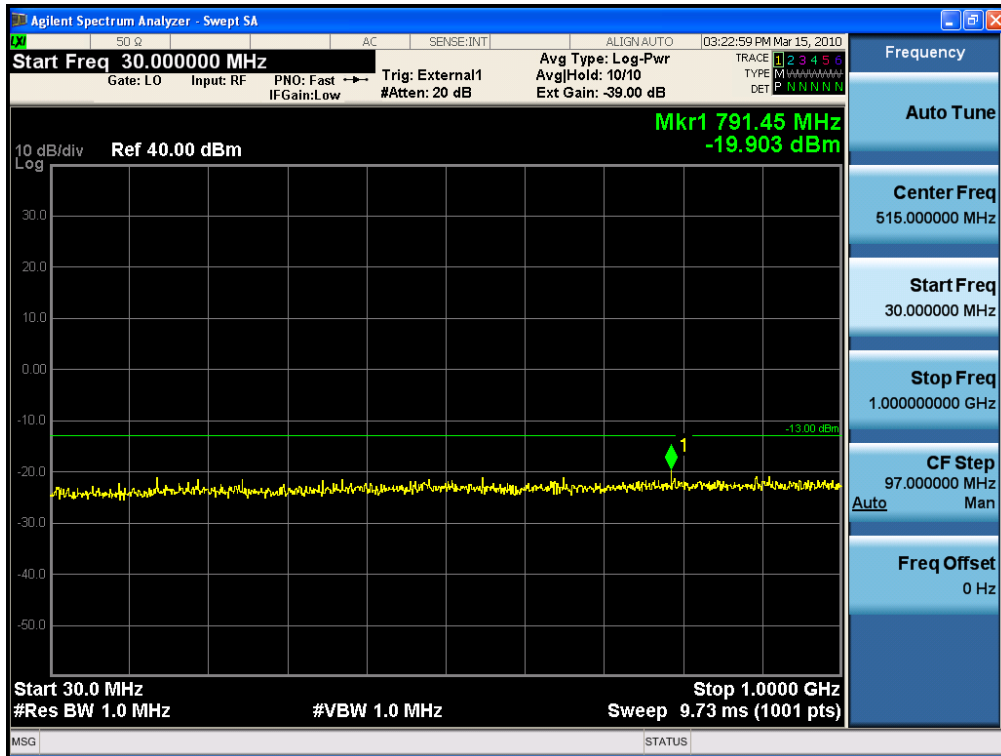
(QPSK High Channel)



(1 GHz ~ 26.5 GHz)

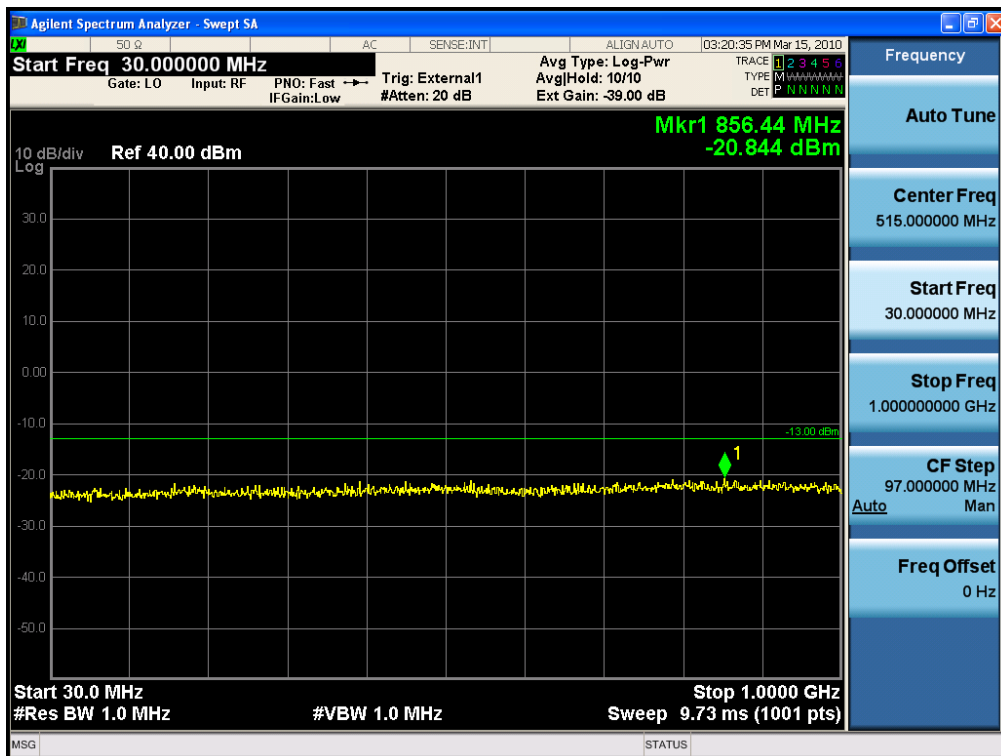
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 56 of 70

(16QAM LOW Channel)



(30 MHz ~ 1 GHz)

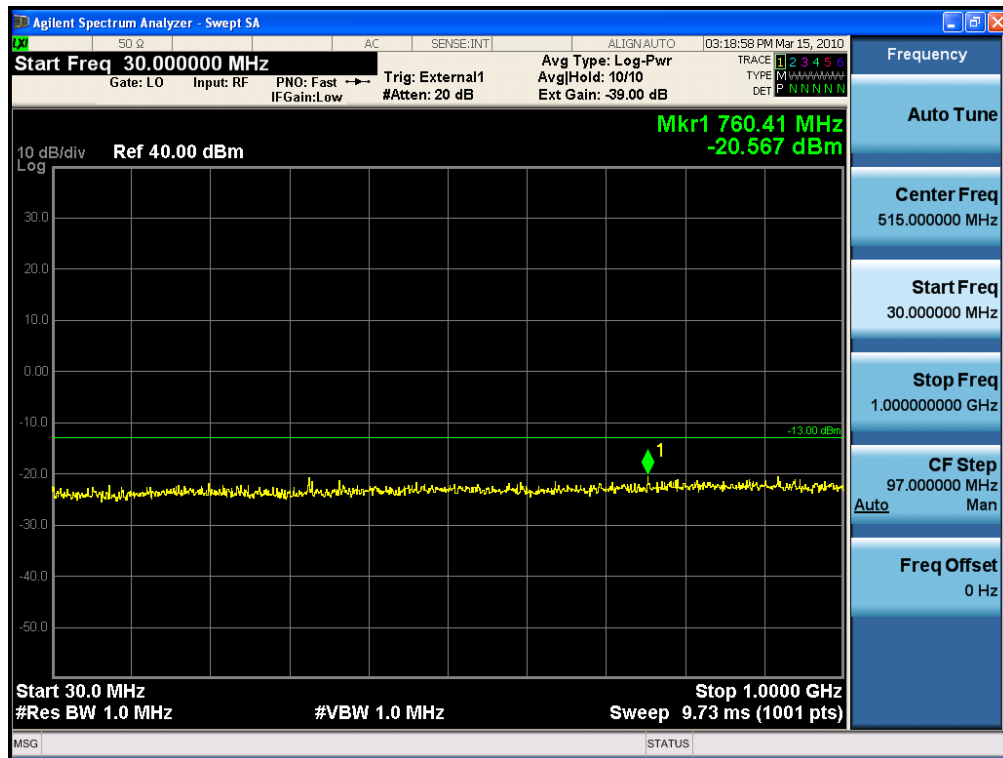
(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 57 of 70

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM LOW Channel)



(1 GHz ~ 26.5 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 58 of 70

(16QAM Middle Channel)



(1 GHz ~ 26.5 GHz)

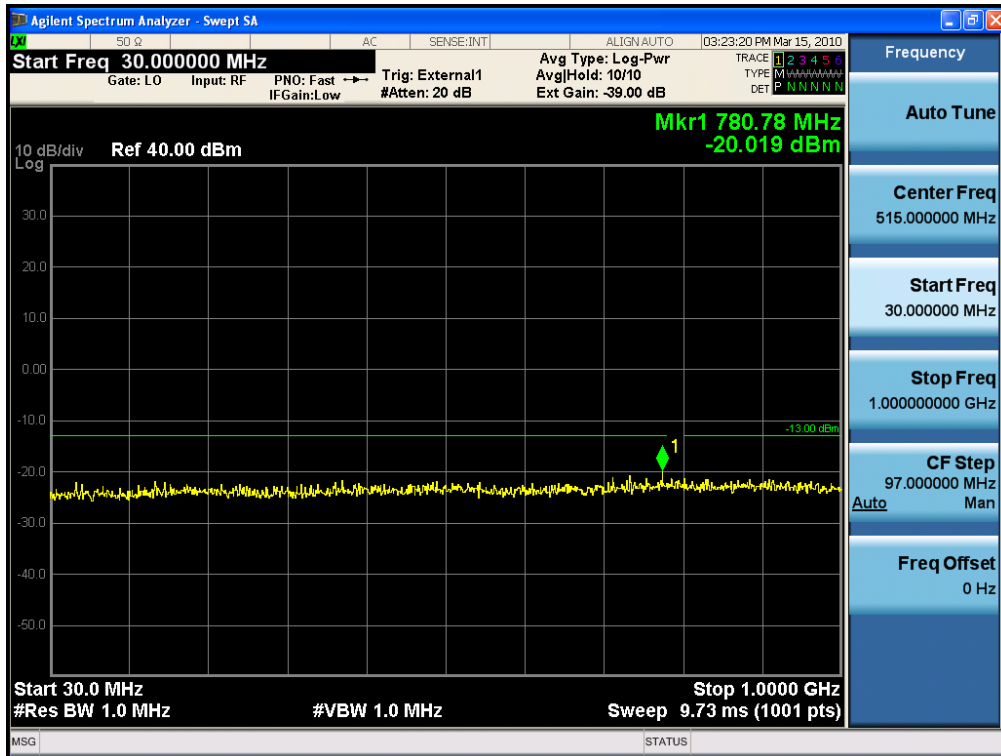
(16QAM High Channel)



(1 GHz ~ 26.5 GHz)

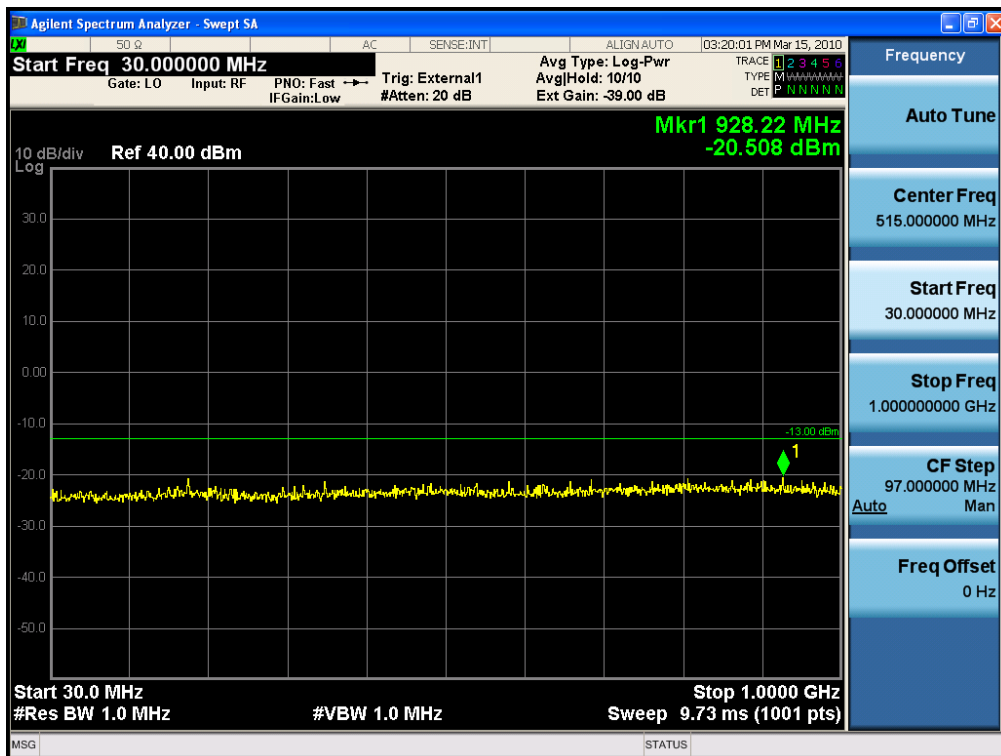
HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 59 of 70

(64QAM Low Channel)



(30 MHz ~ 1 GHz)

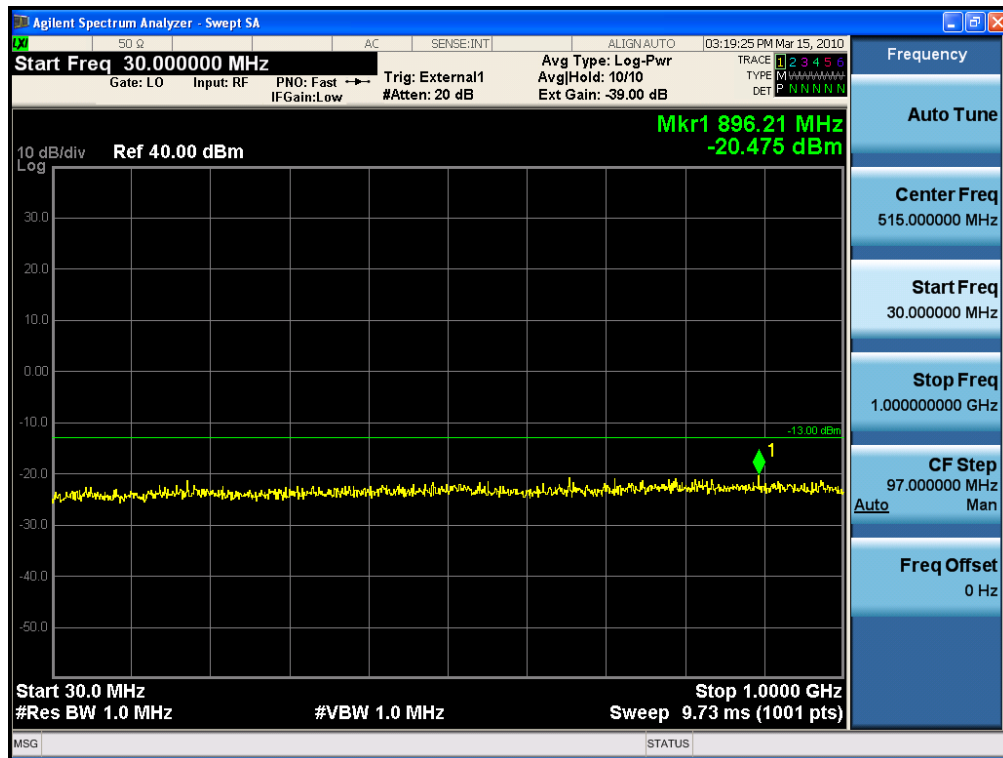
(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 60 of 70

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)



(1 GHz ~ 26.5 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 61 of 70

(64QAM Middle Channel)



(1 GHz ~ 26.5 GHz)

(64QAM High Channel)



(1 GHz ~ 26.5 GHz)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 62 of 70

9. RADIATED SPURIOUS EMISSION

9.1 Applicable Standard

Requirements: CFR 47, §2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	147	03/26/2010
Schwarzbeck	VULB 9160/ TRILOG Antenna	9160-3150	12/18/2010
Schwarzbeck	VULB 9160/ TRILOG Antenna	3125	05/06/2011
HD	MA240/ Antenna Position Tower	556	N/A
EMCO	1050/ Turn Table	114	N/A
HD GmbH	HD 100/ Controller	13	N/A
HD GmbH	KMS 560/ SlideBar	12	N/A
MITEQ	AMF-60-0010 1800-35-20P	1200937	05/20/2010
Schwarzbeck	BBHA9170/ SHF-EHF Horn Antenna	BBHA9170342	03/20/2011
R&S	ESI40 / EMI TEST Receiver	831564/003	10/30/2010

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 63 of 70

9.3 Test Procedure

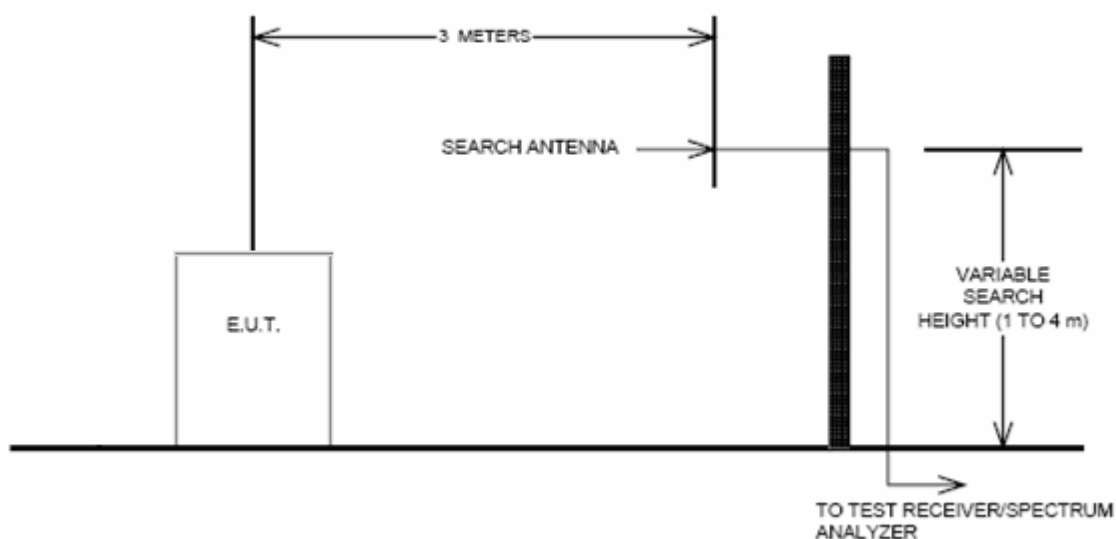
Radiated emission measurements were performed at an open Site.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.

The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

9.3.1 Radiated Spurious Emissions Test Setup



9.3.2 Environmental Conditions:

Temperature:	24 °C
Relative Humidity:	38 %

9.4 Test Result

: PASS (There were no emissions detected above the noise floor which was at least 20 dB below the limit.)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 64 of 70

10. FREQUENCY STABILITY

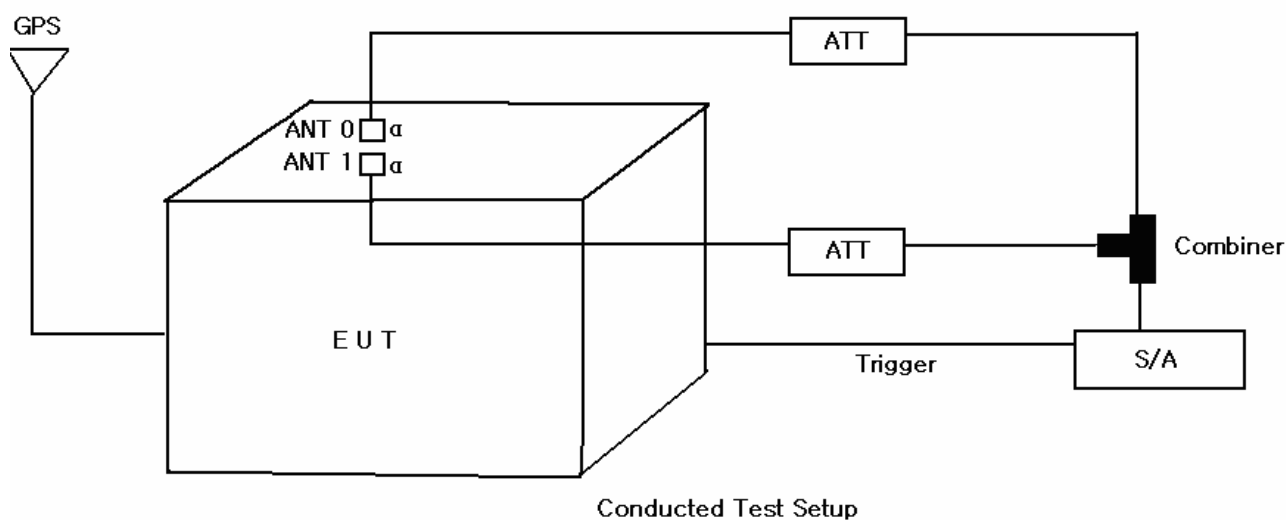
10.1 Applicable Standard

Requirements: FCC § 2.1055 (a), Part 27.54 following: The frequency stability shall be sufficient to ensure that the fundamental emissions stay

10.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	6674A / DC Power Supply	3501A00901	05/14/2010
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-43 / STEP ATTENUATOR	20623	01/14/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Nang-Yeul	NY-THR18750 / Temp	NY-200912201A	12/28/2010

10.3 Test Procedure



HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 65 of 70

Frequency Stability over Temperature variation:

The equipment under test was connected to an external AC-DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the Modulation Analyzing Function via MXA Signal Analyzer.

Frequency stability over Voltage variation:

An external variable AC-DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

10.3.1. Environmental conditions

Temperature:	26 ° C
Relative Humidity:	47 %

10.4. Test Result

: Pass

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23 ,2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 66 of 70

10.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: QPSK

Reference: - 48 Vdc at 20°C Freq. = 2508.5 MHz

Temperature (Celsius)	Measured Freq (Hz)	Drift (ppm)
50	-53	-0.021
40	-51	-0.020
30	-50	-0.020
20	Reference	
10	-55	-0.022
0	-52	-0.021
-10	-54	-0.022
-20	-49	-0.020
-30	-50	-0.020

Reference: - 48 Vdc at 20°C Freq. = 2508.5 MHz

Voltage(dc) +/-15% Ref	Measured Freq (Hz)	Drift (ppm)
40.8	-51	-0.020
55.2	-50	-0.020

(Low CH)

Modulation: 16QAM

Reference: - 48 Vdc at 20°C Freq. = 2590.0 MHz

Temperature (Celsius)	Measured Freq (Hz)	Drift (ppm)
50	-56	-0.022
40	-54	-0.021
30	-52	-0.020
20	Reference	
10	-49	-0.019
0	-55	-0.021
-10	-51	-0.020
-20	-50	-0.019
-30	-52	-0.020

Reference: - 48 Vdc at 20°C Freq. = 2590.0 MHz

Voltage(dc) +/-15% Ref	Measured Freq (MHz)	Drift (ppm)
40.8	-53	-0.020
55.2	-54	-0.021

(Middle CH)

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 67 of 70

Modulation: 64QAM**Reference: - 48 Vdc at 20°C Freq. = 2683.5 MHz**

Temperature (Celsius)	Measured Freq (Hz)	Drift (ppm)
50	-52	-0.019
40	-50	-0.019
30	-53	-0.020
20	Reference	
10	-55	-0.020
0	-56	-0.021
-10	-48	-0.018
-20	-52	-0.019
-30	-50	-0.019

Reference: - 48 Vdc at 20°C Freq. =2683.5 MHz

Voltage(dc) +/-15% Ref	Measured Freq (Hz)	Drift (ppm)
40.8	-56	-0.021
55.2	-55	-0.020

(High CH)

11. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f ²)	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....			f/1500	30
1500 - 100.000.....			1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

HCT PT.27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1003FR17	Test Dates: March 23, 2010	EUT Type: Mobile WiMAX Outdoor RAS	FCC ID: A3LSPI-2L10022500	Page 69 of 70

Max Peak output Power at antenna input terminal	36.20000	dBm
Max Peak output Power at antenna input terminal	4168.69383	mW
Prediction distance	200.00000	cm
Prediction frequency	2508.50000	MHz
Antenna Gain(typical)	17.50000	dBi
Antenna Gain(numeric)	56.23413	–
Power density at prediction frequency (S)	0.44538	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm ²

3. RESULTS

The power density level at 200 cm is 0.44538 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at 2508.5 MHz.