FCC TEST REPORT

(PART 27)

REPORT NO.: RF110513C17

MODEL NO.: WIXS-181

FCC ID: MXF-WIXS-181

RECEIVED: May 13, 2011

TESTED: May 26 ~ Jun. 16, 2011

ISSUED: Jun. 22, 2011

APPLICANT: Gemtek Technology Co., Ltd.

ADDRESS: No. 15-1, Zhonghua Rd, Hsinchu Industrial Park, Hsinchu County, Taiwan, R.O.C. 303

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Jun. 22, 2011

1 CERTIFICATION

PRODUCT: WiMAX Outdoor CPE
MODEL: WIXS-181
BRAND: Gemtek
APPLICANT: Gemtek Technology Co., Ltd.
TESTED: May 26 ~ Jun. 16, 2011
TEST SAMPLE: ENGINEERING SAMPLE
TEST STANDARDS: FCC Part 27, Subpart C & M

The above equipment (Model: WIXS-181) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , DATE : Jun. 22, 2011
Rennie Wang / Supervisor

APPROVED BY : _____ , DATE : Jun. 22, 2011
Gary Chang / Assistant Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION FCC Part 27 & Part 2	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(h)(2)	Maximum Peak Output Power Limit: max. 2 Watt.	PASS	Meet the requirement of limit. Minimum passing margin is 24.42dBm at 2593MHz.
2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	PASS	Meet the requirement of limit.
2.1049 27.53(m)(6)	Emission Bandwidth	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5375MHz.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	WiMAX Outdoor CPE	
MODEL NO.	WIXS-181	
FCC ID	MXF-WIXS-181	
NOMINAL VOLTAGE	56Vdc	
CODED TYPE/MODULATION/ CODING RATE	UL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
	DL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
		64QAM: 1/2, 2/3, 3/4, 5/6
MODULATION TECHNOLOGY	OFDMA	
DUPLEX METHOD	TDD	
OPERATING RANGE	2498.5MHz ~ 2687.5MHz	
CHANNEL BANDWIDTH	5MHz, 10MHz	
MAX. COUDUCTED POWER	26.95dBm (0.496W)	
ANTENNA TYPE	Patch antenna with 13dBi gain	
OPERATION TEMPERATURE RANGE	-40°C ~ 70°C	
DATA CABLE	1.5m shielded RJ45 cable without core	
I/O PORTS	Refer to user's manual	
ACCESSORY DEVICES	Adapter	

NOTE:

1. The EUT consumes power from the following POE.

BRAND:	PHIHONG
MODEL:	PSAA20R-560
INPUT:	100-240Vac, 50/60Hz, 0.5A
OUTPUT:	56Vdc, 0.357A
POWER LINE:	1.8m non-shielded cable with one core

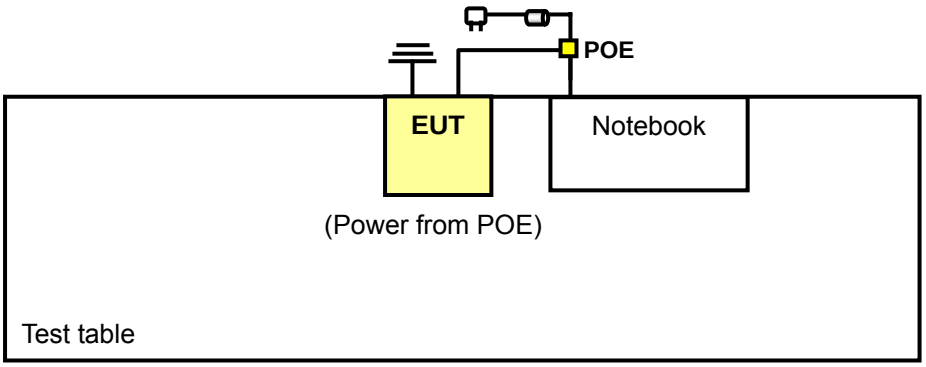
2. The EUT can supports different UL / DL ratio, max transmit ratio is up to 21 (UL): 26 (DL). After pretesting of output power and spurious emission, 21 (UL): 26 (DL) was found to be worst case and was selected for the final test configuration.
3. For the EUT with modulation type and coding rate, after pre-testing in test items of output power and spurious emissions, QPSK 1/2 was found to be worst case and was selected for the final test configuration.
4. The above EUT information is declared by manufacturer and for more detailed feature description please refers to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Three channels of each channel bandwidth had been tested.

CHANNEL (MHz)	CHANNEL BANDWIDTH	
	5.0 MHz	10.0 MHz
LOW	2498.5MHz	2501.0MHz
MIDDLE	2593.0MHz	2593.0MHz
HIGH	2687.5MHz	2685.0MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	EB	CE	CSE	RE<1G	RE≥1G	
-	√	√	√	√	√	√	√	-

Where **OP:** Output power **FS:** Frequency stability
EB: Emission bandwidth **CE:** Channel edge
CSE: Conducted spurious emissions **RE<1G:** Radiated emission below 1GHz
RE≥1G: Radiated emission above 1GHz

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L, M, H	OFDMA	5MHz	QPSK	1/2
-	L, M, H	OFDMA	10MHz	QPSK	1/2

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L	OFDMA	5MHz	QPSK	1/2
-	H	OFDMA	10MHz	QPSK	1/2

EMISSION BANDWIDTH MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L, M, H	OFDMA	5MHz	QPSK	1/2
-	L, M, H	OFDMA	10MHz	QPSK	1/2

CHANNEL EDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L, M, H	OFDMA	5MHz	QPSK	1/2
-	L, M, H	OFDMA	10MHz	QPSK	1/2

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L, M, H	OFDMA	5MHz	QPSK	1/2
-	L, M, H	OFDMA	10MHz	QPSK	1/2

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	M	OFDMA	5MHz	QPSK	1/2
-	M	OFDMA	10MHz	QPSK	1/2

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
-	L, M, H	OFDMA	5MHz	QPSK	1/2
-	L, M, H	OFDMA	10MHz	QPSK	1/2

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
OP	27deg. C, 63%RH, 1001 hPa	120Vac, 60Hz	Mark Liao
FS	27deg. C, 63%RH, 1001 hPa	120Vac, 60Hz	Mark Liao
EB	27deg. C, 63%RH, 1001 hPa	120Vac, 60Hz	Mark Liao
CE	27deg. C, 63%RH, 1001 hPa	120Vac, 60Hz	Mark Liao
CSE	27deg. C, 63%RH, 1001 hPa	120Vac, 60Hz	Mark Liao
RE≥1G	25deg. C, 66%RH, 1012 hPa	120Vac, 60Hz	Frank Wang
RE<1G	25deg. C, 66%RH, 1012 hPa	120Vac, 60Hz	Frank Wang

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a WiMAX product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-C-2004

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	HP	NC6000	CNU4110Y6Q	E2K24CLNS

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m RJ45 cable

NOTE: All power cords of the above support units are non shielded (1.8m).

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
High Speed Peak Power Meter	ML2495A	0824011	Aug. 02, 2010	Aug. 01, 2011
Power Sensor	MA2411B	0738171	Aug. 02, 2010	Aug. 01, 2011

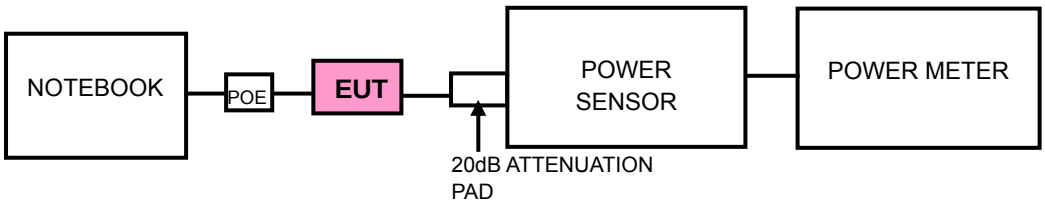
NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Measurement Bandwidth of ML2495A is 65MHz greater than 26dB bandwidth of emission.

4.1.3 TEST PROCEDURES

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

Executes telnet program to send commands via RJ45 cable to control EUT to transmit at specific modulation, coding rate, frequency and output power level.

4.1.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz								
CONDUCTED OUTPUT POWER								
CHANNEL	FREQ. (MHz)	POWER METER READING (dBm)		C.F (dB)	TOTAL POWER		TOTAL POWER (chain 0+1)	
					Chain 0	Chain 1		
		Chain 0	Chain 1		dBm	dBm	dBm	W
LOW	2498.5	1.72	3.35	21.0	22.72	24.35	26.62	0.459
MIDDLE	**2593.0**	**3.42**	**2.41**	**21.0**	**24.42**	**23.41**	**26.95**	**0.496**
HIGH	2687.5	2.28	3.02	21.0	23.28	24.02	26.68	0.465

REMARKS: 1. Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Cable Loss (dB) + 20dB Attenuator.
3. The antenna is a cross-polarized antenna.

CHANNEL BANDWIDTH: 10MHz								
CONDUCTED OUTPUT POWER								
CHANNEL	FREQ. (MHz)	POWER METER READING (dBm)		C.F (dB)	TOTAL POWER		TOTAL POWER (chain 0+1)	
					Chain 0	Chain 1		
		Chain 0	Chain 1		dBm	dBm	dBm	W
LOW	2501.0	1.75	2.05	21.0	22.75	23.05	25.91	0.390
MIDDLE	2593.0	1.91	1.64	21.0	22.91	22.64	25.79	0.379
HIGH	2685.0	1.77	2.14	21.0	22.77	23.14	25.97	0.395

REMARKS: 1. Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Cable Loss (dB) + 20dB Attenuator.
3. The antenna is a cross-polarized antenna.

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -40℃ ~ 70℃.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2010	Aug. 19, 2011
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 28, 2010	Jun. 27, 2011

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURE

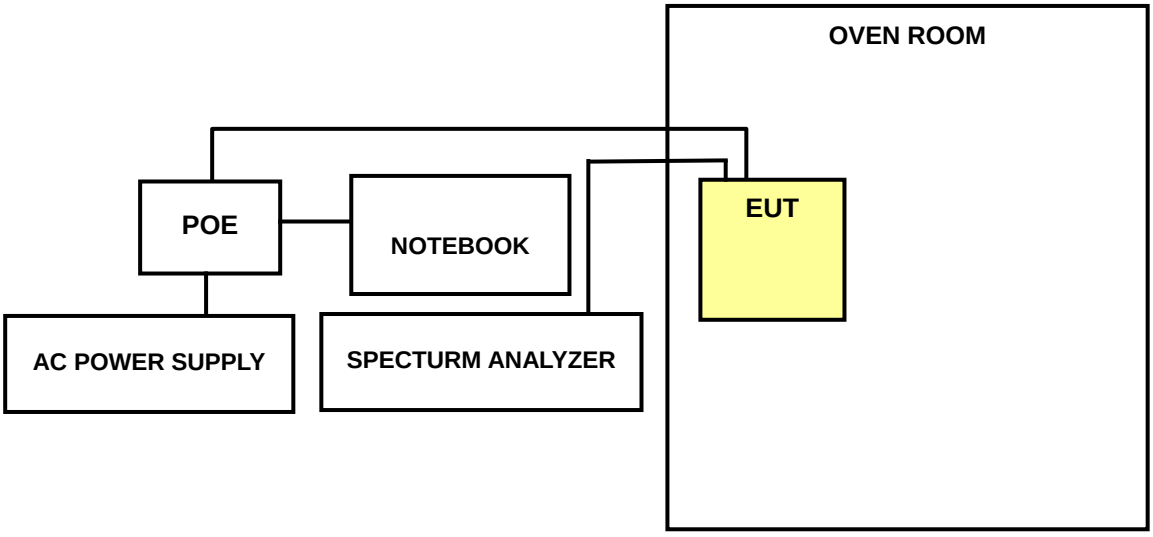
a. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 93.5 Volts to 126.5 Volts. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing.

d. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

4.2.4 TEST SETUP



4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.5

4.2.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz			
AFC FREQUENCY ERROR VS. VOLTAGE			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	20	2498.501538	0.616
110.0	20	2498.501078	0.431
126.5	20	2498.501127	0.451

AFC FREQUENCY ERROR VS. TEMP.			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
110.0	70	2498.501486	0.595
110.0	60	2498.501073	0.429
110.0	50	2498.500914	0.366
110.0	40	2498.500349	0.140
110.0	30	2498.501787	0.715
110.0	20	2498.501078	0.431
110.0	10	2498.501045	0.418
110.0	0	2498.500354	0.142
110.0	-10	2498.500678	0.271
110.0	-20	2498.500670	0.268
110.0	-30	2498.500754	0.302
110.0	-40	2498.500764	0.306
CARRIER FREQUENCY: 2498.5MHz			

CHANNEL BANDWIDTH: 10MHz			
AFC FREQUENCY ERROR VS. VOLTAGE			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	20	2685.001215	0.453
110.0	20	2685.001012	0.377
126.5	20	2685.000950	0.354

AFC FREQUENCY ERROR VS. TEMP.			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
110.0	70	2685.001366	0.509
110.0	60	2685.000965	0.359
110.0	50	2685.001078	0.401
110.0	40	2685.000378	0.141
110.0	30	2685.001979	0.737
110.0	20	2685.001012	0.377
110.0	10	2685.001275	0.475
110.0	0	2685.000575	0.214
110.0	-10	2685.000962	0.358
110.0	-20	2685.001045	0.389
110.0	-30	2685.000639	0.238
110.0	-40	2685.000645	0.240
CARRIER FREQUENCY: 2685MHz			

4.3 EMISSION BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

According to FCC 27.53(m)(6) specified that 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 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

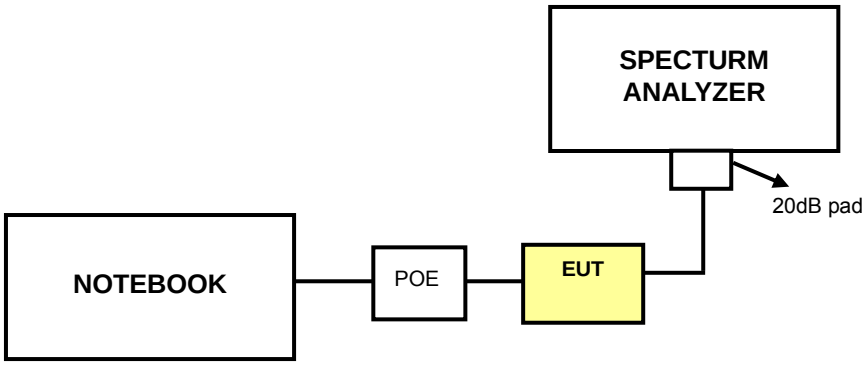
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2010	Aug. 19, 2011
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	May 13, 2011	May 12, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 51kHz, VBW = 160kHz. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.3.4 TEST SETUP



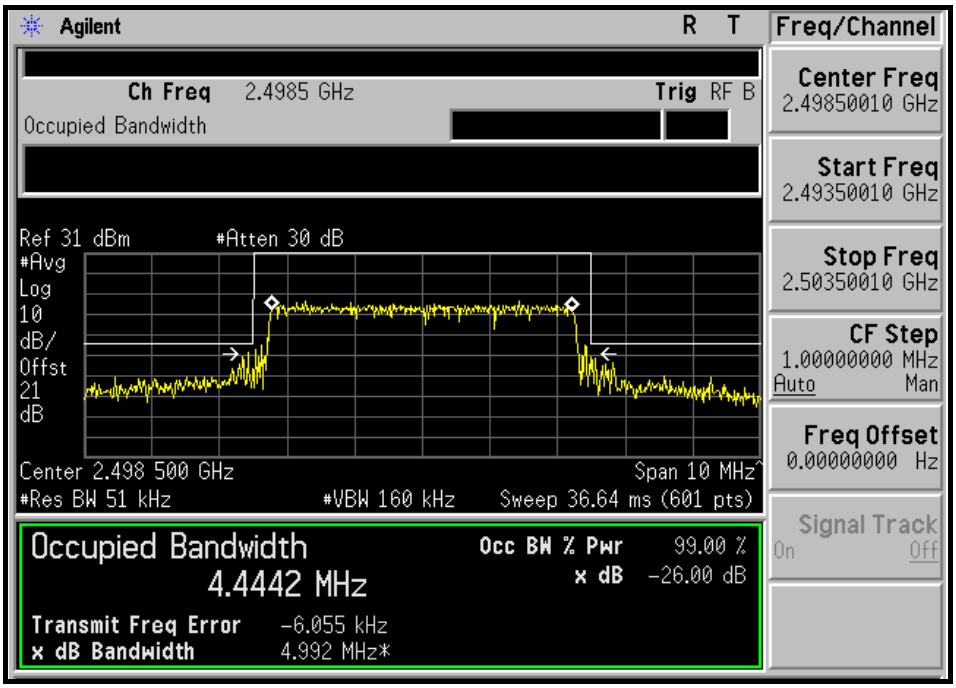
4.3.5 EUT OPERATING CONDITIONS

Same as 4.1.5

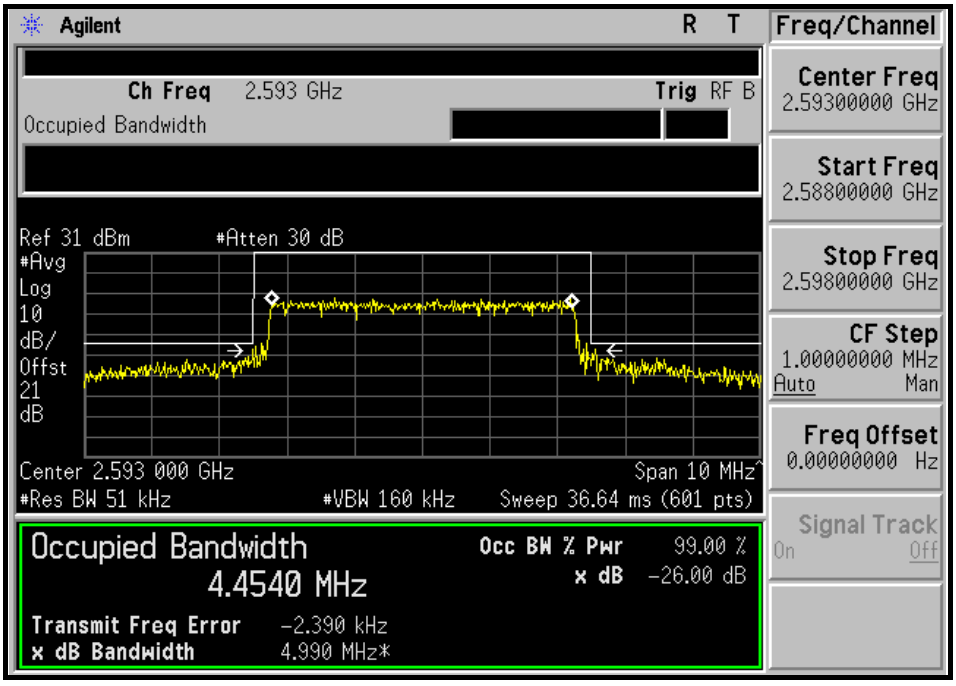
4.3.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz		
CHANNEL	-26dBc BANDWIDTH (MHz)	
	ANT 0	ANT 1
Low	4.992	4.990
Middle	4.990	4.988
High	4.992	4.997

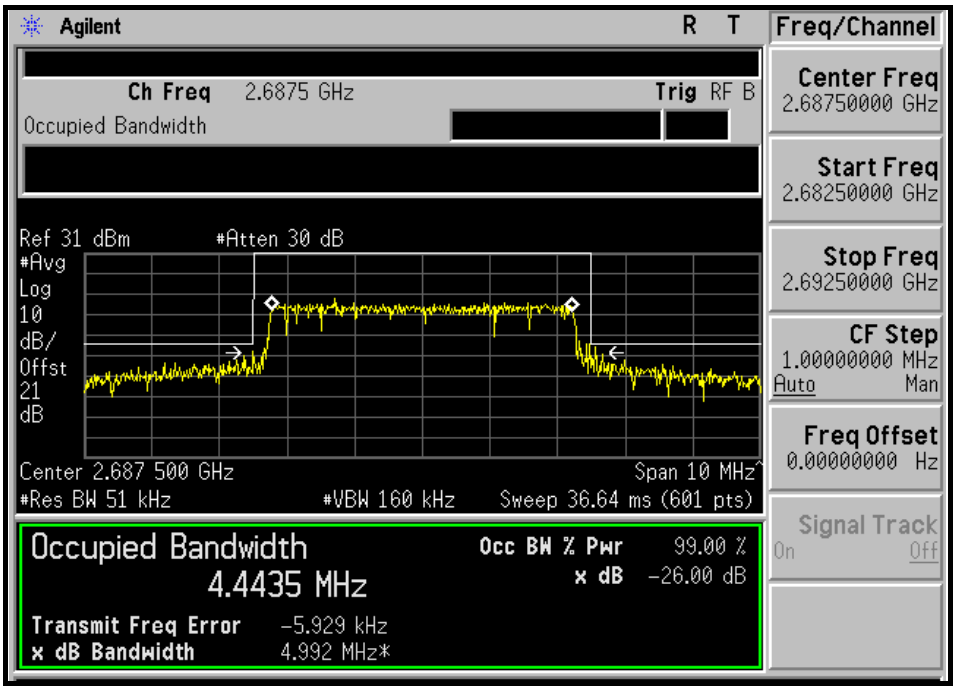
ANT 0, LOW CHANNEL



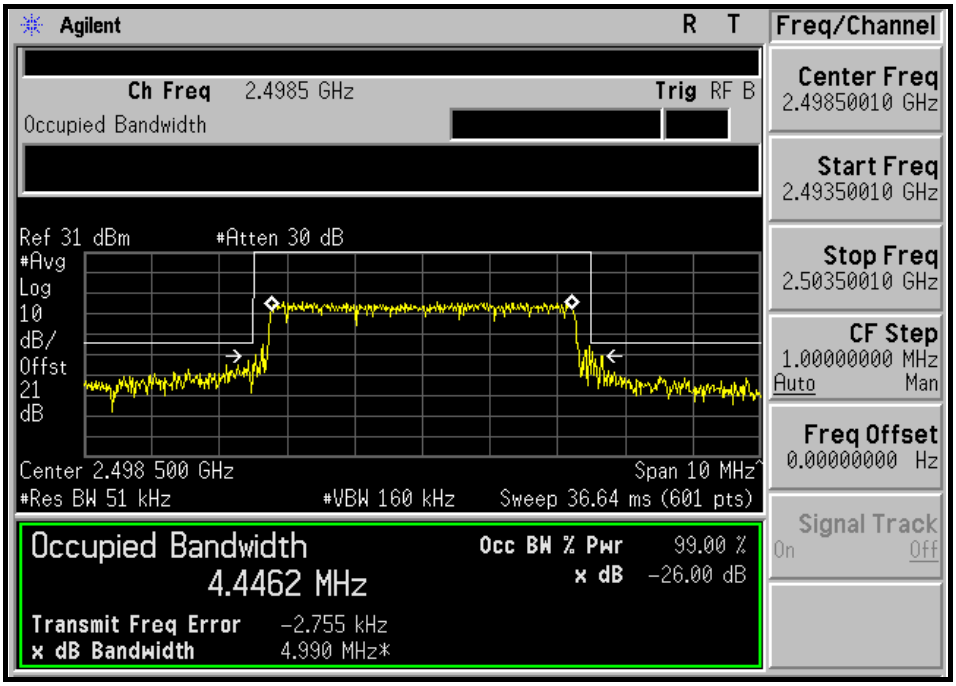
ANT 0, MIDDLE CHANNEL



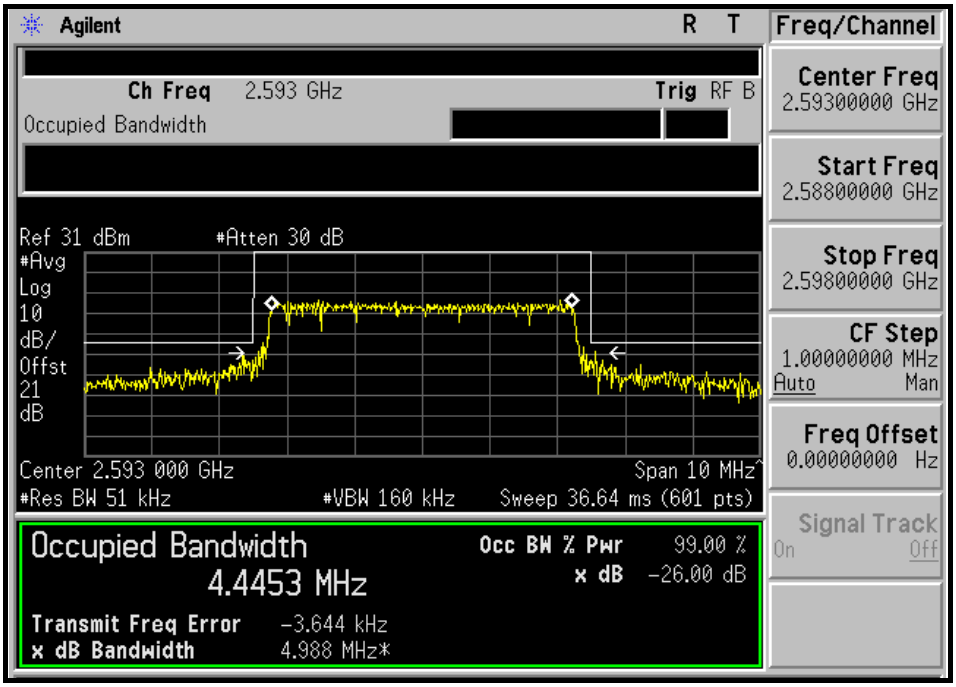
ANT 0, HIGH CHANNEL



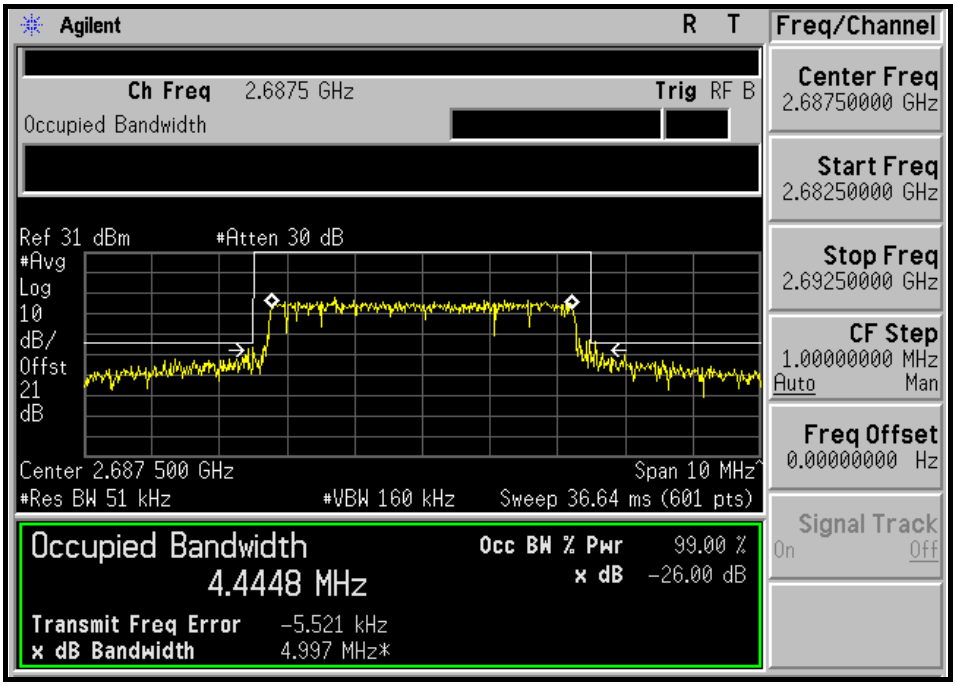
ANT 1, LOW CHANNEL



ANT 1, MIDDLE CHANNEL

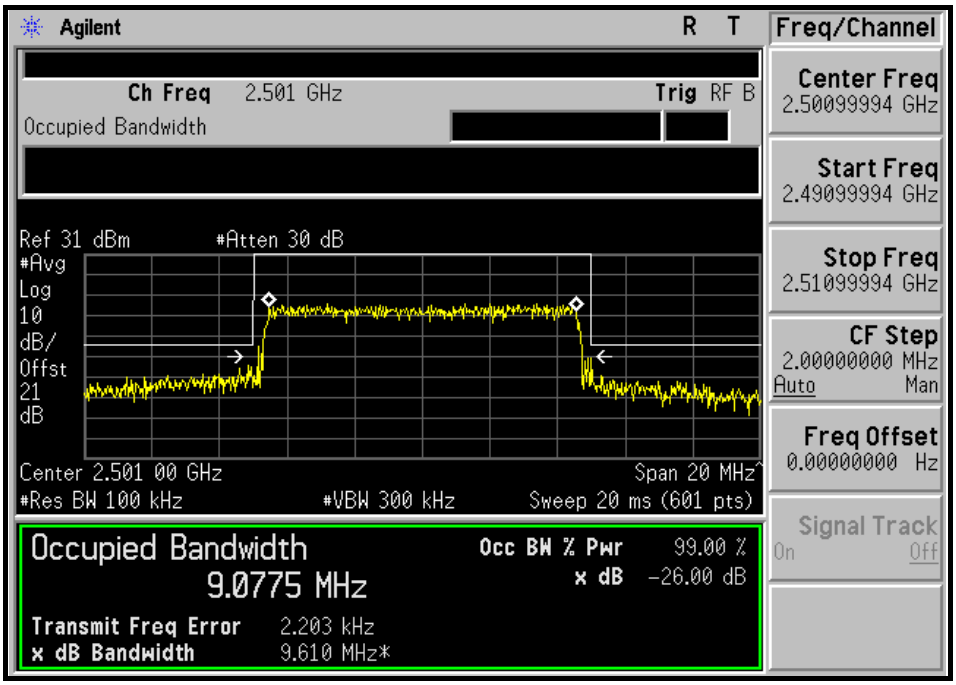


ANT 1, HIGH CHANNEL



CHANNEL BANDWIDTH: 10MHz		
CHANNEL	-26dBc BANDWIDTH (MHz)	
	ANT 0	ANT 1
Low	9.610	9.688
Middle	9.891	9.745
High	9.995	9.693

ANT 0, LOW CHANNEL



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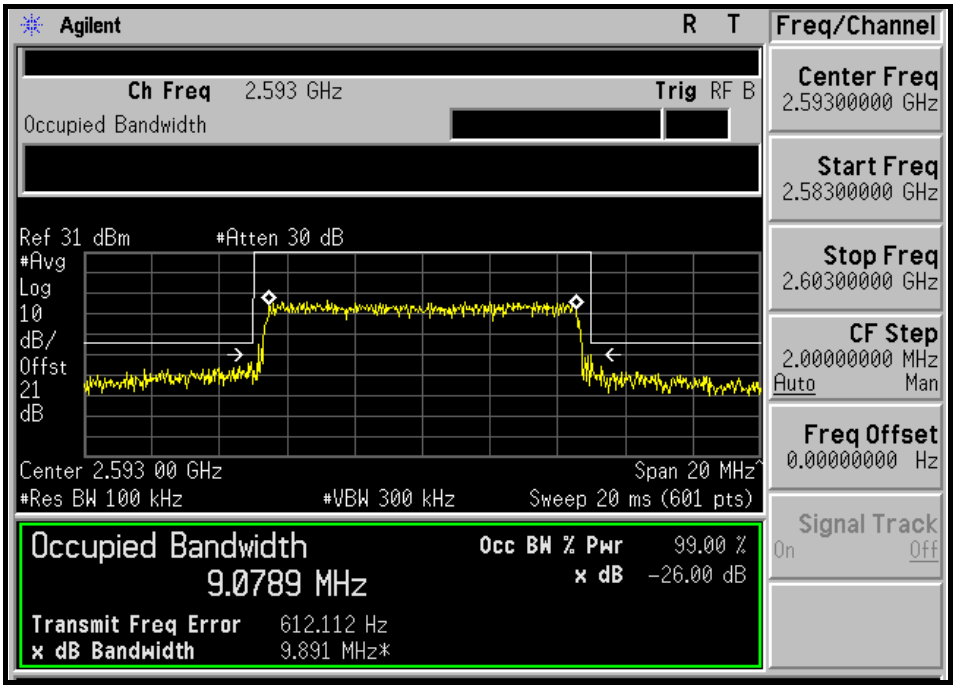
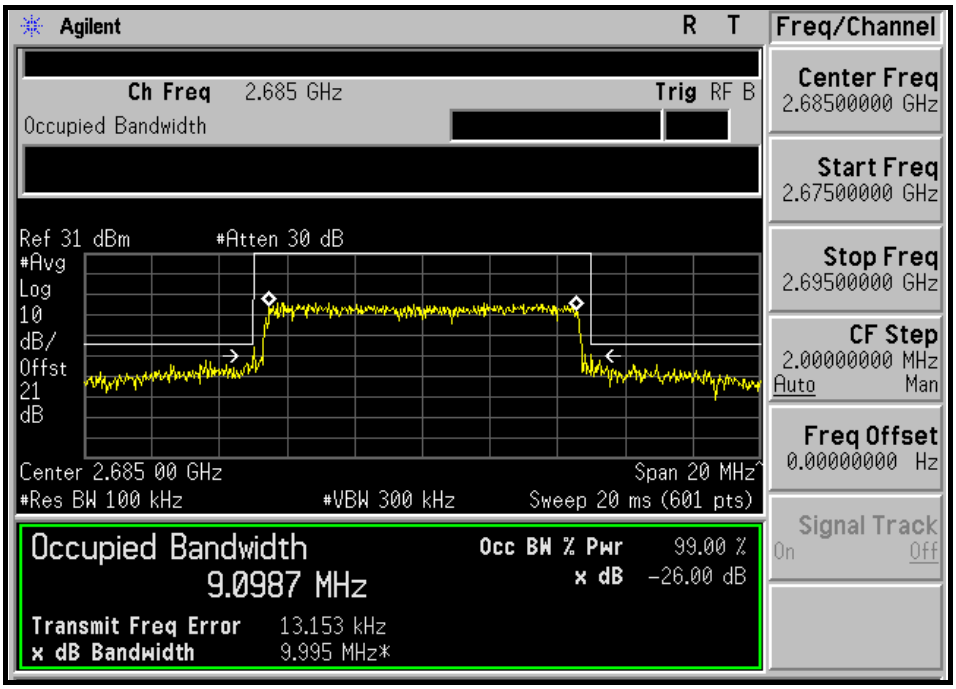
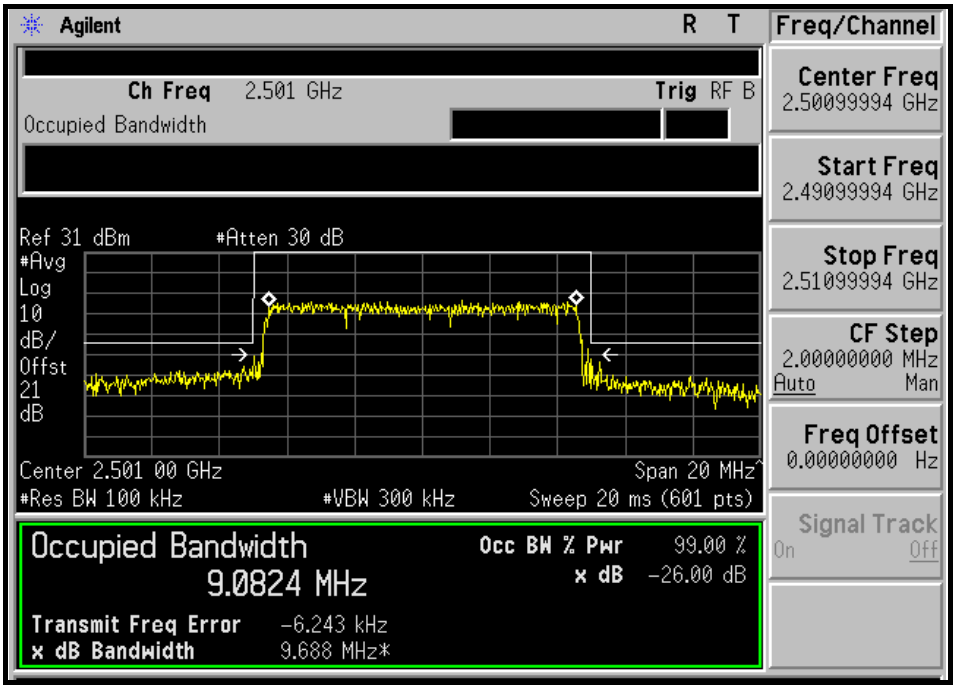


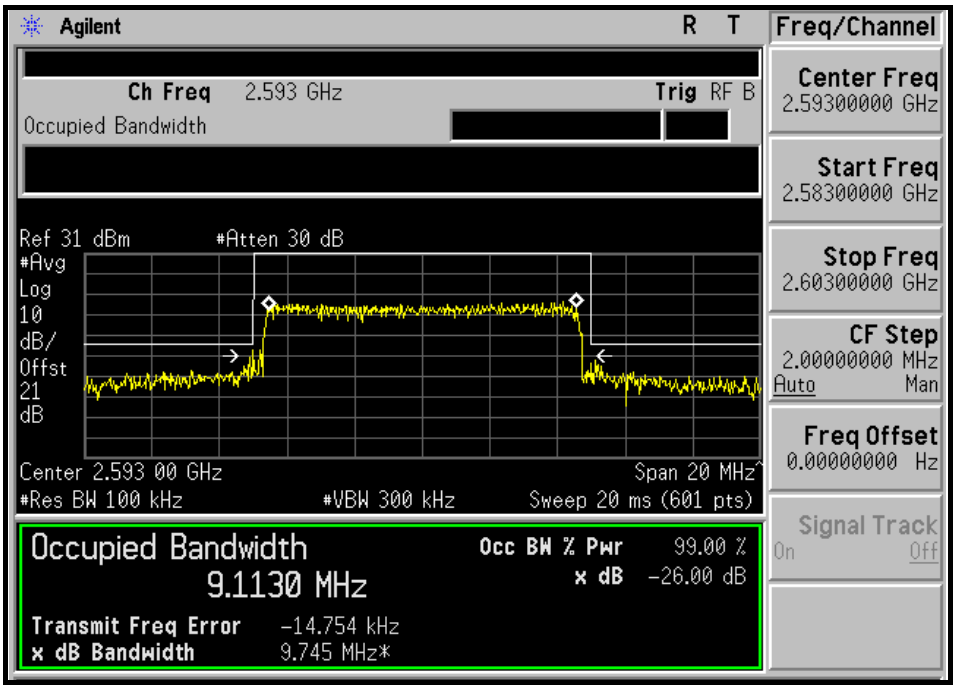
ANT 0, HIGH CHANNEL



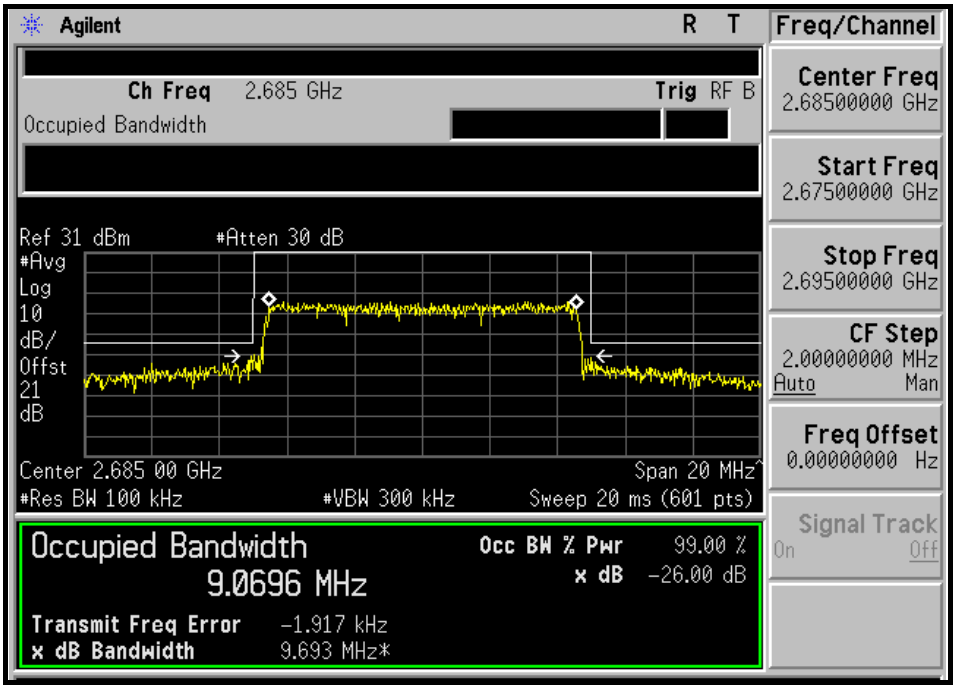
ANT 1, LOW CHANNEL



ANT 1, MIDDLE CHANNEL



ANT 1, HIGH CHANNEL



4.4 CHANNEL EDGE MEASUREMENT

4.4.1 LIMITS OF CHANNEL EDGE MEASUREMENT

According to FCC 27.53(m)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than 43 + 10 log (P) dB at the channel edge, the limit of emission equal to –13dBm. And 55 + 10 log (P) dB at 5.5 MHz from the channel edges, the limit of emission equal to –25dBm.In the 1MHz 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.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2010	Aug. 19, 2011
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 28, 2010	Jun. 27, 2011

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST SETUP

Same as Item 4.3.4

4.4.4 TEST PROCEDURES

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. The center frequency of spectrum is the band edge frequency and span is 20MHz (Channel Bandwidth: 5MHz) / 30MHz (Channel Bandwidth: 10MHz). RBW of the spectrum is 51kHz (Channel Bandwidth: 5MHz) / 100kHz (Channel Bandwidth: 10MHz).

c. Record the max trace plot into the test report.

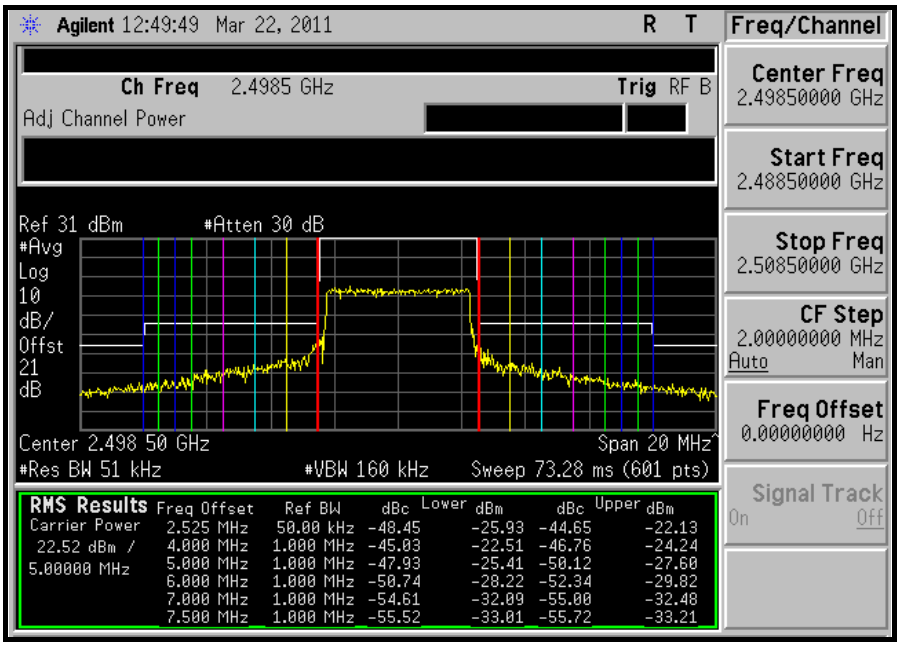
4.4.5 EUT OPERATING CONDITION

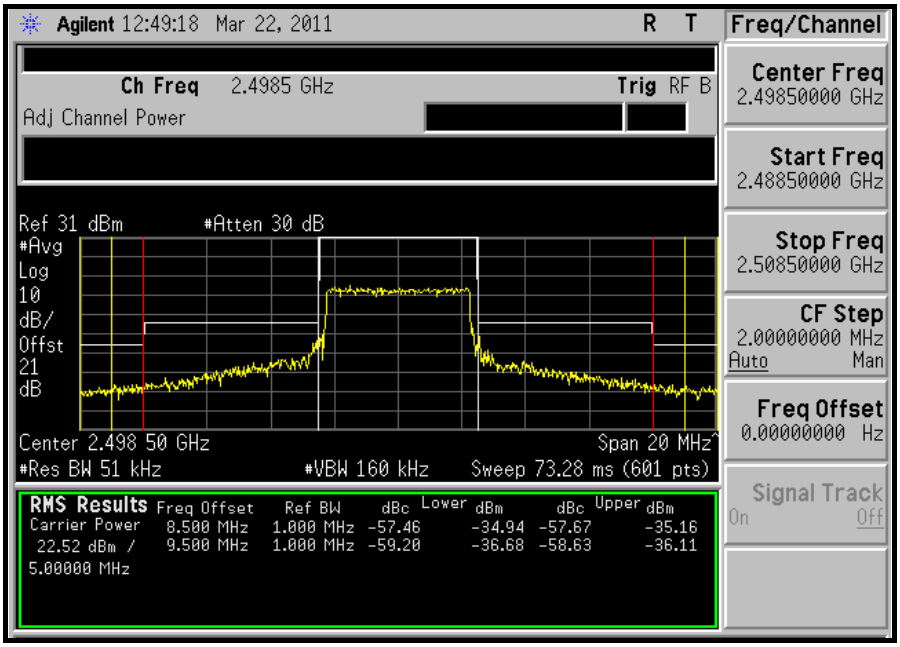
Same as 4.1.5

4.4.6 TEST RESULTS

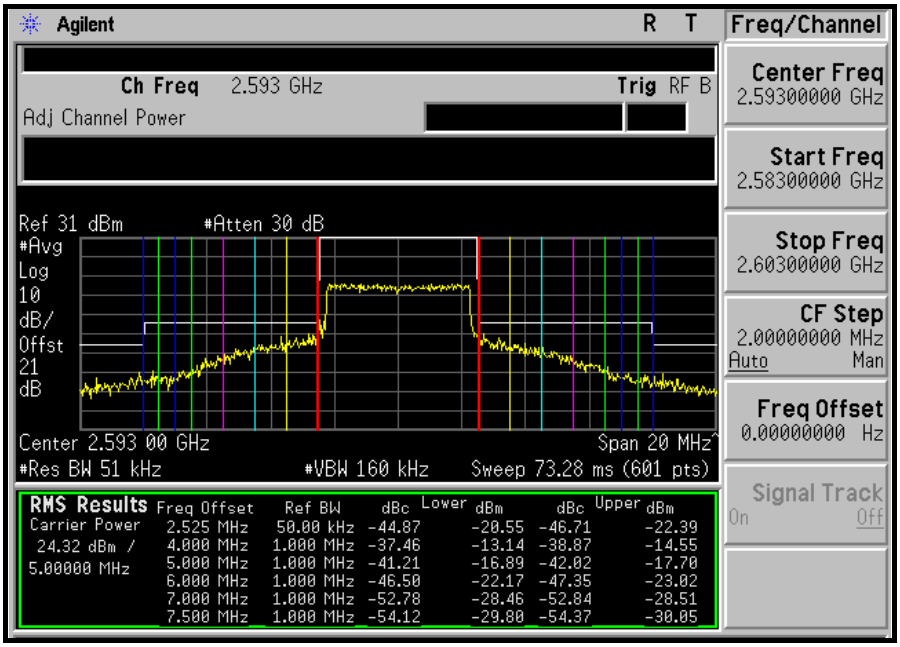
CHANNEL BANDWIDTH: 5MHz

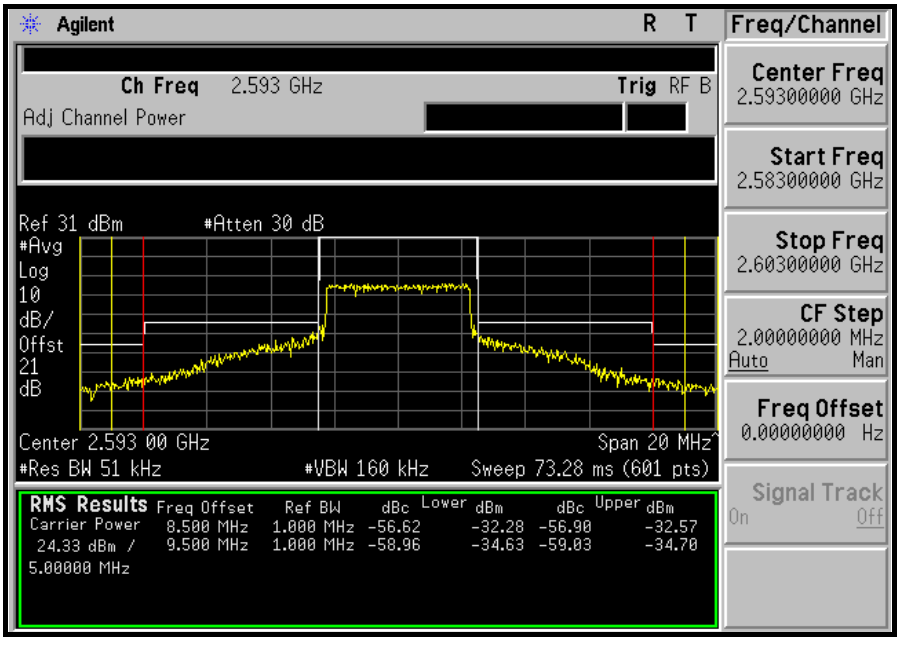
ANT 0, LOW CHANNEL



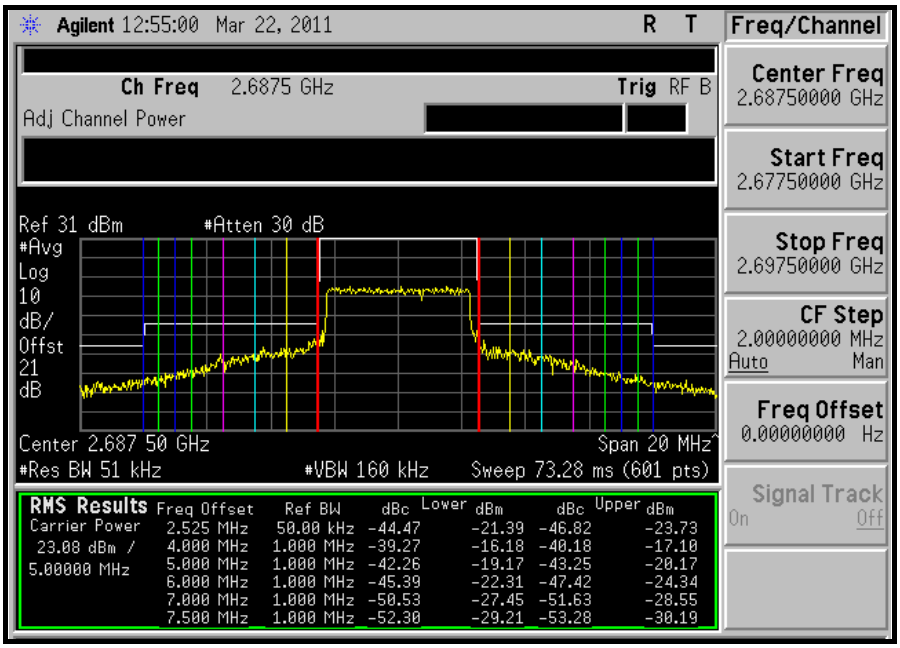


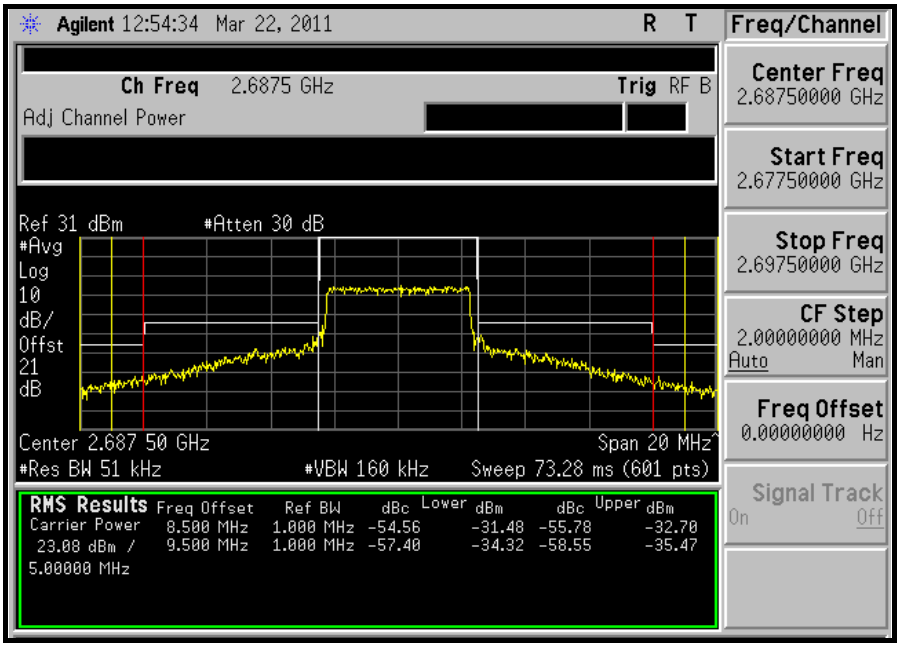
ANT 0, MIDDLE CHANNEL



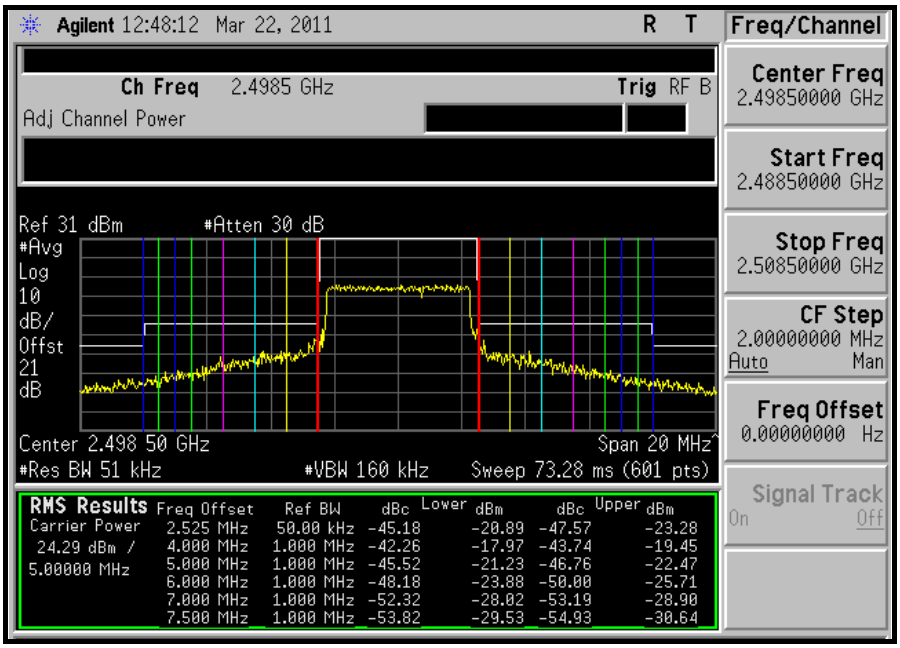


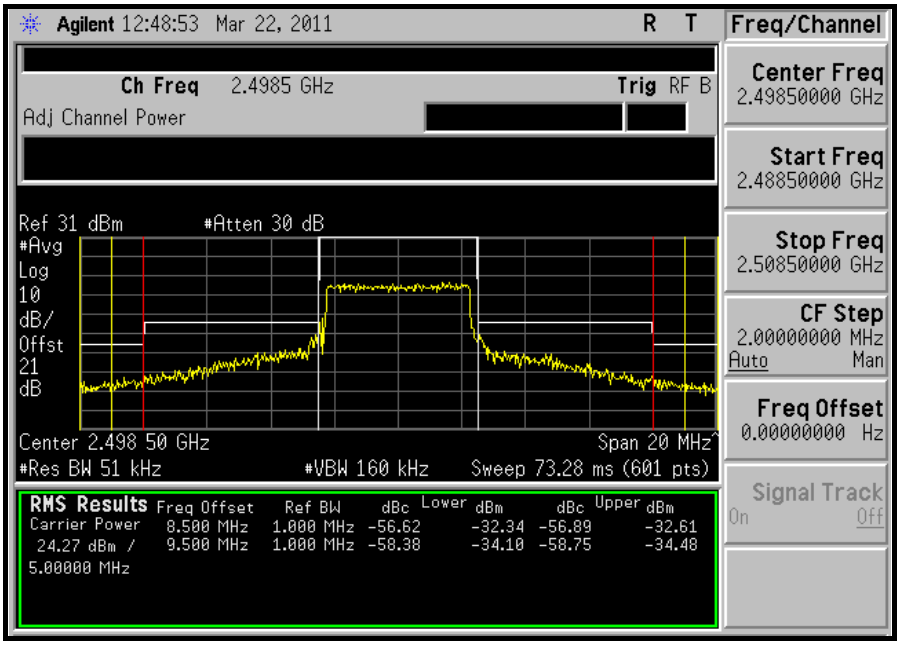
ANT 0, HIGH CHANNEL



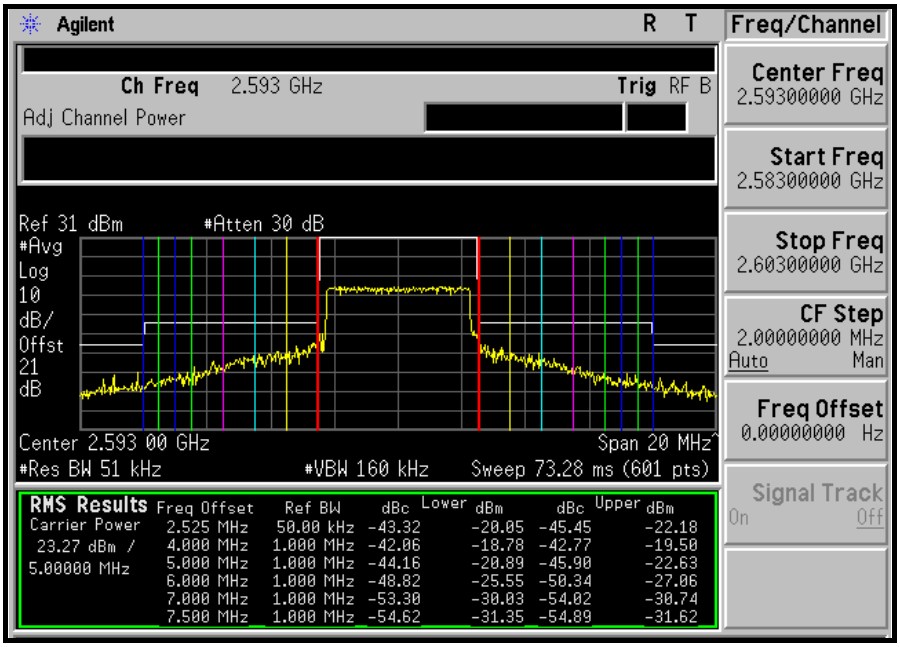


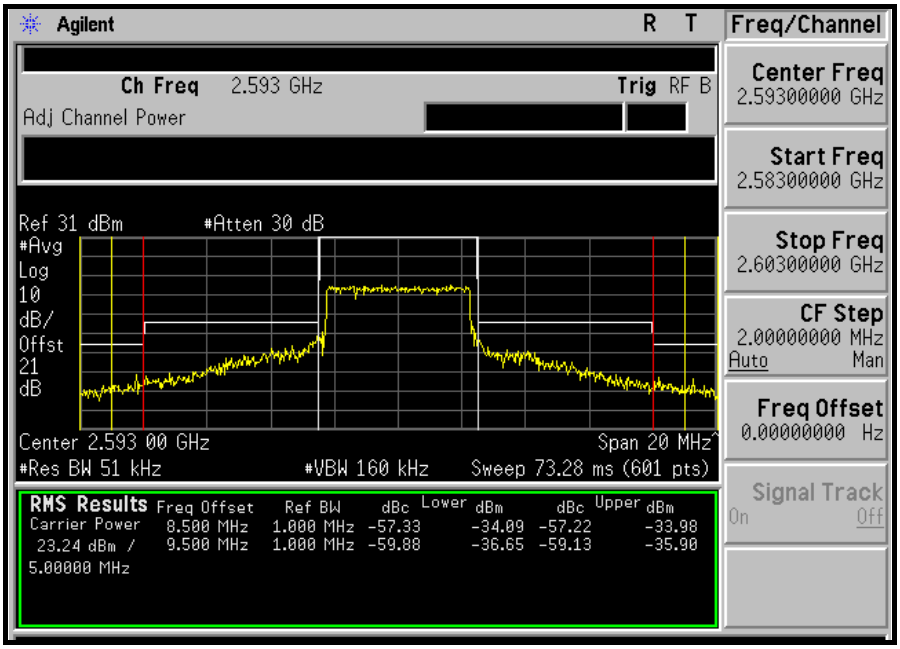
ANT 1, LOW CHANNEL



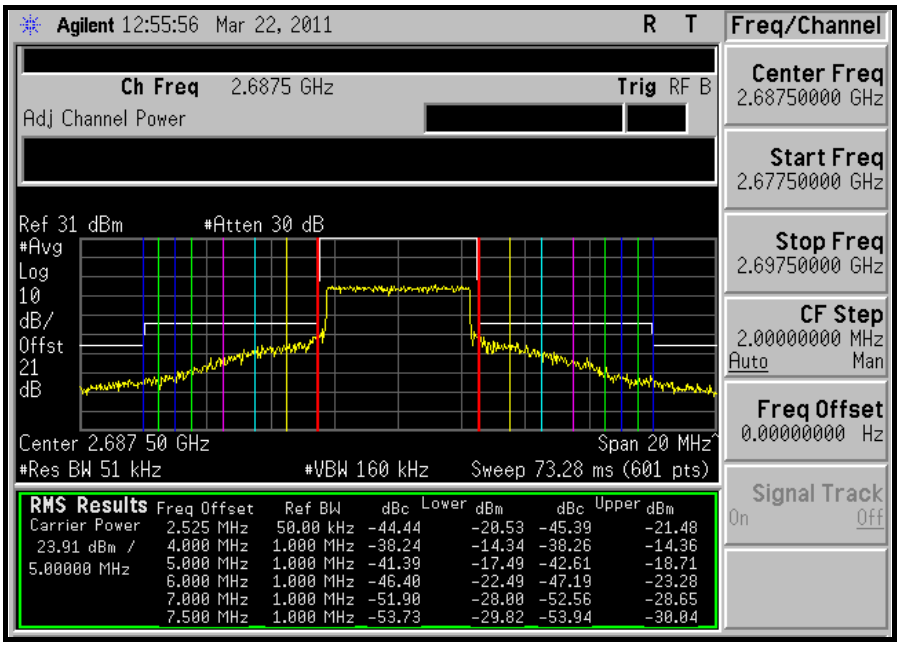


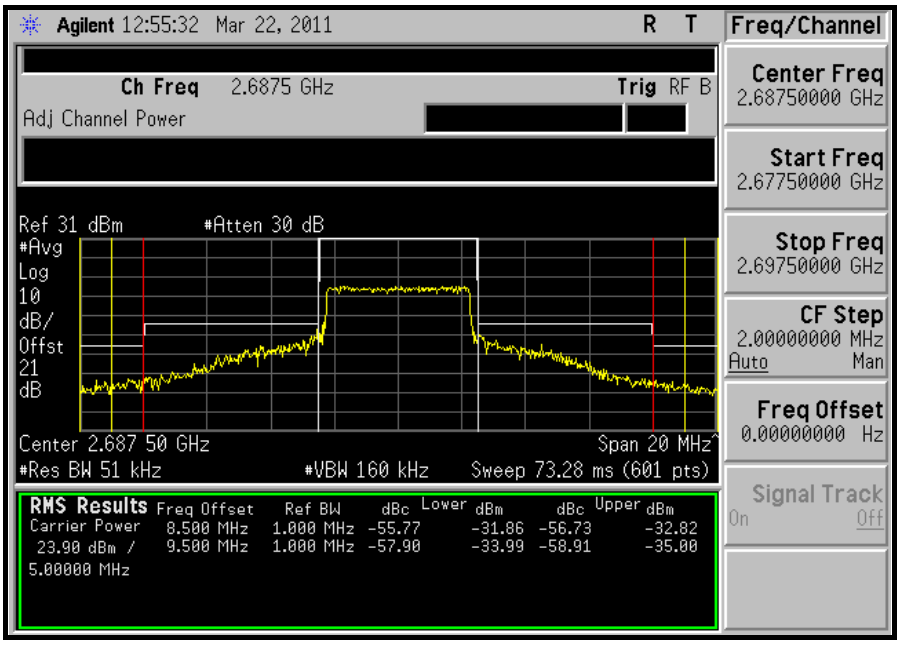
ANT 1, MIDDLE CHANNEL





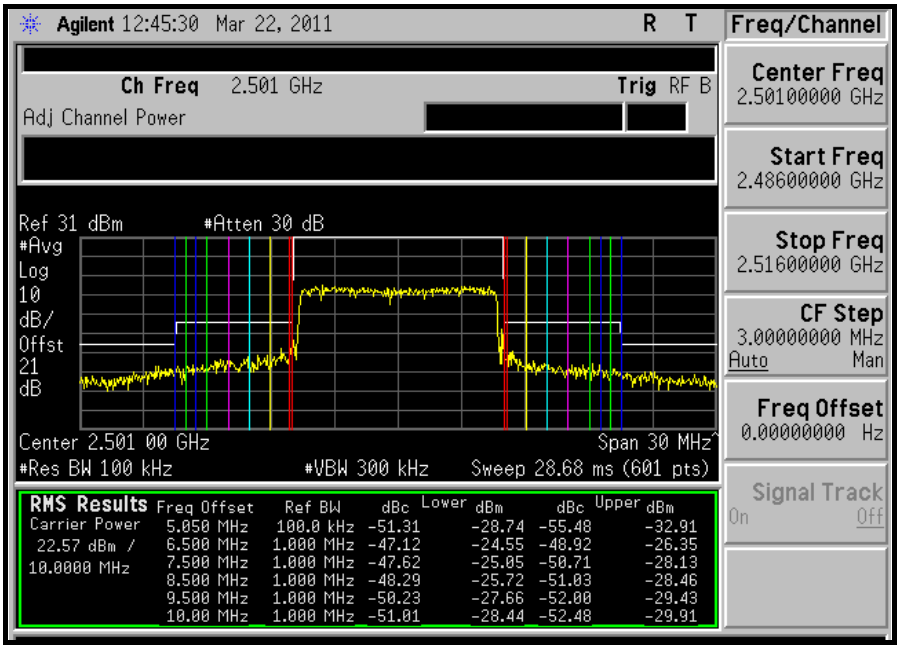
ANT 1, HIGH CHANNEL

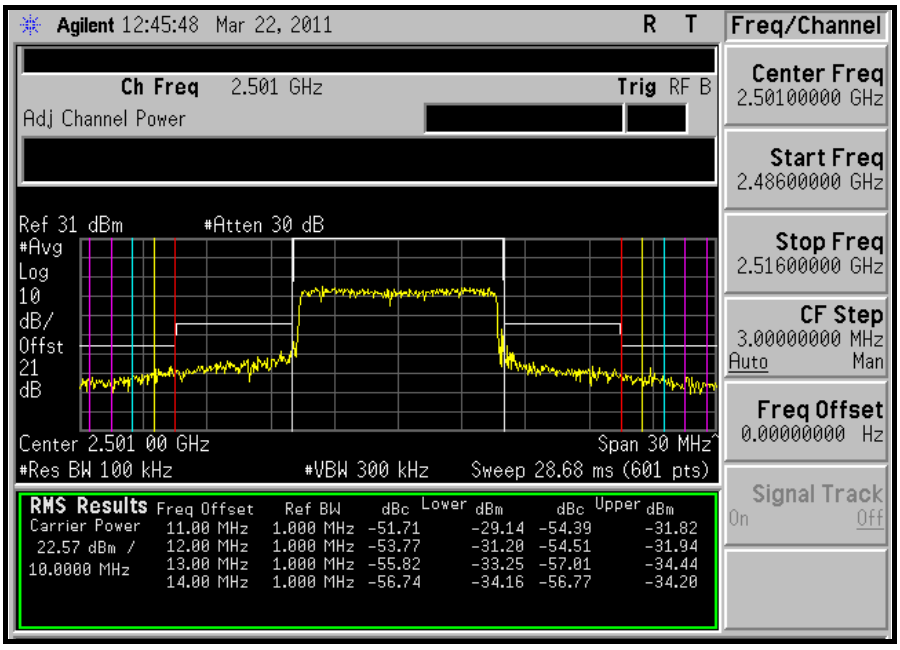




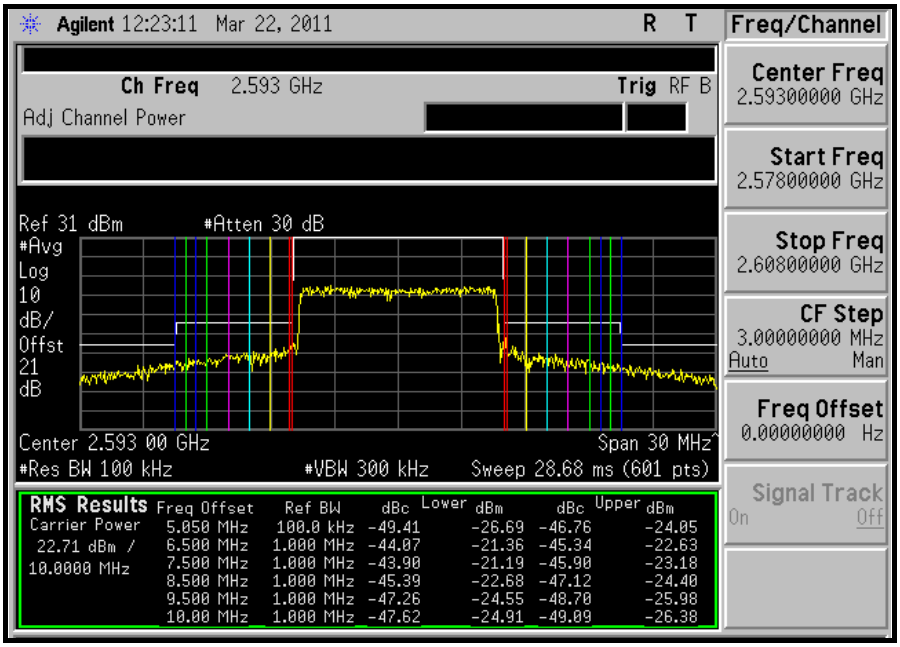
CHANNEL BANDWIDTH: 10MHz

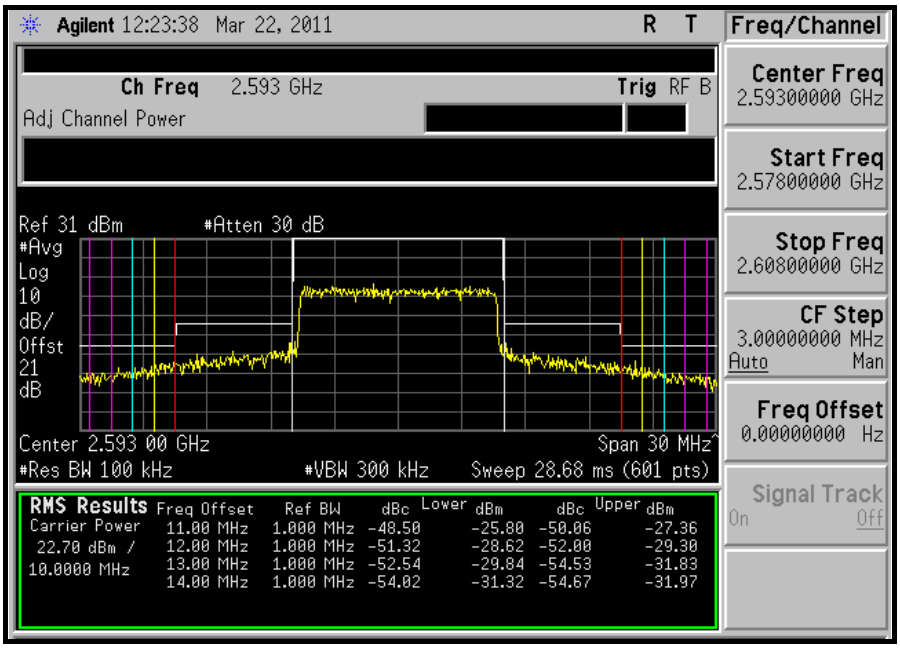
ANT 0, LOW CHANNEL



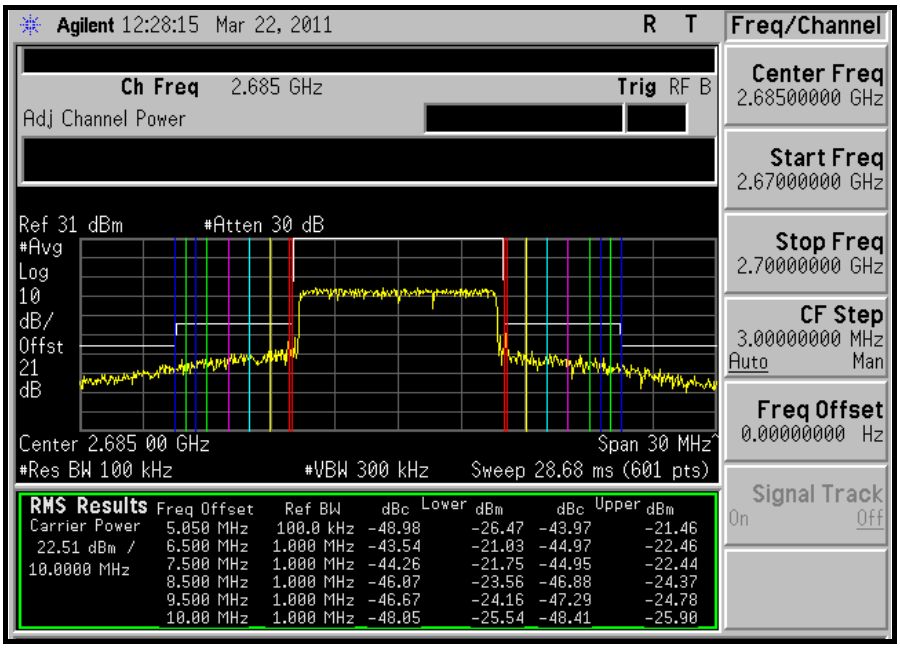


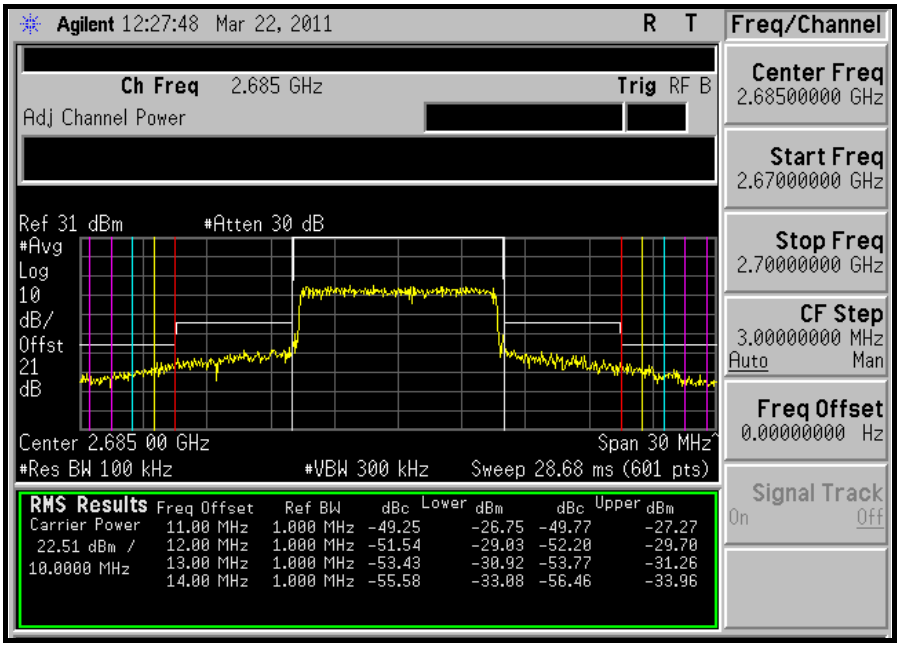
ANT 0, MIDDLE CHANNEL



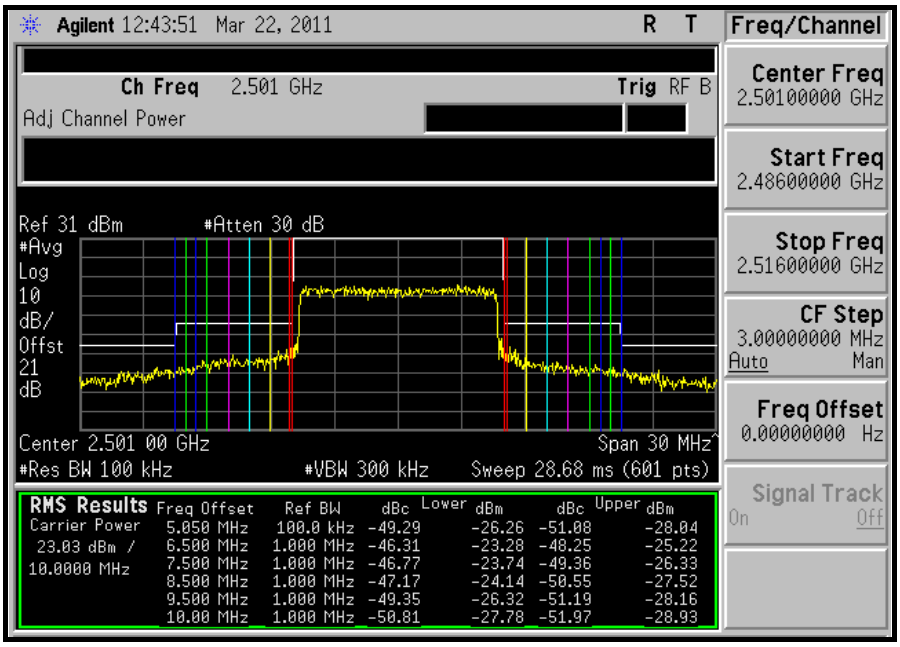


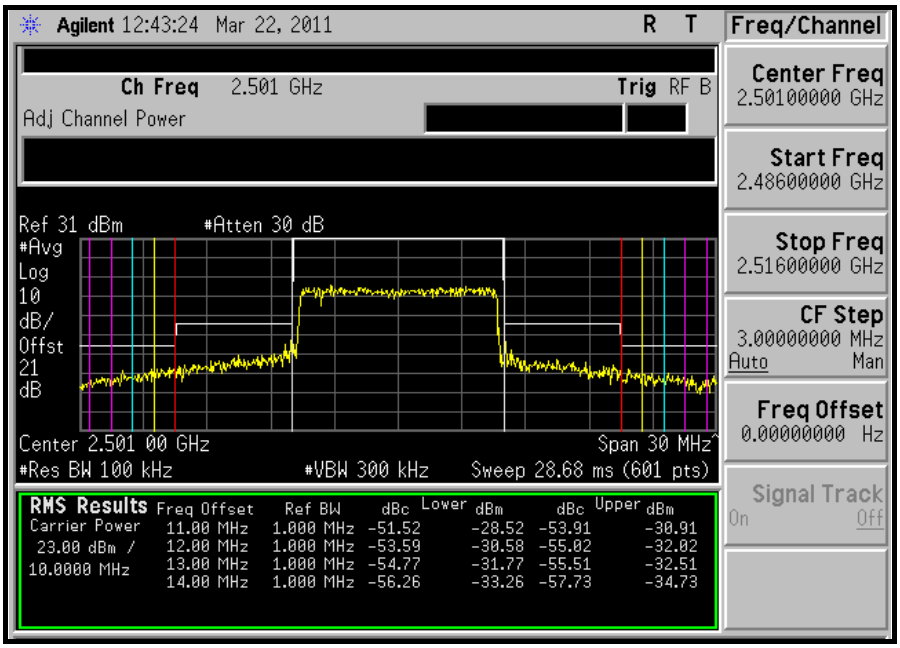
ANT 0, HIGH CHANNEL



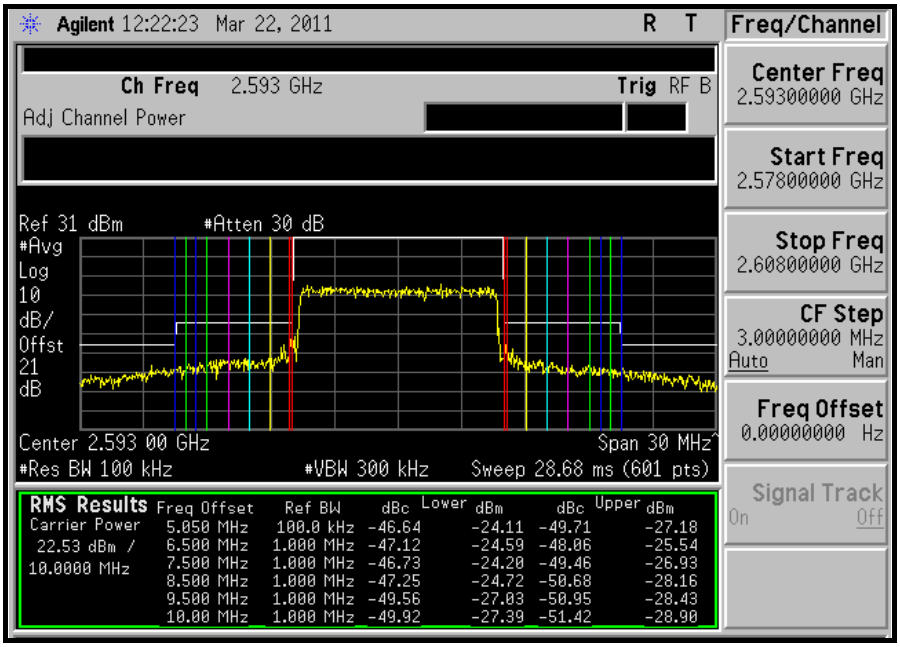


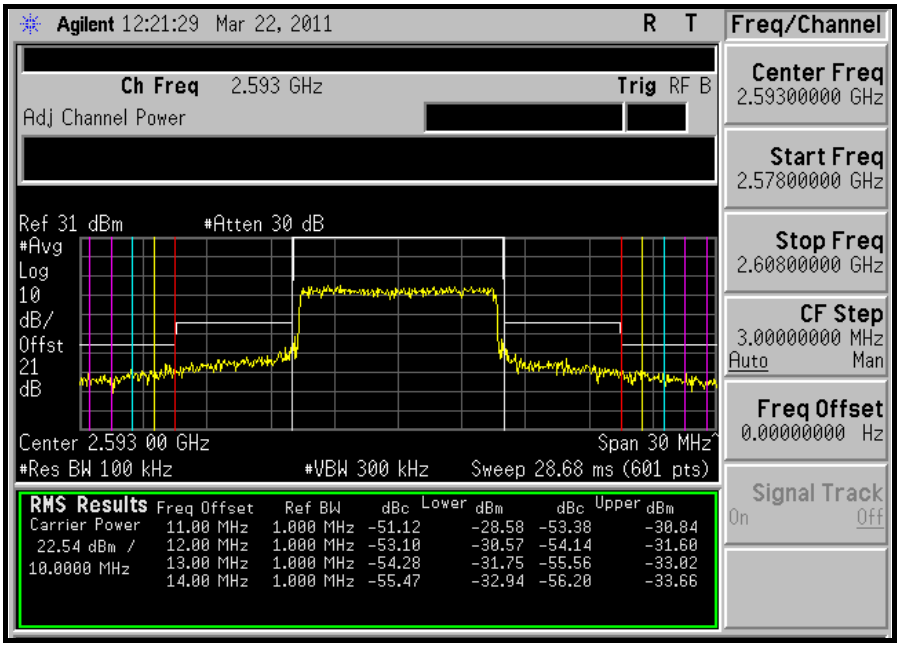
ANT 1, LOW CHANNEL



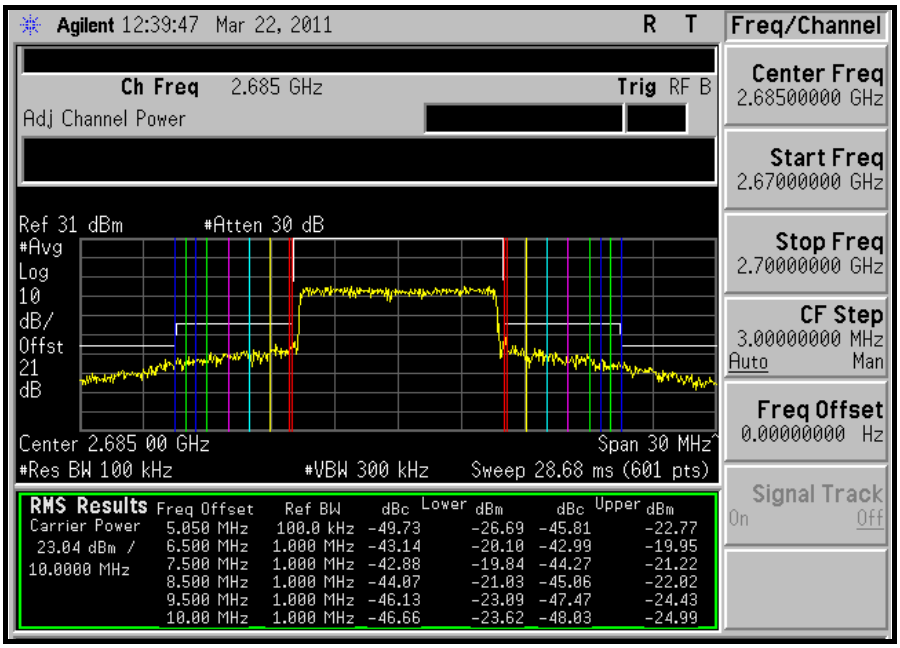


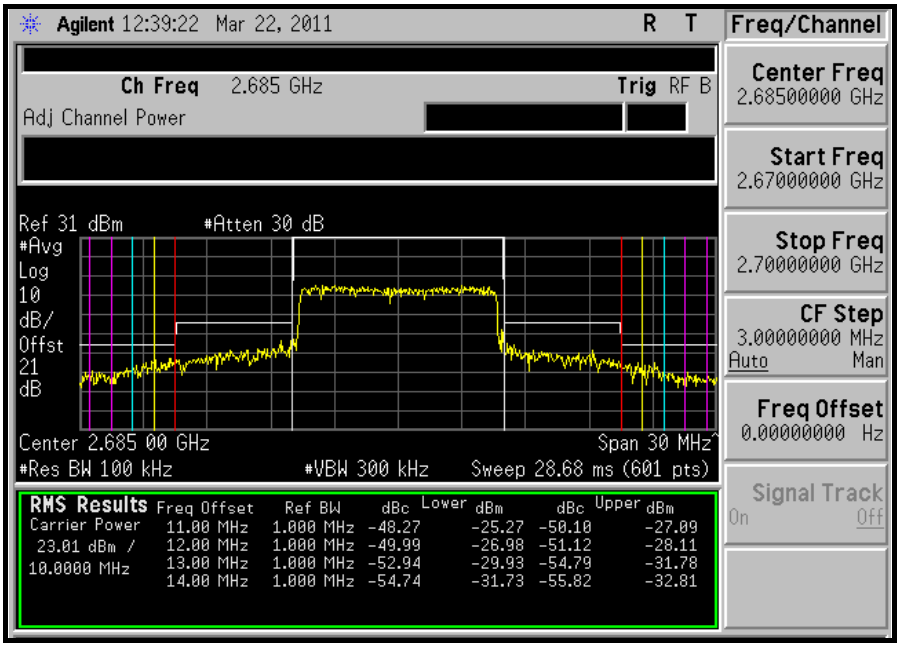
ANT 1, MIDDLE CHANNEL





ANT 1, HIGH CHANNEL





4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 27.53(m)(4), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –25dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Dec. 29, 2010	Dec. 28, 2011
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2010	Aug. 19, 2011
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	May 13, 2011	May 12, 2012
Wainwright Instruments High Pass Filter	WHKX4.5/18G -10SS	NA	NA	NA

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

a. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. When the spectrum scanned from 30MHz to 27GHz, it shall be connected to the 20dB pad attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

4.5.4 TEST SETUP

Same as 4.3.4

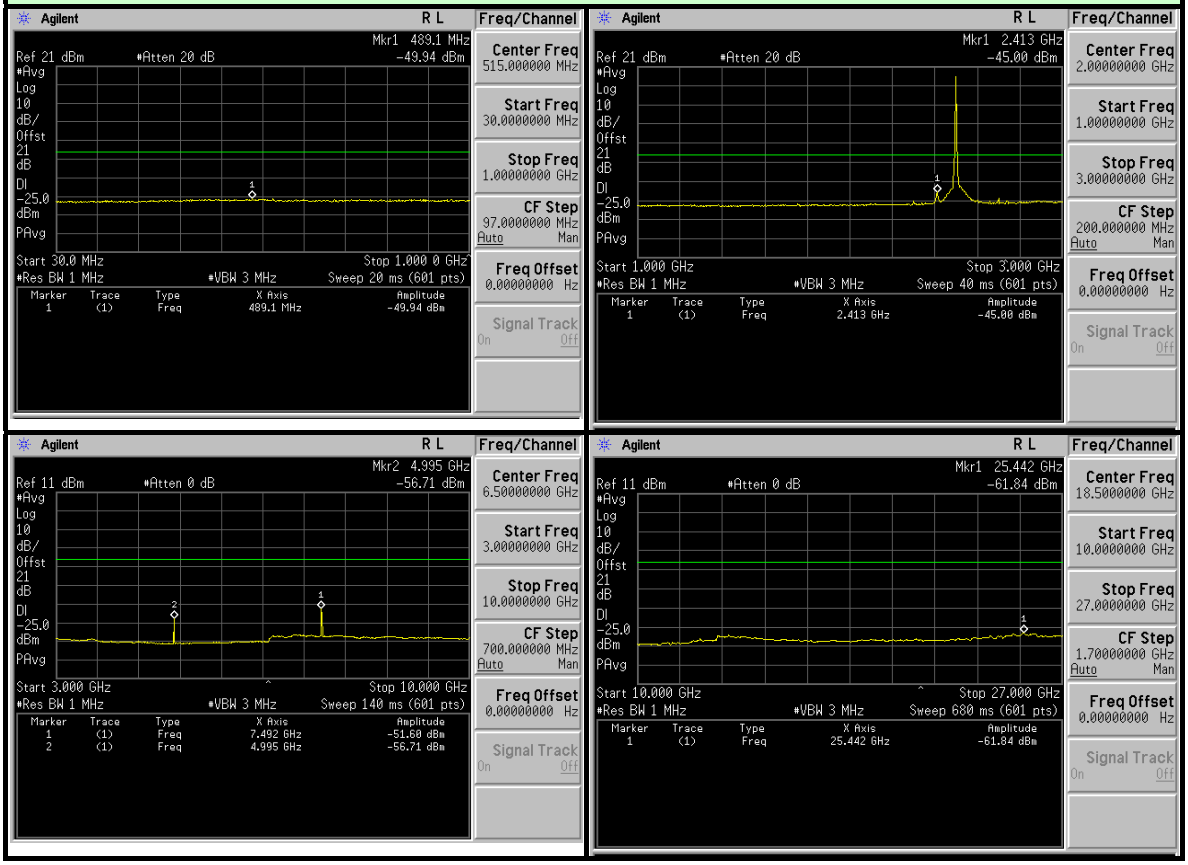
4.5.5 EUT OPERATING CONDITIONS

Same as 4.1.5

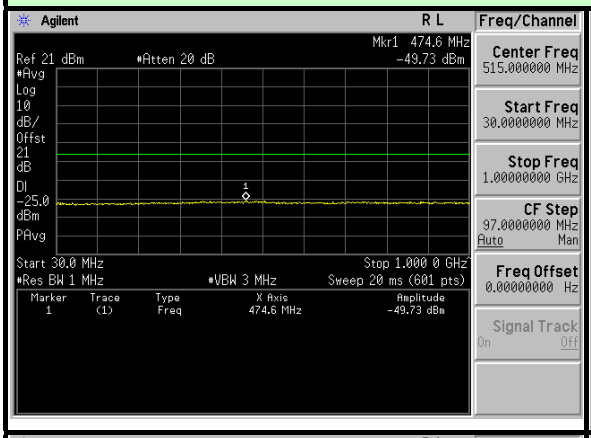
4.5.6 TEST RESULTS

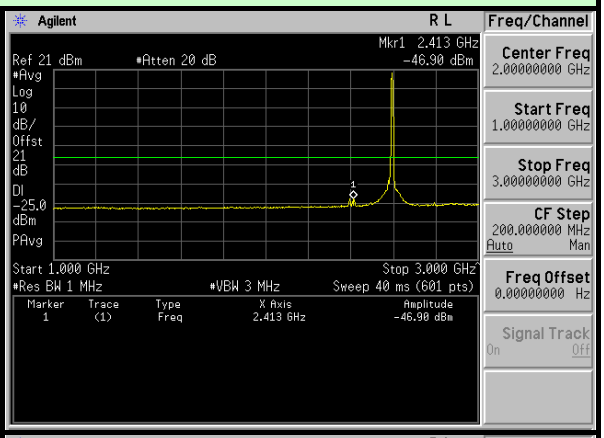
CHANNEL BANDWIDTH: 5MHz

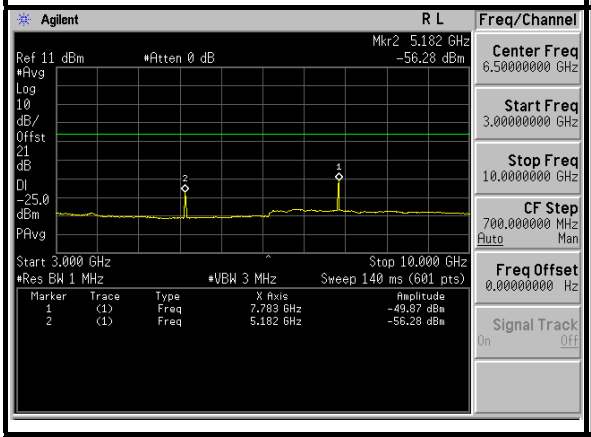
ANT 0, LOW CHANNEL

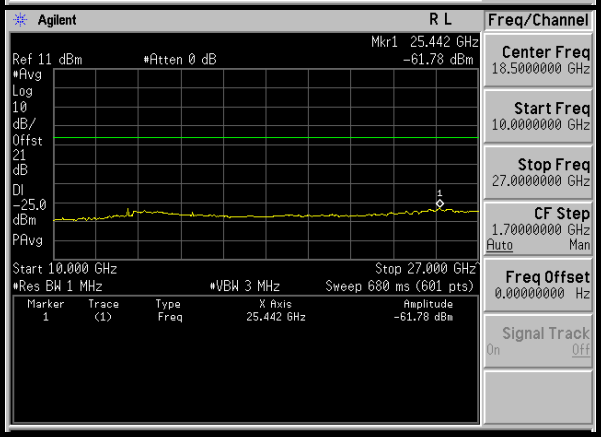


ANT 0, MIDDLE CHANNEL

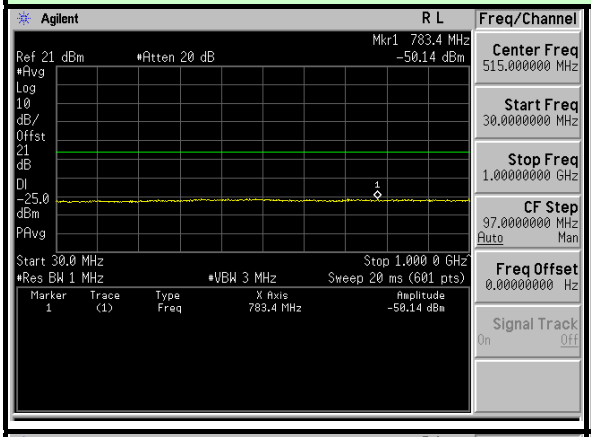


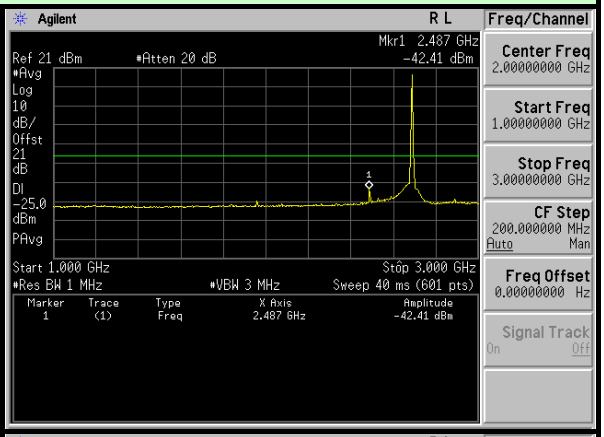


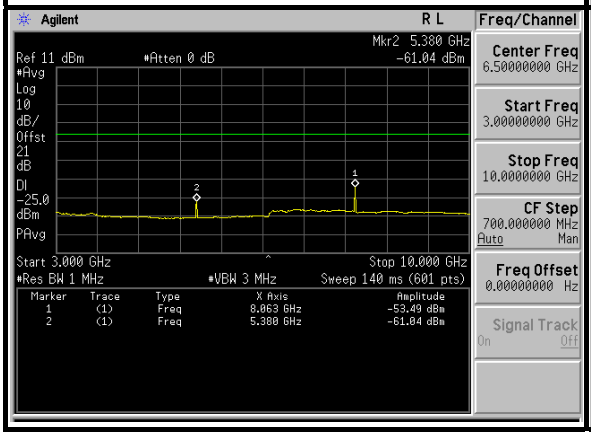


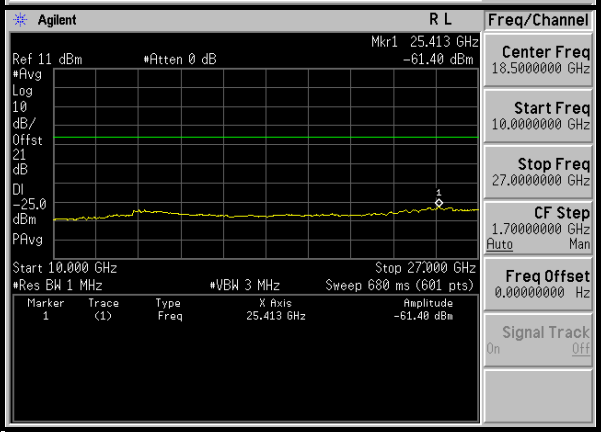


ANT 0, HIGH CHANNEL

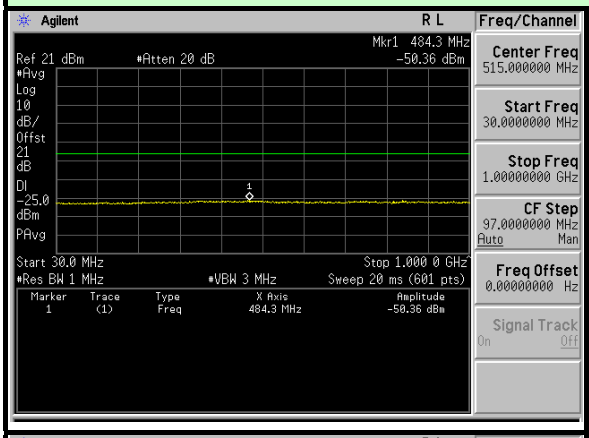


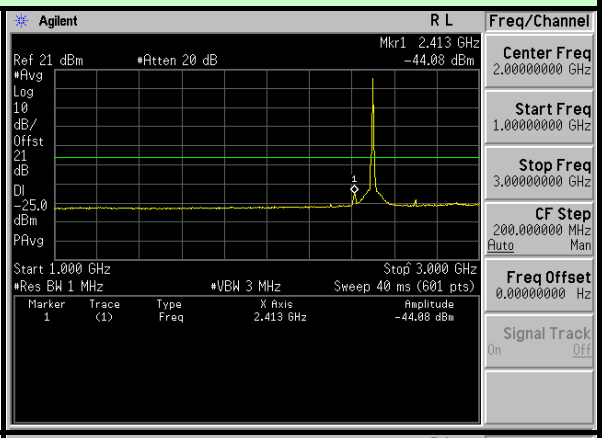


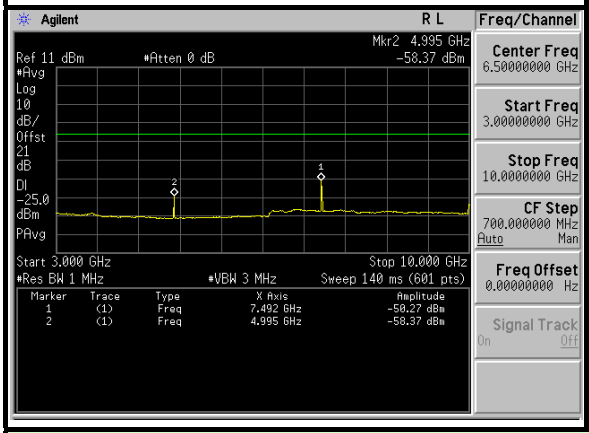


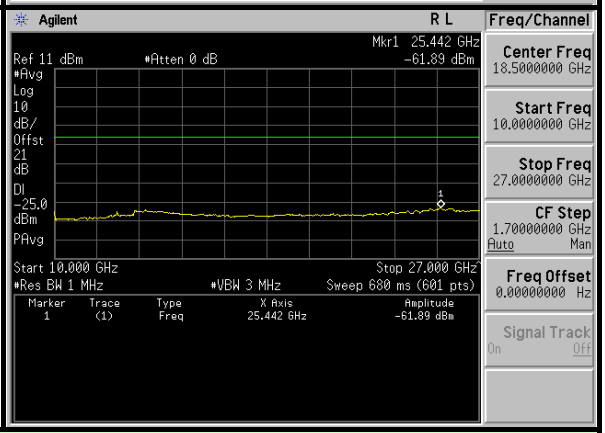


ANT 1, LOW CHANNEL

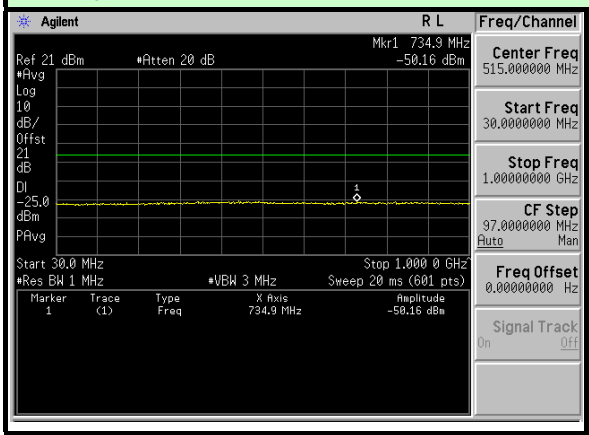


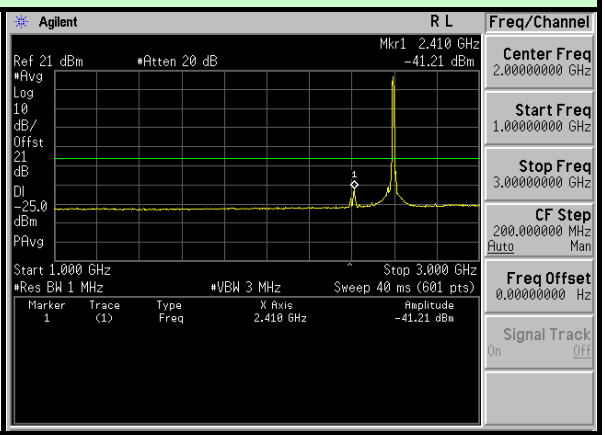


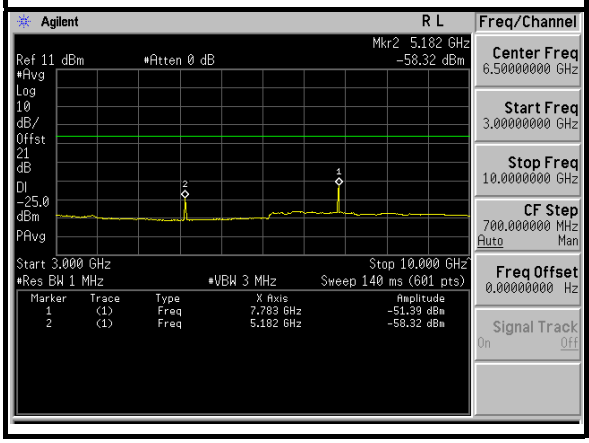


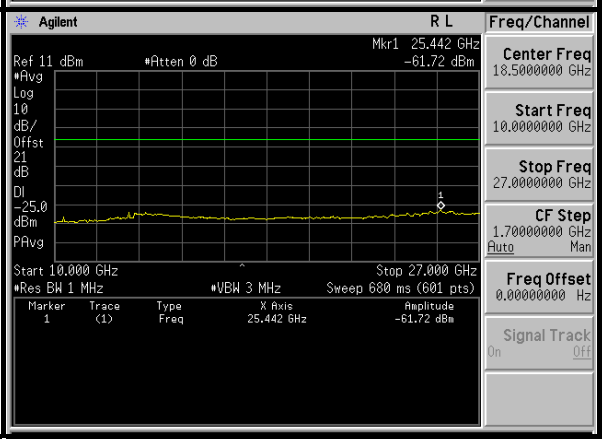


ANT 1 , MIDDLE CHANNEL

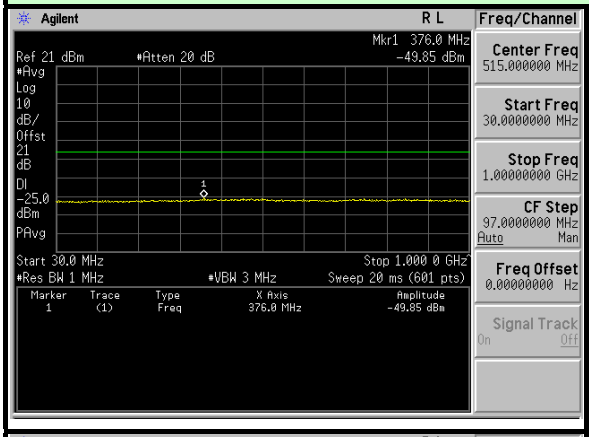


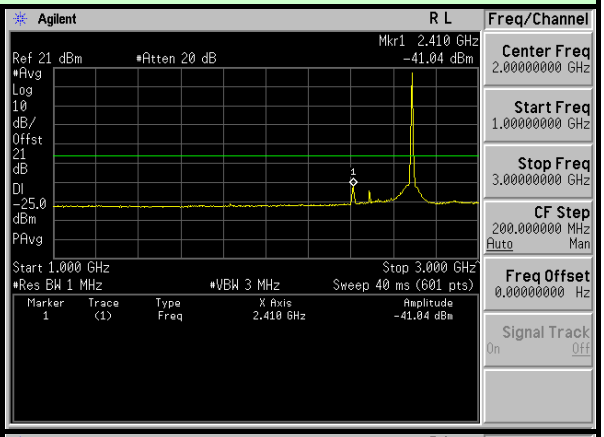


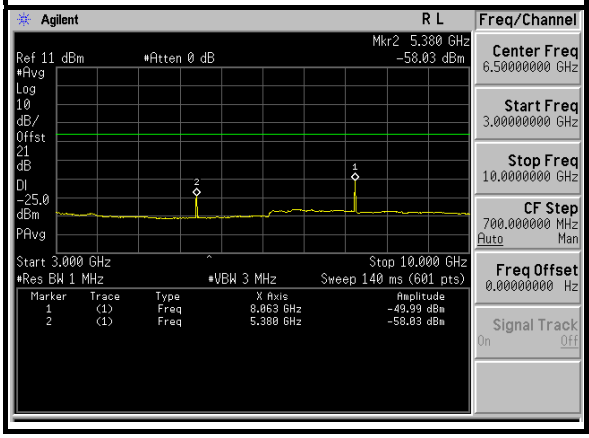


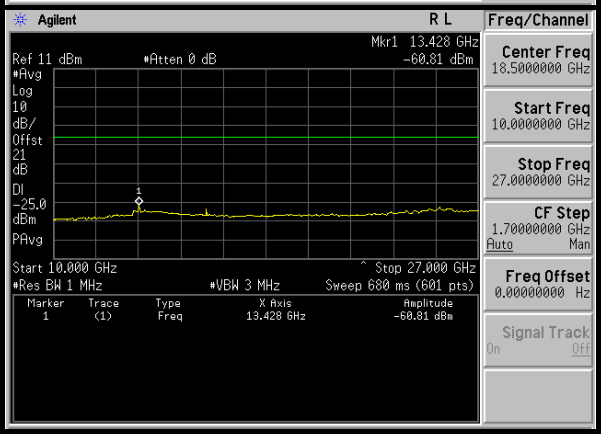


ANT 1 , HIGH CHANNEL



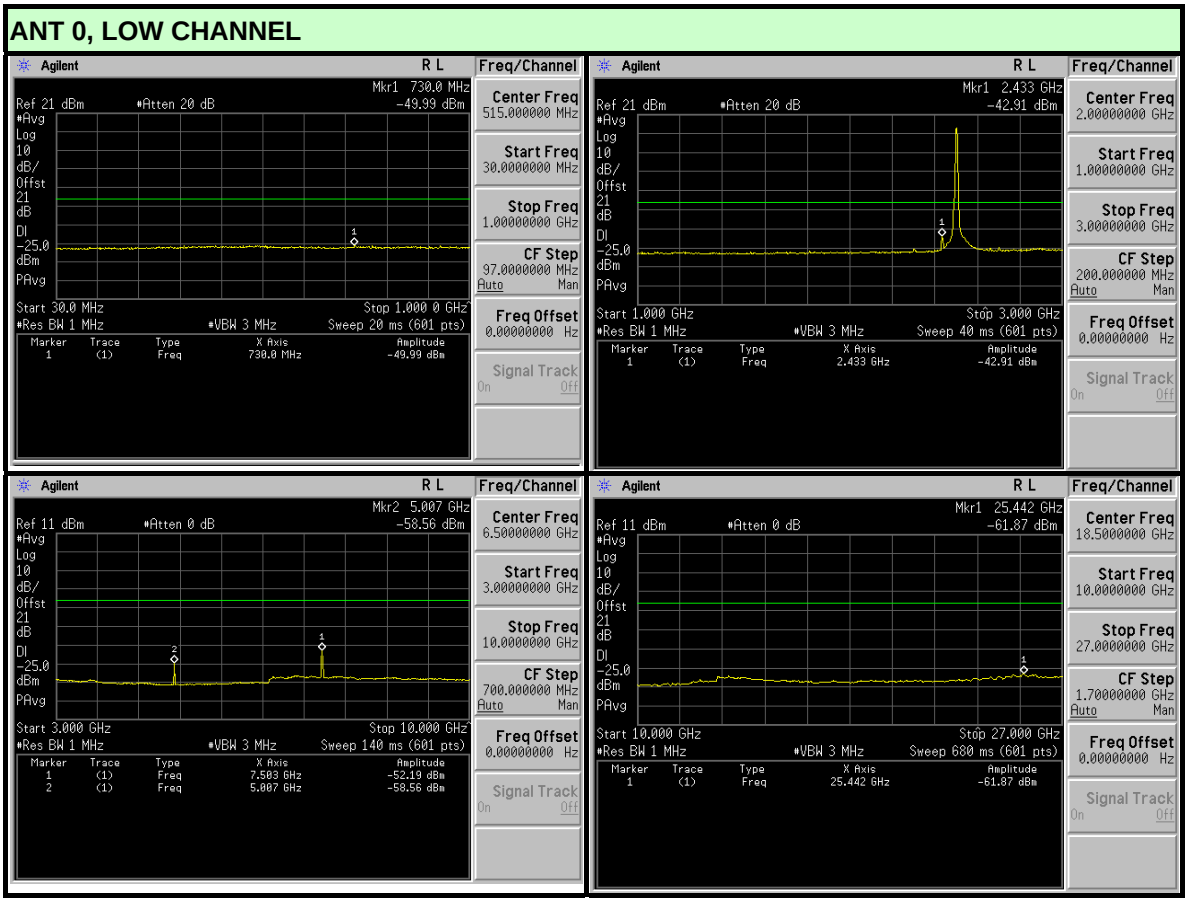




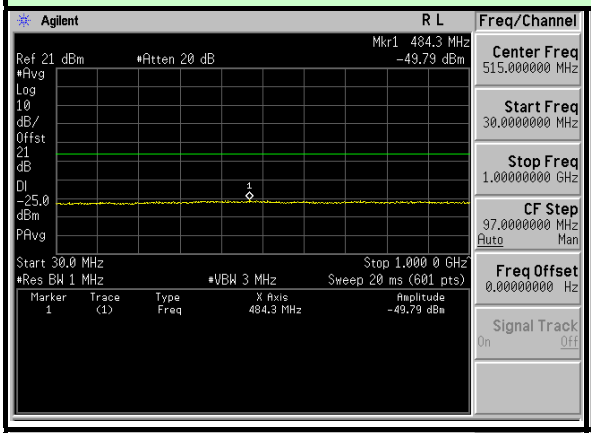


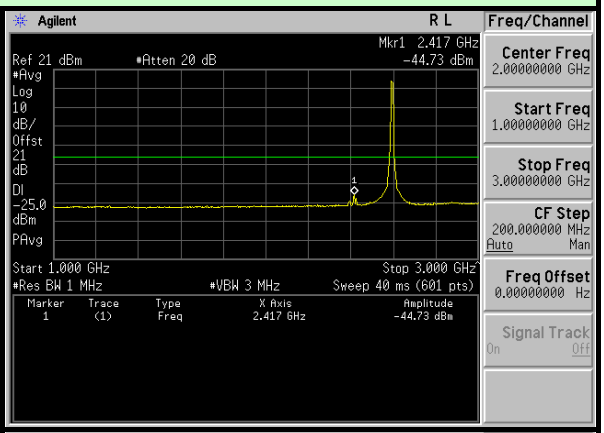
CHANNEL BANDWIDTH: 10MHz

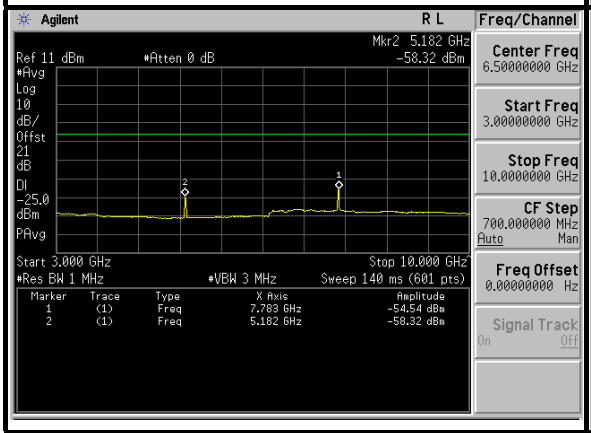
ANT 0, LOW CHANNEL

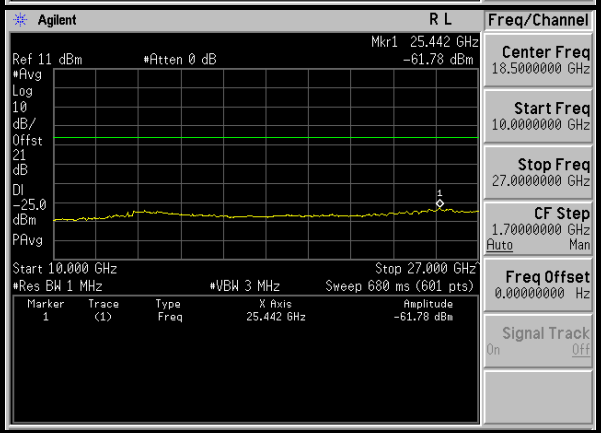


ANT 0, MIDDLE CHANNEL

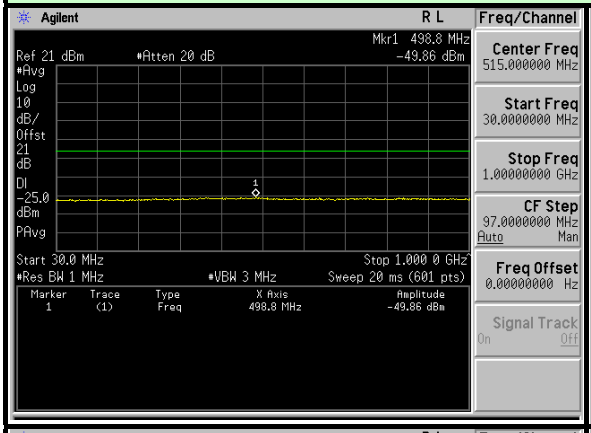


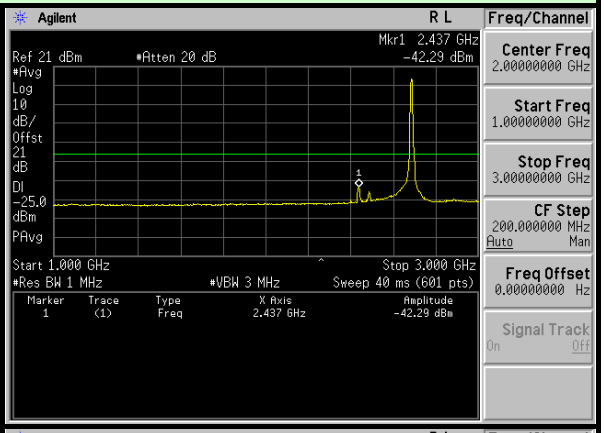


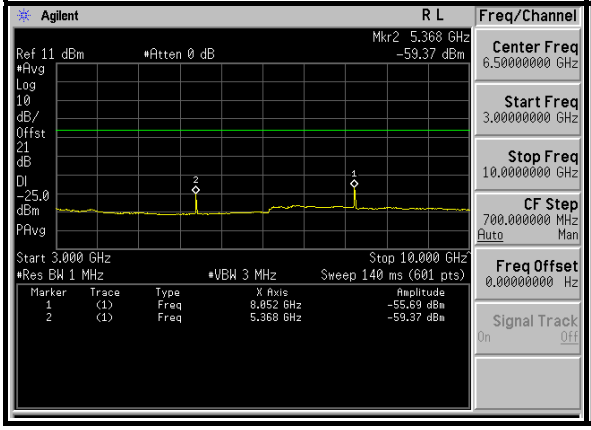


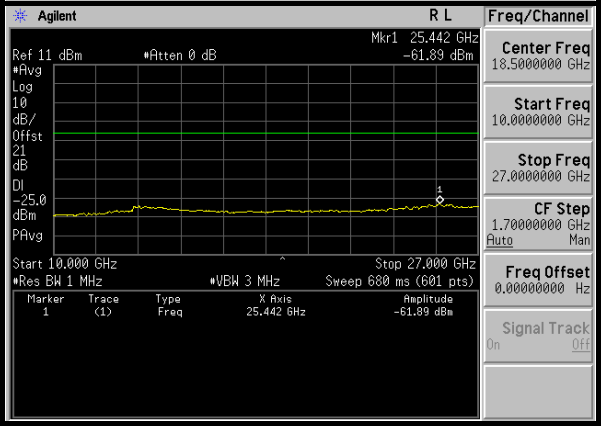


ANT 0, HIGH CHANNEL

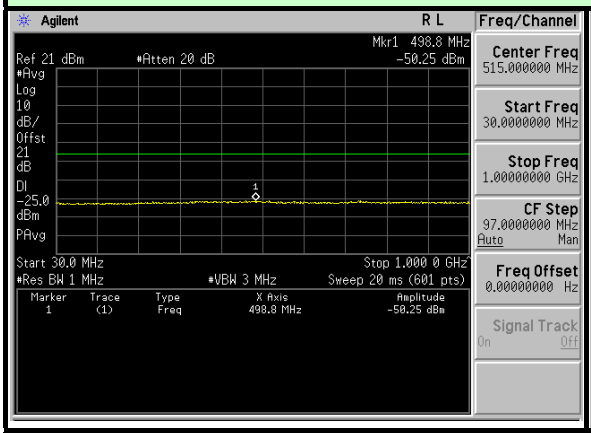


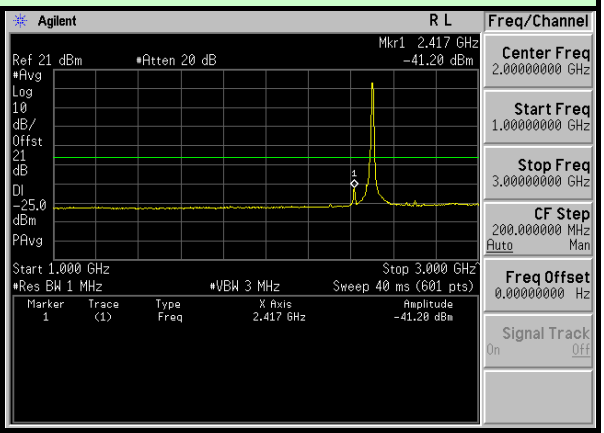


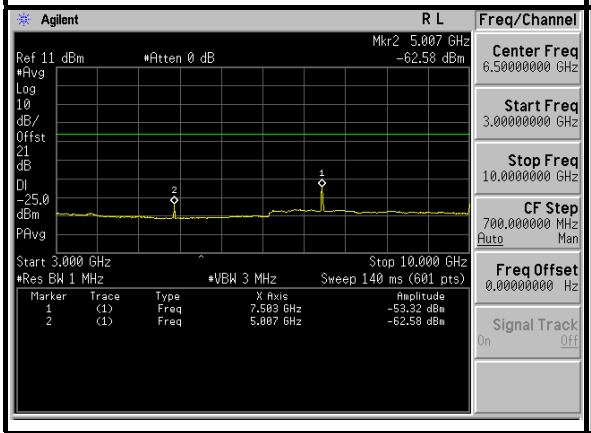


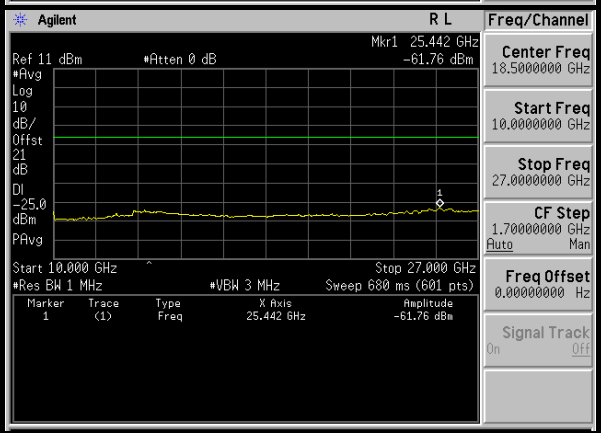


ANT 1, LOW CHANNEL

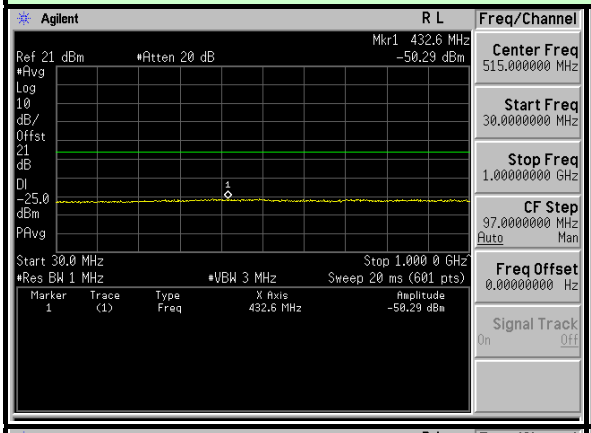


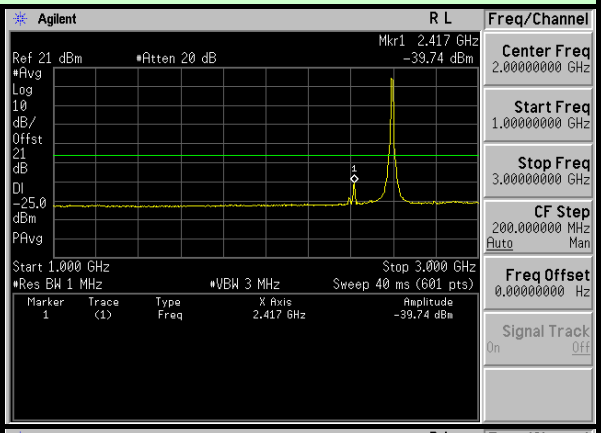


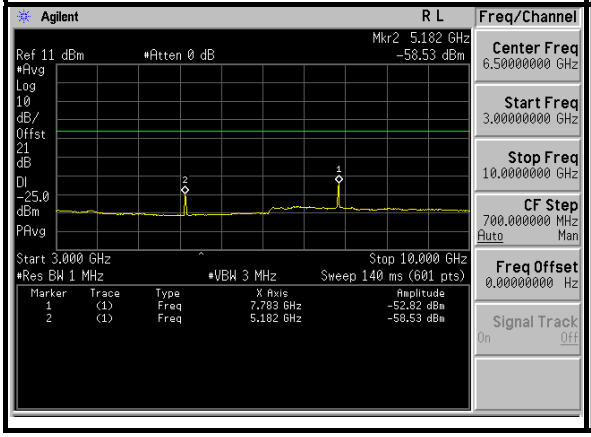


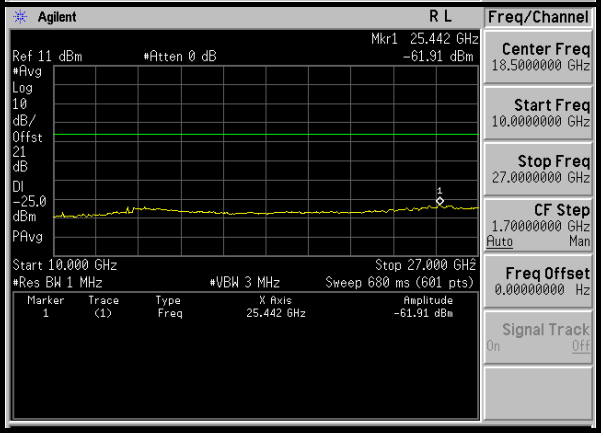


ANT 1 , MIDDLE CHANNEL

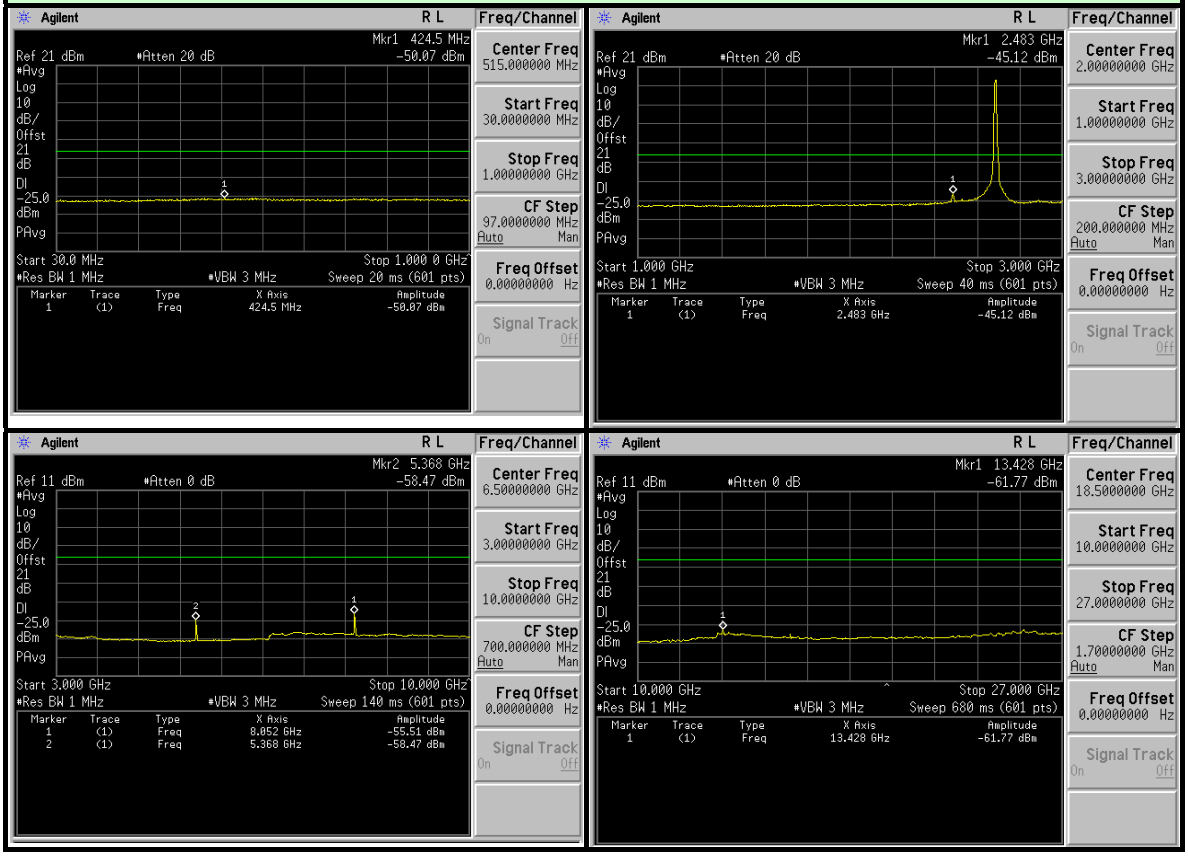








ANT 1 , HIGH CHANNEL



4.6 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (4), On any frequency outside a licensee's frequency block the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –25dBm.

LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBuV/m) (NOTE)
-25	70.2

NOTE: The following formula is used to convert the equipment radiated power to field strength.

E = [1000000√ (30P)] / 3 uV/m, where P is Watts.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 27, 2010	Dec. 26, 2011
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Aug. 02, 2010	Aug. 01, 2011
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 06, 2011	Jan. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 27, 2010	Dec. 26, 2011
Preamplifier Agilent	8449B	3008A01961	Nov. 02, 2010	Nov. 01, 2011
Preamplifier Agilent	8447D	2944A10738	Nov. 02, 2010	Nov. 01, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250792/4	Sep. 03, 2010	Sep. 02, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Sep. 03, 2010	Sep. 02, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Sep. 03, 2010	Sep. 02, 2011
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC7450F-4.

4.6.3 TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step b. Record the power level of S.G

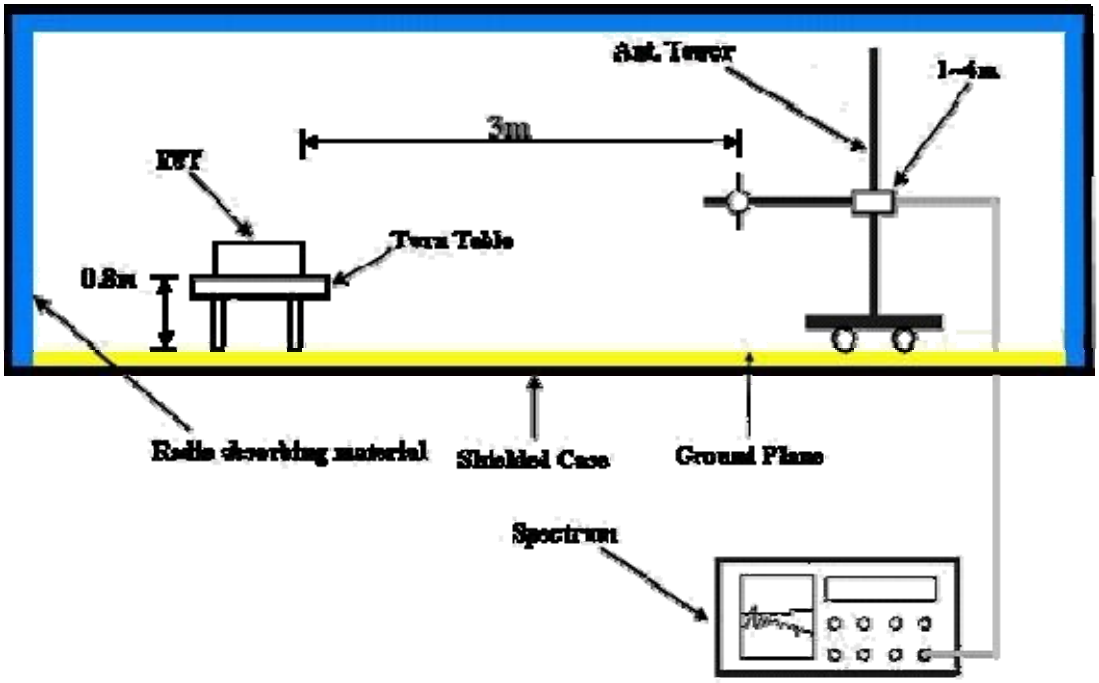
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.6.6 EUT OPERATING CONDITIONS

Same as 4.1.5

4.6.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA (BOTH CHAINS ON)

MODE	Middle channel	CHANNEL BANDWIDTH	5MHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	107.76	62.90	70.2	-7.30	1.50 H	295	52.20	10.70
2	169.96	57.00	70.2	-13.20	1.25 H	286	43.10	13.90
3	245.77	56.20	70.2	-14.00	1.25 H	319	42.80	13.40
4	374.07	49.40	70.2	-20.80	1.00 H	145	31.80	17.60
5	432.38	44.00	70.2	-26.20	1.50 H	292	24.90	19.10
6	875.59	47.20	70.2	-23.00	1.50 H	229	19.40	27.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	64.99	53.30	70.2	-16.90	1.00 V	187	40.10	13.20
2	107.76	54.10	70.2	-16.10	1.50 V	244	43.40	10.70
3	245.77	51.60	70.2	-18.60	1.50 V	214	38.20	13.40
4	374.07	48.20	70.2	-22.00	1.00 V	235	30.60	17.60
5	500.42	47.00	70.2	-23.20	1.00 V	343	26.00	21.00
6	830.88	48.00	70.2	-22.20	1.25 V	10	20.90	27.10

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

MODE	Middle channel	CHANNEL BANDWIDTH	10MHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.93	47.30	70.2	-22.90	1.75 H	40	34.40	12.90
2	109.70	58.10	70.2	-12.10	1.75 H	283	47.10	11.00
3	169.96	57.10	70.2	-13.10	1.50 H	295	43.20	13.90
4	245.77	56.10	70.2	-14.10	1.25 H	319	42.70	13.40
5	374.07	48.70	70.2	-21.50	1.00 H	145	31.10	17.60
6	875.59	47.70	70.2	-22.50	1.50 H	235	19.90	27.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	64.99	53.30	70.2	-16.90	1.00 V	160	40.10	13.20
2	111.64	51.10	70.2	-19.10	1.00 V	259	39.90	11.20
3	245.77	51.60	70.2	-18.60	1.50 V	223	38.20	13.40
4	374.07	47.50	70.2	-22.70	1.00 V	235	29.90	17.60
5	566.51	43.00	70.2	-27.20	1.00 V	349	20.50	22.50
6	832.83	58.00	70.2	-12.20	1.75 V	133	30.80	27.20

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

4.7 RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 27.53(m) (4), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –25dBm.

4.7.2 TEST INSTRUMENTS

Same as 4.6.2

4.7.3 TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step b. Record the power level of S.G

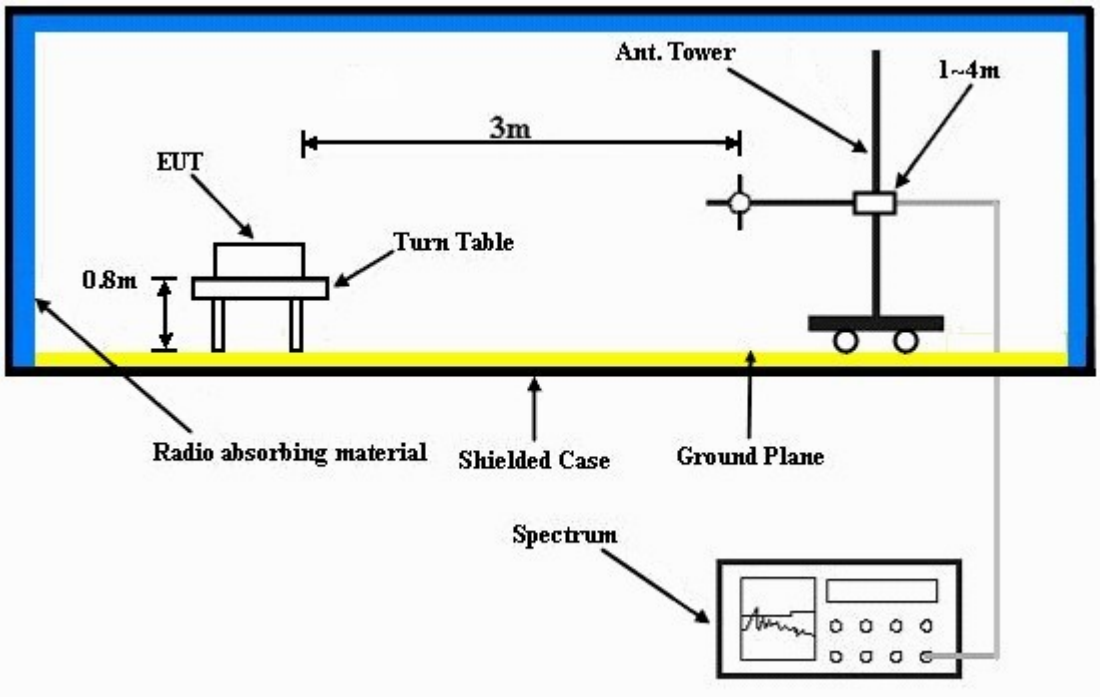
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.7.6 EUT OPERATING CONDITIONS

Same as 4.6.6.

4.7.7 TEST RESULTS

ABOVE 1GHz DATA (BOTH CHAINS ON)

CHANNEL	Low, Middle, High channel	CHANNEL BANDWIDTH	5MHz

LOW CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4997.0	59.4	-25.0	-44.7	9.5	-35.2
2	7495.5	64.7	-25.0	-37.6	7.8	-29.8
3	9994.0	65.9	-25.0	-36.0	7.5	-28.5

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4997.0	57.3	-25.0	-46.8	9.5	-37.3
2	7495.5	61.4	-25.0	-40.9	7.8	-33.1
3	9994.0	62.2	-25.0	-39.7	7.5	-32.2

MIDDLE CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5186.0	58.9	-25.0	-45.3	9.7	-35.6
2	7779.0	63.8	-25.0	-38.3	7.8	-30.5
3	10372.0	64.0	-25.0	-37.5	7.1	-30.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5186.0	59.8	-25.0	-44.4	9.7	-34.7
2	7779.0	61.1	-25.0	-41.0	7.8	-33.2
3	10372.0	58.9	-25.0	-42.6	7.1	-35.5

HIGH CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	**5375.0**	**68.6**	**-25.0**	**-35.8**	**9.7**	**-26.1**
2	8062.5	58.7	-25.0	-43.6	7.8	-35.8
3	10750.0	54.7	-25.0	-46.6	6.7	-39.9

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5375.0	64.3	-25.0	-40.1	9.7	-30.4
2	8062.5	56.2	-25.0	-46.1	7.8	-38.3
3	10750.0	55.4	-25.0	-45.9	6.7	-39.2

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

CHANNEL	Low, Middle, High channel	CHANNEL BANDWIDTH	10MHz

LOW CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5002.0	56.6	-25	-47.5	9.5	-38
2	7503.0	61.1	-25	-41.2	7.8	-33.4
3	10004.0	60.2	-25	-41.7	7.5	-34.2

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5002.0	54.8	-25	-49.3	9.5	-39.8
2	7503.0	55	-25	-47.3	7.8	-39.5
3	10004.0	57.1	-25	-44.8	7.5	-37.3

MIDDLE CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5186.0	56.1	-25	-48.1	9.7	-38.4
2	7779.0	59.5	-25	-42.6	7.8	-34.8
3	10372.0	55.7	-25	-45.8	7.1	-38.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5186.0	55.3	-25	-48.9	9.7	-39.2
2	7779.0	59.2	-25	-42.9	7.8	-35.1
3	10372.0	54.2	-25	-47.3	7.1	-40.2

HIGH CHANNEL

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5370.0	65.3	-25	-39.1	9.7	-29.4
2	8055.0	55.65	-25	-46.65	7.8	-38.85
3	10740.0	53.9	-25	-47.4	6.7	-40.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5370.0	63.2	-25	-41.2	9.7	-31.5
2	8055.0	54.7	-25	-47.6	7.8	-39.8
3	10740.0	52.7	-25	-48.6	6.7	-41.9

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com
Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

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