



FCC TEST REPORT (PART 27)

REPORT NO.: RF970930H02

MODEL NO.: ODX200B

RECEIVED: Sep. 30, 2008

TESTED: Oct. 20 to Nov. 04, 2008

ISSUED: Nov. 13, 2008

APPLICANT: UNIVERSAL SCIENTIFIC INDUSTRIAL CO., LTD.

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ISSUED BY : Advance Data Technology Corporation

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1 CERTIFICATION

PRODUCT: WiMAX 16e Outdoor CPE

BRAND NAME: USI

MODEL NO.: ODX200B

APPLICANT: UNIVERSAL SCIENTIFIC INDUSTRIAL CO., LTD.

TESTED: Oct. 20 to Nov. 04, 2008

TEST SAMPLE: ENGINEERING SAMPLE

TEST STANDARDS: FCC 47 CFR Part 2

FCC 47 CFR Part 27, Subpart C & M

ANSI/TIA/EIA-603-C-2004

The above equipment (Model No.: ODX200B) has been tested by **Advance Data Technology Corporation**, 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:** Nov. 13, 2008
(Sunny Wen, Specialist)

TECHNICAL ACCEPTANCE :  , **DATE:** Nov. 13, 2008
Responsible for RF (Hank Chung, Deputy Manager)

APPROVED BY :  , **DATE:** Nov. 13, 2008
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(h)(2)	Maximum Peak Output Power Limit: max. 2 watts conducted peak power	PASS	Meet the requirement of limit.
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.

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:

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

Measurement	Value
Radiated emissions (30MHz-1GHz)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	WiMAX 16e Outdoor CPE
MODEL NO.	ODX200B
FCC ID	IXMODX200B
POWER SUPPLY	DC 48V from POE
MODULATION TECHNOLOGY	OFDMA
MODULATION	QPSK-1/2, -3/4, 16QAM-1/2, 3/4, 64QAM-1/2, -2/3, -3/4 (64QAM for Rx only)
FREQUENCY RANGE	2500MHz ~ 2690MHz
CHANNEL BANDWIDTH	5MHz & 10MHz
MAX. CONDUCTED POWER	5MHz: 26.43dBm 10MHz: 25.68dBm
ANTENNA TYPE	Dipole antenna with N type connector (Antenna Gain : 7dBi)
DATA CABLE	NA
I/O PORTS	Ethernet port x 1
ASSOCIATED DEVICES	POE

NOTE:

1. For the EUT Modulation type and coding rate. After pre-testing items of output power and spurious emissions, QPSK-1/2 was found to be worst case, and was selected for the final test configuration.

Up Link		Down Link	
Modulation	Coding rate	Modulation	Coding rate
QPSK	1/2	QPSK	1/2
	3/4		3/4
16QAM	1/2	16QAM	1/2
	3/4		3/4
/		64QAM	1/2
			3/4
			5/6

2. The EUT must be supplied with a POE as below:

Brand	Model No.	Spec.
Netstar	POI-101U	AC Input: 100-240V, 50-60Hz, 0.3A DC Output: 48V, 0.35A MAX. AC input cable (shielded, 1.8m)

3. The device has different DL/UL ration in normal operation. It was tested with 43.4% duty cycle mode, which is the worse mode, and controlled by software.
4. The EUT embedded a firmware for testing that needs to control from Notebook computer to let EUT can continue Tx and 43.4% duty cycle.
5. The above EUT information was declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Three channels have been tested and presented.

CHANNEL BANDWIDTH: 5MHz

Low channel (L): 2502.5MHz.

Middle channel (M): 2600MHz.

High channel (H): 2687.5MHz.

CHANNEL BANDWIDTH: 10MHz

Low channel (L): 2505MHz.

Middle channel (M): 2600MHz.

High channel (H): 2685MHz.

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	EB	CE	CSE	RE<1G	RE ³ 1G	
MODE 1	√	√	√	√	√	√	√	Channel Bandwidth: 5MHz
MODE 2	√	√	√	√	√	√	√	Channel Bandwidth: 10MHz

Where **OP**: Output power **FS**: Frequency stability
EB: Emission bandwidth **CE**: Channel edge
CSE: Conducted spurious emissions **RE<1G**: Radiated emission below 1GHz
RE³1G: 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, and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
L, M, H	OFDMA	QPSK

FREQUENCY STABILITY MEASUREMENT:

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

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
M	OFDMA	Unmodulation

EMISSION BANDWIDTH MEASUREMENT:

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

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
L, M, H	OFDMA	QPSK

CHANNEL EDGE MEASUREMENT:

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

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
L, M, H	OFDMA	QPSK

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

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

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
L, M, H	OFDMA	QPSK

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

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

TESTED MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
MODE 1	H	OFDMA	QPSK
MODE 2	L	OFDMA	QPSK

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, and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
L, M, H	OFDMA	QPSK



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF 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, Subpart C & M

ANSI/TIA/EIA-603-C-2004

All test items have been performed and recorded as per the above standards.

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

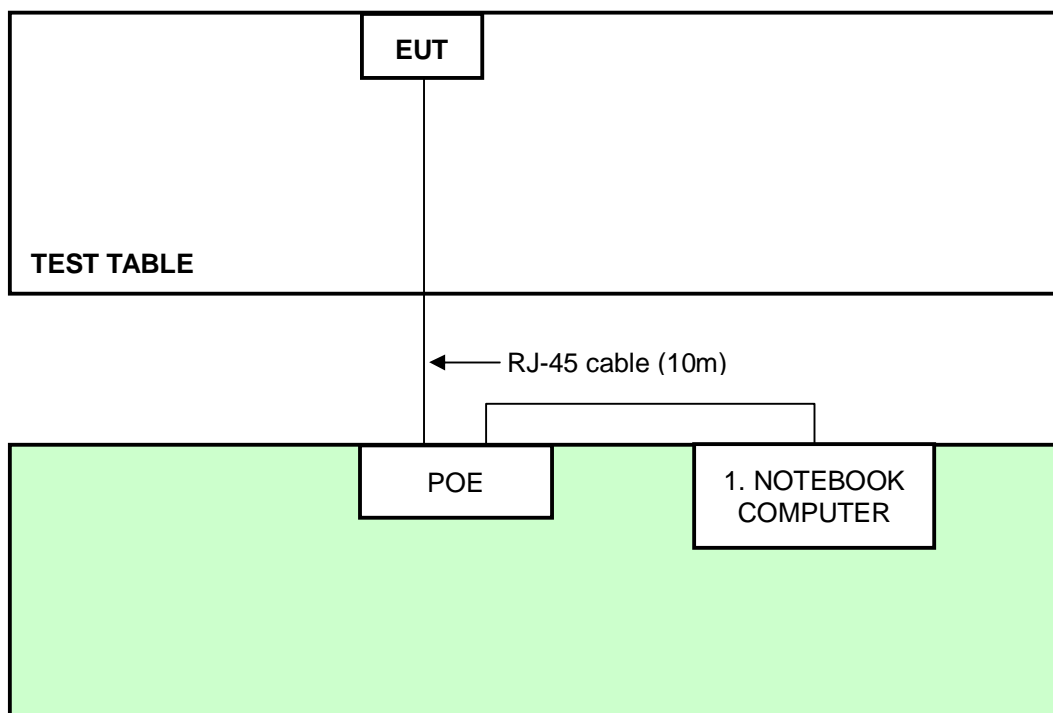
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP19L	CN-OHC416-70166-5CA-0448	PIW632500516610

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

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

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST





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 "Other 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.	Calibrated Until
Agilent Spectrum Analyzer	E4440A	MY46185282	Jun.14, 2009
HUBER+SUHNER	SUCOFLEX104	22076614	Nov. 13, 2008
JFW 10dB attenuation	50HF-010-SMA	N/A	N/A

NOTE:

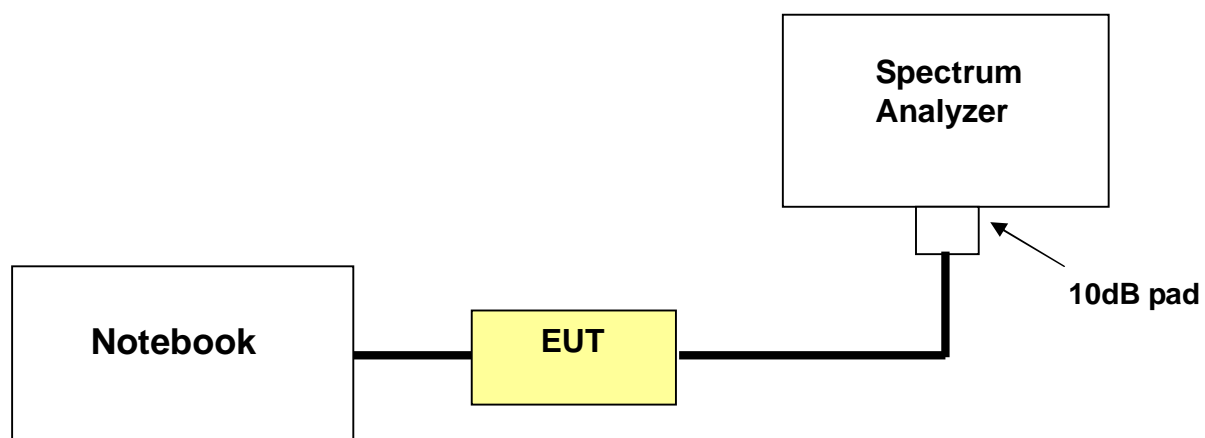
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.3 TEST PROCEDURES

For Conducted Power:

- a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b. For Channel bandwidth: 5 MHz:
Set RBW=56kHz, VBW=180kHz, Detector mode=Avg.
- c. For Channel bandwidth: 10 MHz:
Set RBW=110kHz, VBW=330kHz, Detector mode=Avg.
- d. Computer power by integrating the spectrum across the 26dB EBW of the signal.
- e. Record the power level.
- f. The “Read Value” is the spectrum reading the maximum power value.

4.1.4 TEST SETUP



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

4.1.5 EUT OPERATING CONDITIONS

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.



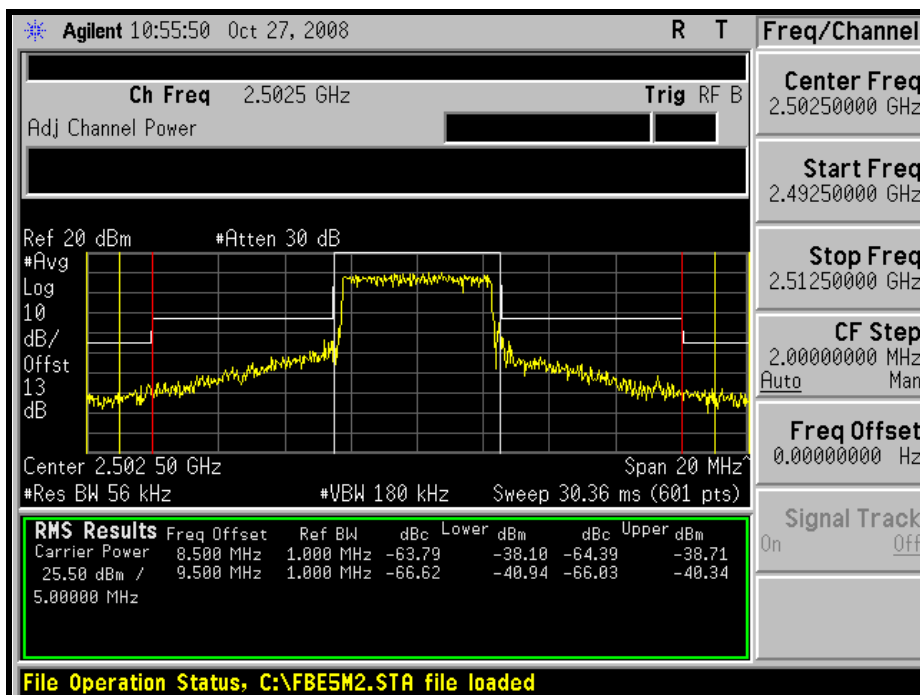
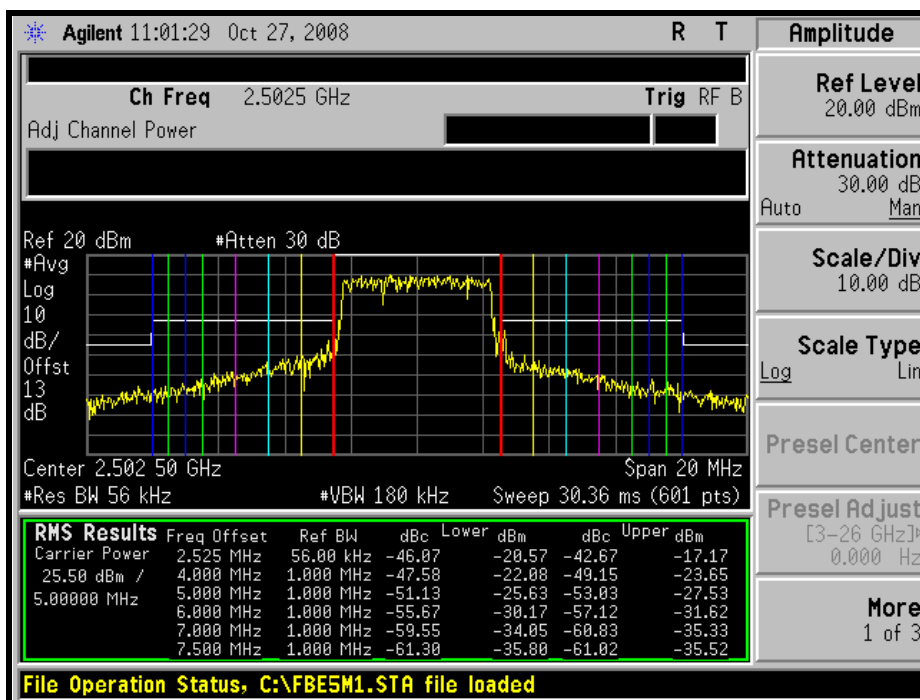
4.1.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

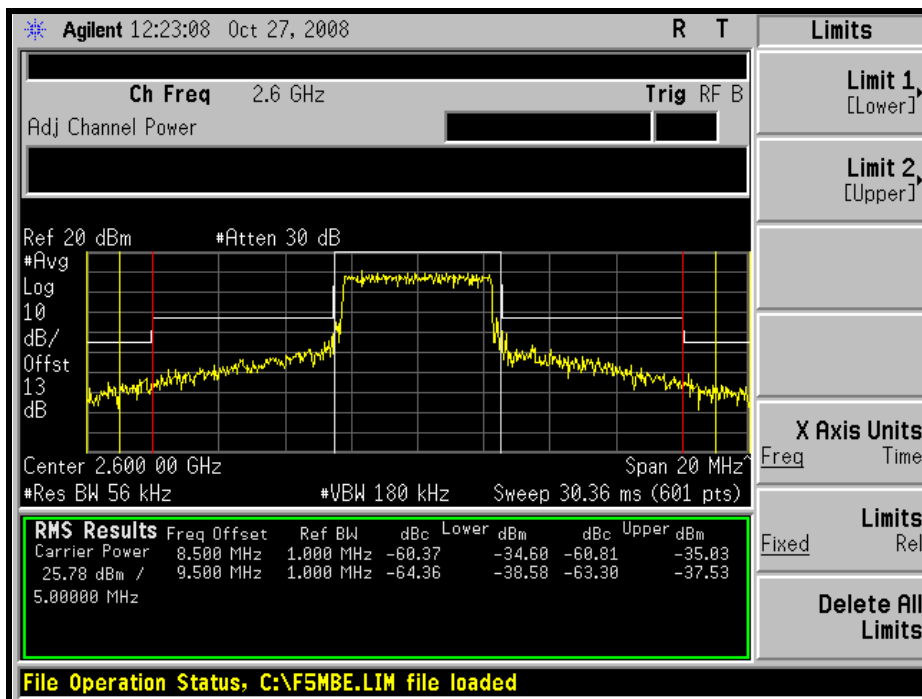
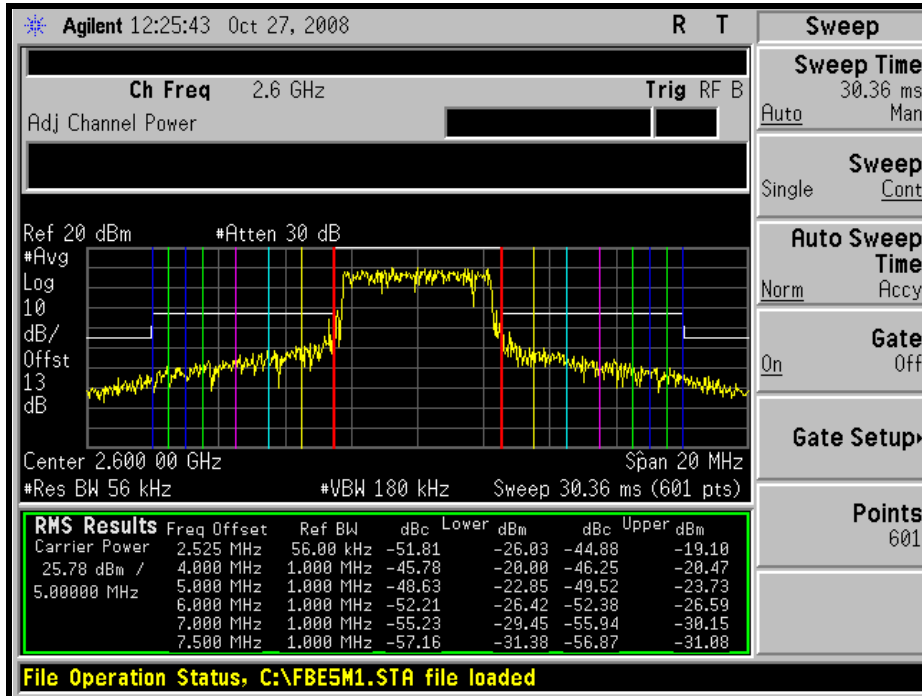
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Avg
ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa	TESTED BY	Rex Huang

CONDUCTED POWER			
CHANNEL	FREQUENCY (MHz)	PEAK POWER OUTPUT(mW)	PEAK POWER OUTPUT(dBm)
Low	2502.5	319.890	25.50
Middle	2600	378.443	25.78
High	2687.5	439.542	26.43

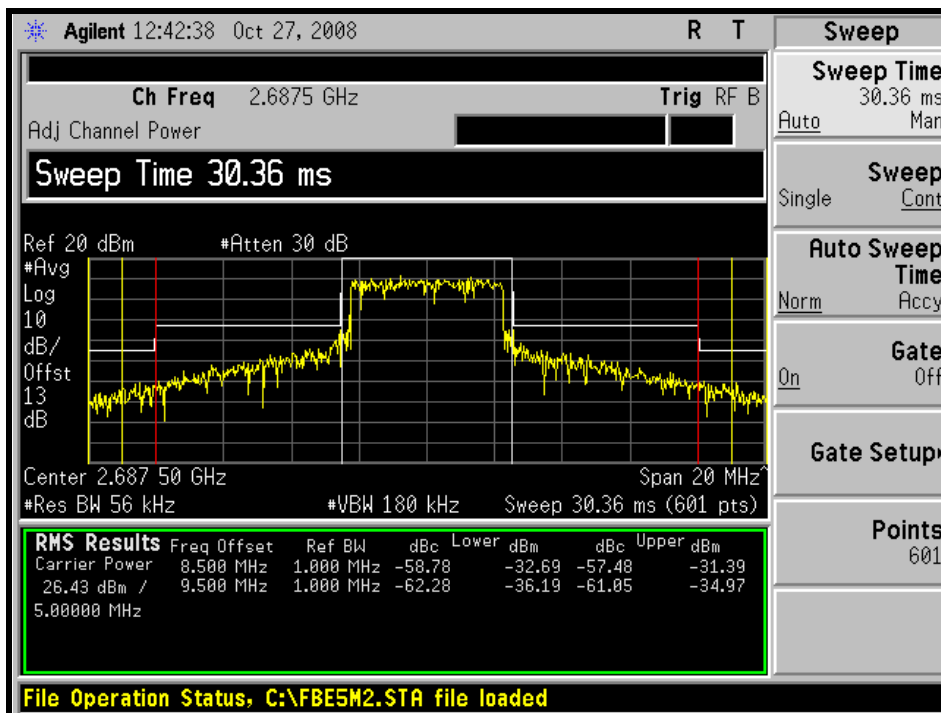
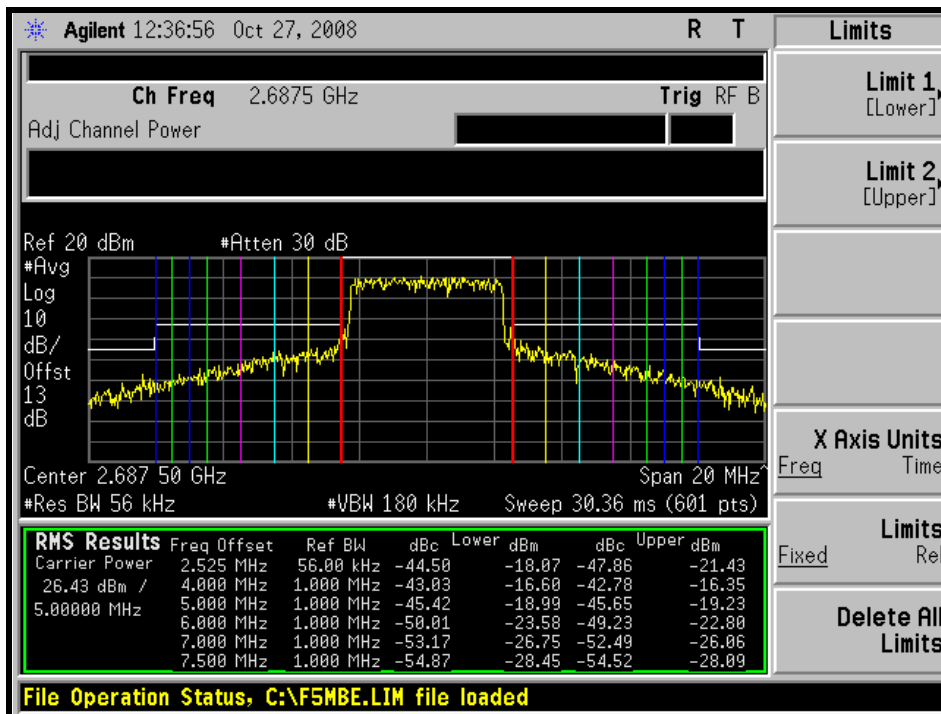
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



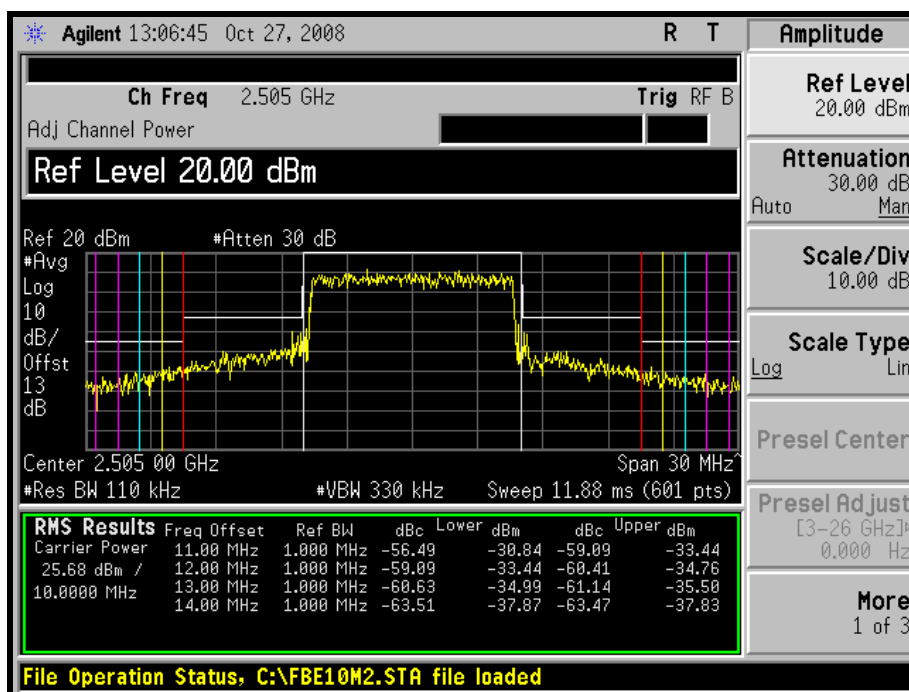
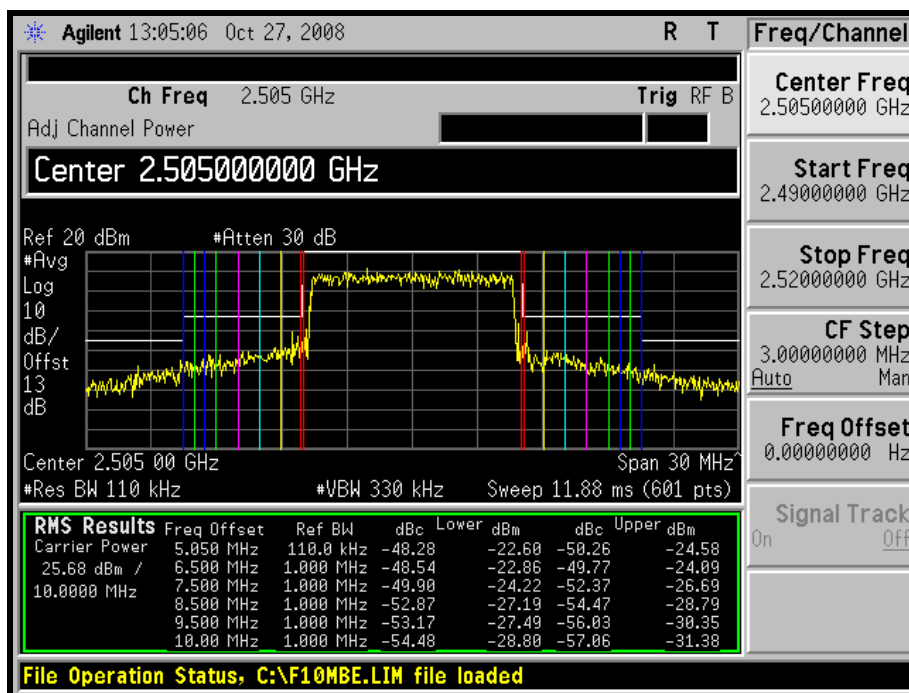


CHANNEL BANDWIDTH: 10MHz

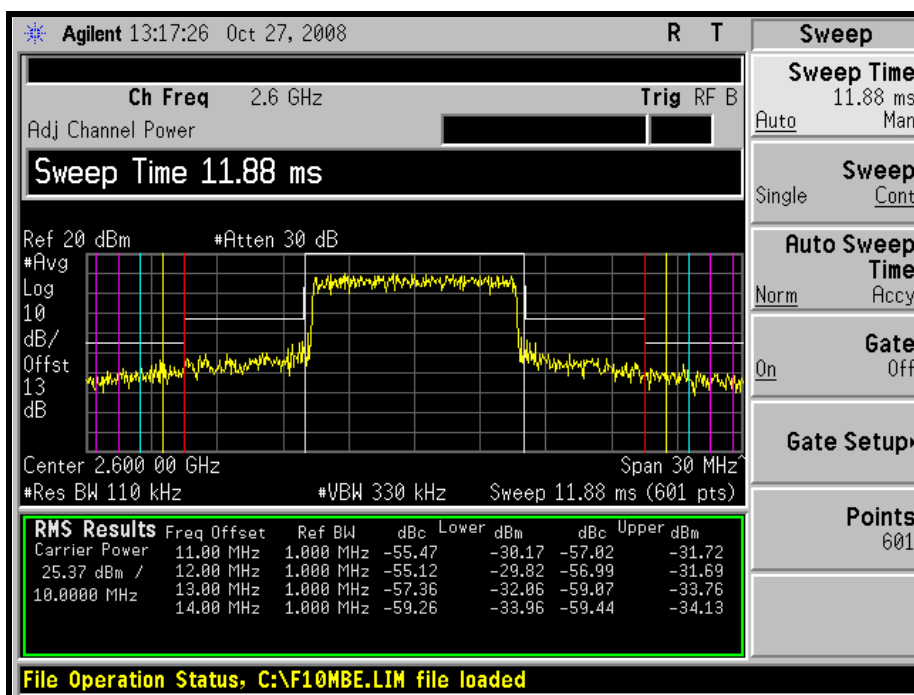
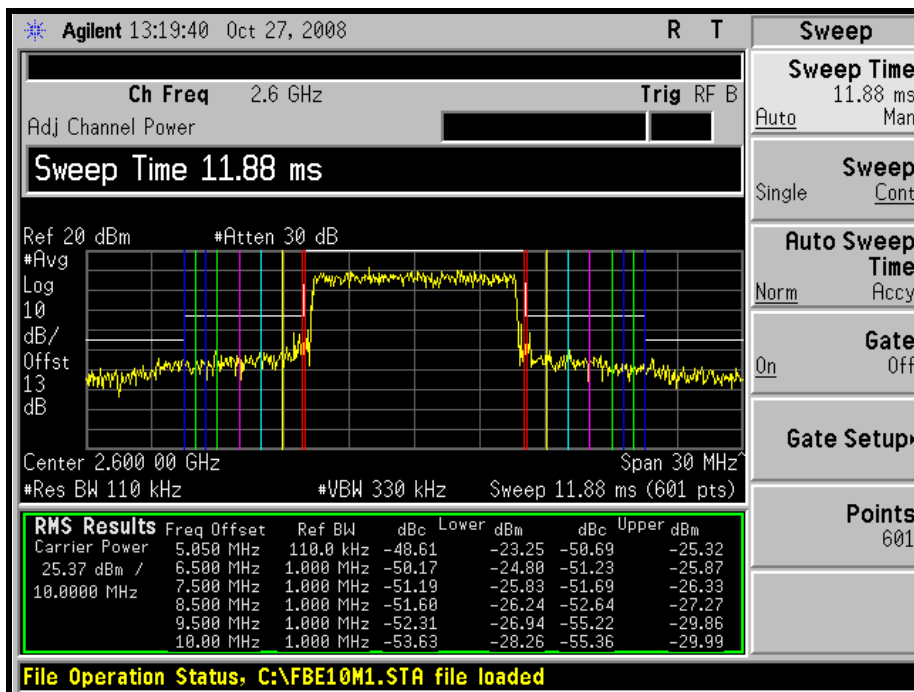
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Avg
ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa	TESTED BY	Rex Huang

CONDUCTED POWER			
CHANNEL	FREQUENCY (MHz)	PEAK POWER OUTPUT(mW)	PEAK POWER OUTPUT(dBm)
Low	2505	369.828	25.68
Middle	2600	344.350	25.37
High	2685	322.107	25.08

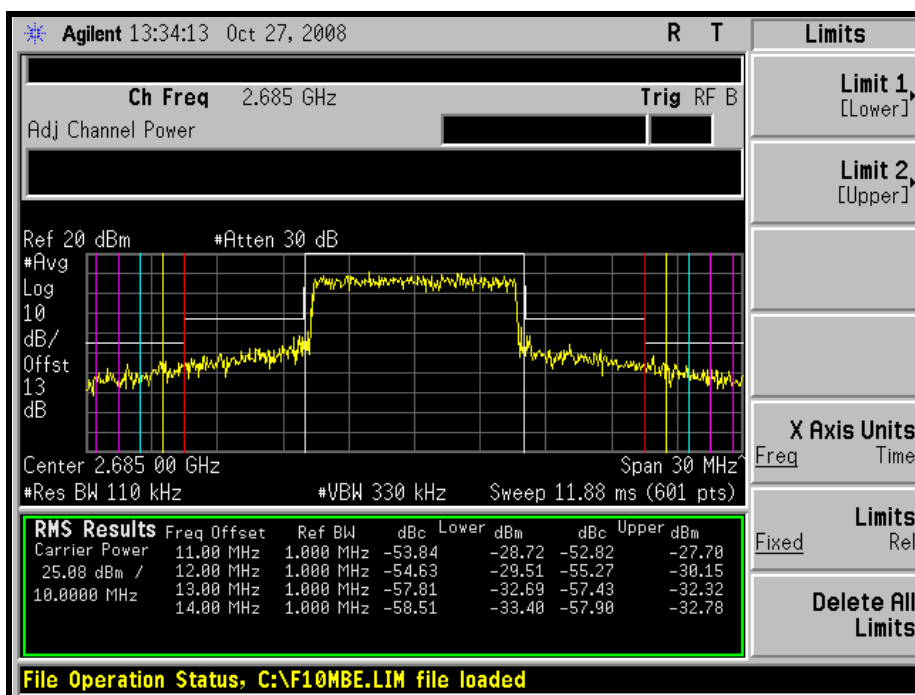
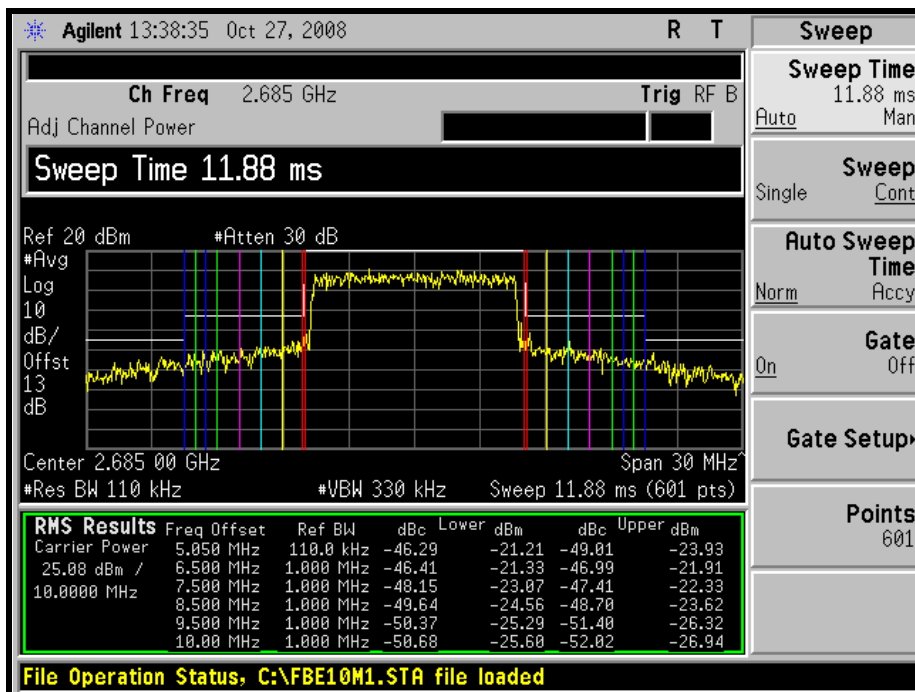
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL





4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY 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 $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

4.2.2 TEST INSTRUMENTS

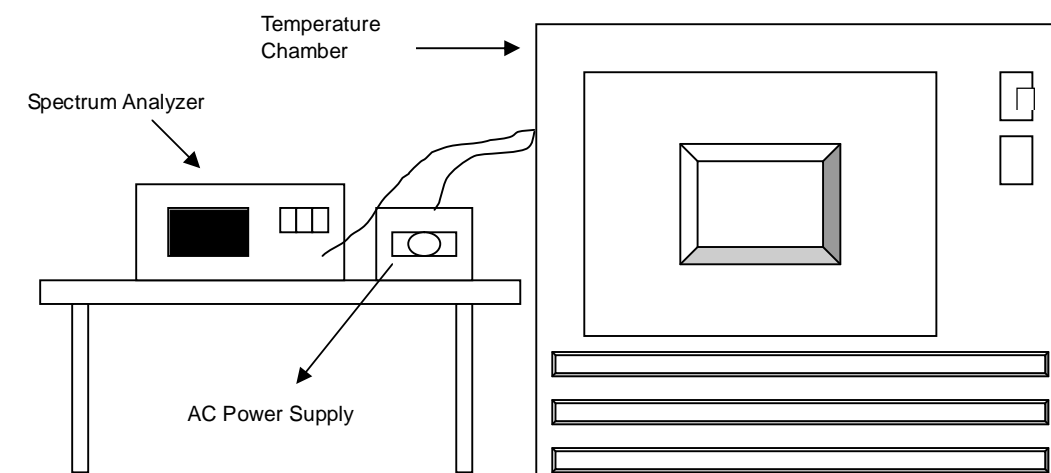
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 08, 2009
OVEN	MHU-225AU	911033	Dec. 04, 2008
HUBER+SUHNER	SUCOFLEX104	22076614	Nov. 13, 2008
AC POWER SOURCE	6205	1140503	N/A

NOTE: 1. 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 DC input power. The various Volts from the minimum 102 Volts to 138 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 $\pm 0.5^{\circ}\text{C}$ 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 TEST RESULTS

MODE	Middle channel (2600MHz)	INPUT POWER (SYSTEM)	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa	TESTED BY	Rex Huang

AFC FREQUENCY ERROR VS. VOLTAGE		
VOLTAGE (Volts)	FREQUENCY (MHz)	FREQUENCY DRIFT (ppm)
138	2600.14	0.005308
120	2600.12	0.004615
102	2600.10	0.003923

AFC FREQUENCY ERROR VS. TEMP.		
TEMP. (°C)	FREQUENCY (MHz)	FREQUENCY DRIFT (ppm)
60	2600.12	0.004615
50	2600.12	0.004615
40	2600.12	0.004615
30	2600.12	0.004615
20	2600.12	0.004615
10	2600.12	0.004615
0	2600.12	0.004615
-10	2600.12	0.004615
-20	2600.12	0.004615
-30	2600.12	0.004615

4.3 EMISSION BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

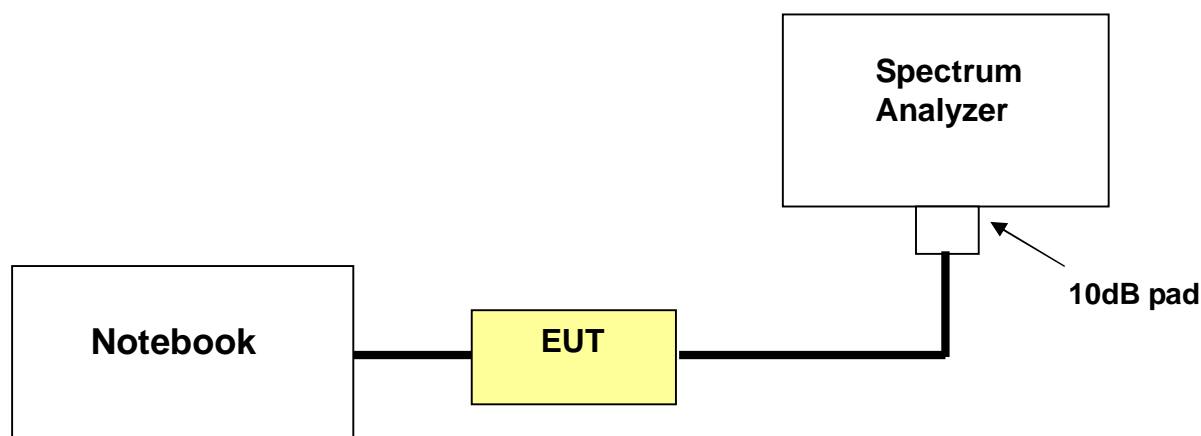
According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4440A	MY46185282	Jun.14, 2009
HUBER+SUHNER	SUCOFLEX104	22076614	Nov. 13, 2008
JFW 10dB attenuation	50HF-010-SMA	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.

4.3.3 TEST SETUP



4.3.4 TEST PROCEDURES

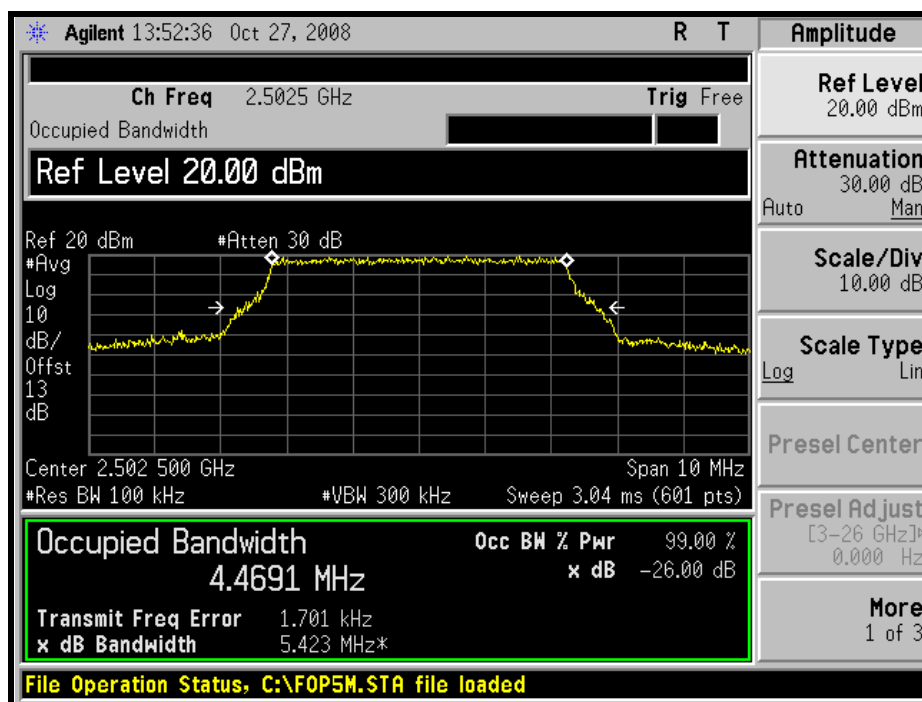
- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 26dB bandwidth is define as the total spectrum the power of which is higher than peak power minus 26dB.

4.3.5 TEST RESULTS

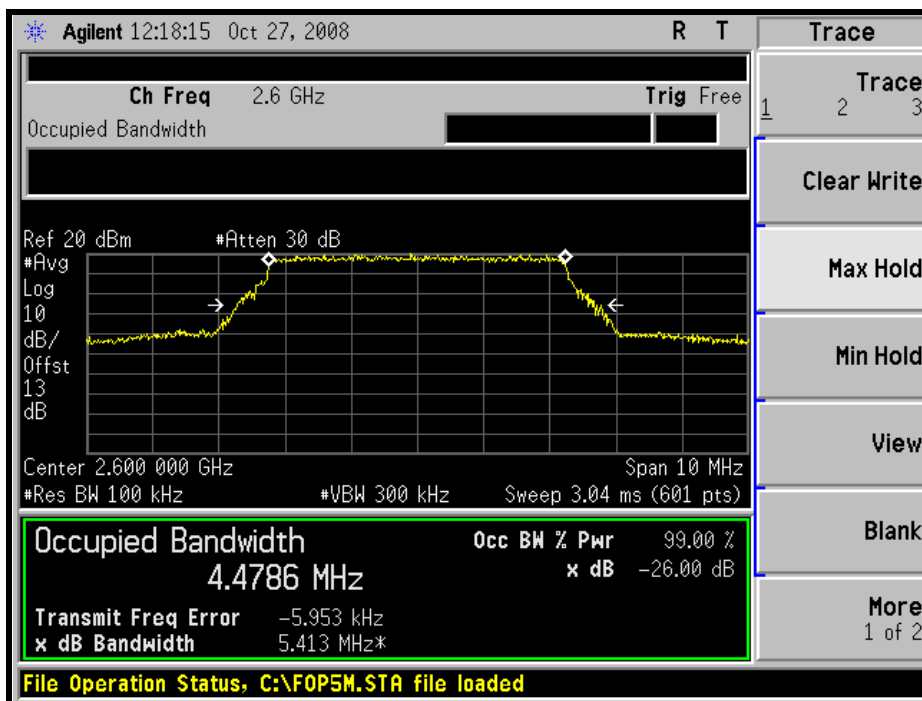
CHANNEL BANDWIDTH: 5MHz

FREQUENCY (MHz)	-26 dBc BANDWIDTH (MHz)
2502.5	5.423
2600	5.413
2687.5	5.456

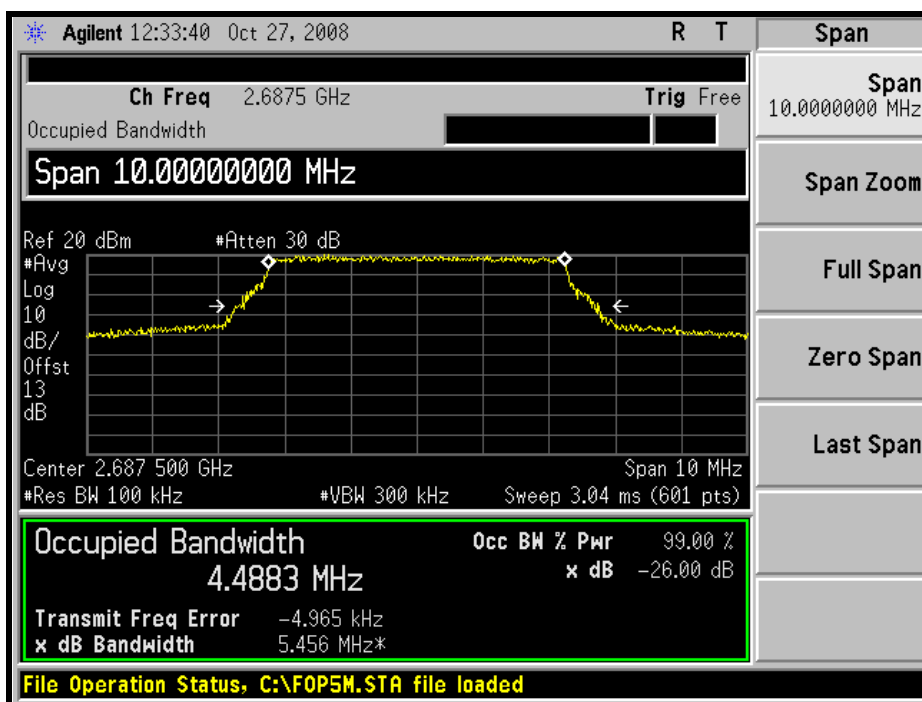
LOW CHANNEL



MIDDLE CHANNEL



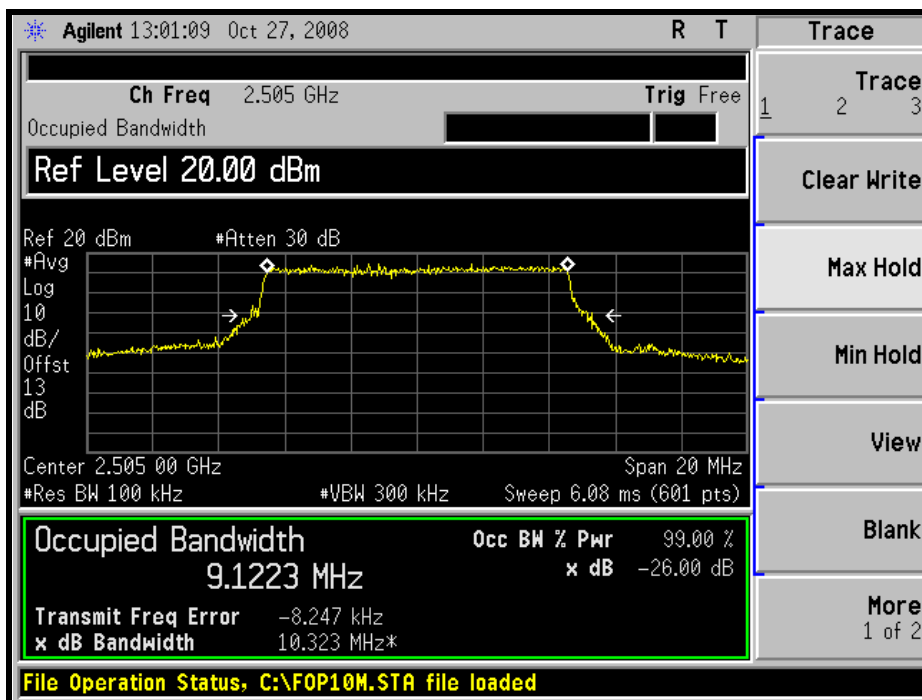
HIGH CHANNEL



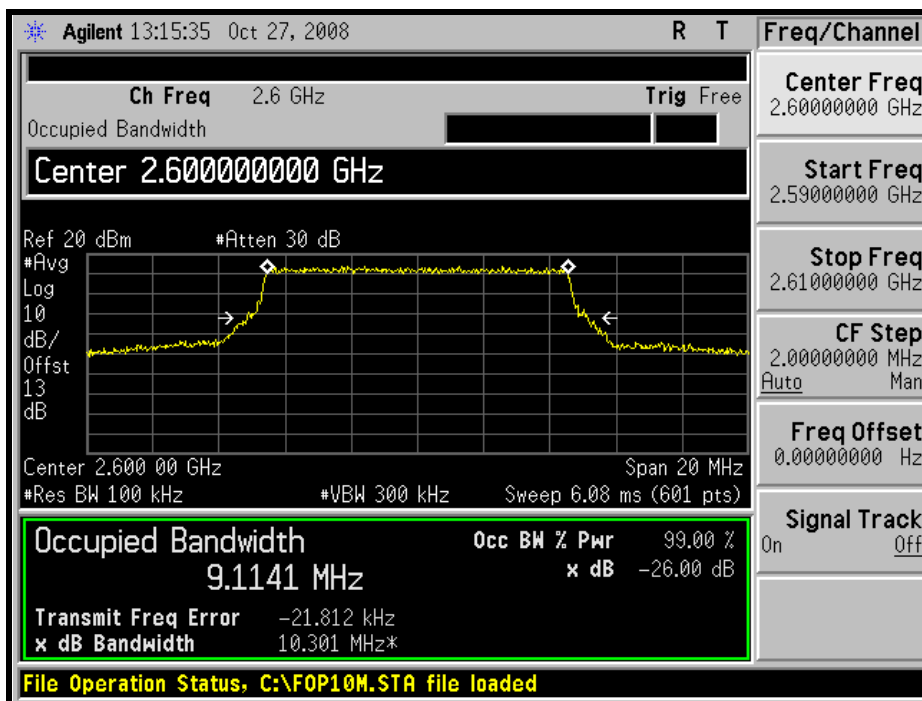
CHANNEL BANDWIDTH: 10MHz

FREQUENCY (MHz)	-26 dBc BANDWIDTH (MHz)
2505	10.323
2600	10.301
2685	10.443

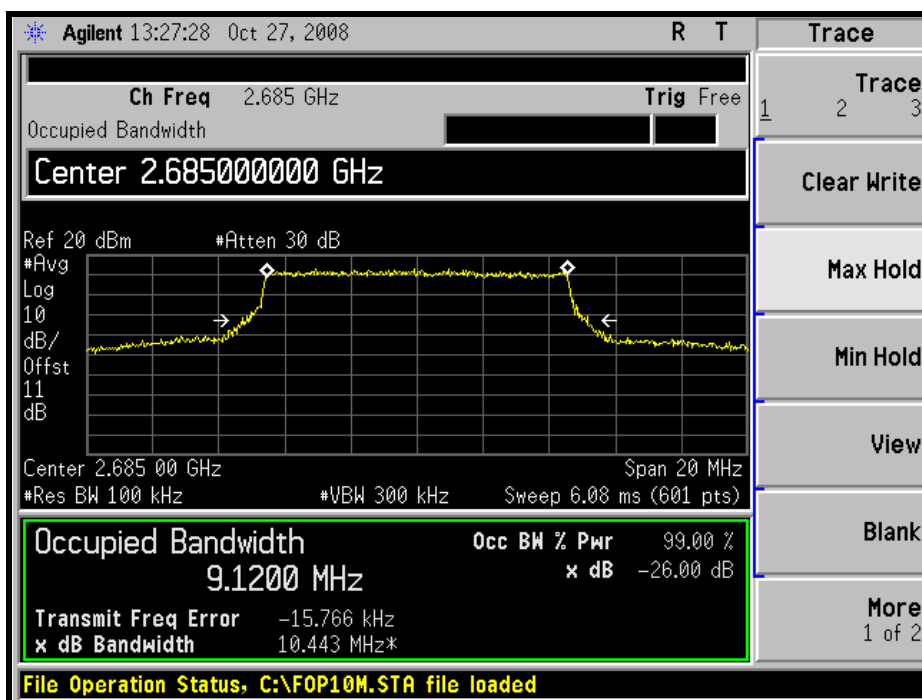
LOW CHANNEL



MIDDLE CHANNEL



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 of at least $43 + 10 \log(P)$ dB and $55 + 10 \log(P)$ dB at 5.5 MHz from the channel edges. 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.	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4440A	MY46185282	Jun. 14, 2009
HUBER+SUHNER	SUCOFLEX104	22076614	Nov. 13, 2008
JFW 10dB attenuation	50HF-010-SMA	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.

4.4.3 TEST SETUP

Same as Item 4.3.3

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. For Channel bandwidth: 5 MHz:
The center frequency of spectrum is the band edge frequency and span is 20MHz. RB of the spectrum is 56kHz and VB of the spectrum is 180kHz.
- c. For Channel bandwidth: 10 MHz:
The center frequency of spectrum is the band edge frequency and span is 30MHz. RB of the spectrum is 110kHz and VB of the spectrum is 330kHz.
- d. Record the max trace plot into the test report.

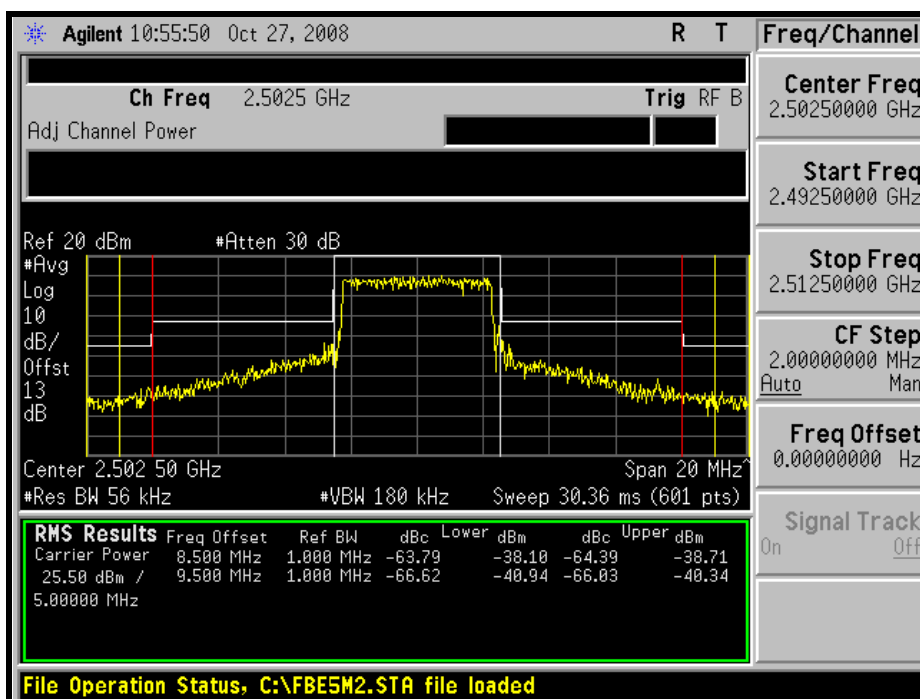
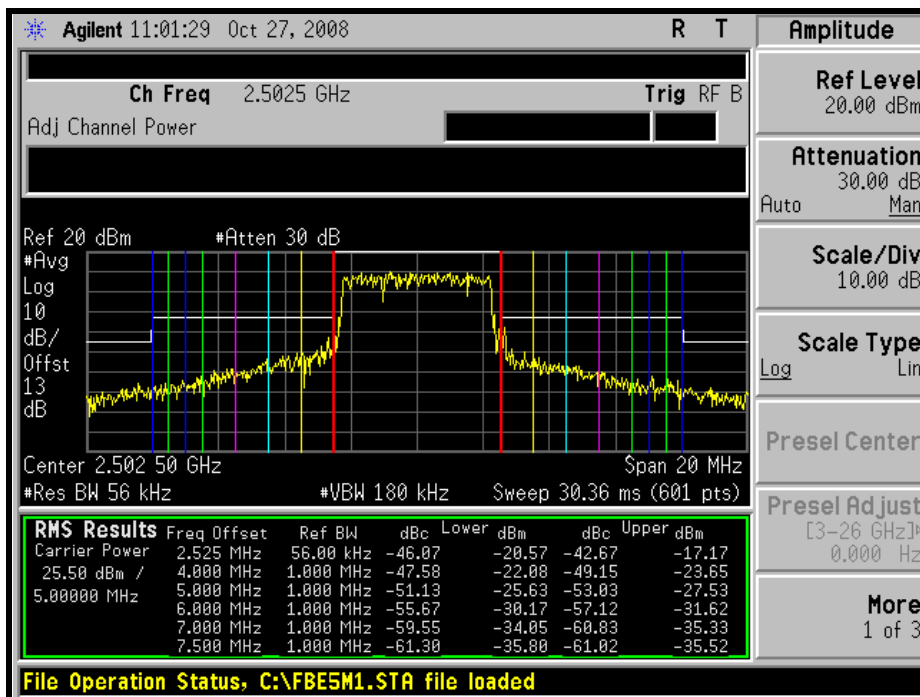
4.4.5 EUT OPERATING CONDITION

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

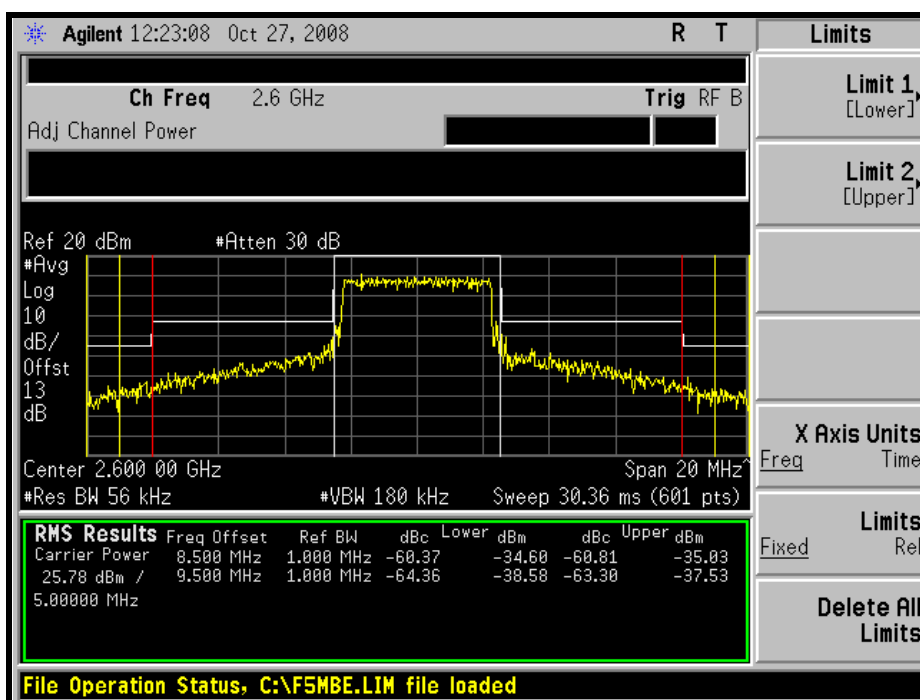
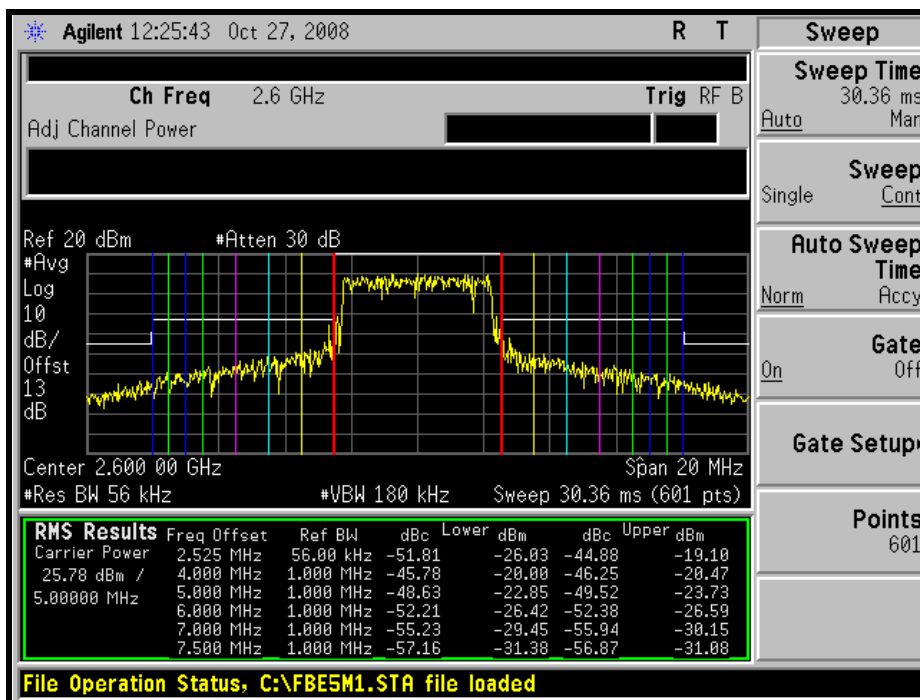
4.4.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

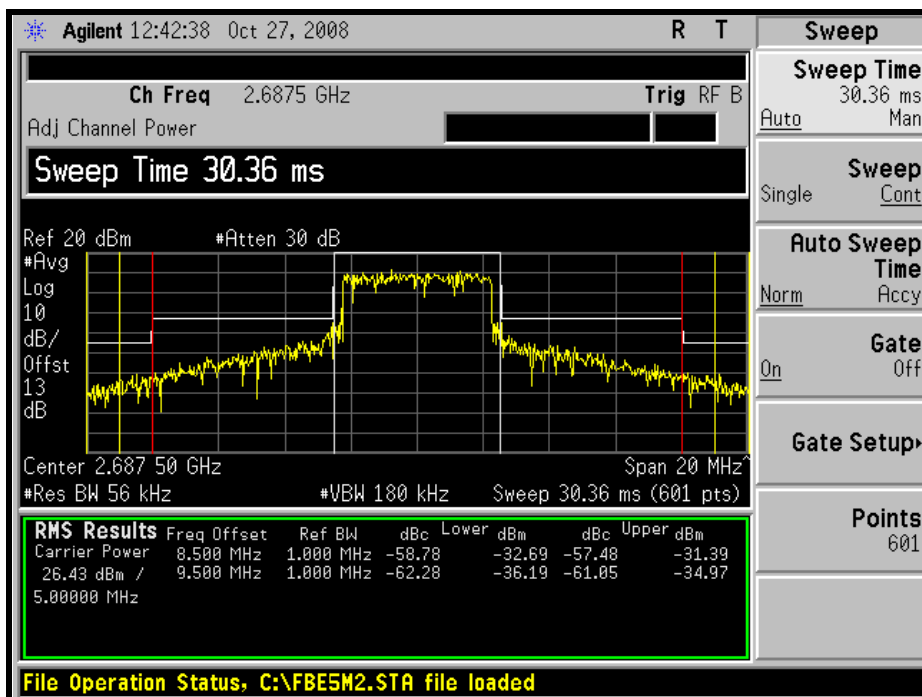
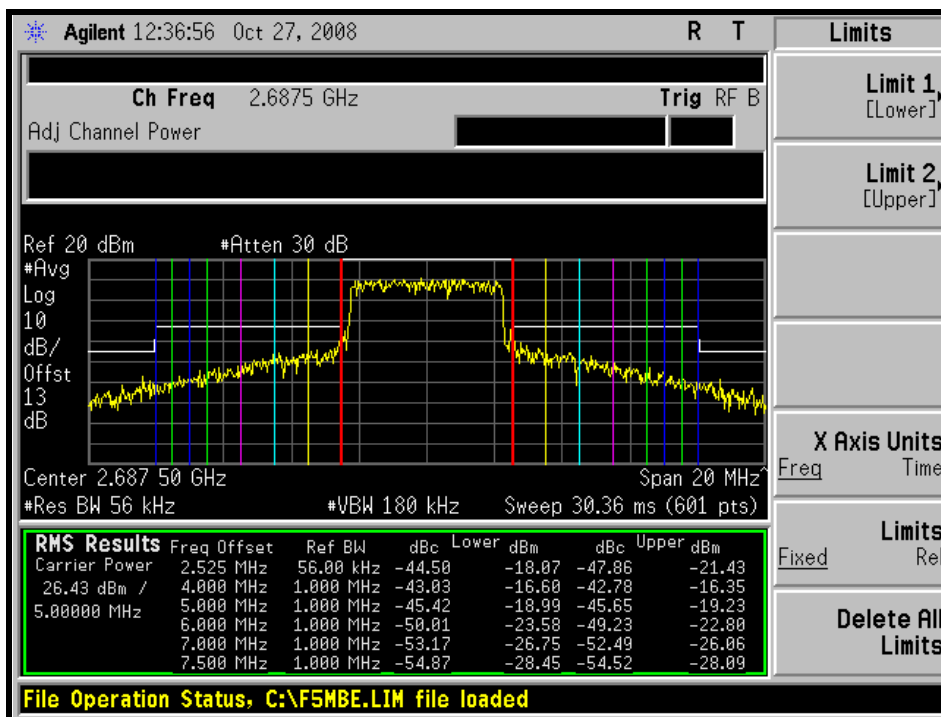
LOW CHANNEL



MIDDLE CHANNEL

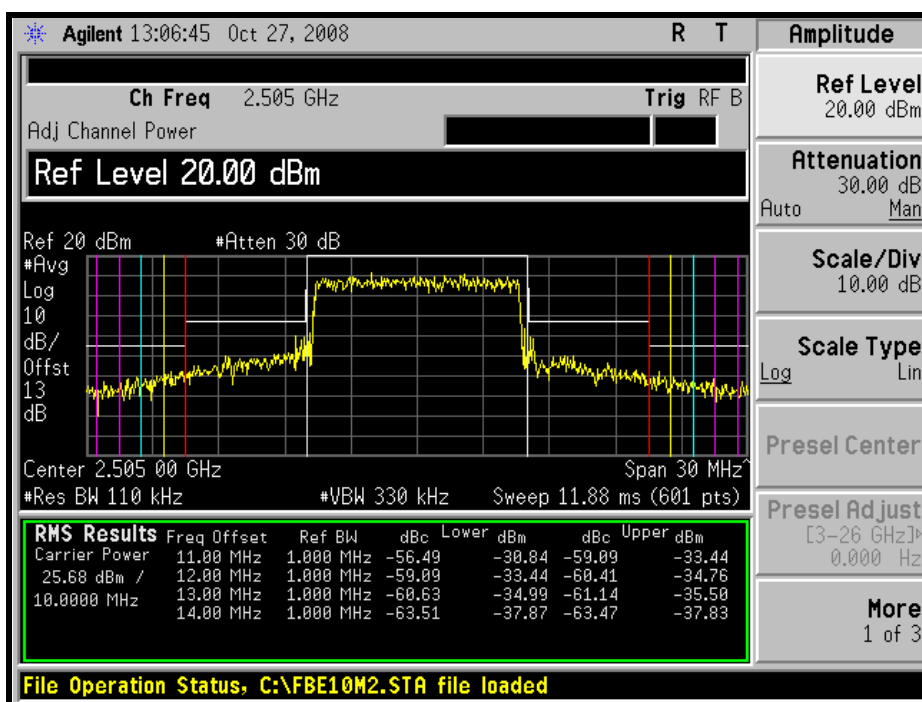
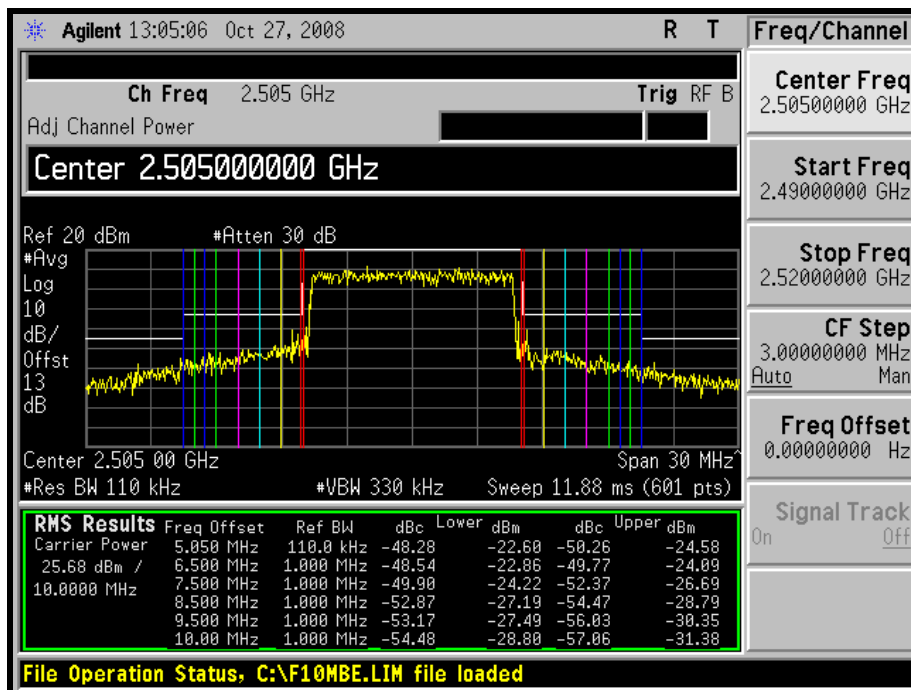


HIGH CHANNEL

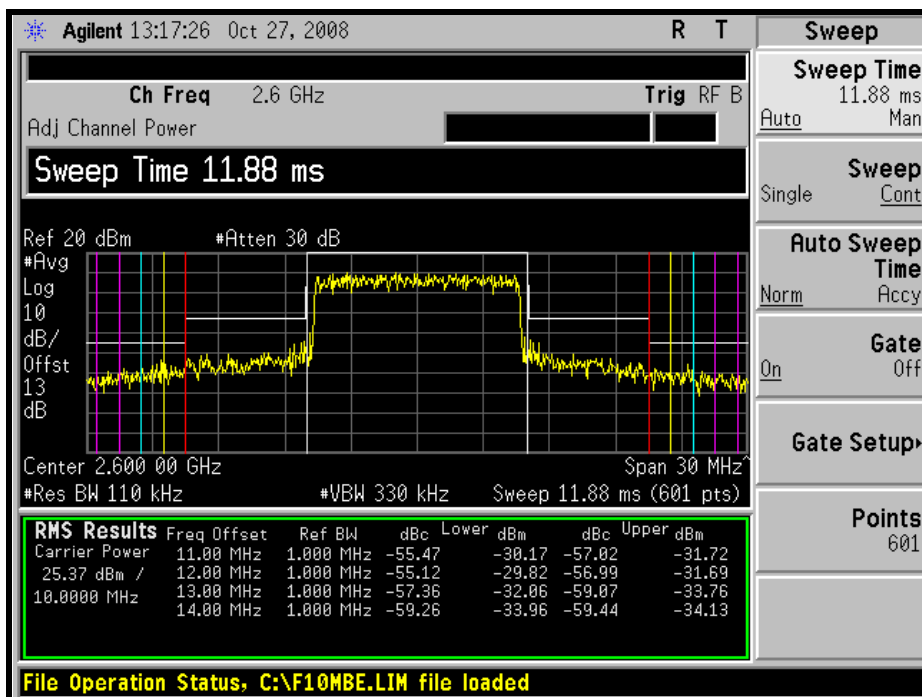
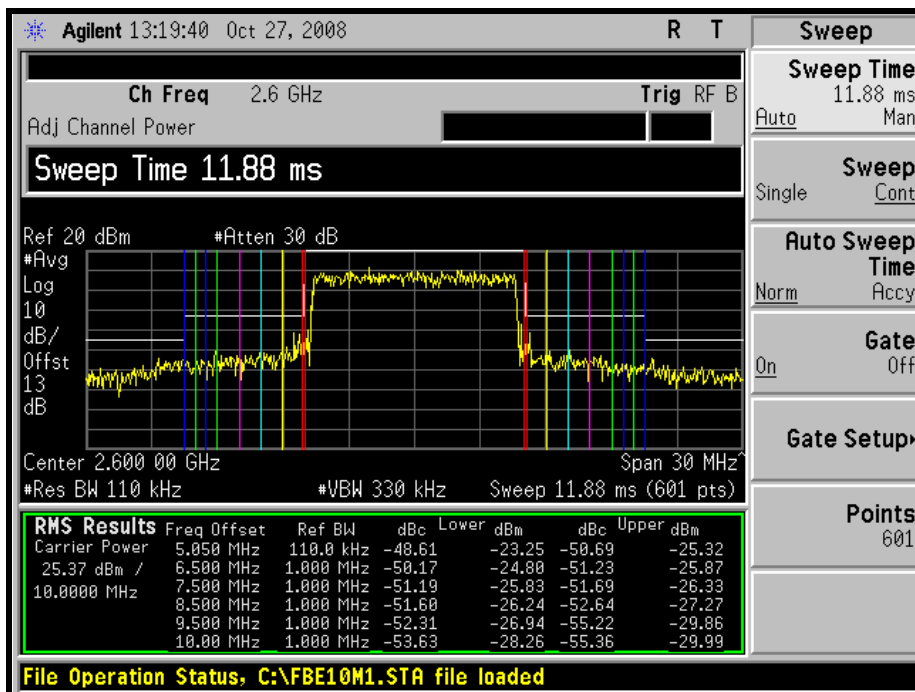


CHANNEL BANDWIDTH: 10MHz

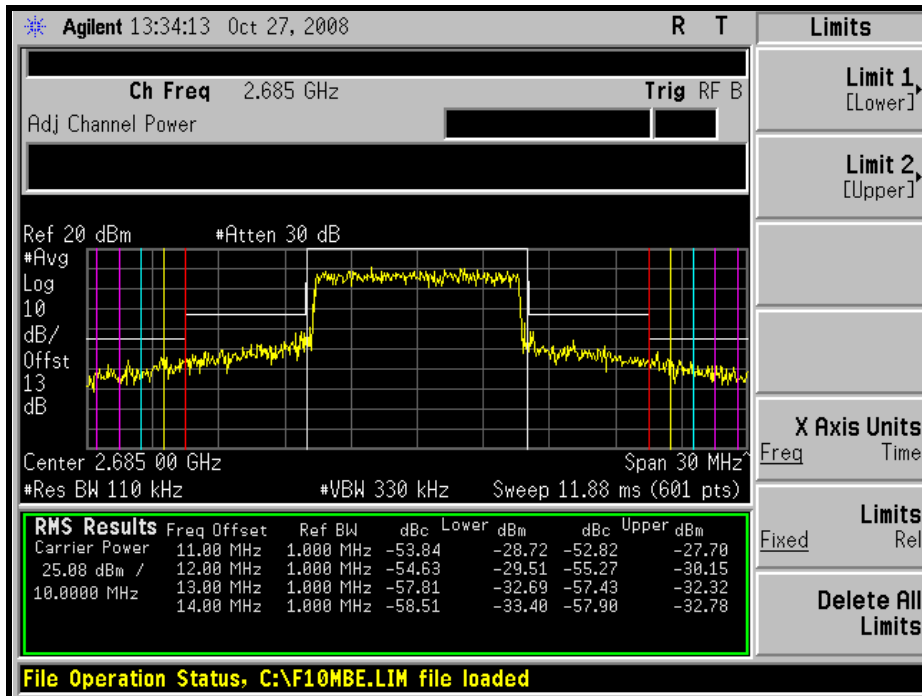
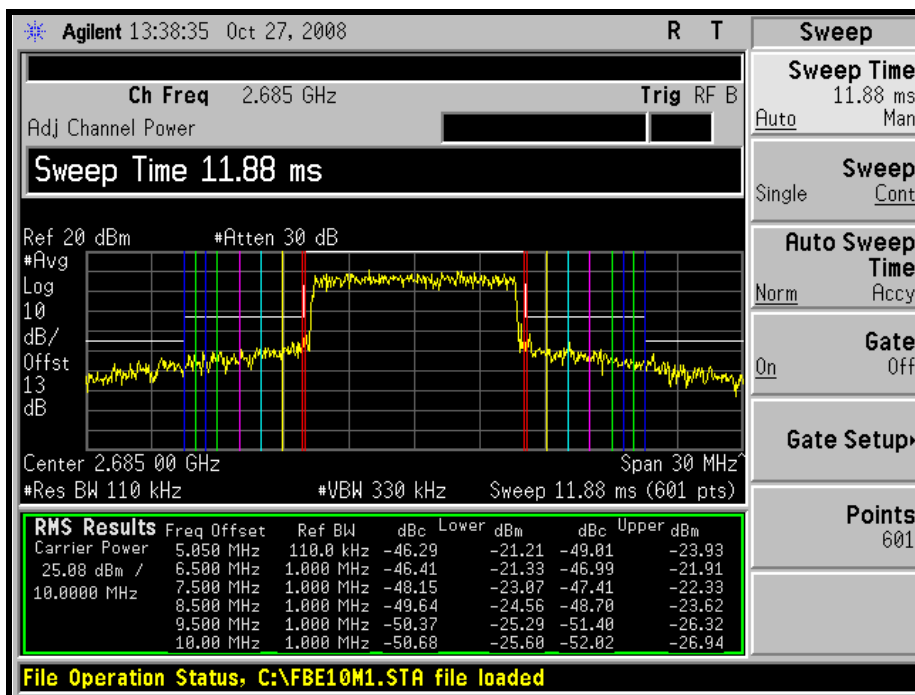
LOW CHANNEL



MIDDLE CHANNEL



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 $43 + 10 \log (P)$ dB and $55 + 10 \log (P)$ dB at 5.5 MHz from the channel edges.

4.5.2 TEST INSTRUMENTS

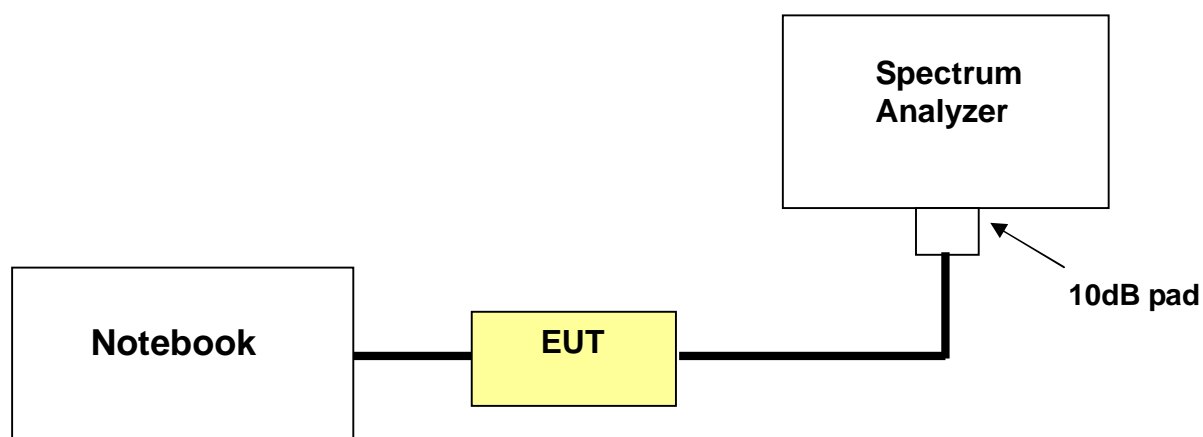
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4440A	MY46185282	Jun. 14, 2009
HUBER+SUHNER	SUCOFLEX104	22076614	Nov. 13, 2008
JFW 10dB attenuation	50HF-010-SMA	NA	NA
Wainwright Instruments High Pass Filter	WHK3.1/18G-10SS	ZZ-010091	NA

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

4.5.3 TEST PROCEDURE

- 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. When the spectrum scanned from 30MHz to 3GHz, it shall be connected to the 10dB pad attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.
- c. When the spectrum scanned from 3GHz to 26.5GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

4.5.4 TEST SETUP



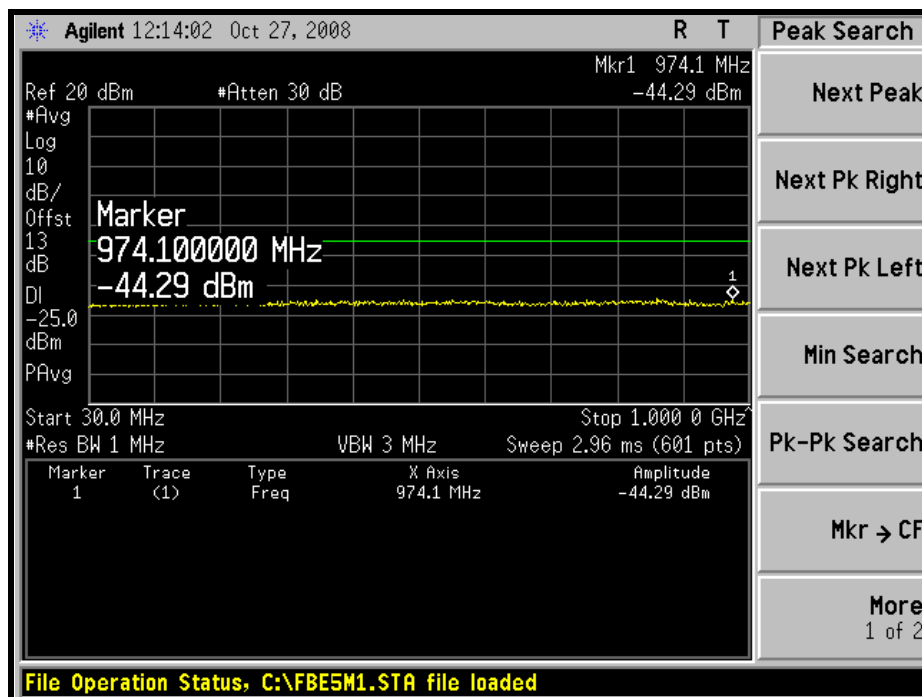
4.5.5 EUT OPERATING CONDITIONS

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

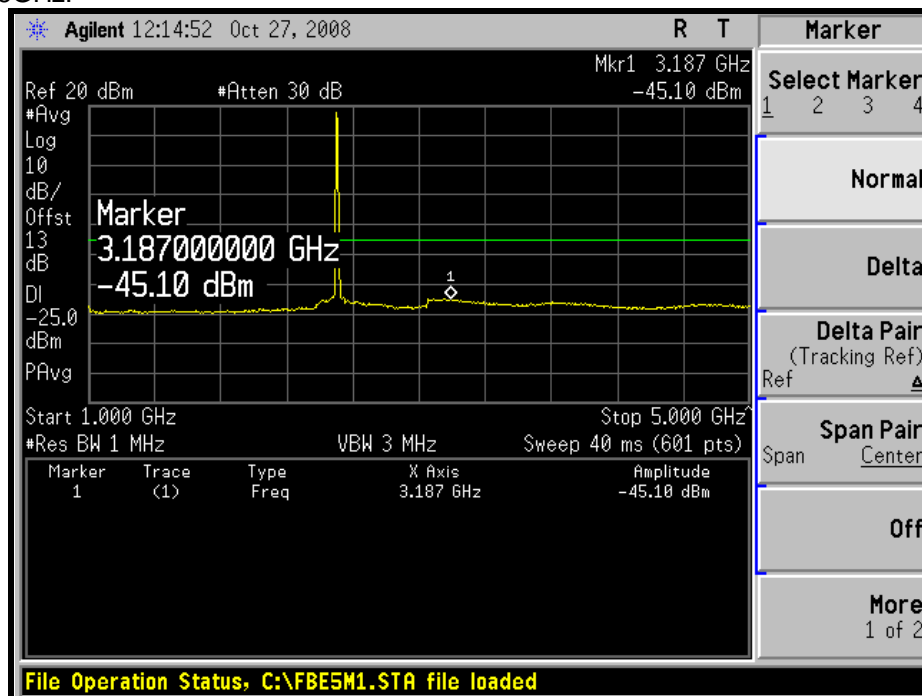
4.5.6 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

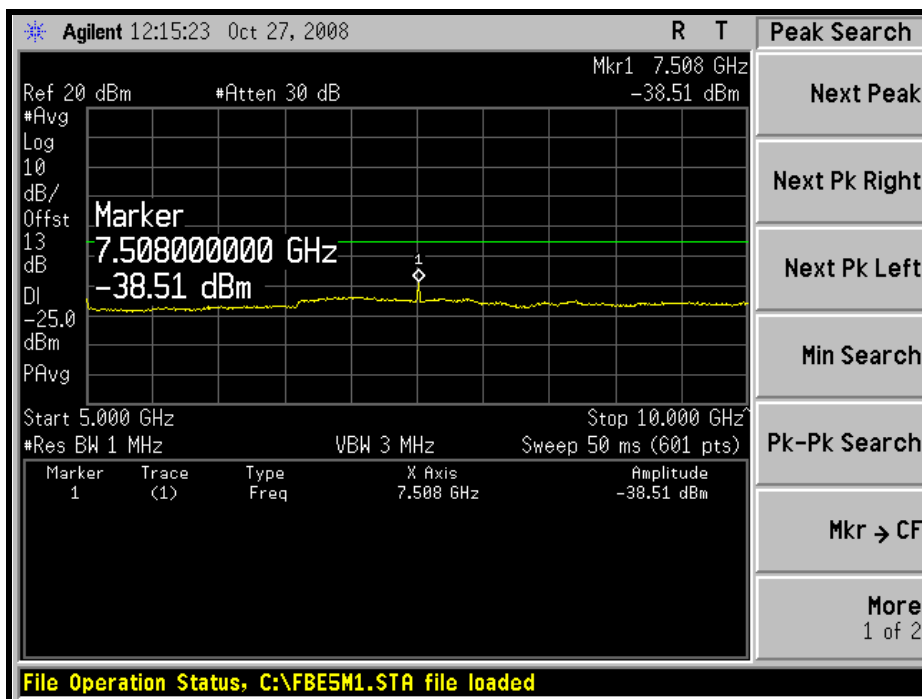
LOW CHANNEL: 30MHz ~ 1GHz:



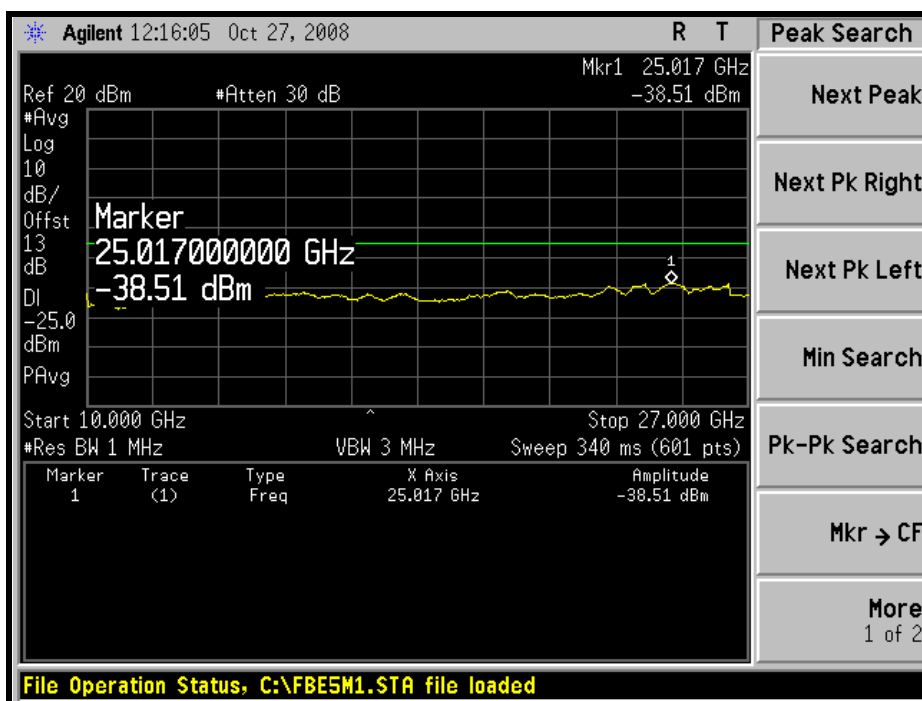
1GHz ~ 5GHz:



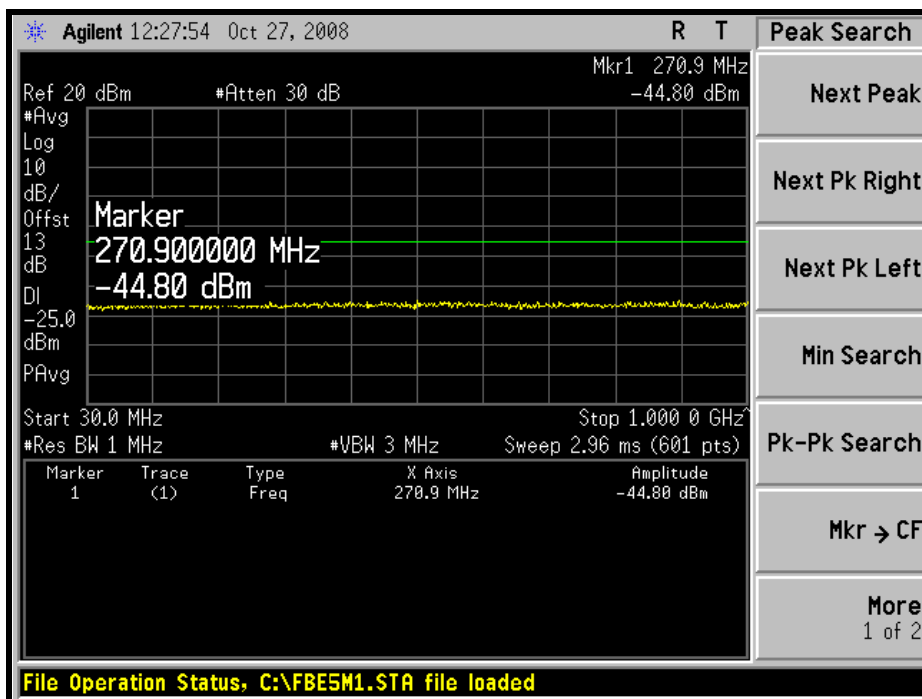
5GHz ~ 10GHz:



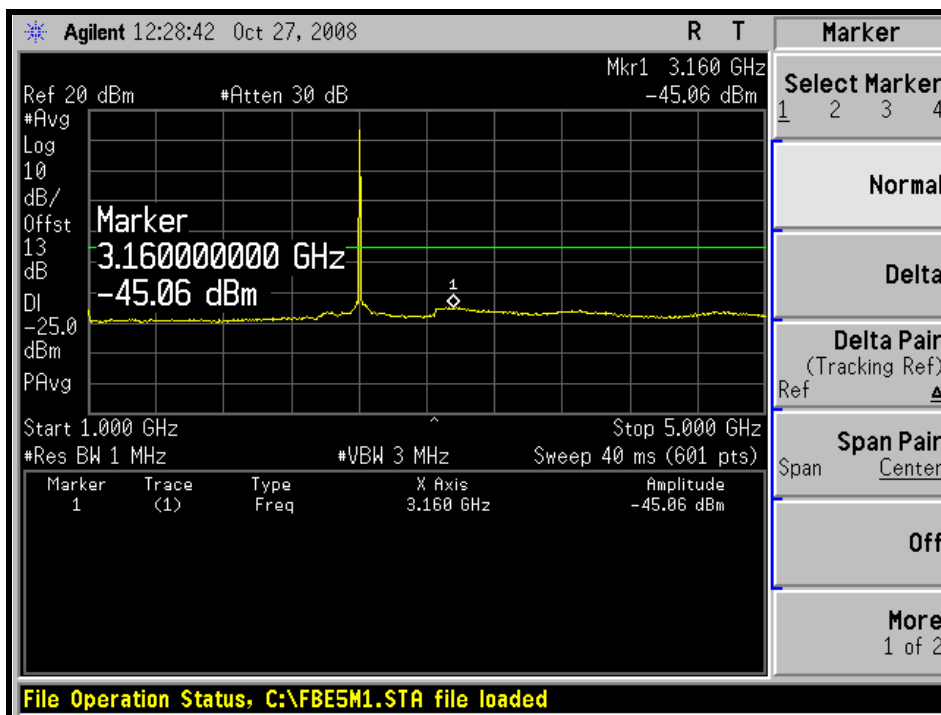
10GHz ~ 27GHz:



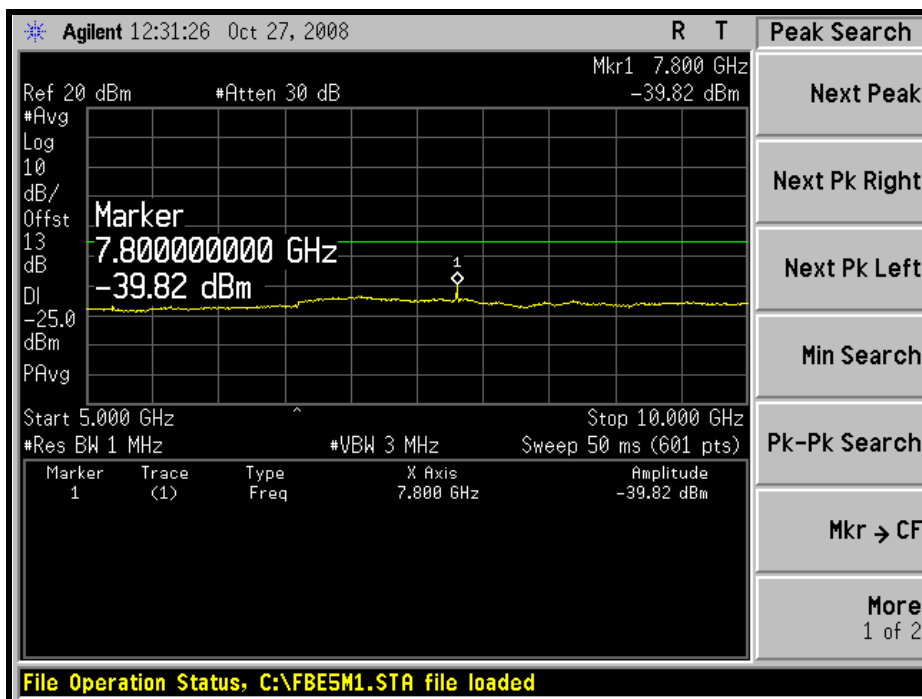
MIDDLE CHANNEL: 30MHz ~ 1GHz:



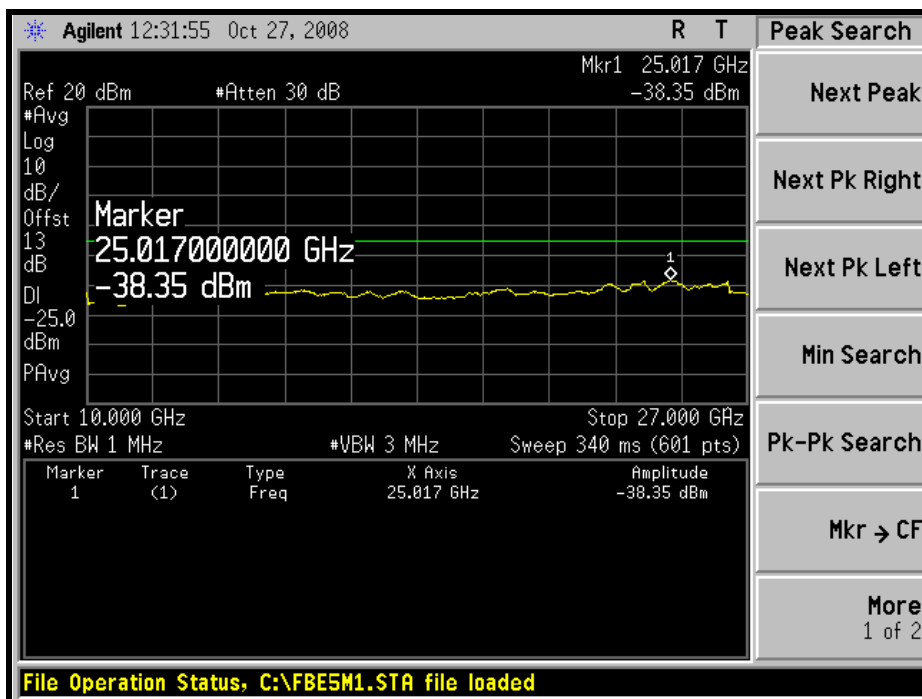
1GHz ~ 5GHz:



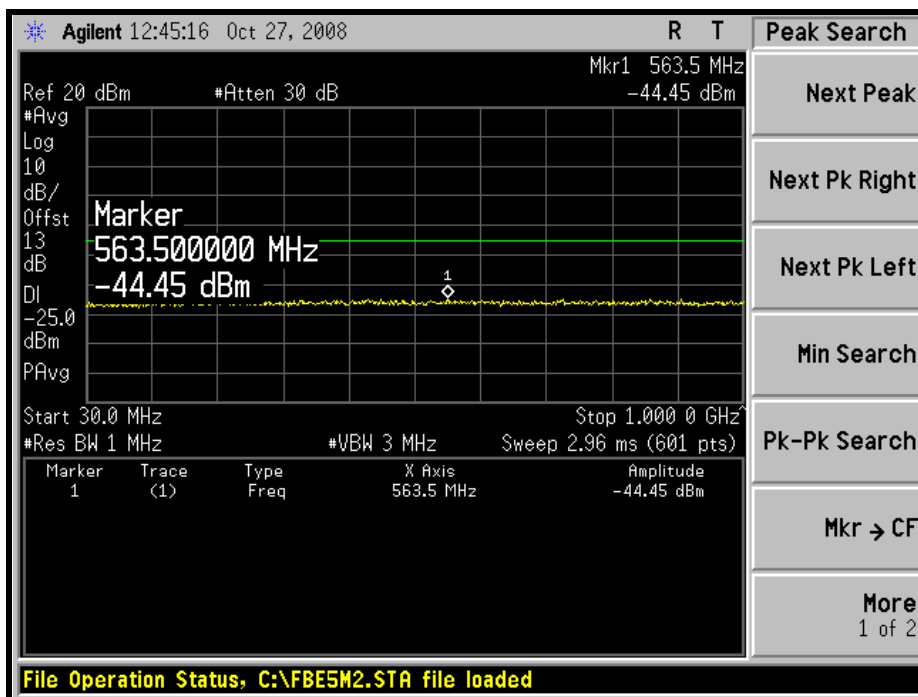
5GHz ~ 10GHz:



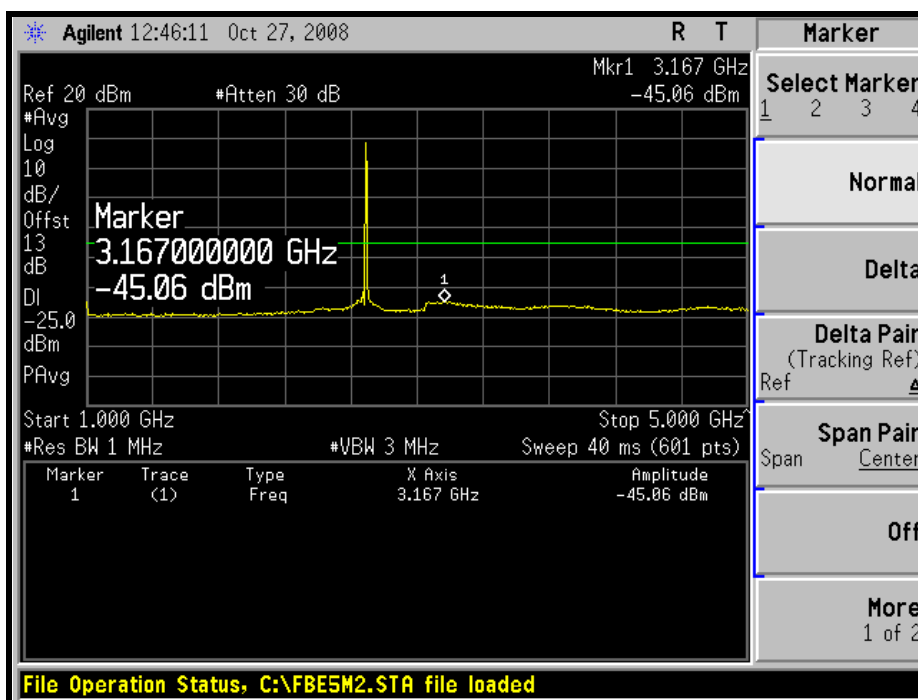
10GHz ~ 27GHz:



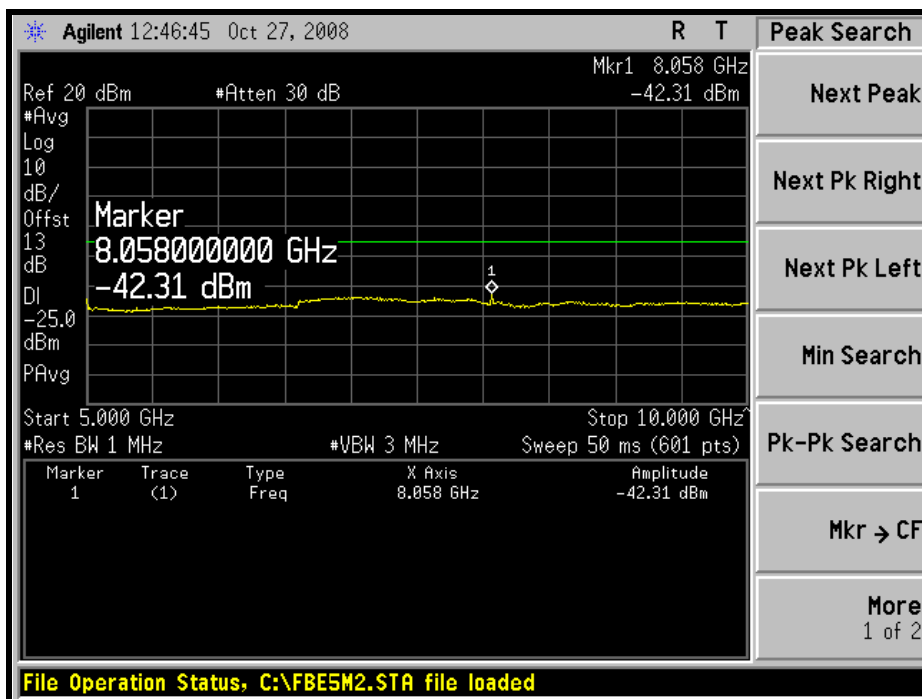
HIGH CHANNEL: 30MHz ~ 1GHz:



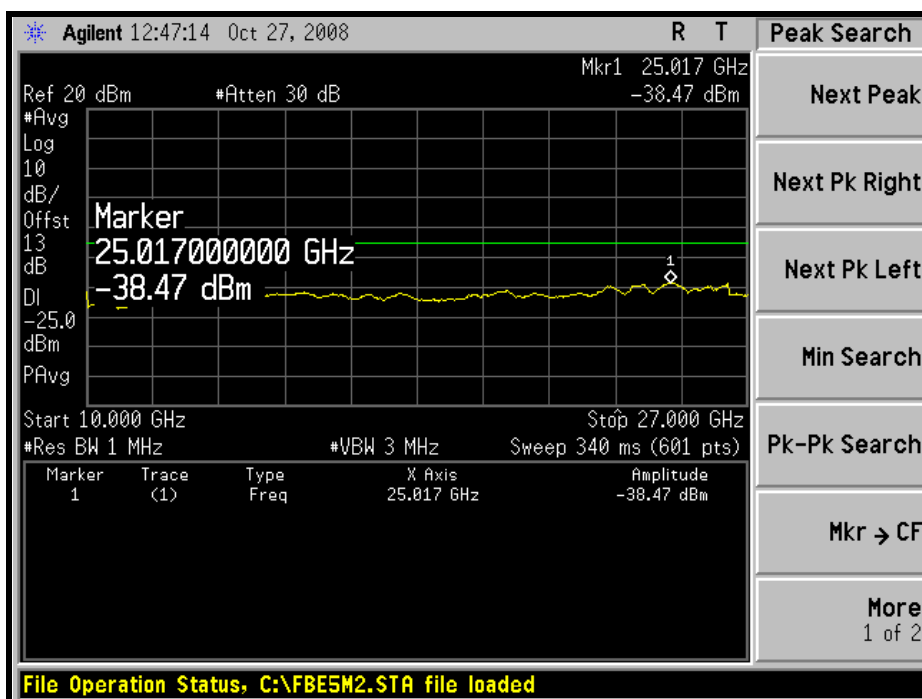
1GHz ~ 5GHz:



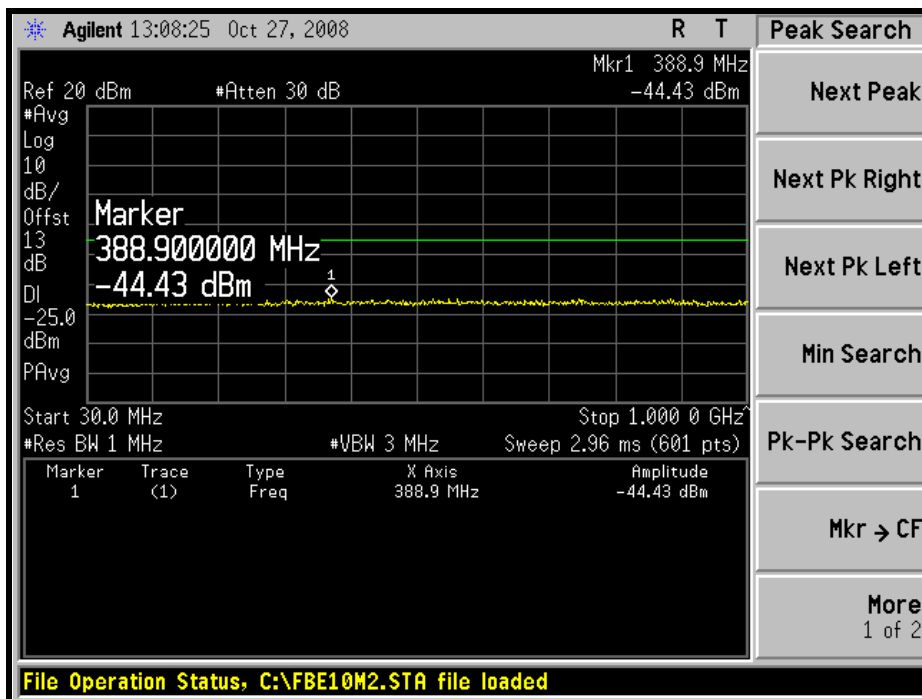
5GHz ~ 10GHz:



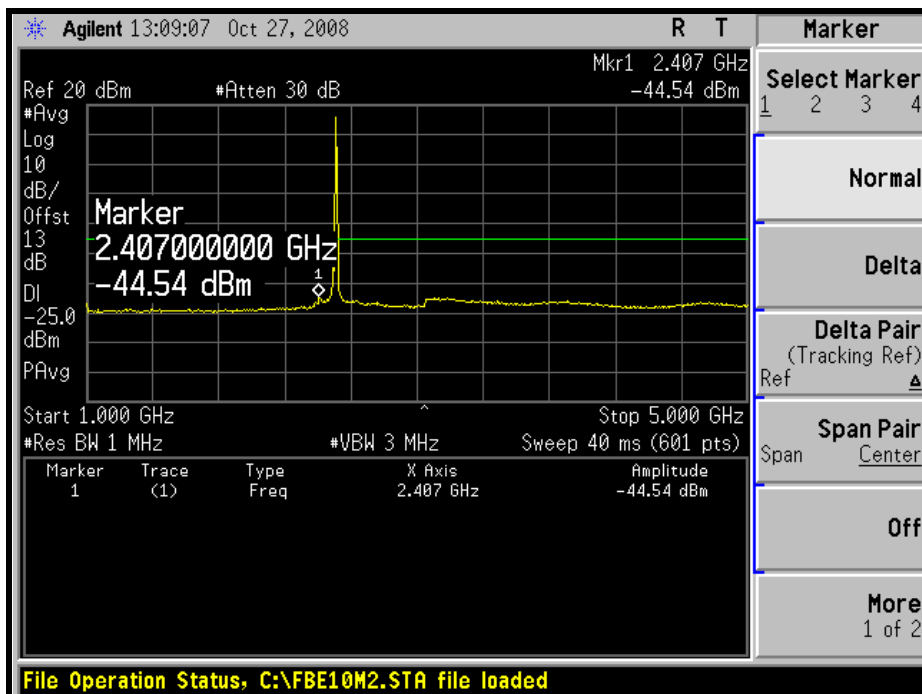
10GHz ~ 27GHz:



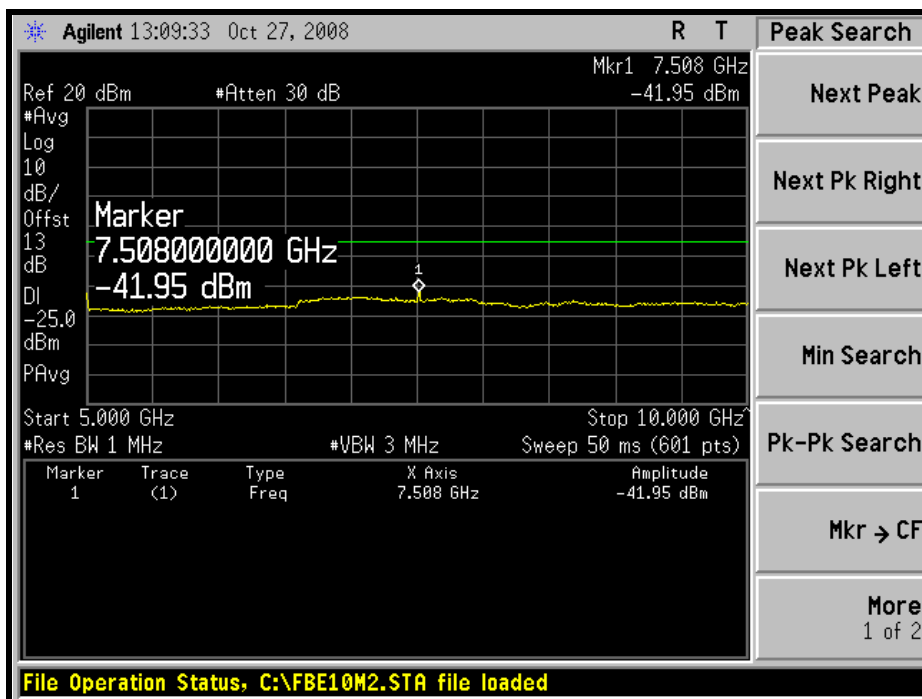
CHANNEL BANDWIDTH: 10MHz
LOW CHANNEL: 30MHz ~ 1GHz:



1GHz ~ 5GHz:



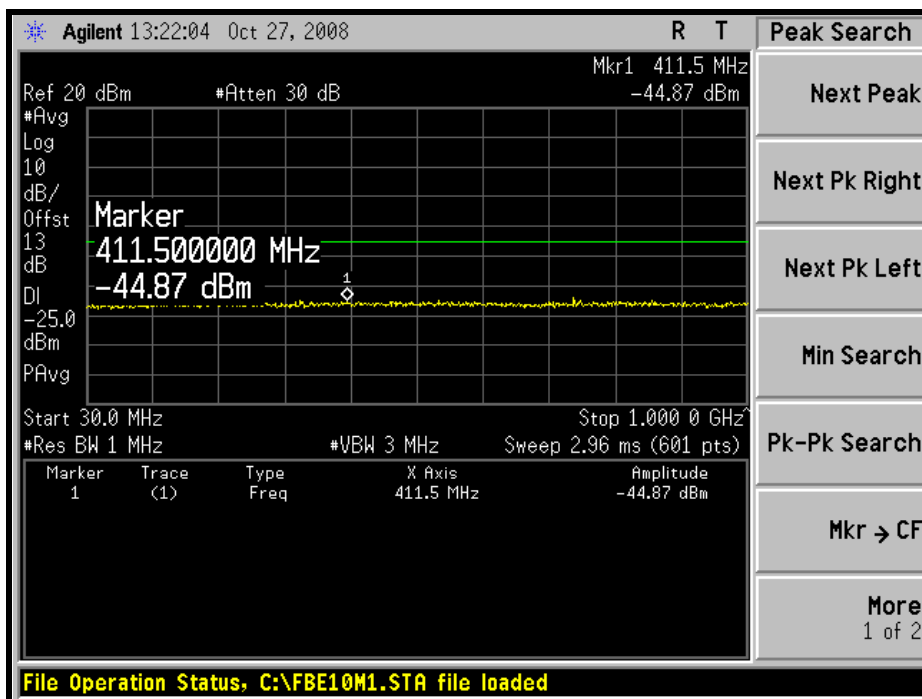
5GHz ~ 10GHz:



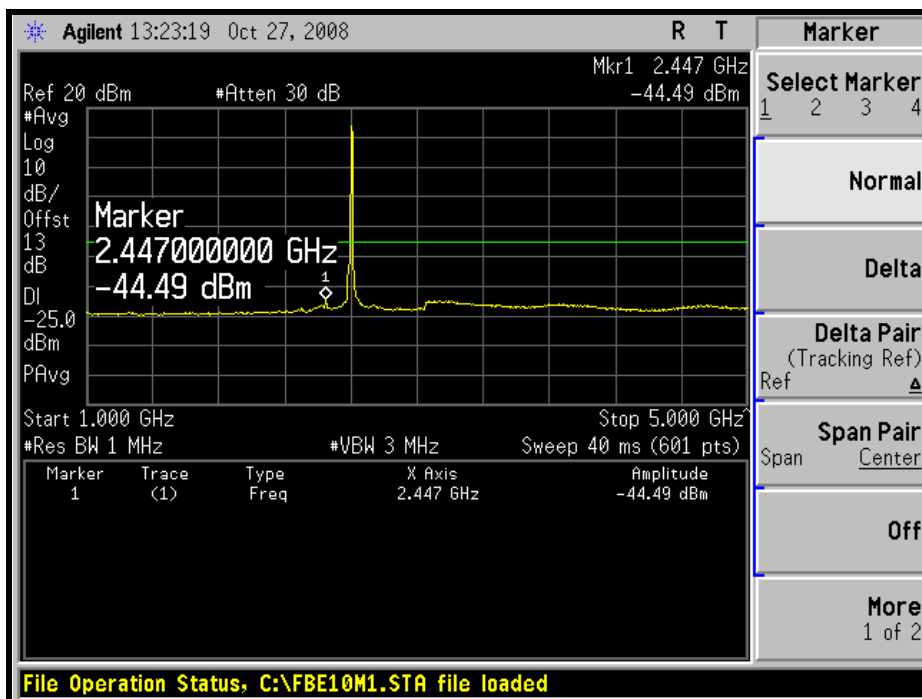
10GHz ~ 27GHz:



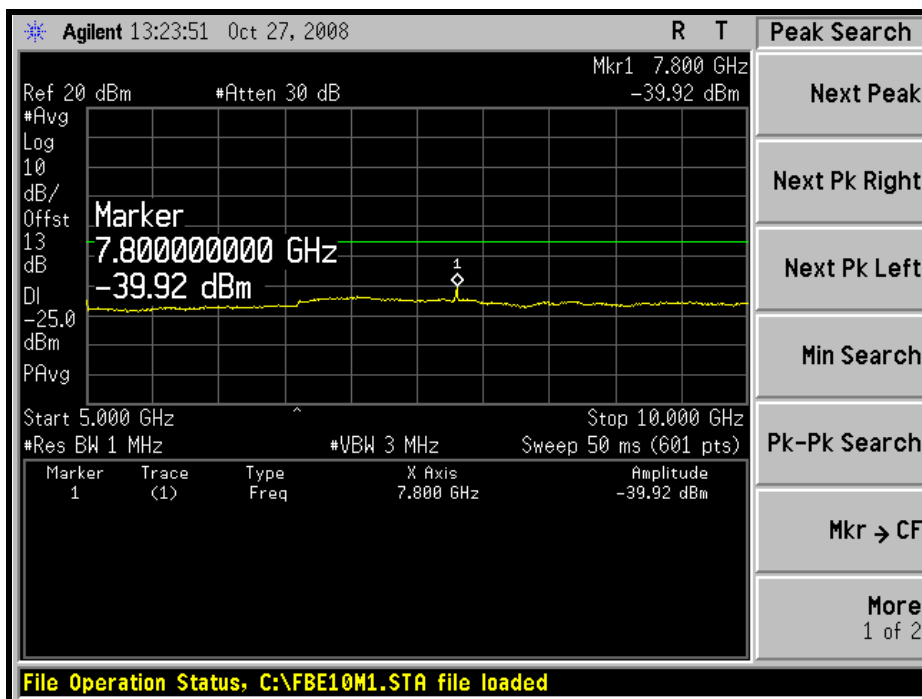
MIDDLE CHANNEL: 30MHz ~ 1GHz:



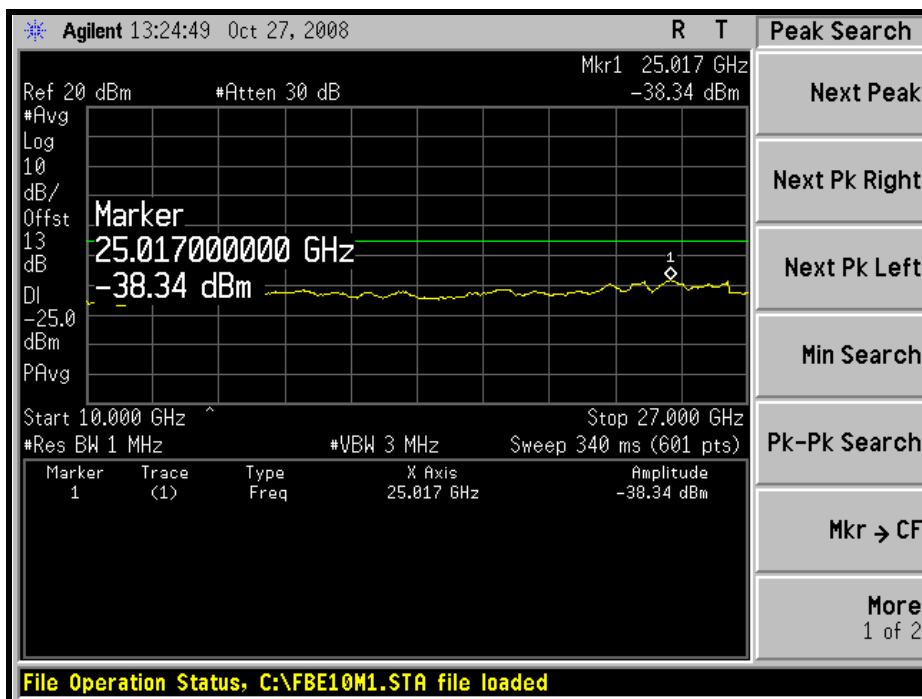
1GHz ~ 5GHz:



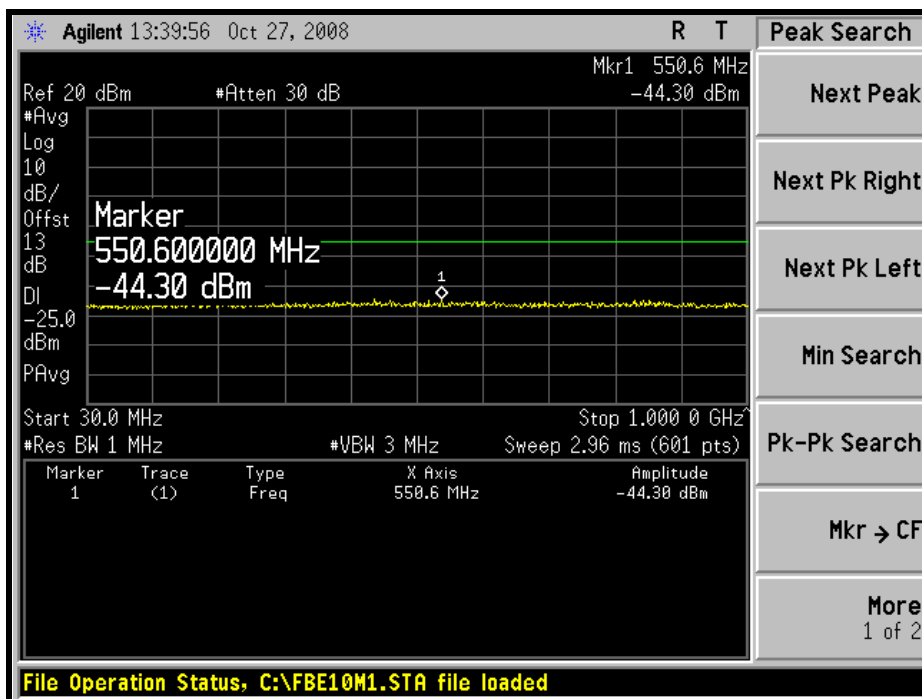
5GHz ~ 10GHz:



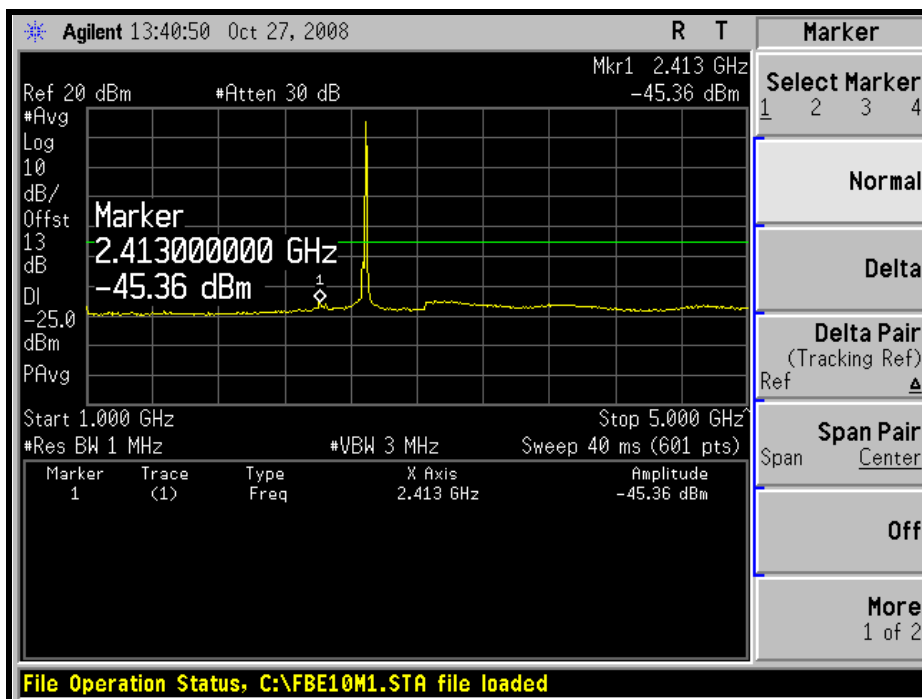
10GHz ~ 27GHz:



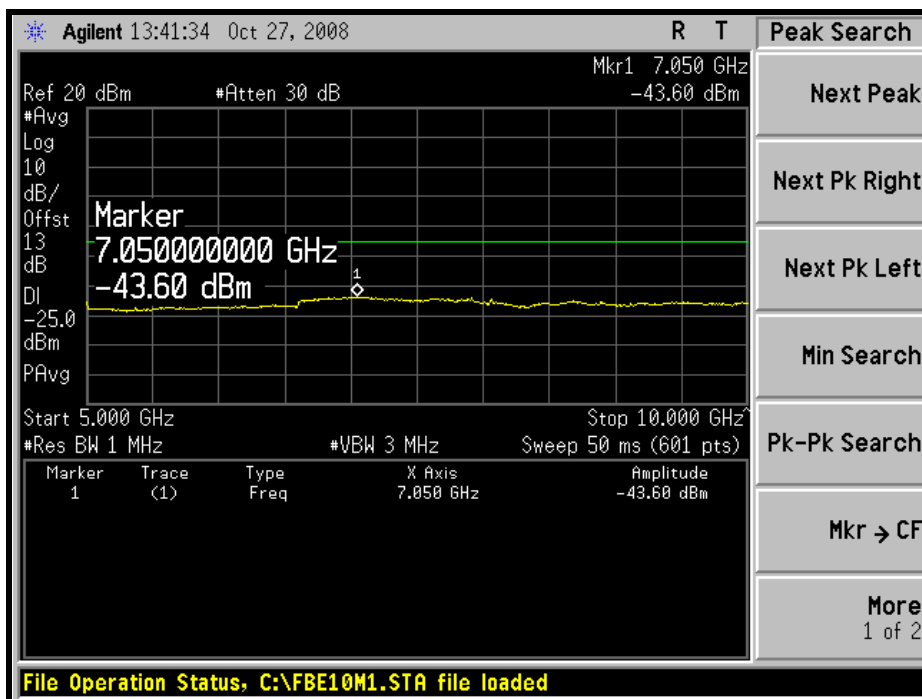
HIGH CHANNEL: 30MHz ~ 1GHz:



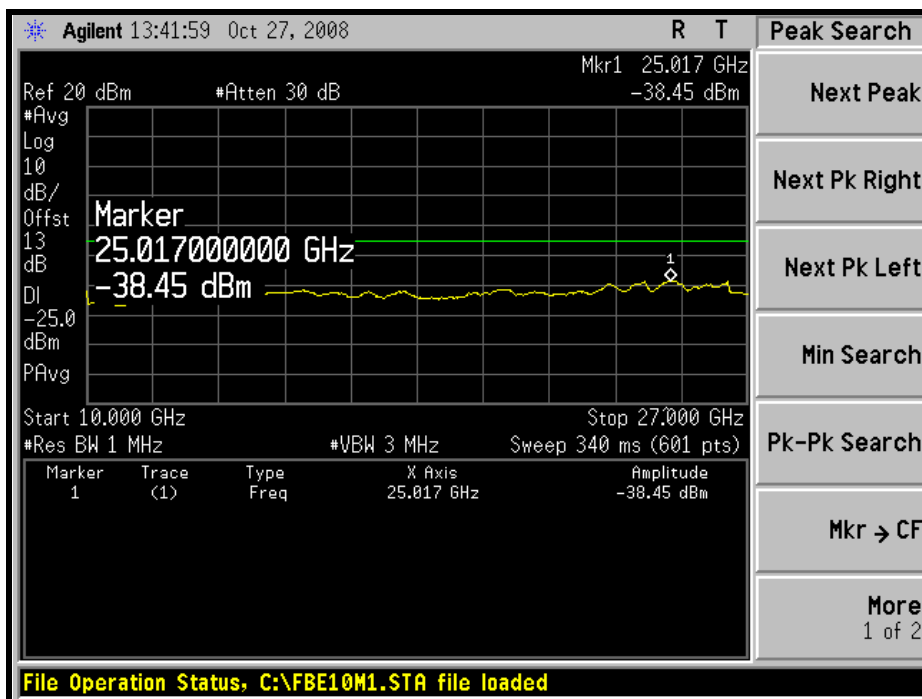
1GHz ~ 5GHz:



5GHz ~ 10GHz:



10GHz ~ 27GHz:



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 $43 + 10 \log (P)$ dB and $55 + 10 \log (P)$ dB at 5.5 MHz from the channel edges.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 16, 2008	July 15, 2009
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2008	Sep. 24, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	April 01, 2008	Mar. 31, 2009
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 30, 2008	April 29, 2009
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2007	Dec. 16, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 28, 2008	Jan. 27, 2009
RF Switches	EMH-011	08009	Oct. 07, 2008	Oct. 06, 2009
RF CABLE (Chaintek)	SF102	22054-2	Dec. 07, 2007	Dec. 06, 2008
RF Cable	8DFB	STCCAB-30M-1GHz	Oct. 07, 2008	Oct. 06, 2009
Software	ADT_Radiated_V7.6.15.8	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in ADT Open Site No. C.
 4. The FCC Site Registration No. is 656396.
 5. The VCCI Site Registration No. is R-1626.
 6. The CANADA Site Registration No. is IC 3789C-3.

4.6.3 TEST PROCEDURES

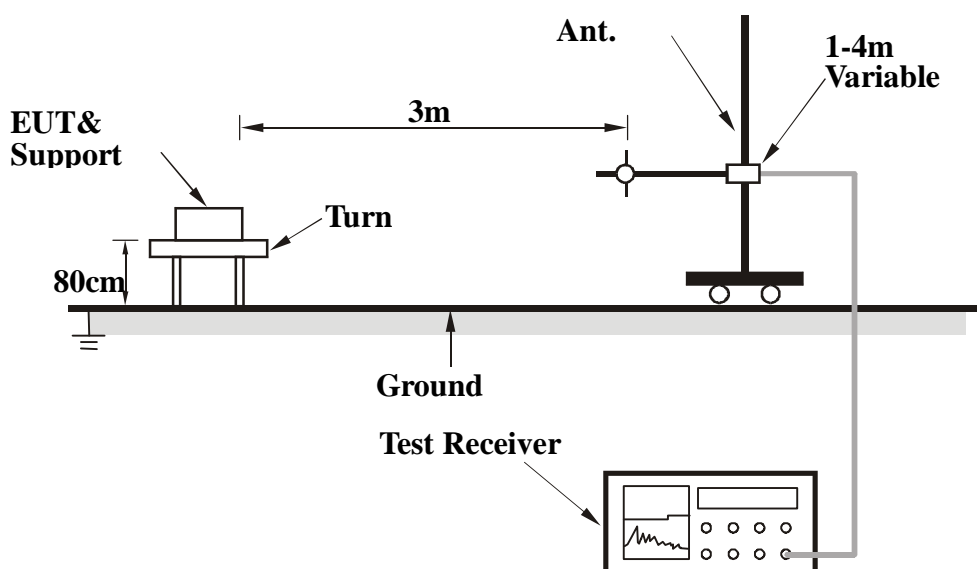
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.
- c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.
- d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.
- e. The signal generator level has to be adjusted to have the same emission nature.
- f. The radiated power can be calculated via the factor and antenna gain.
- g. Repeat step a ~ f for horizontal polarization.

NOTE: The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is 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

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

4.6.7 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

MODE	High channel	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	250.25	32.63	-25	-62.32	3.90	-58.43
2	400	34.2	-25	-63.64	3.33	-60.31
3	500	31.29	-25	-64.23	2.89	-61.34
4	750	36.93	-25	-59.45	0.82	-58.63
5	875	32.95	-25	-63.74	0.76	-62.98
6	925	33.66	-25	-64.79	0.42	-64.38

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	250.25	33.65	-25	-61.30	3.90	-57.41
2	400	40.94	-25	-56.90	3.33	-53.57
3	500	41.41	-25	-54.11	2.89	-51.22
4	750	39.46	-25	-56.92	0.82	-56.10
5	875	38.77	-25	-57.92	0.76	-57.16
6	925	36.11	-25	-62.34	0.42	-61.93

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



CHANNEL BANDWIDTH: 10MHz

MODE	Low channel	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	77.97	33.8	-25	-59.09	-2.37	-61.46
2	375	33.8	-25	-64.05	3.46	-60.59
3	400	31.9	-25	-65.94	3.33	-62.61
4	500	38.6	-25	-56.92	2.89	-54.03
5	625	34.8	-25	-60.01	1.77	-58.24
6	750	31.2	-25	-65.18	0.82	-64.36
7	875	32.6	-25	-64.09	0.76	-63.33
8	975	35.4	-25	-64.98	3.90	-61.08

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	77.97	36.24	-25	-56.65	-2.37	-59.02
2	375	35.22	-25	-62.63	3.46	-59.17
3	400	37.84	-25	-60.00	3.33	-56.67
4	500	41.21	-25	-54.31	2.89	-51.42
5	625	42.33	-25	-52.48	1.77	-50.71
6	750	39.7	-25	-56.68	0.82	-55.86
7	875	38.97	-25	-57.72	0.76	-56.96
8	975	40.25	-25	-60.13	3.90	-56.23

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



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 $43 + 10 \log (P)$ dB.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 16, 2008	July 15, 2009
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2008	Sep. 24, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	April 01, 2008	Mar. 31, 2009
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 30, 2008	April 29, 2009
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2007	Dec. 16, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 28, 2008	Jan. 27, 2009
RF Switches	EMH-011	08009	Oct. 07, 2008	Oct. 06, 2009
RF CABLE (Chaintek)	SF102	22054-2	Dec. 07, 2007	Dec. 06, 2008
RF Cable	8DFB	STCCAB-30M-1GHz	Oct. 07, 2008	Oct. 06, 2009
Software	ADT_Radiated_V7.6.15.8	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in ADT Open Site No. C.
 4. The FCC Site Registration No. is 656396.
 5. The VCCI Site Registration No. is R-1626.
 6. The CANADA Site Registration No. is IC 3789C-3.

4.7.3 TEST PROCEDURES

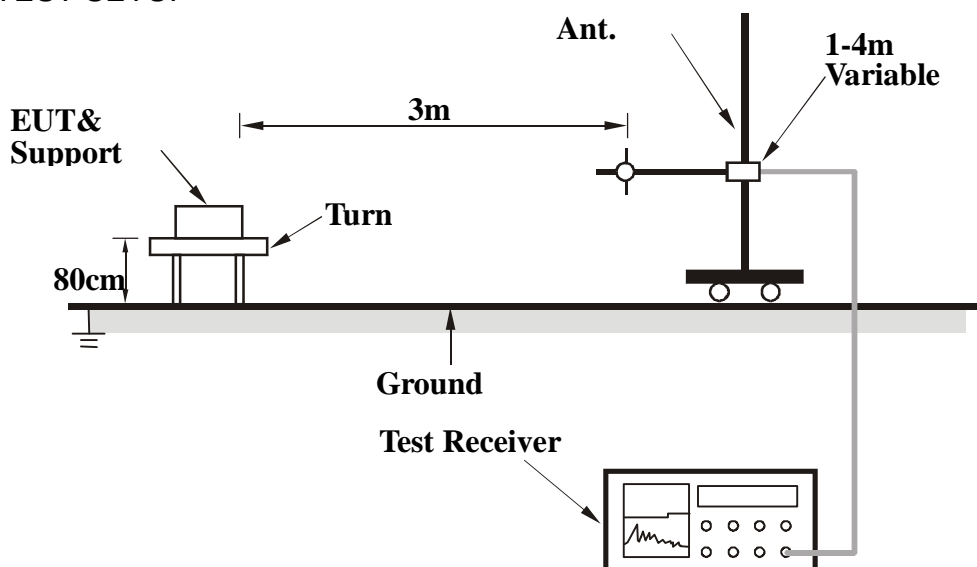
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.
- c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.
- d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.
- e. The signal generator level has to be adjusted to have the same emission nature.
- f. The radiated power can be calculated via the factor and antenna gain.
- g. Repeat step a ~ f for horizontal polarization.

NOTE: The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is 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

- a. The Notebook controlled EUT to export rated output power under transmission mode and specific channel frequency.

4.7.7 TEST RESULTS

CHANNEL BANDWIDTH: 5MHz

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3336.7	43.45	-25	-59.55	7.61	-51.94
2	5005	54.14	-25	-50.10	7.01	-43.09
3	6673.3	47.62	-25	-55.79	5.60	-50.19
4	7507.5	56.7	-25	-45.92	4.54	-41.38
5	10010	59.13	-25	-42.44	4.03	-38.41

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3336.7	52.02	-25	-50.98	7.61	-43.37
2	5005	59.11	-25	-45.13	7.01	-38.12
3	6673.3	49.72	-25	-53.69	5.60	-48.09
4	7507.5	57.83	-25	-44.79	4.54	-40.25
5	10010	55.52	-25	-46.05	4.03	-42.02

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



MODE	Middle channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3466.7	43.68	-25	-59.48	7.80	-51.68
2	5200	52.04	-25	-52.49	7.05	-45.44
3	6933.3	52.76	-25	-49.54	5.10	-44.44
4	7800	58.23	-25	-44.39	4.29	-40.10
5	10400	56.17	-25	-45.84	3.66	-42.17

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3466.7	50.04	-25	-53.12	7.80	-45.32
2	5200	56.9	-25	-47.63	7.05	-40.58
3	6933.3	53.12	-25	-49.18	5.10	-44.08
4	7800	61.82	-25	-40.80	4.29	-36.51
5	10400	56.34	-25	-45.67	3.66	-42.00

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



MODE	High channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3583.3	46.42	-25	-57.08	7.79	-49.29
2	5375	57.63	-25	-47.16	7.09	-40.07
3	7166.7	55.05	-25	-47.17	4.83	-42.34
4	8062.5	59.47	-25	-43.15	4.13	-39.02
5	10750	56.49	-25	-45.35	3.33	-42.01

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3583.3	50.33	-25	-53.17	7.79	-45.38
2	5375	58.79	-25	-46.00	7.09	-38.91
3	7166.7	52.14	-25	-50.08	4.83	-45.25
4	8062.5	65.42	-25	-37.20	4.13	-33.07
5	10750	57.06	-25	-44.78	3.33	-41.44

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



CHANNEL BANDWIDTH: 10MHz

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3340	43.84	-25	-59.16	7.62	-51.55
2	5010	50.61	-25	-53.64	7.01	-46.62
3	6680	47.69	-25	-55.69	5.58	-50.10
4	7515	53.42	-25	-49.20	4.53	-44.67
5	10020	58.23	-25	-43.35	4.02	-39.33

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3340	52.38	-25	-50.62	7.62	-43.01
2	5010	53.3	-25	-50.95	7.01	-43.93
3	6680	49.69	-25	-53.69	5.58	-48.10
4	7515	53.69	-25	-48.93	4.53	-44.40
5	10020	53.3	-25	-48.28	4.02	-44.26

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



MODE	Middle channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3466.7	43.57	-25	-59.59	7.80	-51.79
2	5200	50.32	-25	-54.21	7.05	-47.16
3	6933.3	52.26	-25	-50.04	5.10	-44.94
4	7800	56.75	-25	-45.87	4.29	-41.58
5	10400	56.64	-25	-45.37	3.66	-41.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3466.7	49.52	-25	-53.64	7.80	-45.84
2	5200	55.55	-25	-48.98	7.05	-41.93
3	6933.3	52.73	-25	-49.57	5.10	-44.47
4	7800	60.2	-25	-42.42	4.29	-38.13
5	10400	55.99	-25	-46.02	3.66	-42.35

REMARKS: 1. Power Value(dBm)=S.G Power Value (dBm) + Correction Factor(dB)



MODE	High channel	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	20deg°C, 60%RH 960hPa
TESTED BY	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3580	46.2	-25	-57.29	7.80	-49.50
2	5370	57.01	-25	-47.78	7.09	-40.68
3	7160	54.99	-25	-47.22	4.83	-42.39
4	8055	57.3	-25	-45.32	4.13	-41.19
5	10740	56.49	-25	-45.36	3.34	-42.02

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBm)	S.G level (dBm)	C.F. (dB)	Power level (dBm)
1	3580	50.06	-25	-53.43	7.80	-45.64
2	5370	57.04	-25	-47.75	7.09	-40.65
3	7160	52.27	-25	-49.94	4.83	-45.11
4	8055	67.52	-25	-35.10	4.13	-30.97
5	10740	56.94	-25	-44.91	3.34	-41.57

REMARKS: 1. Power Value(dBm)=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, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL
GERMANY	TUV Rheinland
JAPAN	VCCI
NORWAY	NEMKO
CANADA	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
NETHERLANDS	Telefication
SINGAPORE	GOST-ASIA (MOU)
RUSSIA	CERTIS (MOU)

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: Web Site: www.adt.com.tw

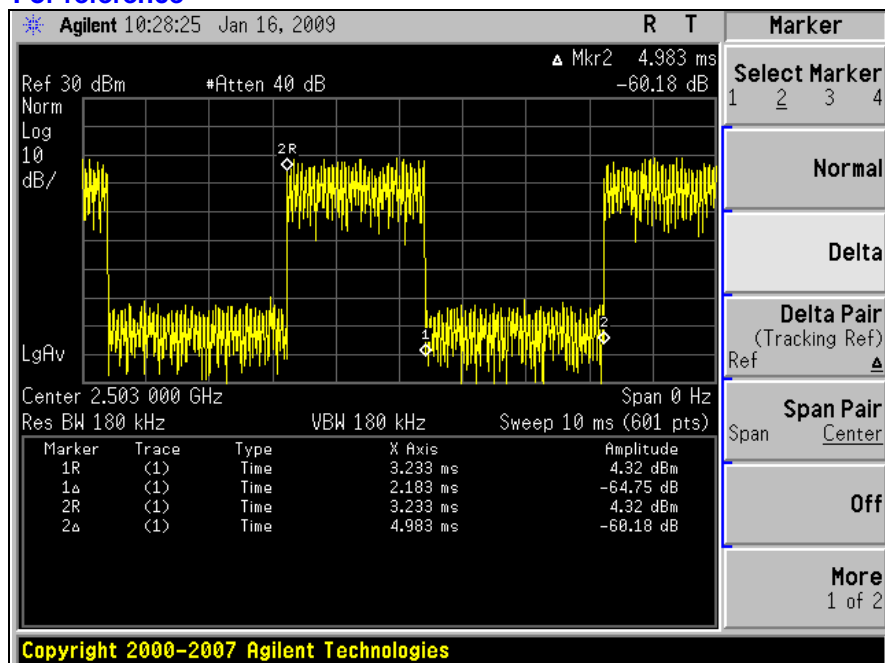
Tel: 886-3-3183232

Fax: 886-3-3185050

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

7 APPENDIX- A DL/UL RATION FOR TEST

For reference



The ration is approximate 43.4%.

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