FCC TEST REPORT

(PART 27)

REPORT NO.: RF990514C07

MODEL NO.: 4M-CPE-USB250-2.5
(refer to item 3.1 for more details)

RECEIVED: May 14, 2010

TESTED: Jun. 02 ~ Jun. 03, 2010

ISSUED: Jun. 10, 2010

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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1 CERTIFICATION

PRODUCT: WiMAX USB250, 802.16e wave2 2.5GHz USB Dongle
MODEL: 4M-CPE-USB250-2.5 (refer to item 3.1 for more details)
BRAND: Alvarion (refer to item 3.1 for more details)
APPLICANT: Gemtek Technology Co., Ltd.
TESTED: Jun. 02 ~ Jun. 03, 2010
TEST SAMPLE: ENGINEERING SAMPLE
TEST STANDARDS: FCC Part 27, Subpart C & M

The above equipment (Model no.: 4M-CPE-USB250-2.5) 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 : Rennie Wang , **DATE:** Jun. 10, 2010
Rennie Wang / Supervisor

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jun. 10, 2010
Responsible for RF
Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Jun. 10, 2010
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 22.6dBm at 2685.0MHz.
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 -16.2dB at 10740.0MHz.

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	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 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

PRODUCT	WiMAX USB250, 802.16e wave2 2.5GHz USB Dongle	
MODEL NO.	4M-CPE-USB250-2.5 (refer to Note for more details)	
FCC ID	MXF-WIXUBB-110	
POWER SUPPLY	5Vdc	
MODULATION TECHNOLOGY	OFDMA	
DUPLEX METHOD	TDD	
MULTIPLE ACCESS METHOD	TDMA	
CODED TYPE/MODULATION/ CODING RATE	UL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
		64QAM: 1/2, 2/3, 3/4, 5/6
	DL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
		64QAM: 1/2, 2/3, 3/4, 5/6
OPERATING FREQUENCY	2498.5MHz to 2687.5Mz	
CHANNEL BANDWIDTH	5MHz, 10MHz	
MAX. E.I.R.P. POWER (RMS)	22.6dBm	
ANTENNA TYPE	Printed antenna with -1dBi gain	
UL ZONE TYPE	PUSC	
OPERATION TEMPERATURE RANGE	-5 ~ 45°C	
DATA CABLE	0.12m shielded USB cable without core	
I/O PORTS	Refer to user's manual	
ACCESSORY DEVICES	NA	

NOTE:

1. The models as below are identical to each other except for their model designation and brand name due to marketing purpose.

BRAND	MODEL
Alvarion	4M-CPE-USB250-2.5
Gemtek	WIXUBB-110

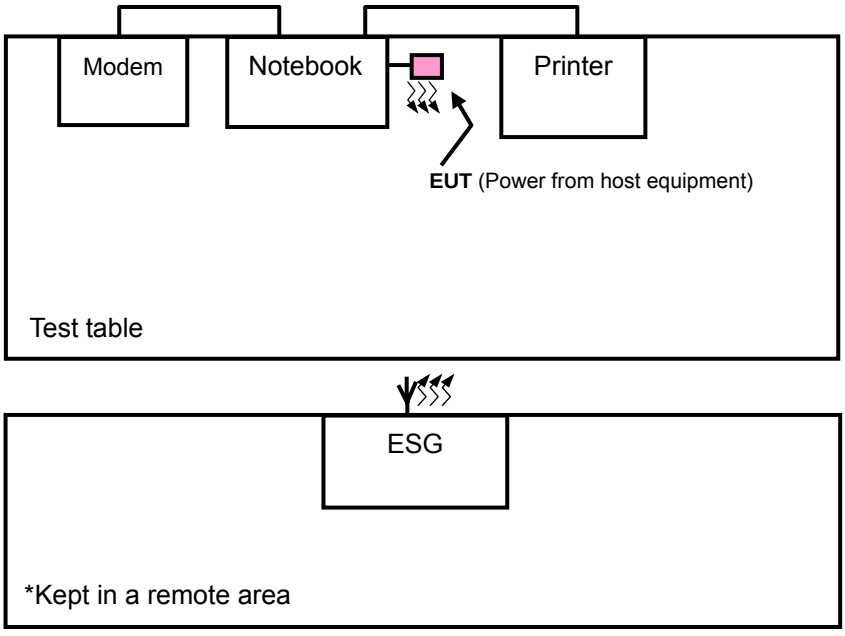
2. The EUT can supports different UL / DL ratio, max transmit ratio is up to 18 (UL): 29 (DL). After pre-testing of output power and spurious emission, 18 (UL): 29 (DL) was found to be worst case and was selected for the final test configuration.
3. The EUT provides one completed transmitter and two receivers. The device supports TX antenna diversity function. After pre-testing, antenna 2 has the worst emission value, therefore the following test results came out from this.
4. 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 had been tested for each channel bandwidth.

CHANNEL BANDWIDTH: 5MHz	CHANNEL BANDWIDTH: 10MHz
Low channel (L): 2498.5MHz.	**Low channel (L)**: 2501.0MHz.
Middle channel (M): 2600.0MHz.	**Middle channel (M)**: 2600.0MHz.
High channel (H): 2687.5MHz.	**High channel (H)**: 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, coding rate, 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	UL ZONE TYPE	AXIS
-	L, M, H	OFDMA	5MHz	16QAM	3/4	PUSC	X
			10MHz				

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
-	H	OFDMA	5MHz	16QAM	3/4
	L	OFDMA	10MHz	16QAM	3/4

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	UL ZONE TYPE
-	L, M, H	OFDMA	5MHz	16QAM	3/4	PUSC
			10MHz			

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	UL ZONE TYPE
-	L, M, H	OFDMA	5MHz	16QAM	3/4	PUSC
			10MHz			

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	UL ZONE TYPE
-	L, M, H	OFDMA	5MHz	16QAM	3/4	PUSC
			10MHz			

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, 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	UL ZONE TYPE	AXIS
-	L	OFDMA	5MHz	16QAM	3/4	PUSC	X
			10MHz				

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, 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	UL ZONE TYPE	AXIS
-	L, M, H	OFDMA	5MHz	16QAM	3/4	PUSC	X
			10MHz				

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

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	Dell	D830	10026042688	NA
2	MODEM	ACEEX	1414V/3	0401008253	IFAXDM1414
3	PRINTER	HP	hp-1015	Q2462A -CNFG149502	NA
4	SIGNAL GENERATOR	Agilent	E4438C	MY45092849	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m braid shielded wire , DB25 & DB9 connector , w/o core.
3	1.2m shielded cable, w/o core.
4	NA

NOTE: 1. All power cords of the above support units are non shielded (1.8m).
2. Item 4 acted as a communication partner to transfer data.

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
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Dec. 21, 2009	Dec. 20, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2010	Apr. 29, 2011
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Aug. 10, 2009	Aug. 09, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Dec. 25, 2009	Dec. 24, 2010
Preamplifier Agilent	8449B	3008A01910	Sep. 11, 2009	Sep. 10, 2010
Preamplifier Agilent	8447D	2944A10638	Dec. 21, 2009	Dec. 20, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218190/4 231241/4	May 14, 2010	May 13, 2011
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 17, 2009	Aug. 16, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	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 test was performed in HwaYa Chamber 9.
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 460141.
5. The IC Site Registration No. is IC 7450F-4.

4.1.3 TEST PROCEDURES

EIRP

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.

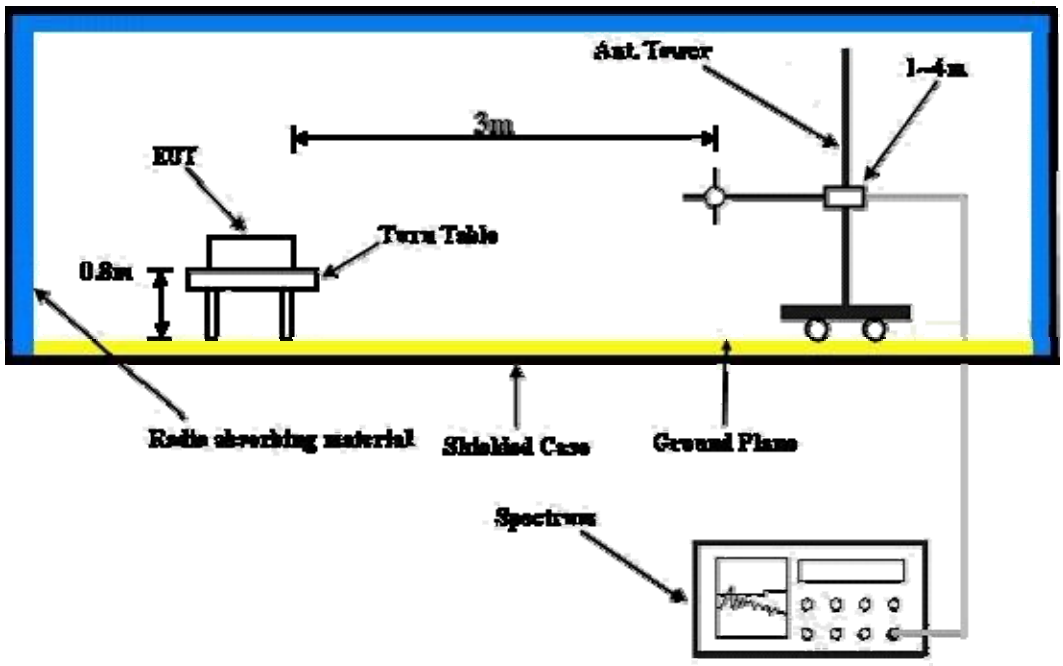
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz

CONDUCTED POWER

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.

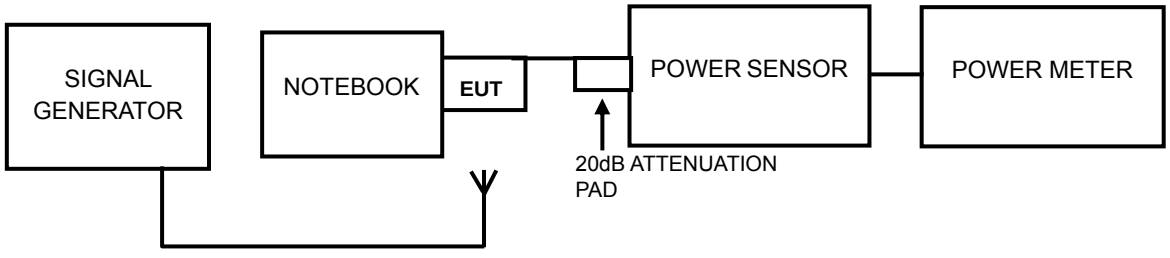
4.1.4 TEST SETUP

EIRP



For the actual test configuration, please refer to the attached file (Test Setup Photo)

CONDUCTED POWER



4.1.5 EUT OPERATING CONDITIONS

a. Link up EUT with signal generator.

b. The signal generator controlled EUT to export rated output power under transmission mode and specific channel frequency.

4.1.6 TEST RESULTS

ENVIRONMENTAL CONDITIONS	23 deg. C, 62% RH 991hPa	TESTED BY	Dean Wang

NOTE: C.F = attenuator + cable loss

CONDUCTED POWER (RMS)

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH						
CHANNEL	FREQUENCY (MHz)	C.F (dB)	POWER METER READING (dBm)	POWER (dBm)	POWER (mW)	UL MODULATION
Low	2498.5	21.00	2.12	23.12	205.1	16QAM 3/4
Middle	2600.0	21.00	2.15	23.15	206.5	16QAM 3/4
High	2687.5	21.00	2.15	23.15	206.5	16QAM 3/4

PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH						
CHANNEL	FREQUENCY (MHz)	C.F (dB)	POWER METER READING (dBm)	POWER (dBm)	POWER (mW)	UL MODULATION
Low	2501.0	21.00	2.07	23.07	202.8	16QAM 3/4
Middle	2600.0	21.00	2.06	23.06	202.3	16QAM 3/4
High	2685.0	21.00	2.04	23.04	201.4	16QAM 3/4

EIRP POWER (RMS)

ENVIRONMENTAL CONDITIONS	23 deg. C, 62% RH 991hPa	TESTED BY	Dean Wang

NOTE: C.F = Substitution Antenna Gain (dB) + Cable Loss (dB).

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH						
CHANNEL	**FREQUENCY (MHz)**	**C.F (dB)**	**S.G POWER VALUE (dBm)**	**POWER (dBm)**	**POWER (mW)**	**UL MODULATION**
Low	2498.5	8.3	12.8	21.1	128.8	16QAM 3/4
Middle	2600.0	8.5	12.7	21.2	131.8	16QAM 3/4
High	2687.5	8.5	12.9	21.4	138.0	16QAM 3/4

PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH						
CHANNEL	**FREQUENCY (MHz)**	**C.F (dB)**	**S.G POWER VALUE (dBm)**	**POWER (dBm)**	**POWER (mW)**	**UL MODULATION**
Low	2501.0	8.3	11.7	20.0	100.0	16QAM 3/4
Middle	2600.0	8.5	13.0	21.5	141.3	16QAM 3/4
High	**2685.0**	**8.5**	**14.1**	**22.6**	**182.0**	**16QAM 3/4**

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 0℃ ~ 45℃.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Feb. 05, 2010	Feb. 04, 2011
RF cable	SUCOFLEX 104	257029	Sep. 12, 2009	Sep. 11, 2010
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 24, 2009	Jun. 23, 2010

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

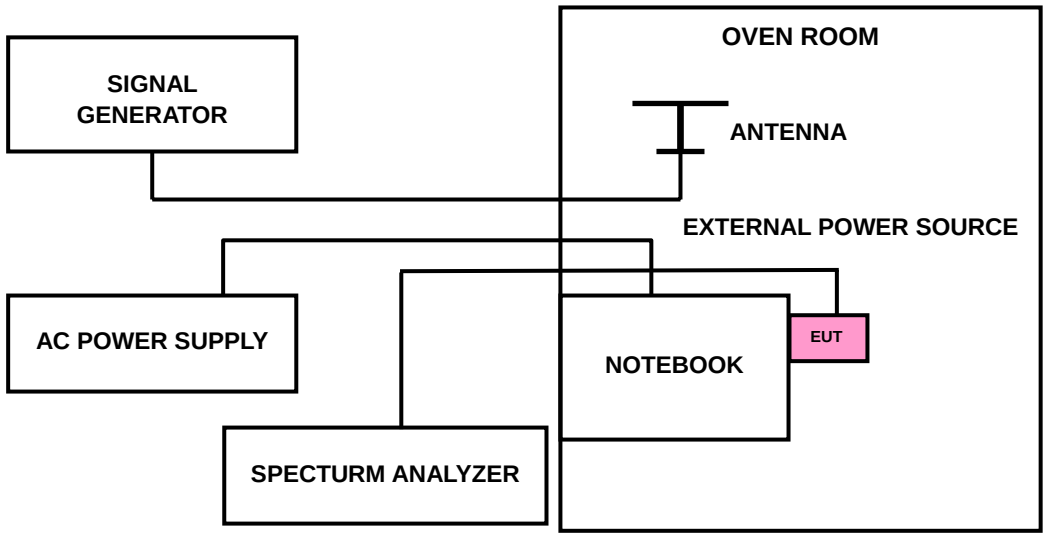
a. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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

MODE	High channel	ENVIRONMENTAL CONDITIONS	23 deg. C, 62% RH 991hPa
CHANNEL BANDWIDTH	5MHz	TESTED BY	Dean Wang

AFC FREQUENCY ERROR VS. VOLTAGE		
VOLTAGE (Volts)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	2687.501353	0.503
110.0	2687.500843	0.314
126.5	2687.500730	0.272

AFC FREQUENCY ERROR VS. TEMP.		
TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
50	2687.501374	0.511
40	2687.500801	0.298
30	2687.501353	0.503
20	2687.500843	0.314
10	2687.500506	0.188
0	2687.501130	0.420
-10	2687.500639	0.238

MODE	Low channel	**ENVIRONMENTAL CONDITIONS**	23 deg. C, 62% RH 991hPa
CHANNEL BANDWIDTH	10MHz	**TESTED BY**	Dean Wang

AFC FREQUENCY ERROR VS. VOLTAGE		
VOLTAGE (Volts)	**FREQUENCY (MHz)**	**FREQUENCY ERROR (ppm)**
93.5	2501.001137	0.455
110.0	2501.001303	0.521
126.5	2501.001870	0.748

AFC FREQUENCY ERROR VS. TEMP.		
TEMP. (℃)	**FREQUENCY (MHz)**	**FREQUENCY ERROR (ppm)**
50	2501.001239	0.495
40	2501.001083	0.433
30	2501.000704	0.281
20	2501.001303	0.521
10	2501.001391	0.556
0	2501.001353	0.541
-10	2501.000854	0.341

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

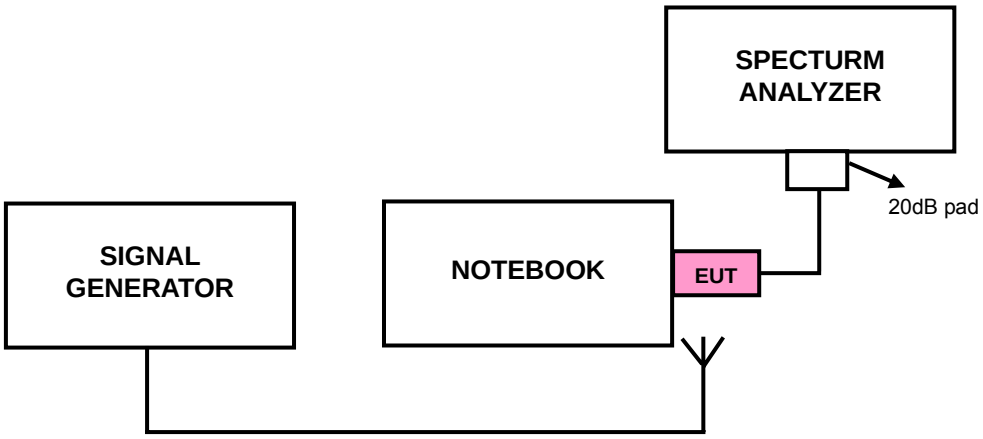
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY44360124	Feb. 05, 2010	Feb. 04, 2011
RF cable	SUCOFLEX 104	257029	Sep. 12, 2009	Sep. 11, 2010
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 24, 2009	Jun. 23, 2010

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 (channel bandwidth 5MHz), RBW = 100kHz, VBW = 300kHz (channel bandwidth 10MHz). 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



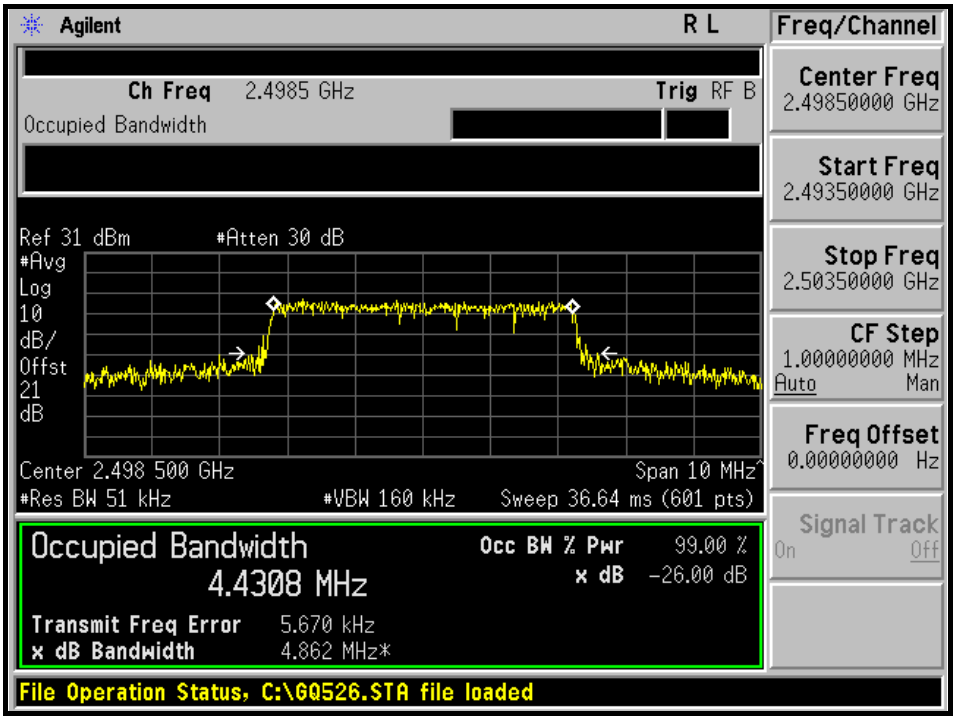
4.3.5 EUT OPERATING CONDITIONS

Same as 4.1.5

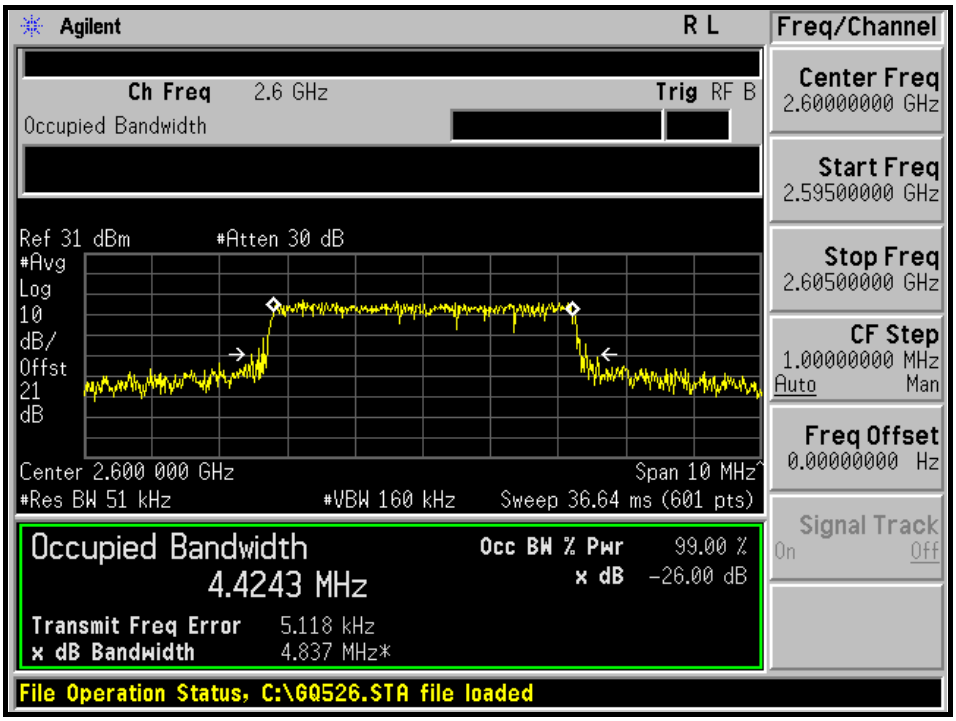
4.3.6 TEST RESULTS

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH	
CHANNEL	**-26dBc BANDWIDTH (MHz)**
Low	4.862
Middle	4.837
High	4.836

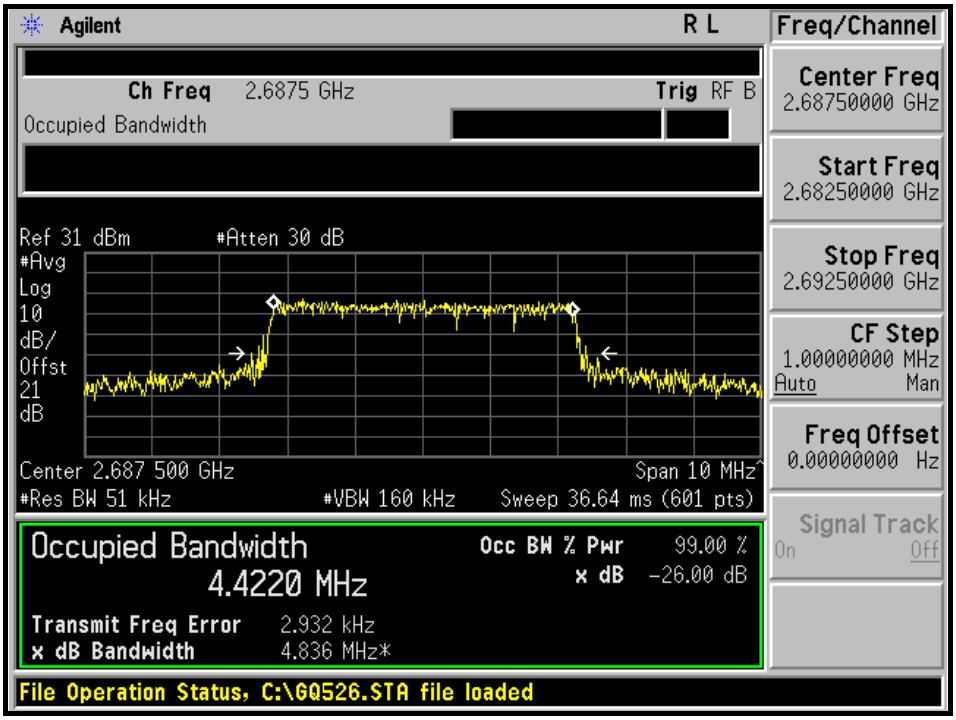
LOW CHANNEL



MIDDLE CHANNEL

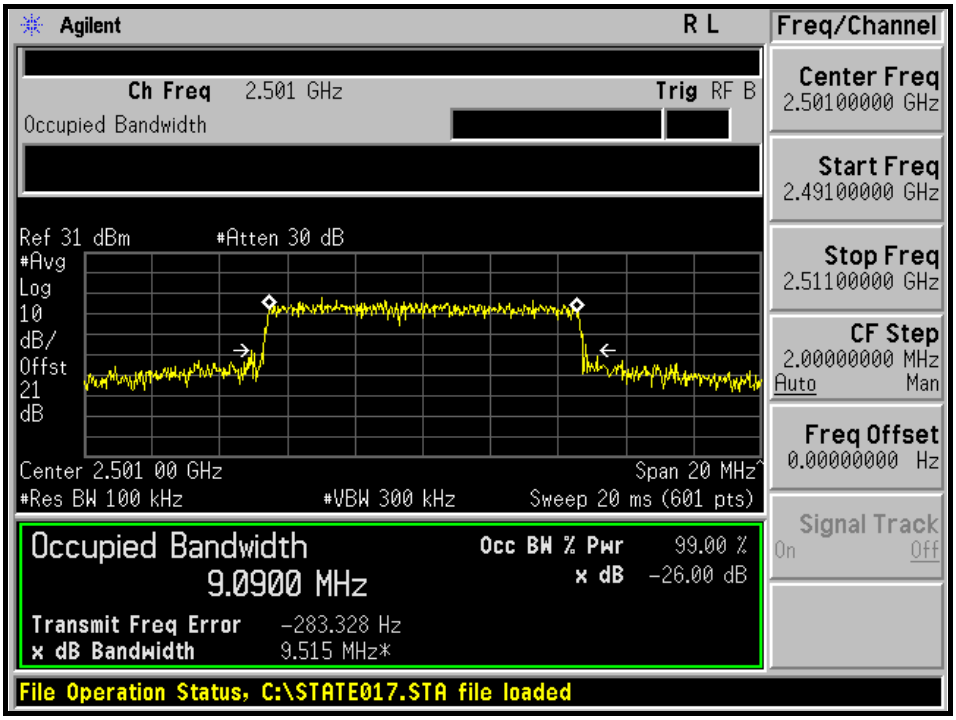


HIGH CHANNEL

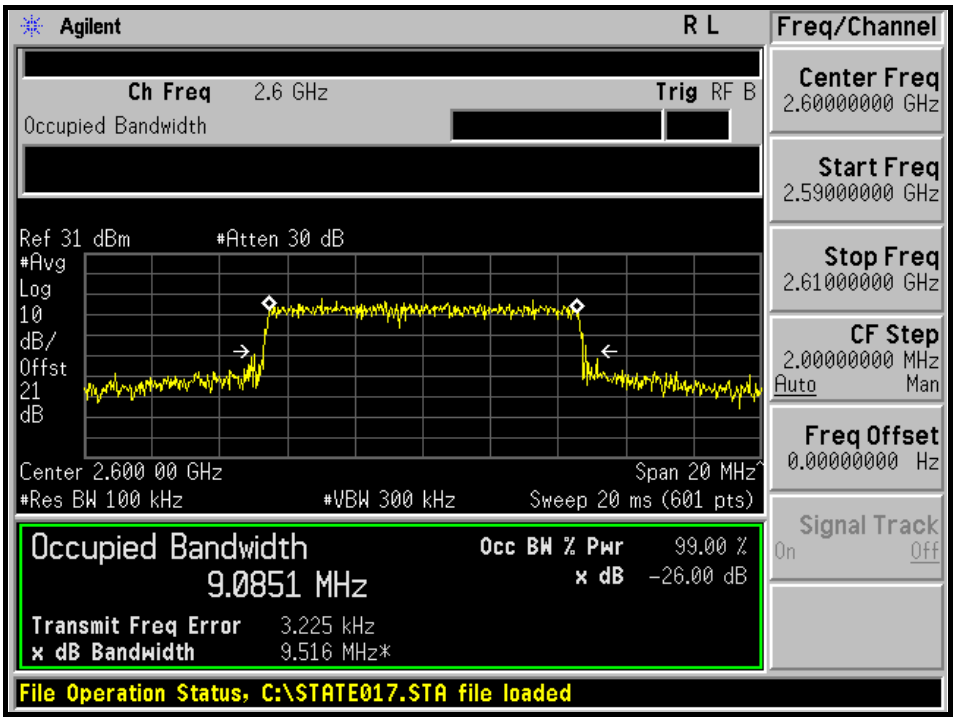


PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH	
CHANNEL	**-26dBc BANDWIDTH (MHz)**
Low	9.515
Middle	9.516
High	9.513

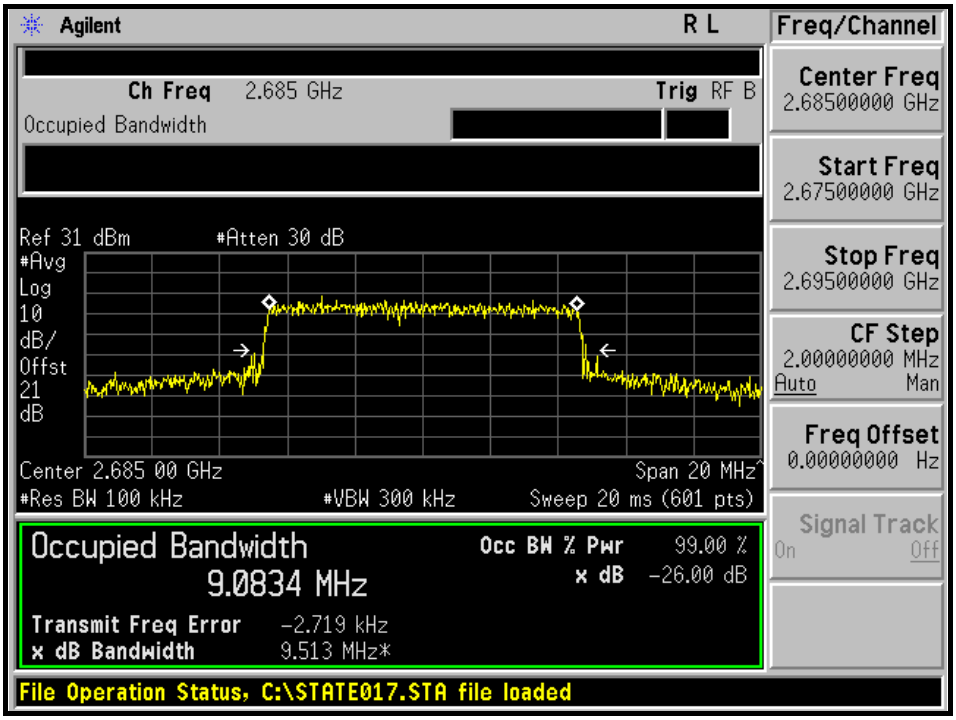
LOW CHANNEL



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 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	Feb. 05, 2010	Feb. 04, 2011
RF cable	SUCOFLEX 104	257029	Sep. 12, 2009	Sep. 11, 2010
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 24, 2009	Jun. 23, 2010

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 4.3.3

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. 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.

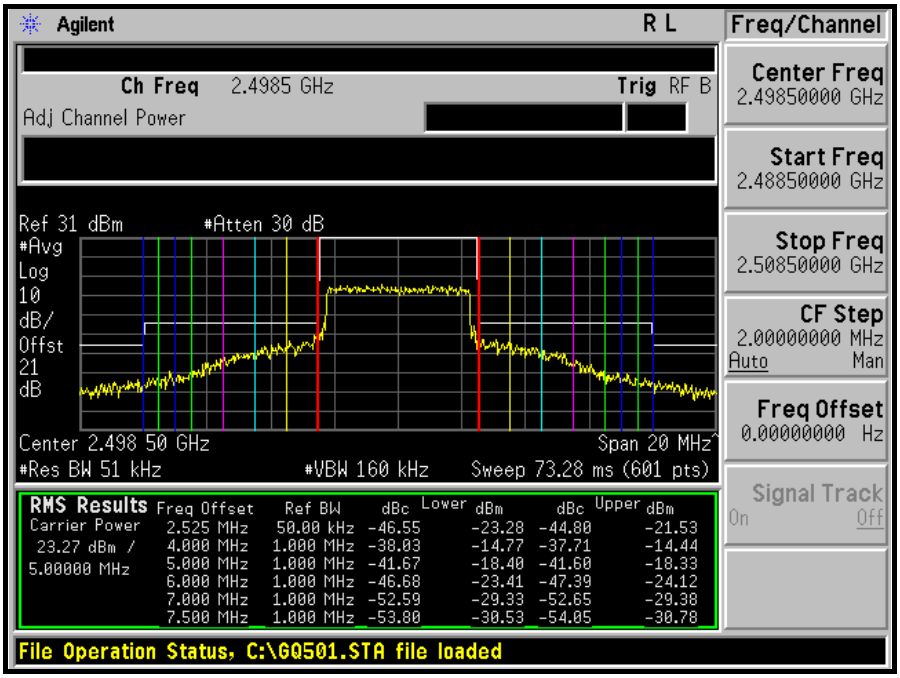
4.4.5 EUT OPERATING CONDITION

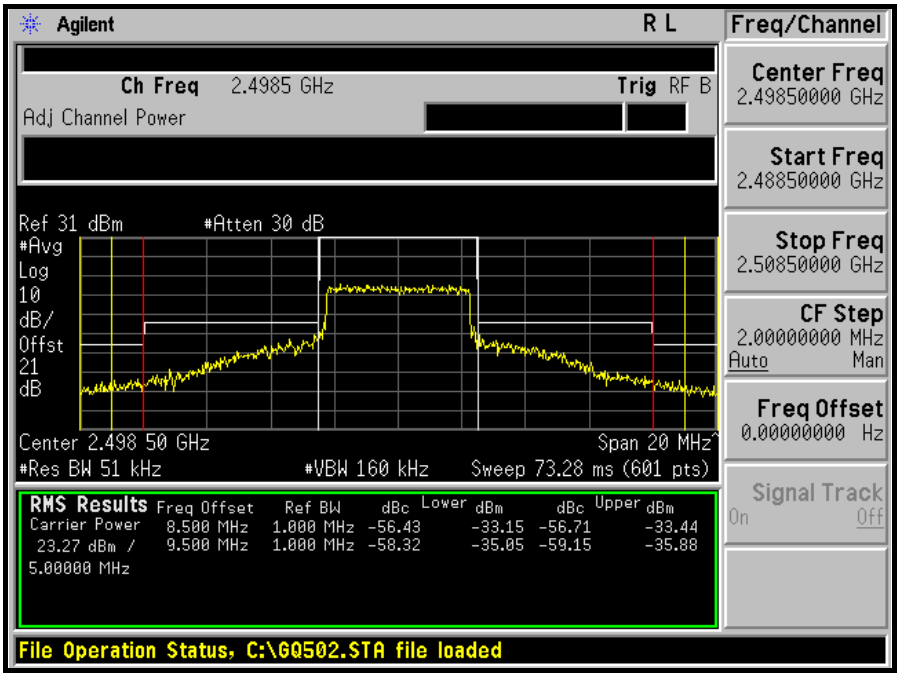
Same as 4.1.5

4.4.6 TEST RESULTS

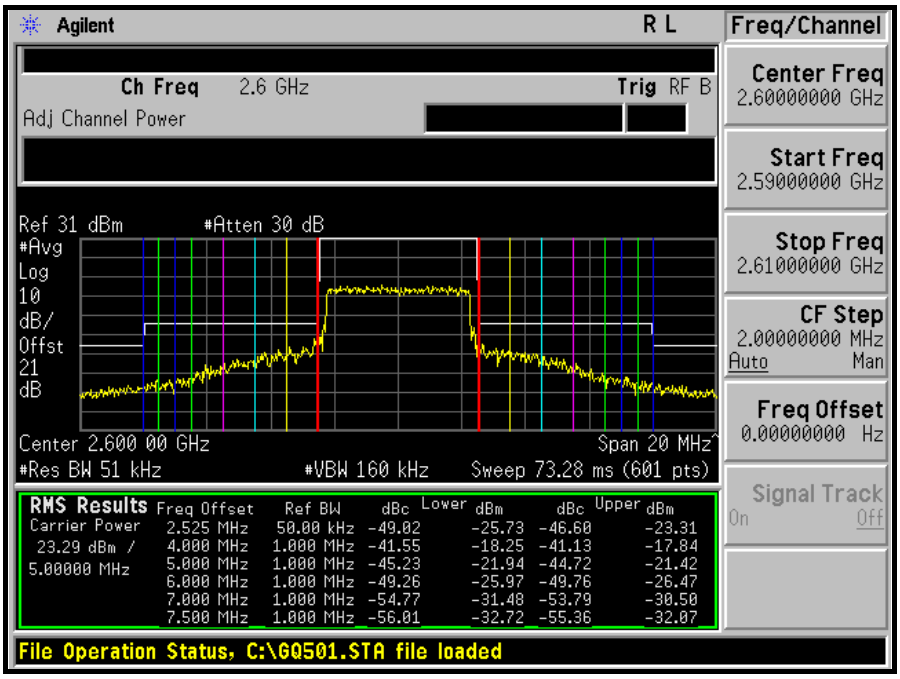
PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH

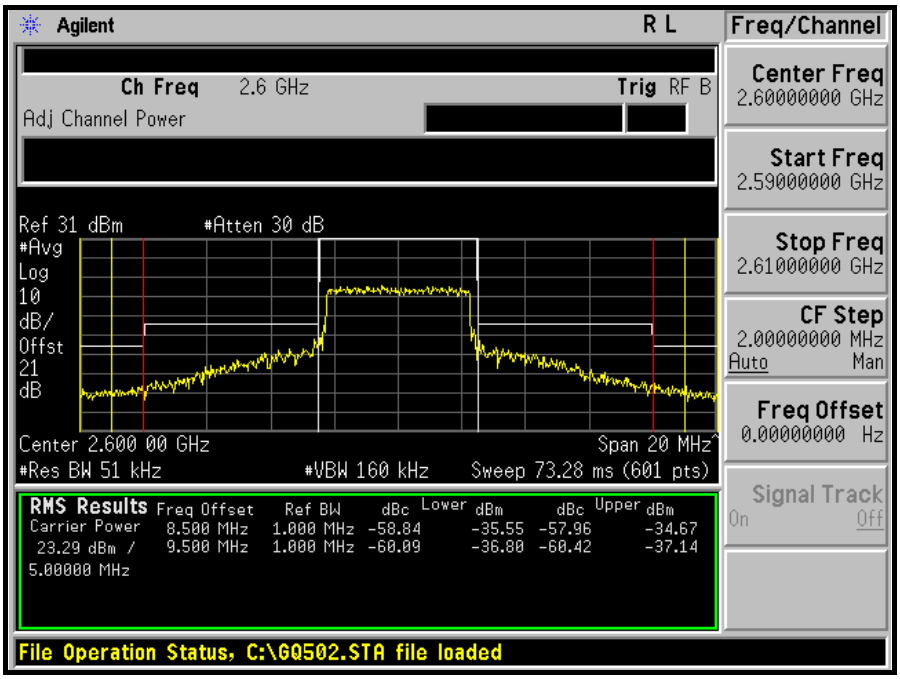
LOW CHANNEL



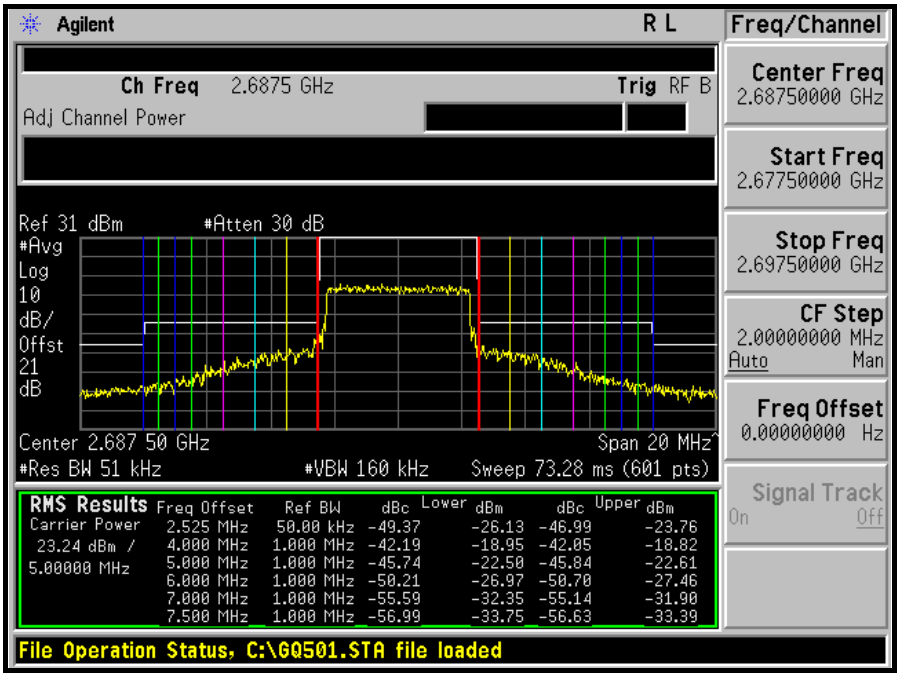


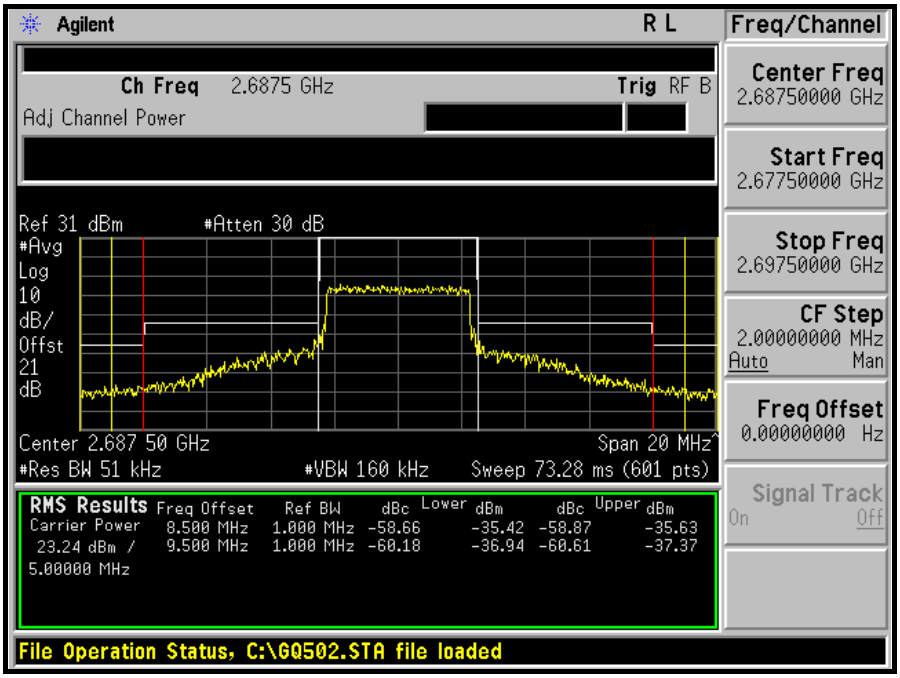
MIDDLE CHANNEL





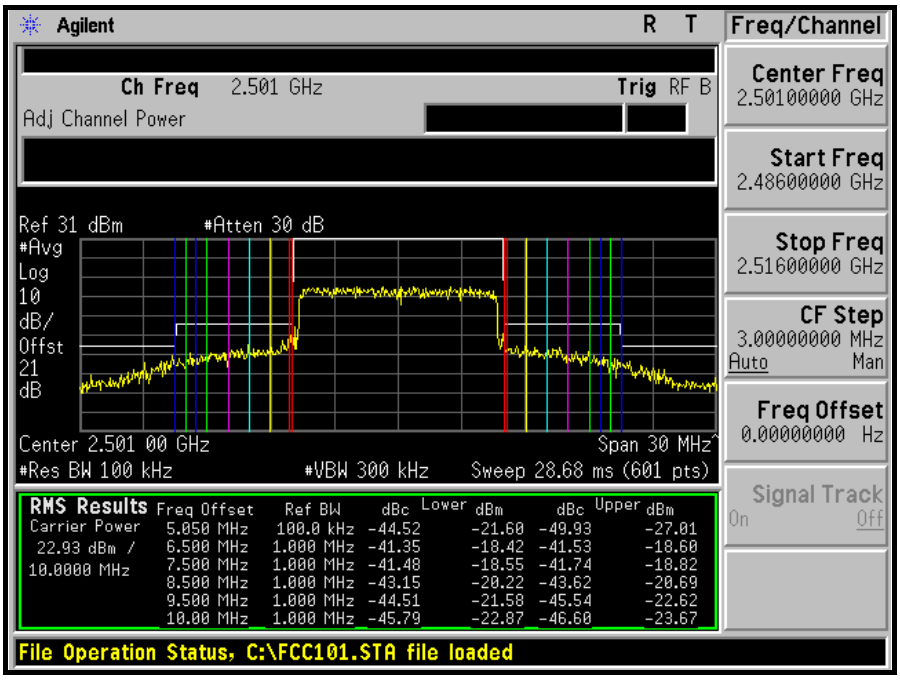
HIGH CHANNEL

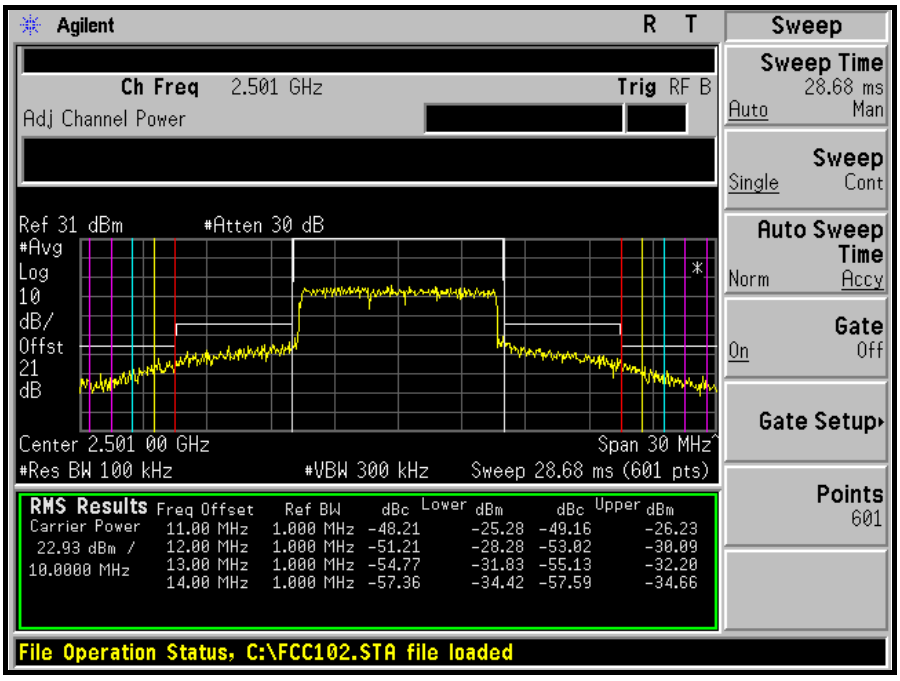




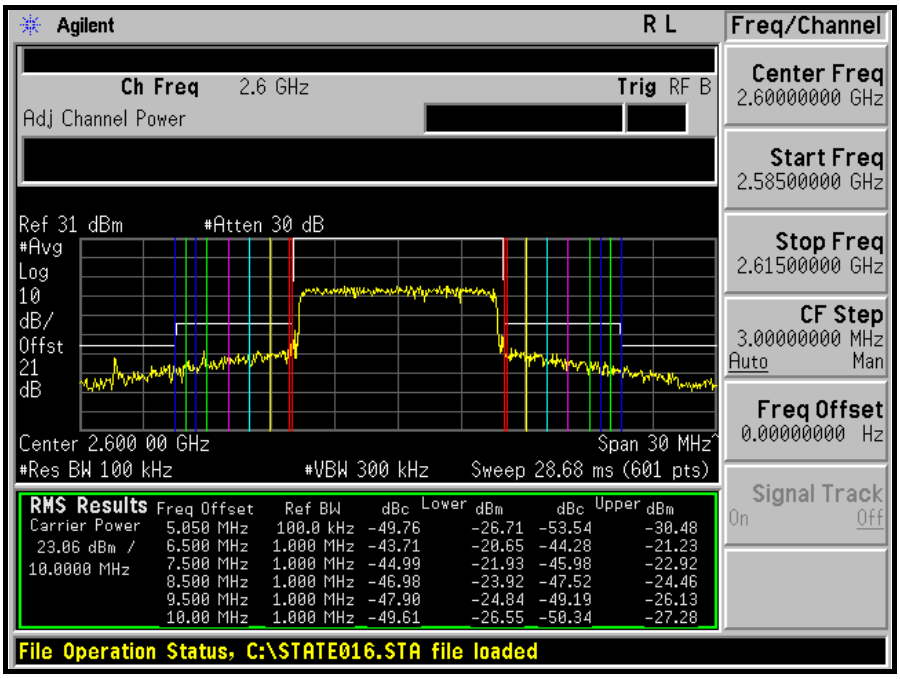
PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH

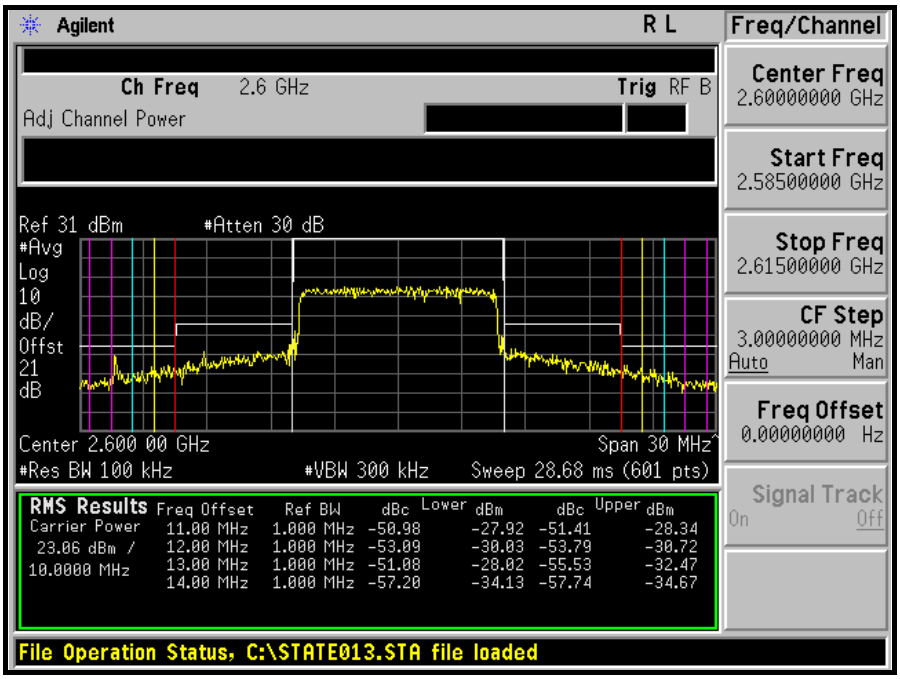
LOW CHANNEL



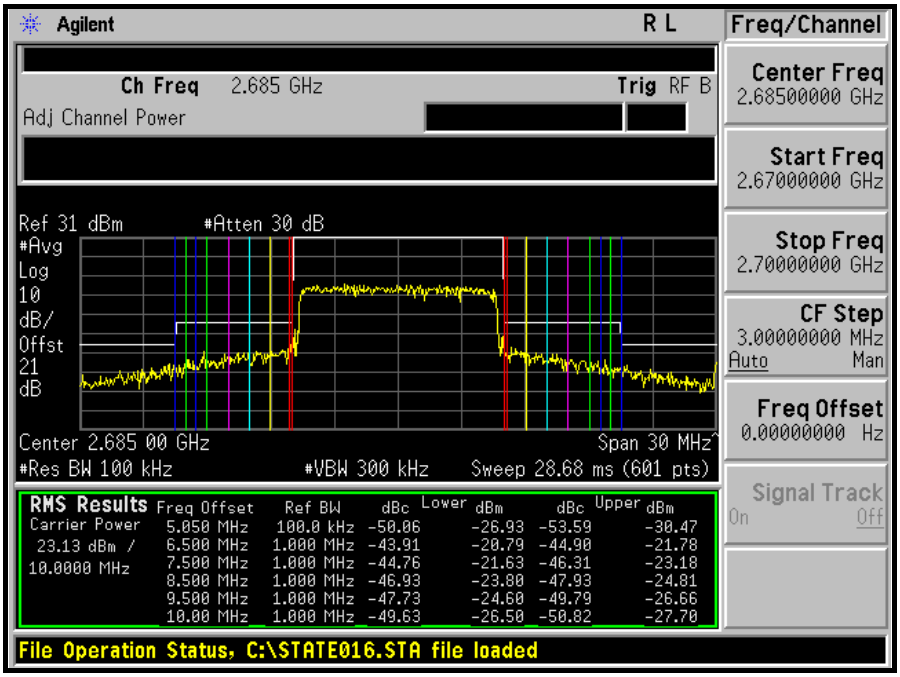


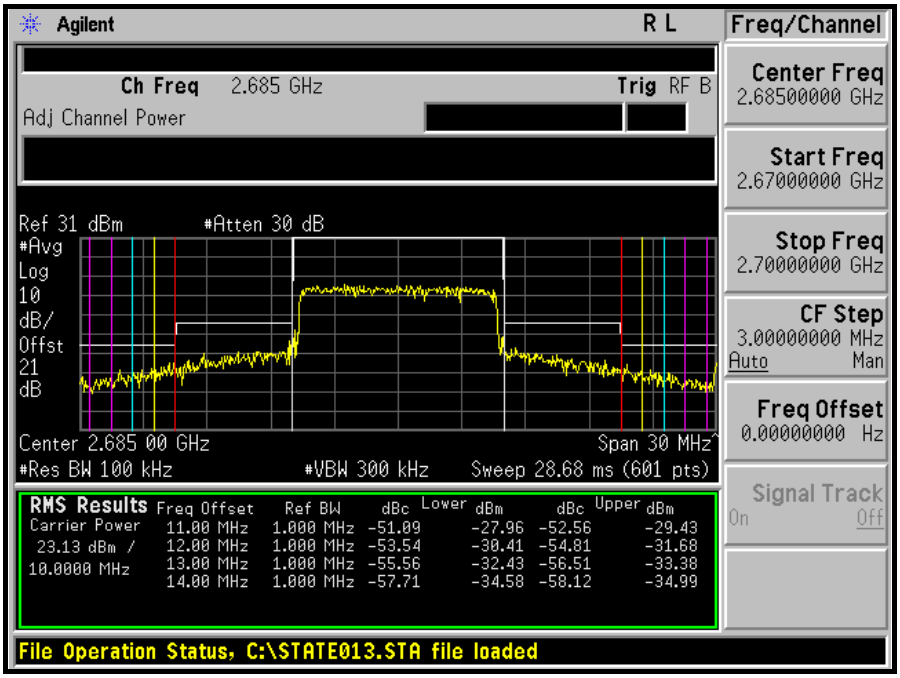
MIDDLE CHANNEL





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 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	Feb. 05, 2010	Feb. 04, 2011
RF cable	SUCOFLEX 104	257029	Sep. 12, 2009	Sep. 11, 2010

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

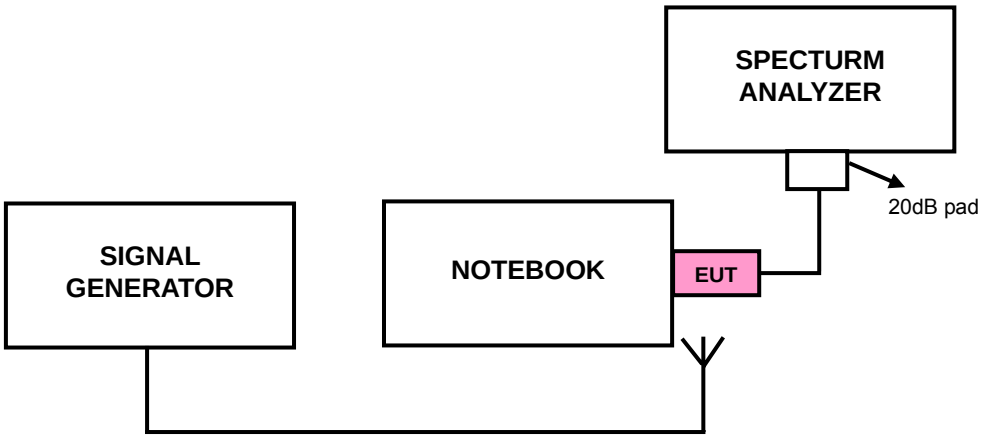
4.5.3 TEST PROCEDURE

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

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

c. When the spectrum scanned from 3GHz to 27GHz, 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



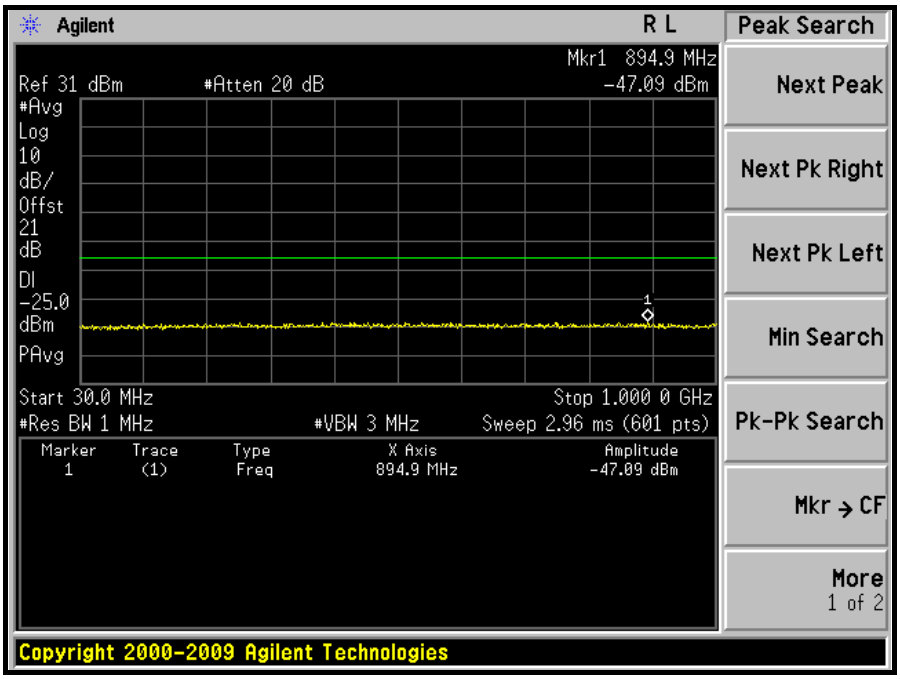
4.5.5 EUT OPERATING CONDITIONS

Same as 4.1.5

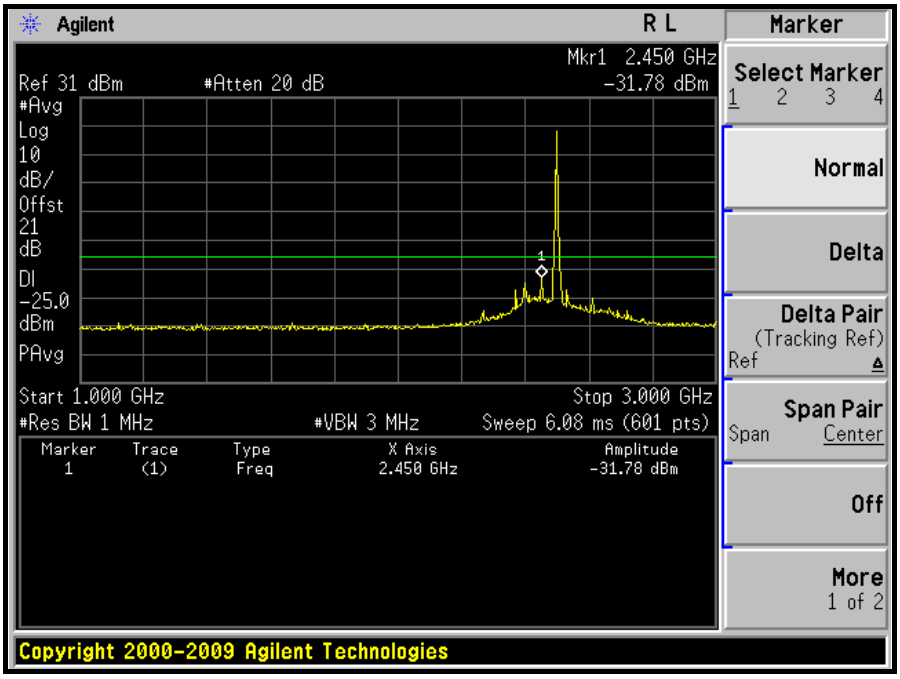
4.5.6 TEST RESULTS

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH

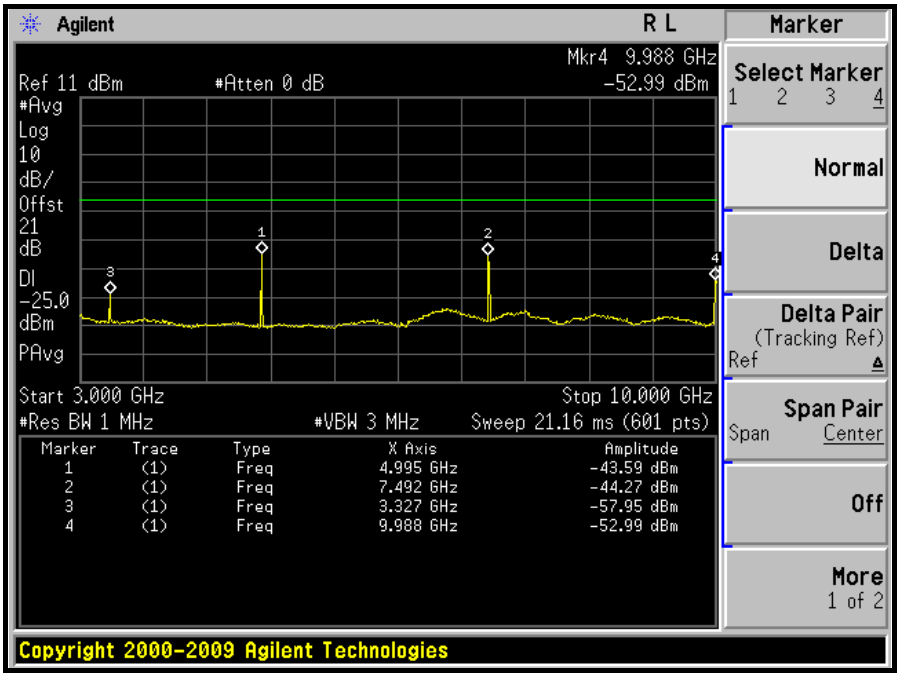
LOW CHANNEL: 30MHz ~ 1GHz:



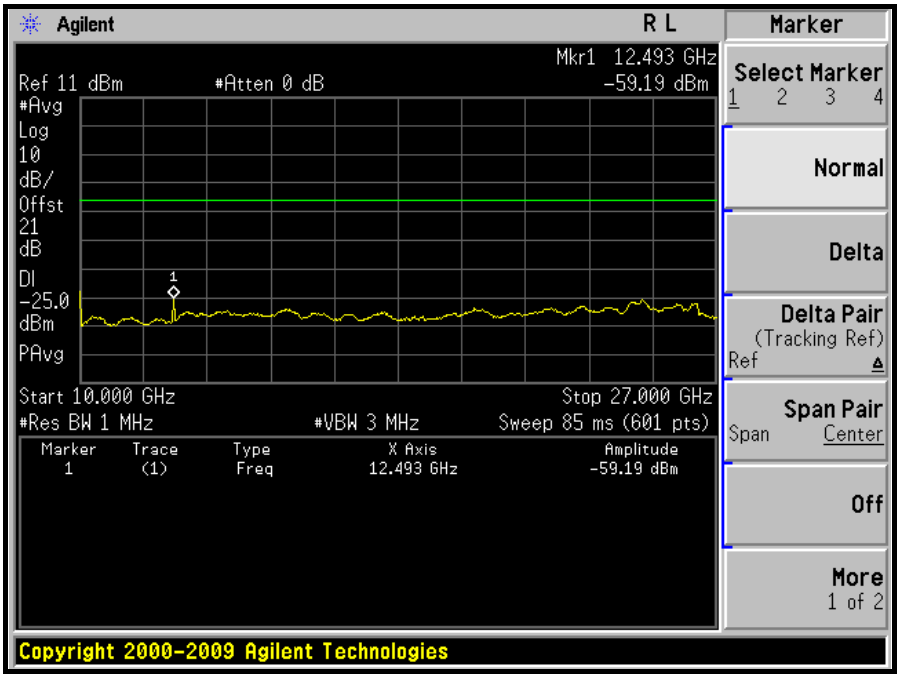
1GHz ~ 3GHz:



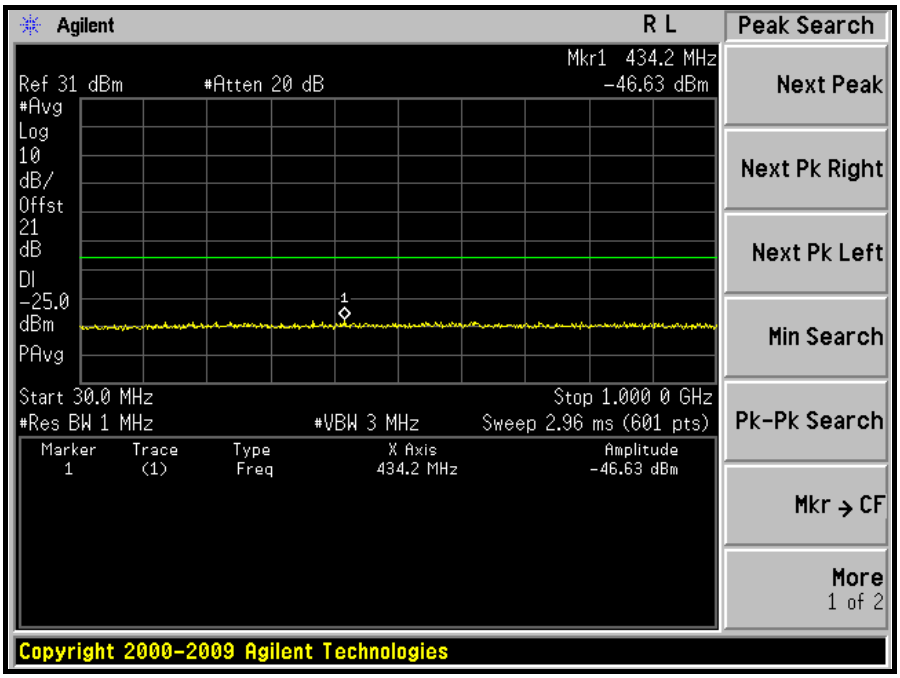
3GHz ~ 10GHz:



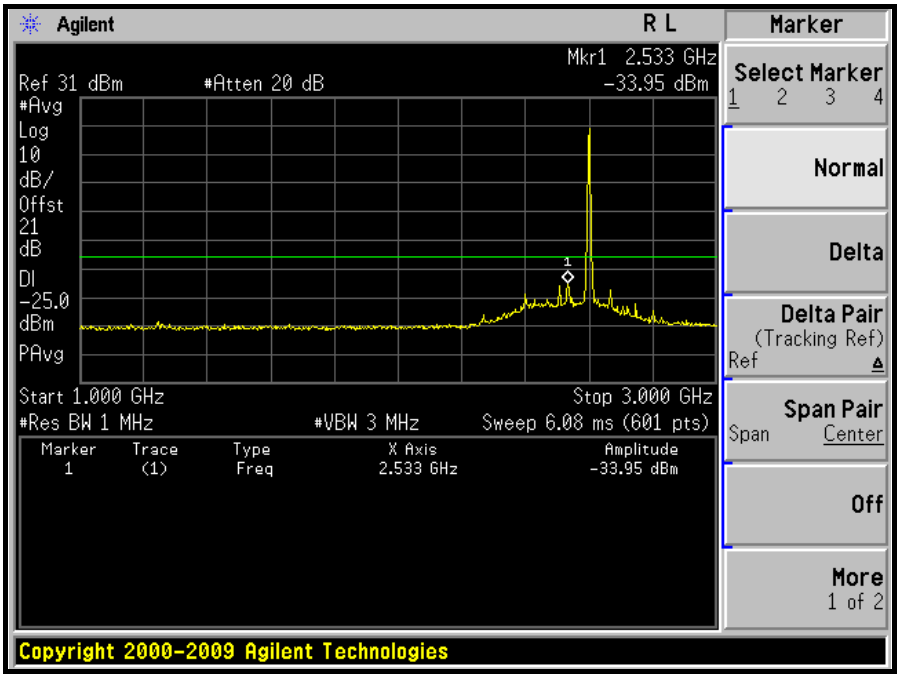
10GHz ~ 27GHz:



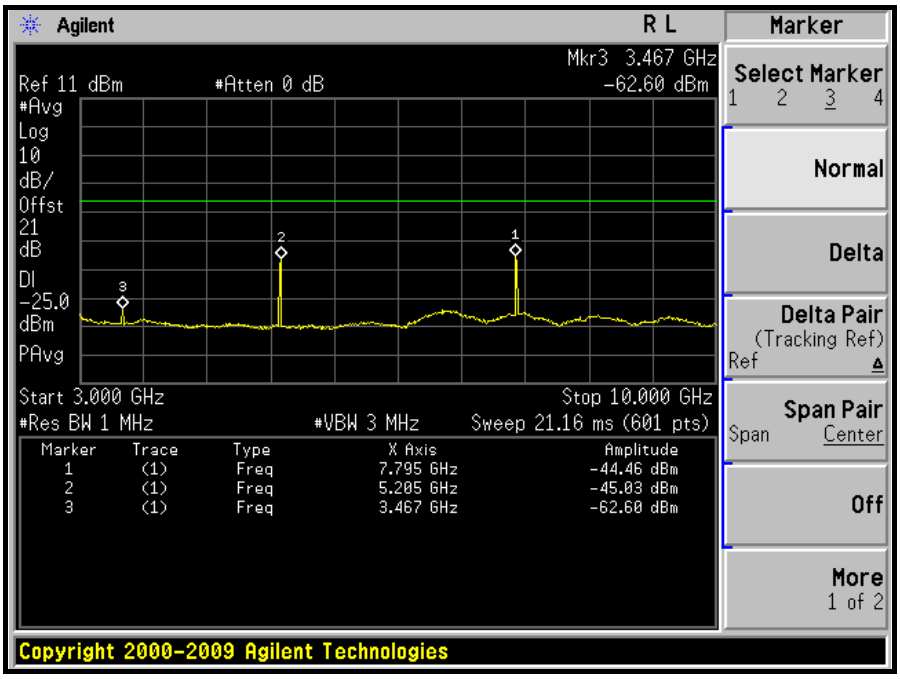
MIDDLE CHANNEL: 30MHz ~ 1GHz:



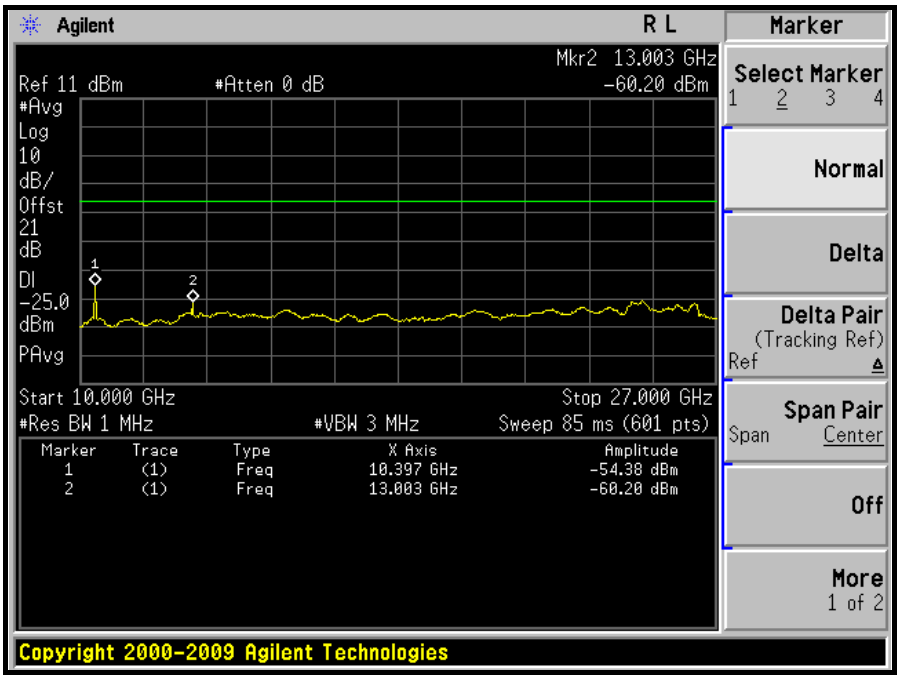
1GHz ~ 3GHz:



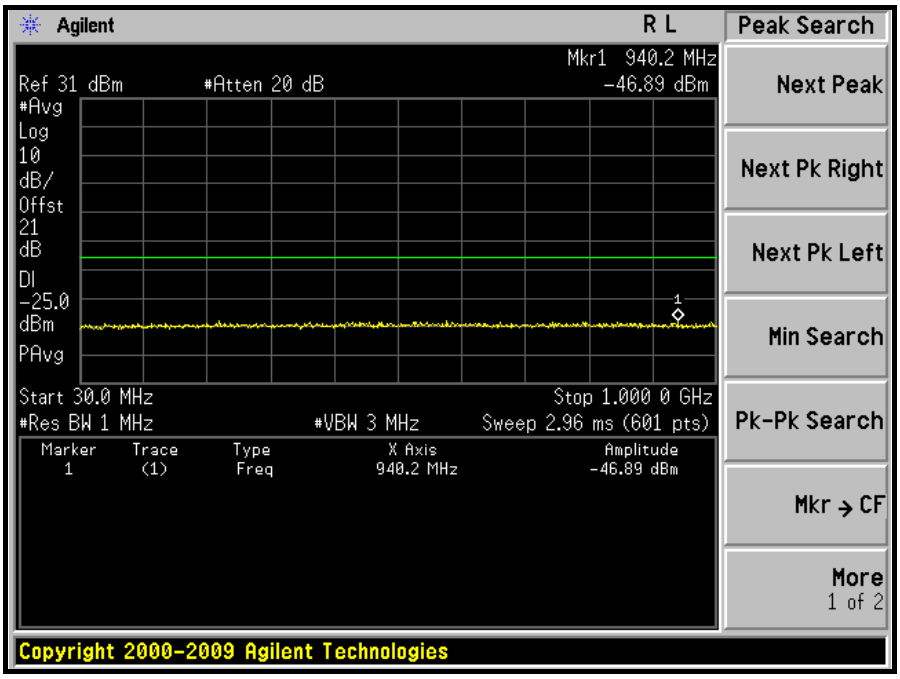
3GHz ~ 10GHz:



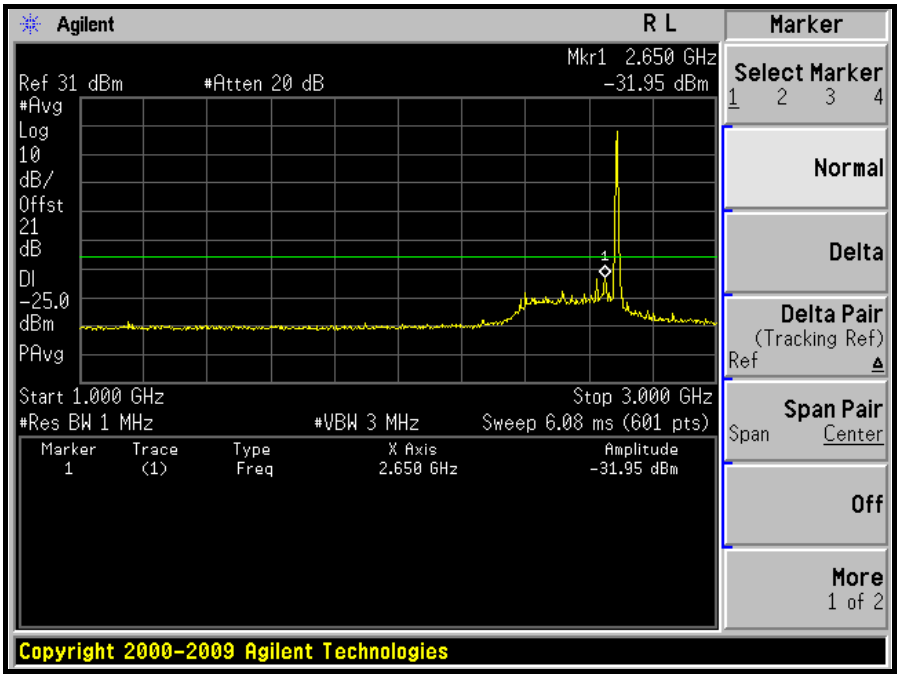
10GHz ~ 27GHz:



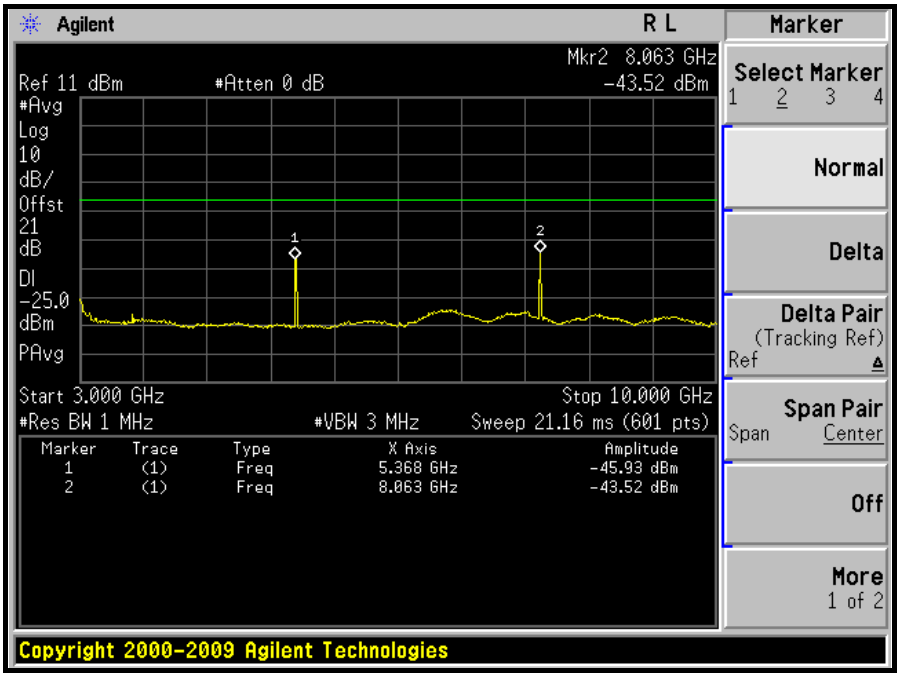
HIGH CHANNEL: 30MHz ~ 1GHz:



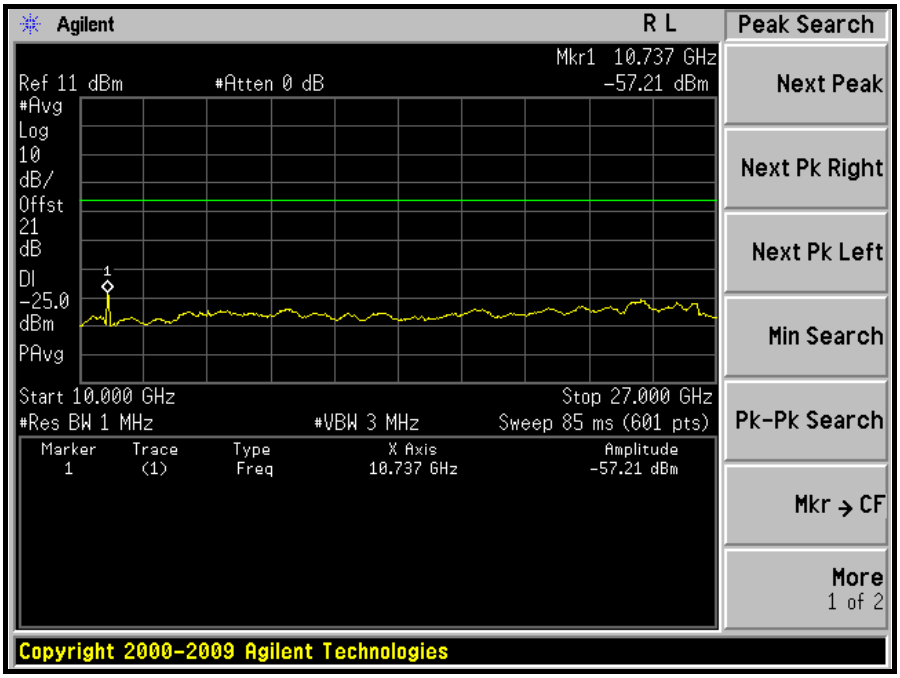
1GHz ~ 3GHz:



3GHz ~ 10GHz:

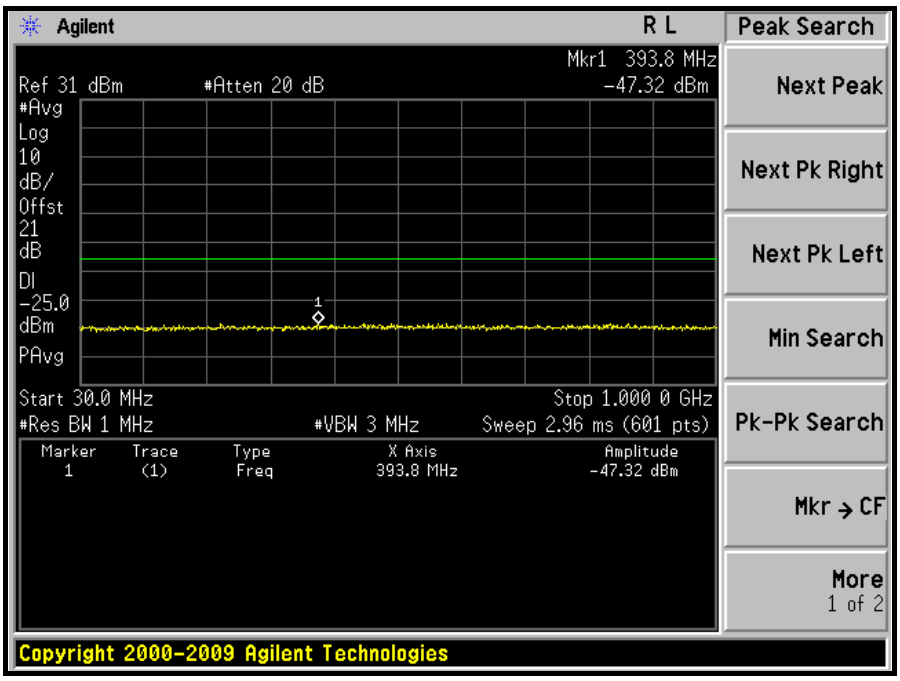


10GHz ~ 27GHz:

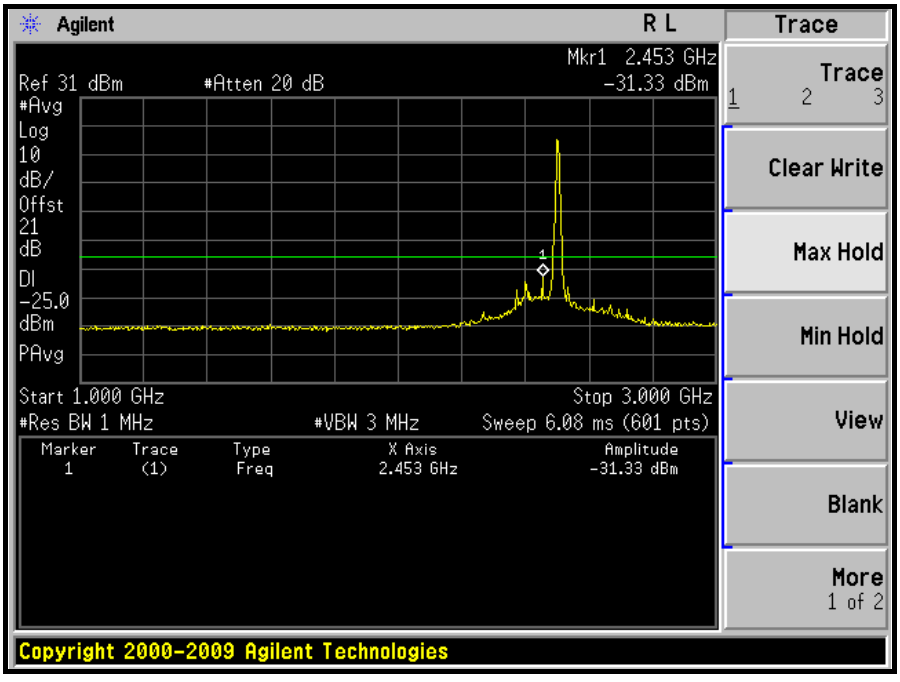


PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH

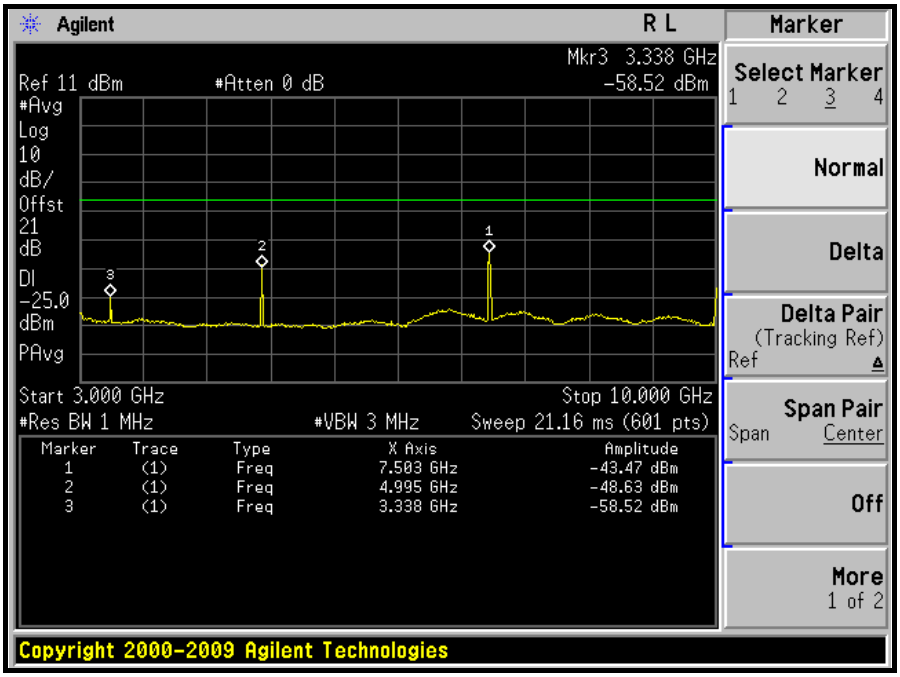
LOW CHANNEL: 30MHz ~ 1GHz:



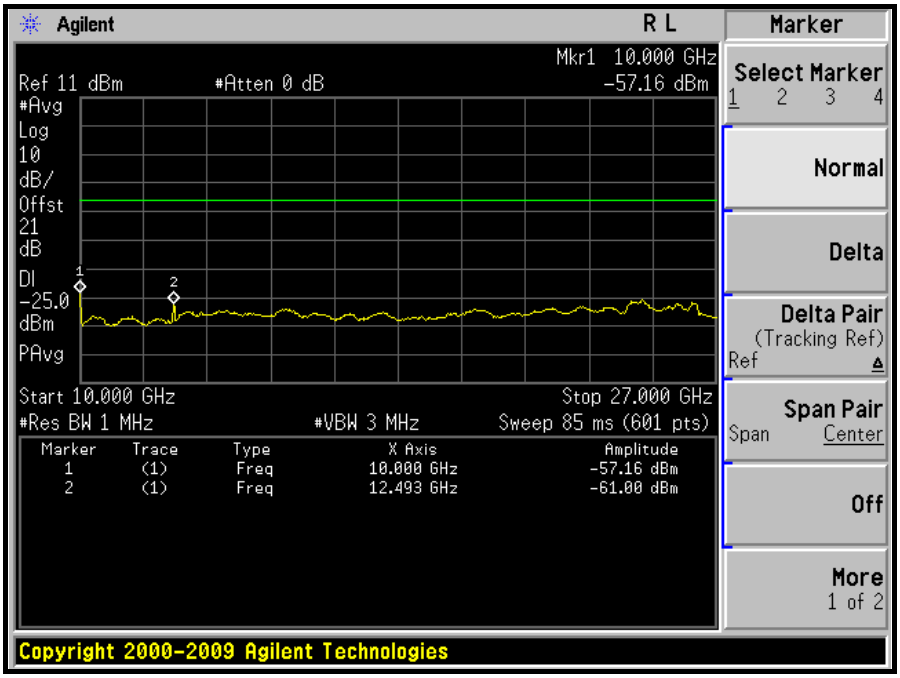
1GHz ~ 3GHz:



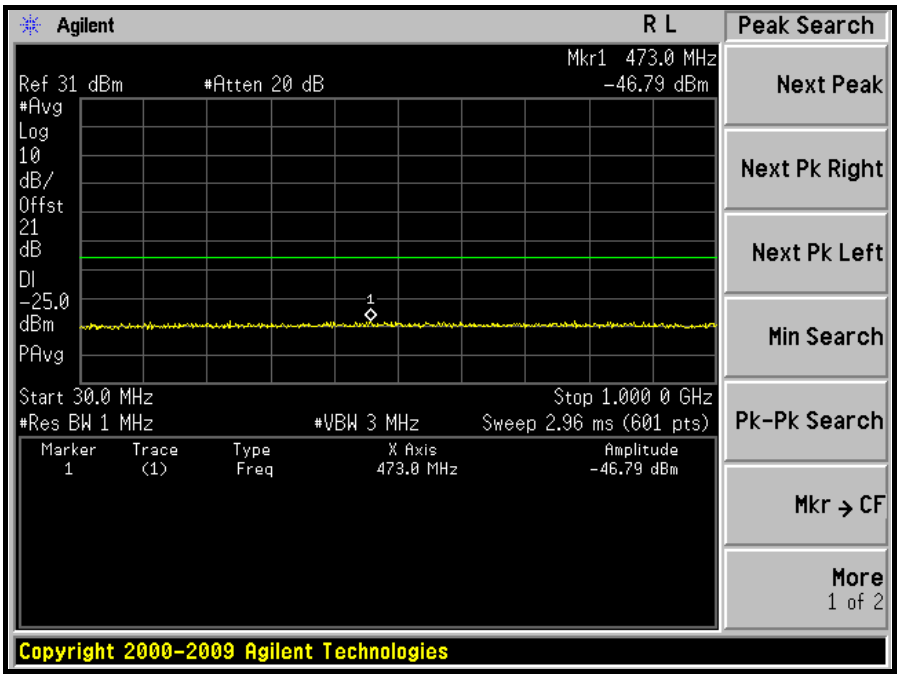
3GHz ~ 10GHz:



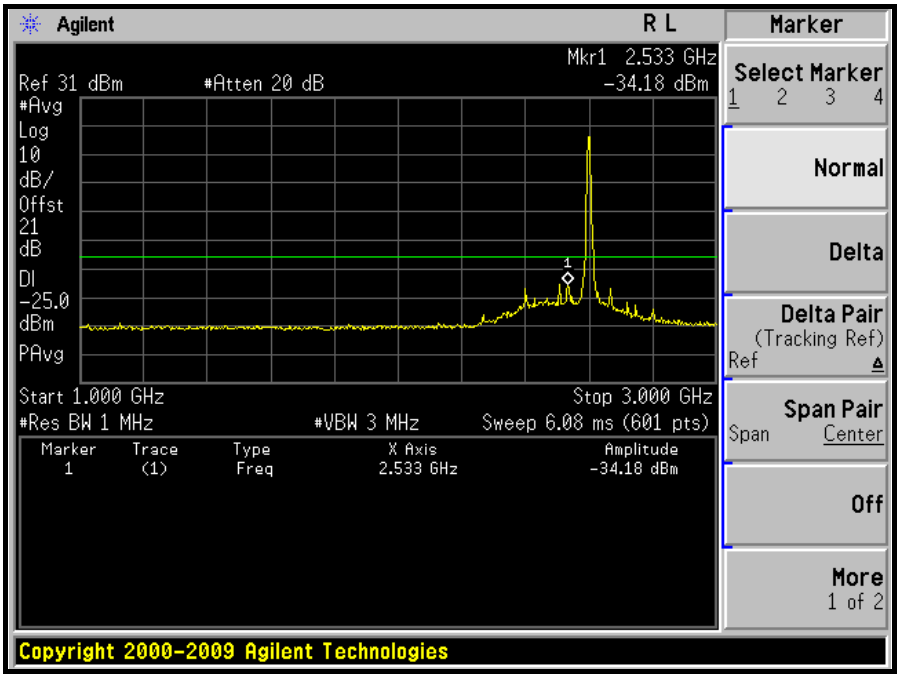
10GHz ~ 27GHz:



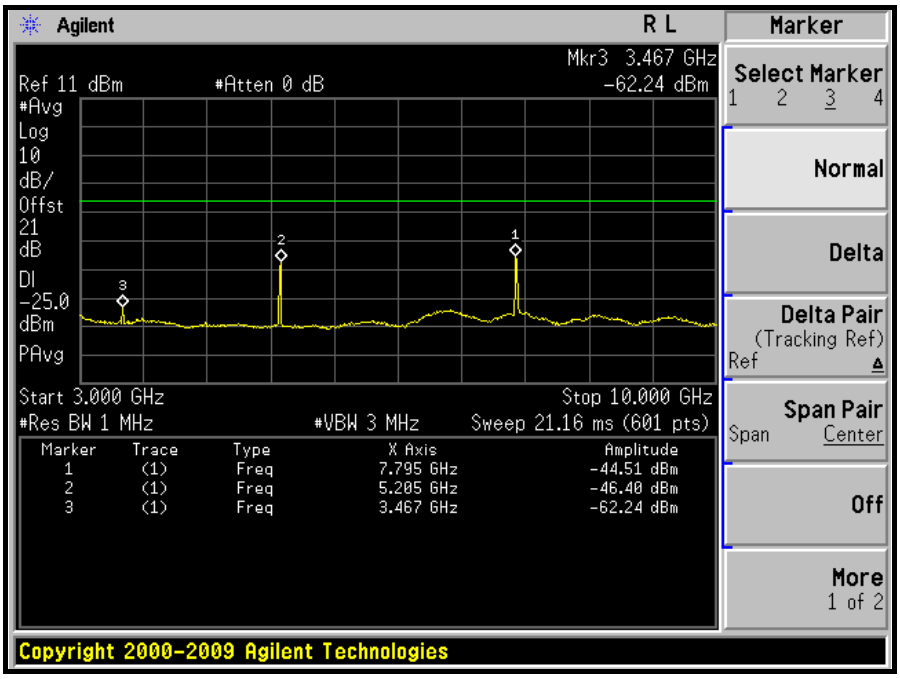
MIDDLE CHANNEL: 30MHz ~ 1GHz:



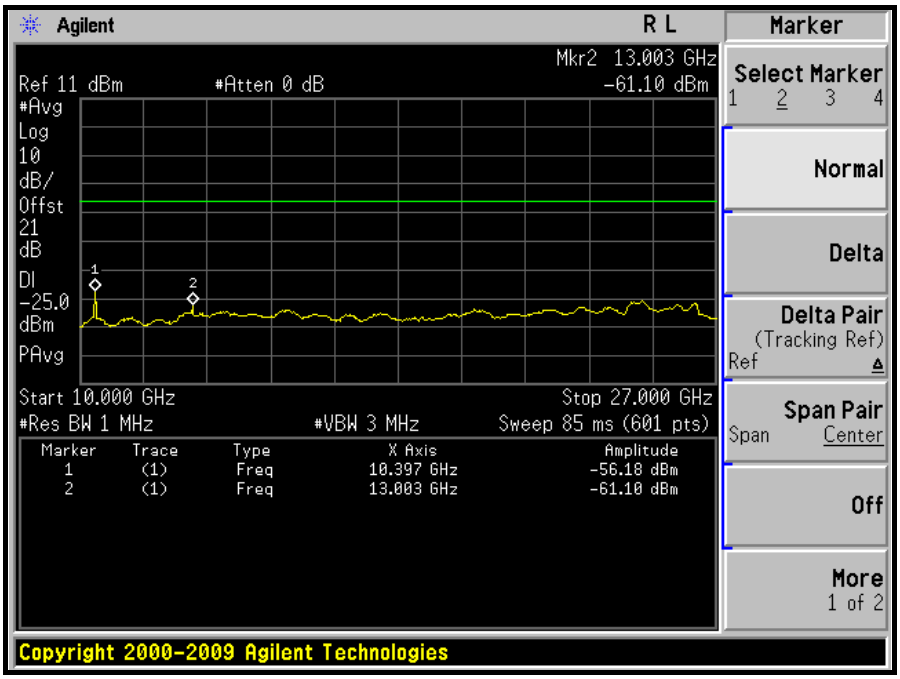
1GHz ~ 3GHz:



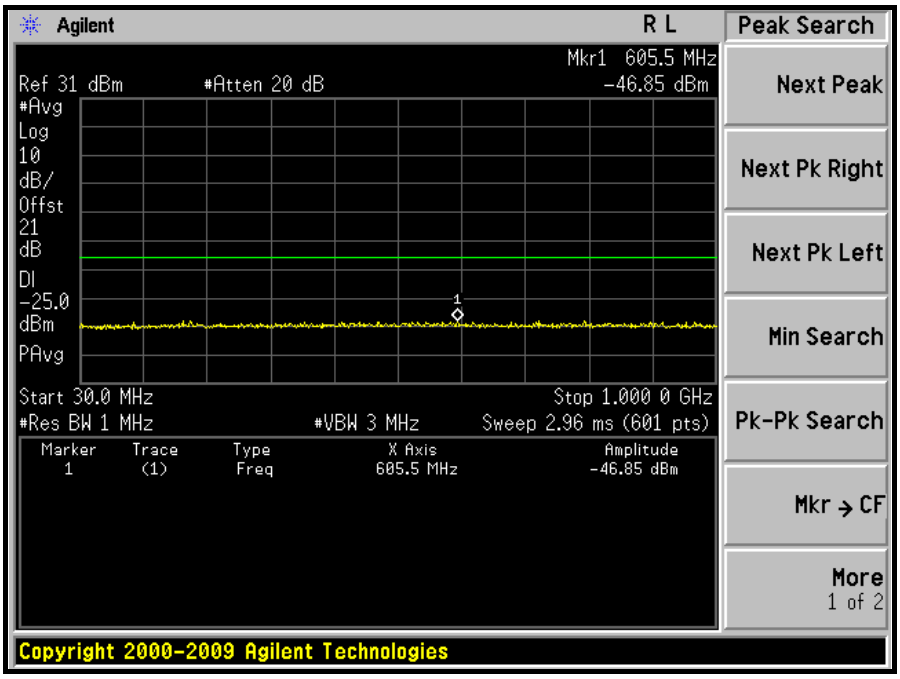
3GHz ~ 10GHz:



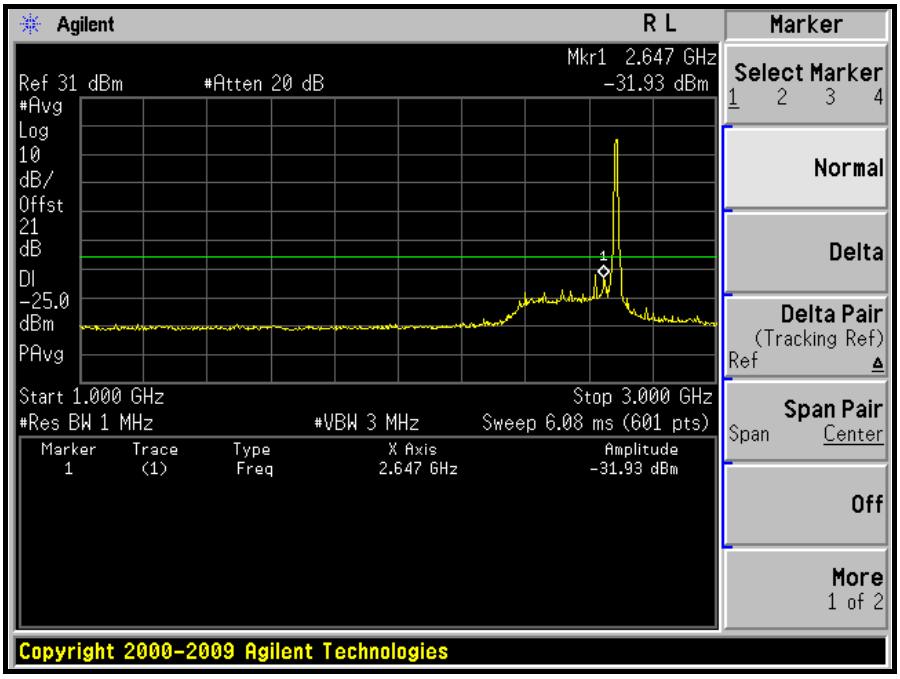
10GHz ~ 27GHz:



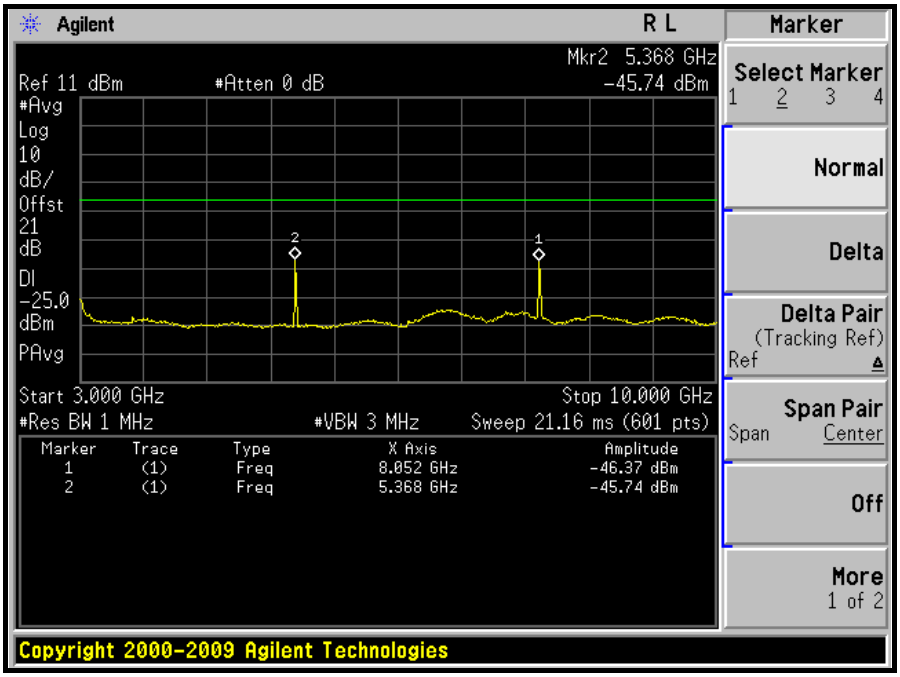
HIGH CHANNEL: 30MHz ~ 1GHz:



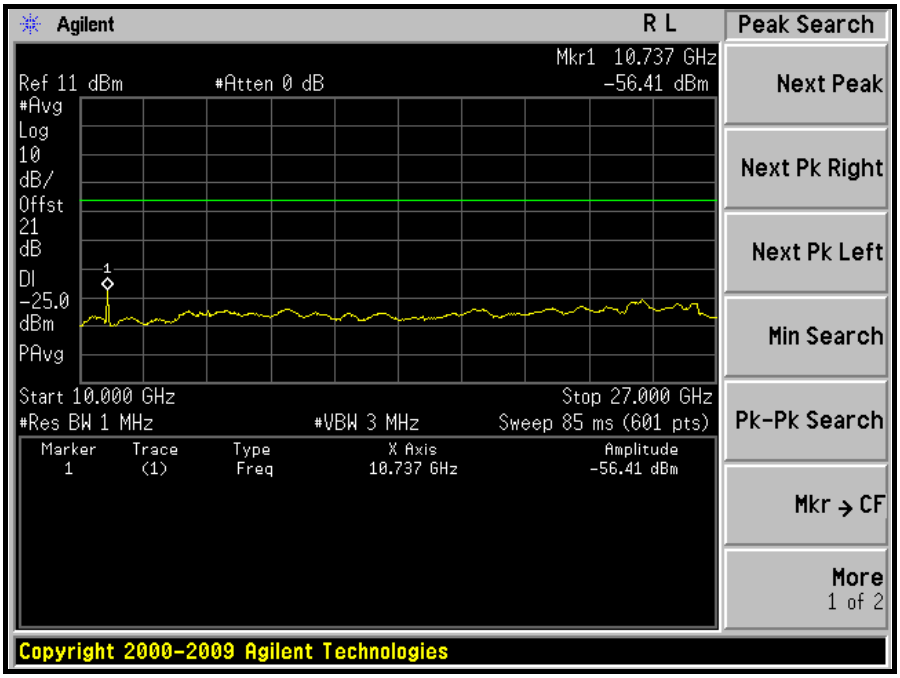
1GHz ~ 3GHz:



3GHz ~ 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 55 +10 log (P)dB. The limit of emission equal to –25dBm.

4.6.2 TEST INSTRUMENTS

Same as 4.1.2.

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

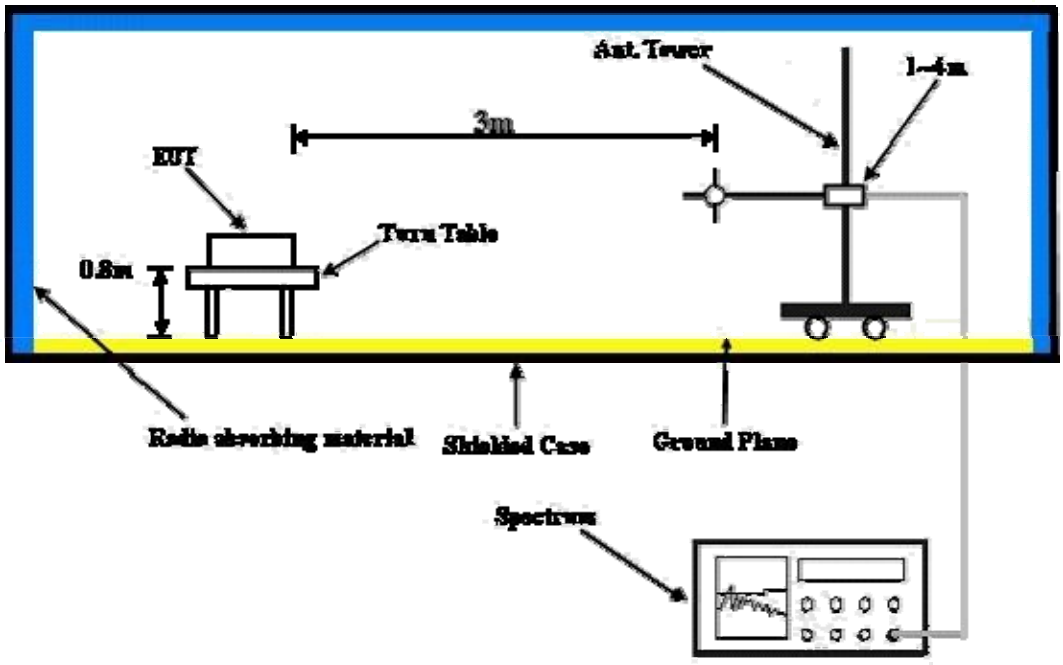
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

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 attached file (Test Setup Photo)

4.6.6 EUT OPERATING CONDITIONS

The EUT connected to the notebook and ran a test program (provided by manufacturer) to enable all functions under transmitting condition continuously at specific channel frequency.

4.6.7 TEST RESULTS

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH			
MODE	Low channel	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	105.81	46.2	-25.0	-41.0	-7.7	-48.7
2	243.83	48.3	-25.0	-38.7	-7.7	-46.4
3	325.47	48.9	-25.0	-38.3	-7.8	-46.1
4	341.02	50.2	-25.0	-36.8	-7.8	-44.6
5	665.65	46.0	-25.0	-40.8	-7.8	-48.6
6	998.06	45.2	-25.0	-37.9	-7.9	-45.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	37.78	47.6	-25.0	-39.4	-7.7	-47.1
2	105.81	45.8	-25.0	-41.4	-7.7	-49.1
3	131.08	42.7	-25.0	-44.2	-7.7	-51.9
4	665.65	43.2	-25.0	-43.8	-7.8	-51.6
5	955.29	41.4	-25.0	-45.4	-7.9	-53.3
6	1000.00	41.8	-25.0	-45.2	-7.9	-53.1

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH			
MODE	Low channel	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	105.81	44.8	-25.0	-42.1	-7.7	-49.8
2	243.83	48.7	-25.0	-38.5	-7.7	-46.2
3	341.02	50.2	-25.0	-36.7	-7.8	-44.5
4	665.65	46.6	-25.0	-40.1	-7.8	-47.9
5	770.62	41.2	-25.0	-45.7	-7.9	-53.6
6	924.19	43.9	-25.0	-42.9	-7.9	-50.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	37.78	48.3	-25.0	-38.9	-7.7	-46.6
2	105.81	45.0	-25.0	-42.1	-7.7	-49.8
3	129.14	43.3	-25.0	-43.8	-7.7	-51.5
4	329.36	41.3	-25.0	-45.8	-7.8	-53.6
5	667.60	43.1	-25.0	-43.6	-7.8	-51.4
6	963.07	41.4	-25.0	-45.4	-7.9	-53.3

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

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

Same as 4.6.3.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP

Same as 4.6.5.

4.7.6 EUT OPERATING CONDITIONS

Same as 4.6.6.

4.7.7 TEST RESULTS

PUSC UL ZONE TYPE, 5MHz CHANNEL BANDWIDTH

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4997.0	47.2	-25.0	-57.1	9.5	-47.6
2	7495.5	45.8	-25.0	-56.7	7.8	-48.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	4997.0	45.0	-25.0	-59.2	9.5	-49.7
2	7495.5	45.5	-25.0	-57.1	7.8	-49.3

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

MODE	Middle channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5200.0	45.4	-25.0	-59.3	9.7	-49.6
2	7800.0	49.5	-25.0	-53.1	7.8	-45.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5200.0	47.0	-25.0	-57.2	9.7	-47.5
2	7800.0	49.9	-25.0	-52.6	7.8	-44.8

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

MODE	High channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5375.0	46.5	-25.0	-58.2	9.7	-48.5
2	8062.5	50.1	-25.0	-52.4	7.8	-44.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5375.0	46.5	-25.0	-58.0	9.7	-48.3
2	8062.5	46.8	-25.0	-55.9	7.8	-48.1

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

PUSC UL ZONE TYPE, 10MHz CHANNEL BANDWIDTH

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5002.0	51.4	-25.0	-53.0	9.5	-43.5
2	7503.0	47.0	-25.0	-55.6	7.8	-47.8
3	10004.0	43.3	-25.0	-59.1	7.8	-51.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5002.0	50.6	-25.0	-53.7	9.5	-44.2
2	7503.0	47.5	-25.0	-54.9	7.8	-47.1
3	10004.0	45.2	-25.0	-57.4	7.8	-49.6

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

MODE	Middle channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5200.0	49.9	-25.0	-54.5	9.7	-44.8
2	7800.0	48.6	-25.0	-54.1	7.8	-46.3
3	10400.0	46.0	-25.0	-56.5	7.8	-48.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5200.0	48.6	-25.0	-55.9	9.7	-46.2
2	7800.0	48.3	-25.0	-54.1	7.8	-46.3
3	10400.0	48.9	-25.0	-53.7	7.8	-45.9

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

MODE	High channel	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23 deg.C, 62%RH 991hPa	TESTED BY	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5370.0	47.0	-25.0	-57.5	9.7	-47.8
2	8055.0	49.5	-25.0	-53.2	7.8	-45.4
3	10740.0	51.1	-25.0	-51.7	7.8	-43.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBm)	S.G POWER VALUE (dBm)	CORRECTION FACTOR (dB)	POWER VALUE (dBm)
1	5370.0	43.8	-25.0	-60.6	9.7	-50.9
2	8055.0	47.7	-25.0	-55.0	7.8	-47.2
3	**10740.0**	**53.7**	**-25.0**	**-49.0**	**7.8**	**-41.2**

NOTE:

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

2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

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

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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