Prüfbericht - Nr.: *Test Report No.:*	**16011768 001**	**Seite 1 von 37** *Page 1 of 37*

Auftraggeber: *Client:*	**Seikaku Technical Group Limited** **Offshore Chambers, P. O. Box 217,** **Apia, Samoa**		
Gegenstand der Prüfung: *Test item:*	**Wireless Microphone Transmitter**		
Bezeichnung: *Identification:*	**UEM-8T**	**FCC ID:** *FCC ID*	**H38UEM-8T**
Wareneingangs-Nr.: *Receipt No.:*	**173034960** **173050057**	**Eingangsdatum:** *Date of receipt:*	**29.12.2009**
Prüfort: *Testing location:*	**TÜV Rheinland (Guangdong) Ltd. EMC Laboratory** **Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650** **P. R. China**		**Listed test laboratory according to FCC rules section 2.948 for measuring devices under Parts 74**
Prüfgrundlage: *Test specification:*	**TIA/EIA-603-C-2004** **FCC "Rules and Regulations", Part 74: 01, Oct., 2008** **Subpart H, Section 74.861**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (Guangdong) Ltd.**		

geprüft / *tested by:*

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*
20. Apr. 2010	Liangdong Xie Project Manager	

kontrolliert/ *reviewed by:*

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*
20. Apr. 2010	Ricky Liu Project Manager	Ricky Liu

Sonstiges/ Other Aspects:

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

TEST SUMMARY

5.1 CONDUCTED POWER OUTPUT MEASUREMENT FOR FCC PART 74 PER SECTION 74.861(E)(1)
RESULT: Pass

5.2 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT FOR FCC PART 74 PER SECTION 74.861(E)(1)
RESULT: Pass

5.3 RADIATED POWER OUTPUT MEASUREMENT FOR FCC PART 74 PER SECTION 74.861(E)(1)
RESULT: Pass

5.4 SPURIOUS RADIATION MEASUREMENT FOR FCC PART 74 PER SECTION 74.861(E)(6)(III)
RESULT: Pass

5.5 MODULATION CHARACTERISTICS MEASUREMENT
RESULT: Pass

5.6 OCCUPIED BANDWIDTH FOR FCC PART 74 PER SECTION 74.861(E)(3), 74.861(E)(5) AND 74.861(E)(6)
RESULT: Pass

5.7 FREQUENCY TOLERANCE FOR FCC PART 74 PER SECTION 74.861(E)(4)
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory

Guangzhou Auto Market, Yuan Gang Section of Guangshan Road
Guangzhou 510650

P. R. China

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Manufacturer	Type	Serial No.	Calibrated until
TÜV Rheinland (Guangdong) Ltd.				
EMI Test Receiver	Rohde & Schwarz	ESCI-3	100216	16.Mar.2011
Spectrum Analyzer	Rohde & Schwarz	FSP30	100286	16.Mar.2011
Trilog-Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	209	07.Nov.2011
Trilog-Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	210	26.Jun.2011
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF906	100385	18.Jul.2010
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF906	100407	26.Jun.2011
Pre-amplifier	MITEQ	AFS42-00101800-25-S-42	1101599	31.Jul.2010
Band Reject Filter	Micro-Tronics	BRM50702	023	14.Mar.2010
Precision Dipole	Schwarzbeck	VHAP	1180+1109	22.Dec.2011
Precision Dipole	Schwarzbeck	UHAP	1091+1092	26.Jun.2011
Standard Gain Horn Antenna	EMCO	3160-09	21642	26.Jun.2014
Standard Gain Horn Antenna	EMCO	3160-09	21645	N/A
Pre-amplifier	MITEQ	AFS33-18002650-30-8P-44	1108282	16.Mar.2011
3m Anechoic Chamber	Albatross Project GmbH	N/A	N/A	16.Apr.2011
Climatic Chamber	ESPEC	EL-04 KA	6107116	16.Mar.2011
Spectrum analyzer	Agilent	E4404B	MY41440753	16.Mar.2011
10dB Attenuator	SH Huaxiang	TS5-10dB-18G	7053102	16.Mar.2011
Audio analyzer	HP	3729A18683	8903B	21.Oct.2010
FM/AM modulation meter	JUNC JIN	JMM-2200	199810154	23.Oct.2010

2.3 Trace ability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Uncertainty for conducted emissions measurements is ± 2.68dB.
Uncertainty for radiated emissions measurements is ± 4.94dB (30MHz-1GHz), ± 4.88dB (>1GHz).

The reported expanded uncertainty is based on a standard uncertainty multiply by a coverage factor k=2, providing a level of confidence of approximately 95%.

2.6 Location of original data

The original copies of all test data taken during actual testing were attached at Appendix 1 of this report and delivered to the applicant. A copy has been retained in the TUV Rheinland (Guangzhou) file for certification follow-up purposes.

2.7 Status of facility used for testing

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory; Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements, the register no. 833845.

3 General Product Information

The submitted sample UEM-8T is wireless microphone transmitter operating within the frequency range of 535 MHz to 564 MHz.

The operating frequency can be adjusted manually via panel key.

3.1 Product Function and Intended Use

For details, refer to technical document and the user manual.

3.2 Ratings and System Details

Frequency range	:	535 - 564MHz
RF output power	:	0 = 30mW (e.r.p) 1 = 100mW(e.r.p)
Channel bandwidth	:	200 kHz
Type of antenna	:	Dedicated antenna
FCC ID	:	H38UEM-8T
Power Supply	:	DC input port: DC 12-15V (powered by external AC/DC or SPS adaptor)
Frequency Response	:	50Hz-15kHz
Frequency Stability	:	0.0009%
Emission designator	:	147KF3E
Protection Class	:	II (with AC/DC adaptor connection)

Refer to the technical document for further information.

3.3 Independent Operation Modes

The basic operation modes are:

Transmitting without modulation
Transmitting with modulation

For further information refer to User Manual

3.4 Submitted Documents

Block Diagram
Circuit Diagram
Components List
PCB layout
FCC label
User Manual
Photo document

4 Test Set-up and Operation Mode

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

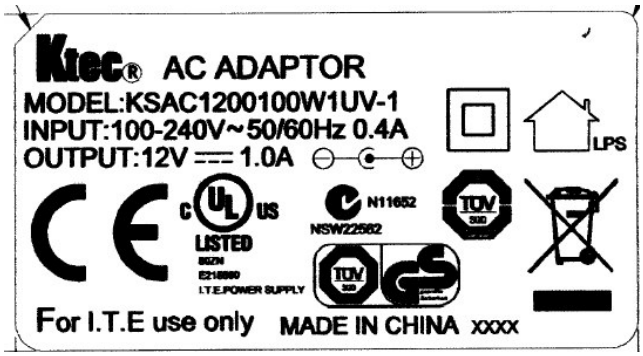
Refer to Test set-up in chapter 5.

4.3 Special Accessories and Auxiliary Equipment

Two alternative AC adaptors are used:

1. AC/DC Linear adaptor:

2. SPS adaptor



4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the technical document. No additional measures were employed to achieve compliance.

4.5 Test set-up

Diagram 1 of Measurement Equipment Configuration for Testing Radiated Emission

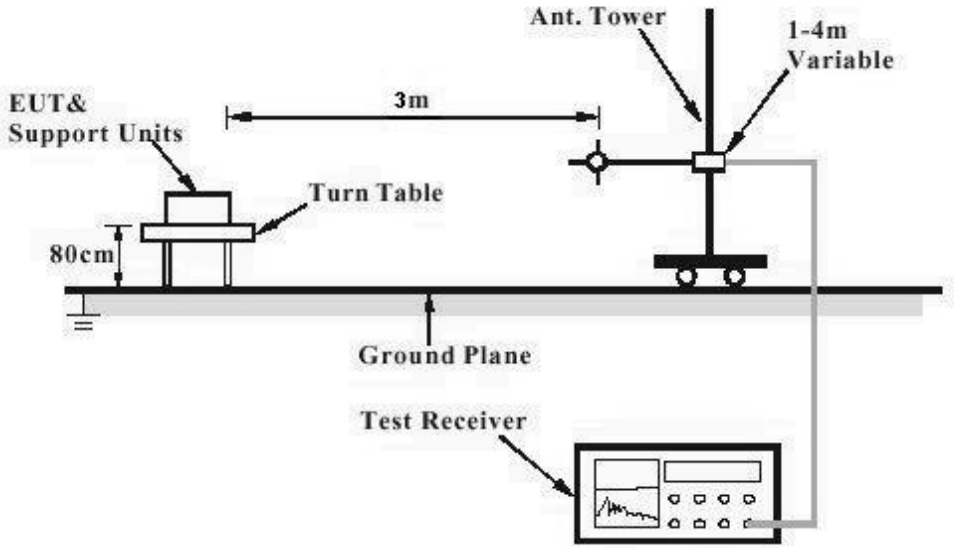


Diagram 2 of Measurement Equipment Configuration for Substitution Method

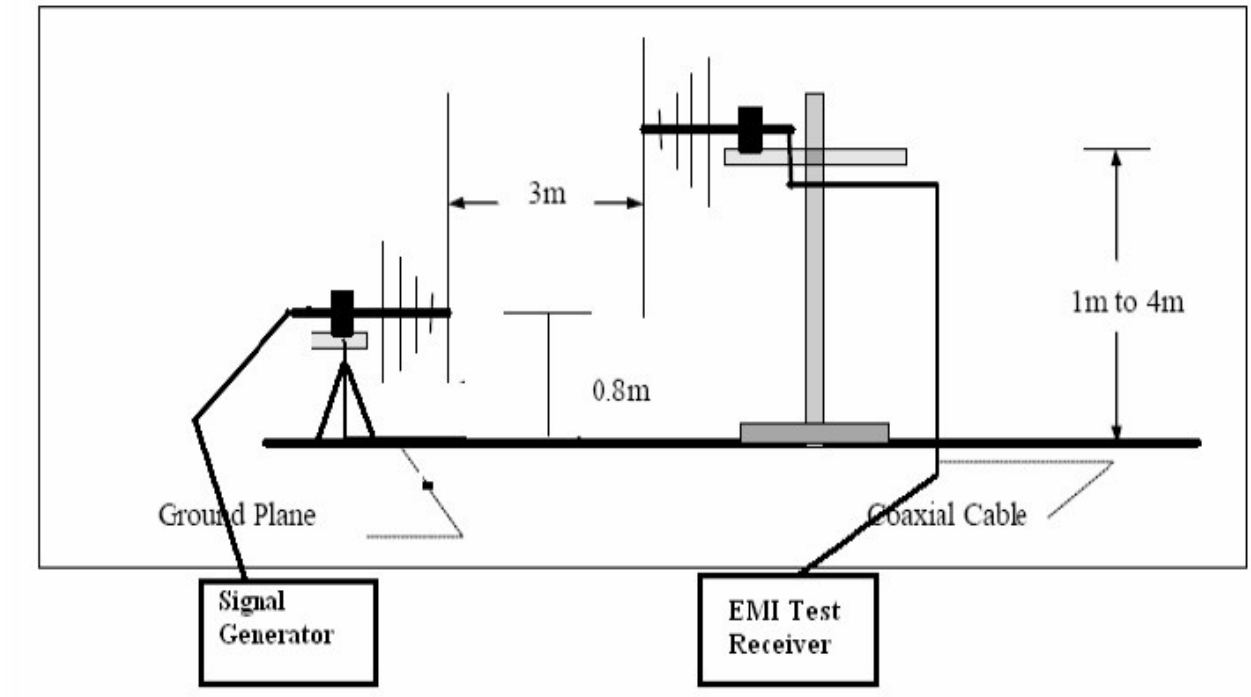


Diagram 3 of Measurement Equipment Configuration for Conducted power output and conducted spurious emissons measurement

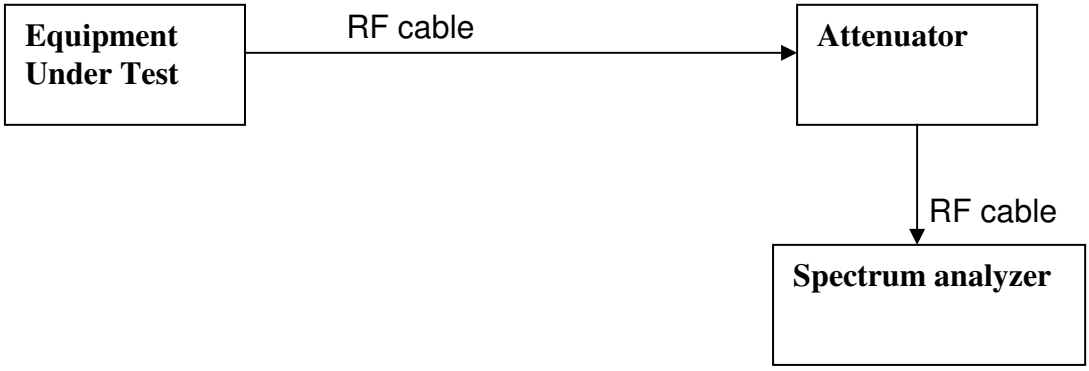
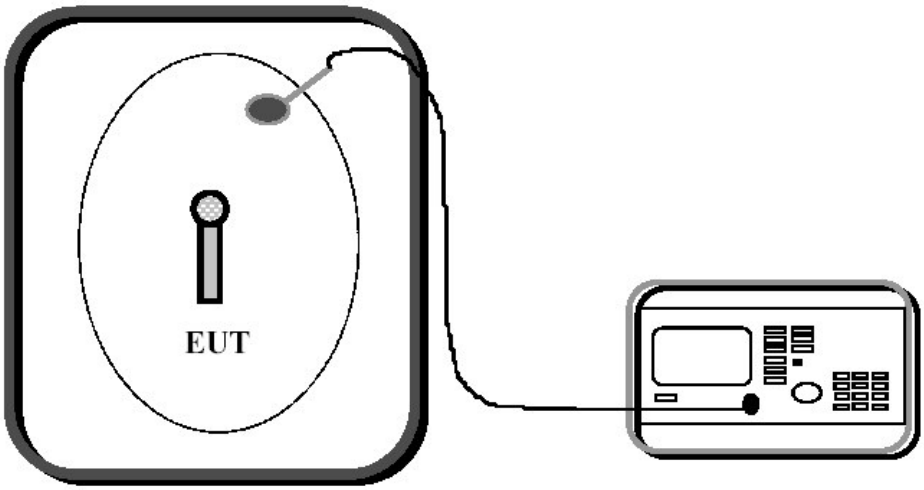
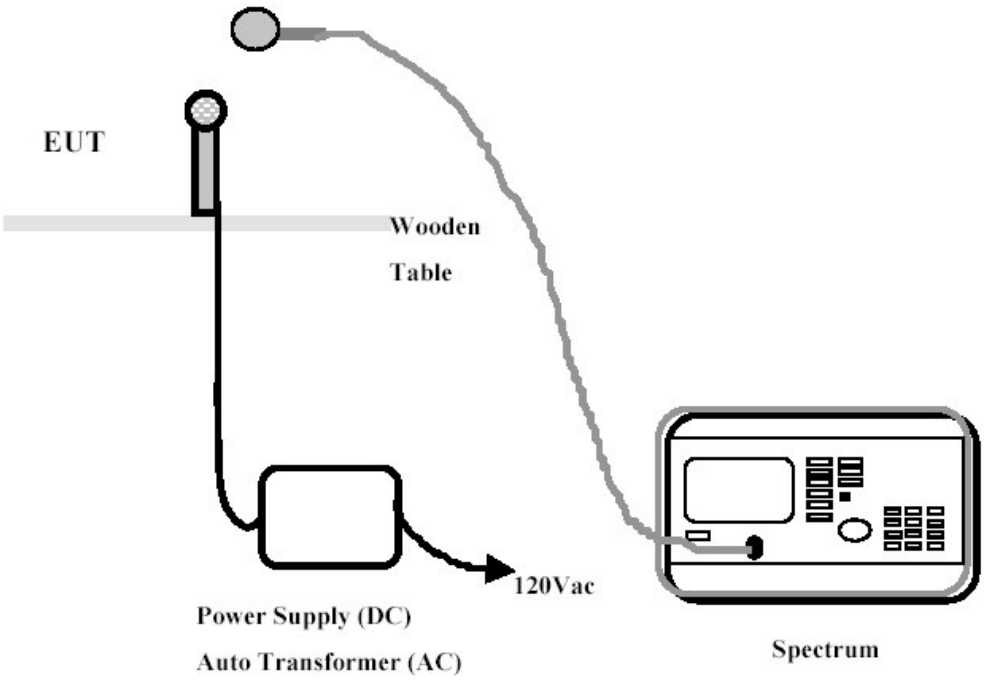


Diagram 4 of Measurement Equipment Configuration for Testing Modulation Characteristics measurement

Diagram 5 of Measurement Equipment Configuration for Testing Frequency Tolerance





5 Test Results EMISSION

5.1 Conducted Power Output measurement for FCC part 74 Per Section 74.861(e)(1)

RESULT: **Pass**

Date of testing	:	13.Apr.2010
Test specification	:	FCC Part 2 Per Section 2.1046(a)
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.1
Limits	:	FCC Part 74 Per Section 74.861(e)(1)
Kind of test site	:	3m Anechoic Chamber
Operation mode	:	Transmitting (unmodulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Measurement procedure:

1. connected equipment as diagram 4;
2. The EUT was connected to spectrum analyzer through a resistive coaxial attenuator;
3. Correct all losses in the RF path.
4. The EUT was set to operate on unmodulation mode at low, mid and high channels;
5. Measure the EUT output power.

Measurement result:

Table 2: Measurement Result of conducted output power at low, mid and high channel

Channel	Frequency (MHz)	Output power		Limit: (mW)
		(dBm)	(mW)	
Lowest	535.125	20.41	109.9	250
Middle	547.725	20.33	107.9	250
Highest	563.725	18.85	76.7	250

5.2 Conducted Spurious emissions measurement for FCC part 74 Per Section 74.861(e)(1)

RESULT: **Pass**

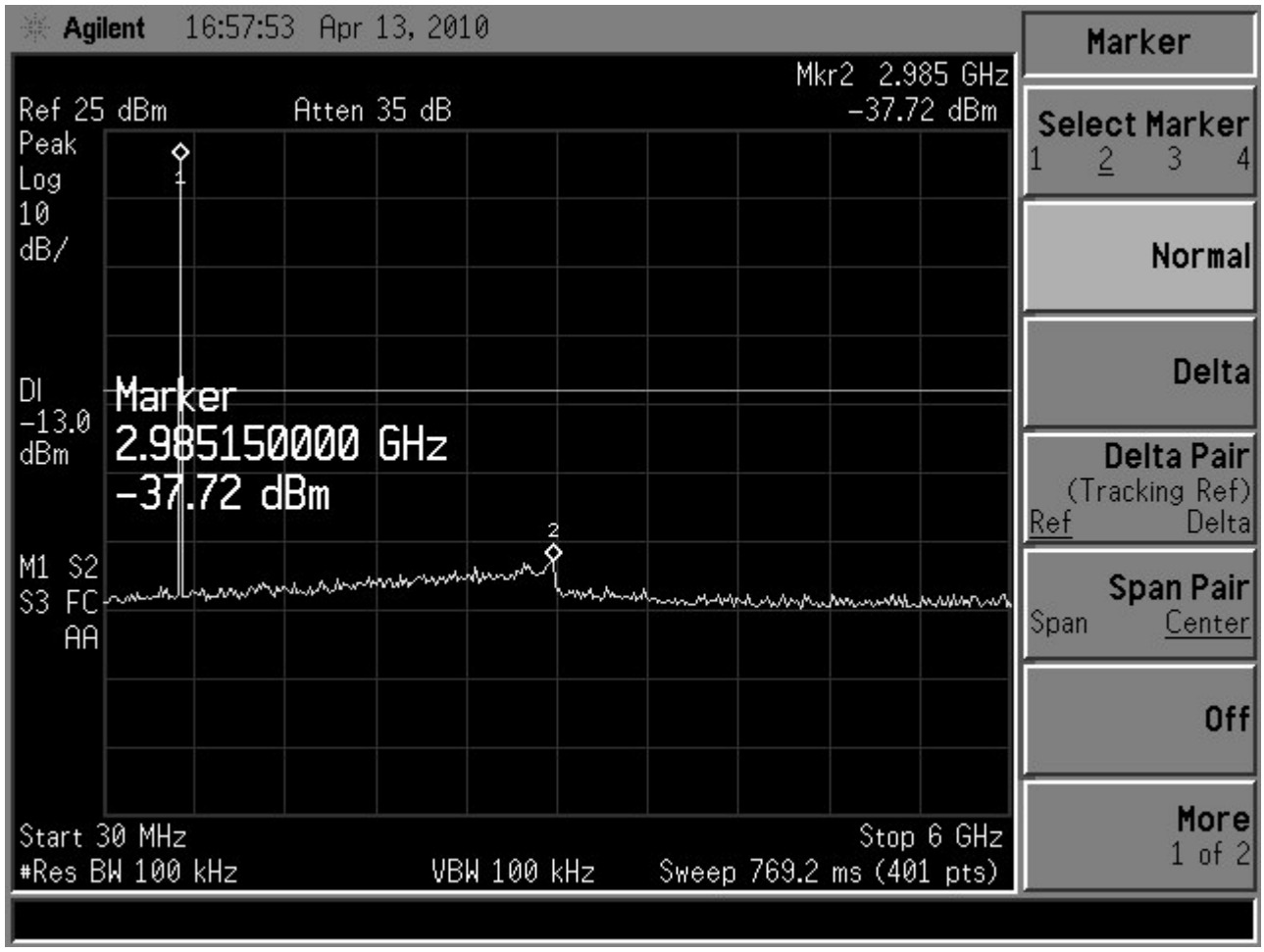
Date of testing	:	13.Apr.2010
Test specification	:	FCC Part 2 Per Section 2.1046(a)
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.1
Limits	:	FCC Part 74 Per Section 74.861(e)(1)
Kind of test site	:	3m Anechoic Chamber
Operation mode	:	Transmitting (unmodulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Measurement procedure:

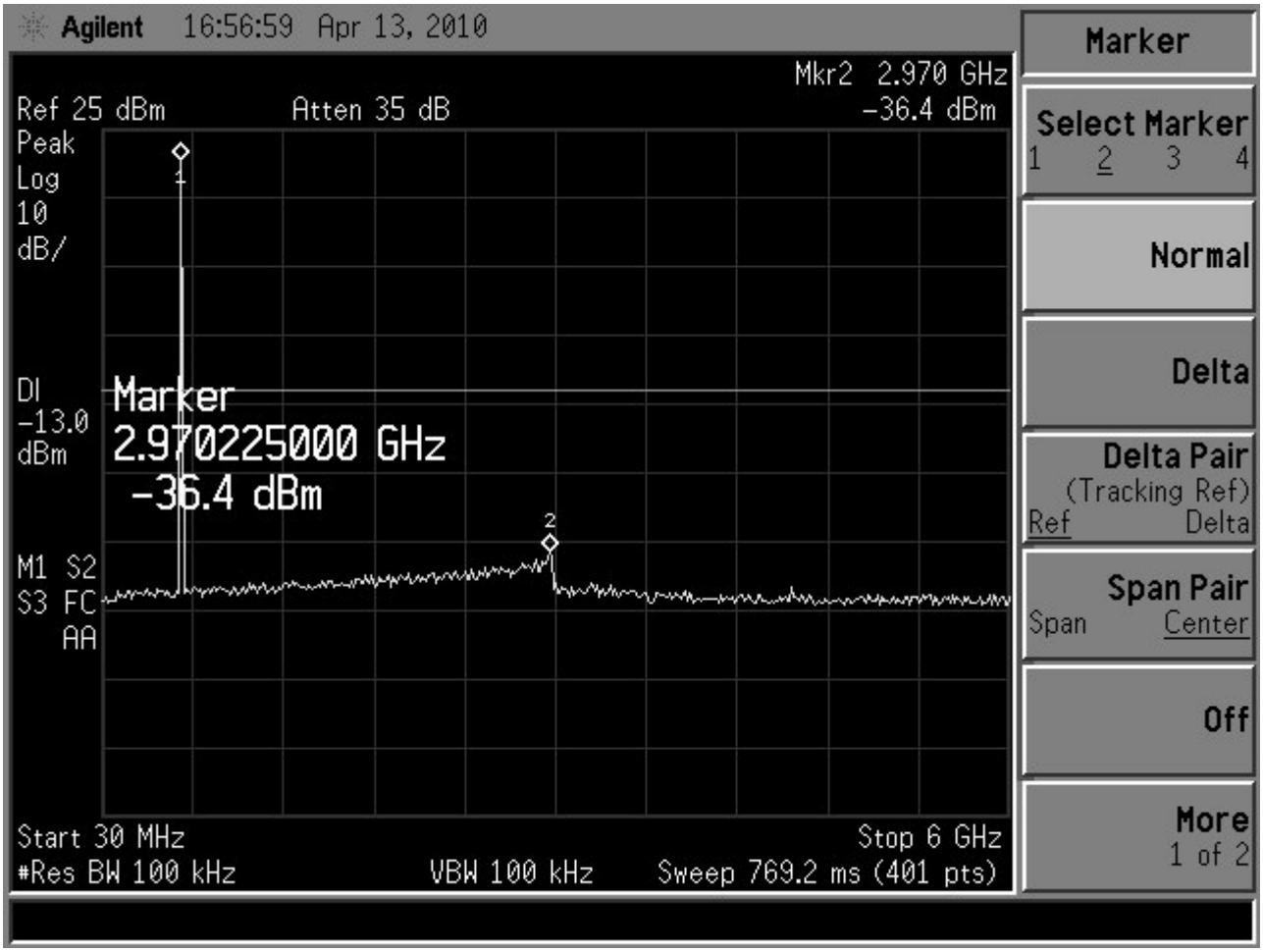
1. connected equipment as diagram 4;
2. The EUT was connected to spectrum analyzer through a resistive coaxial attenuator;
3. Correct all losses in the RF path.
4. The EUT was set to operate on unmodulation mode at low, mid and high channels;
5. Measure the EUT output power.

Measurement result at low, mid and high channel:

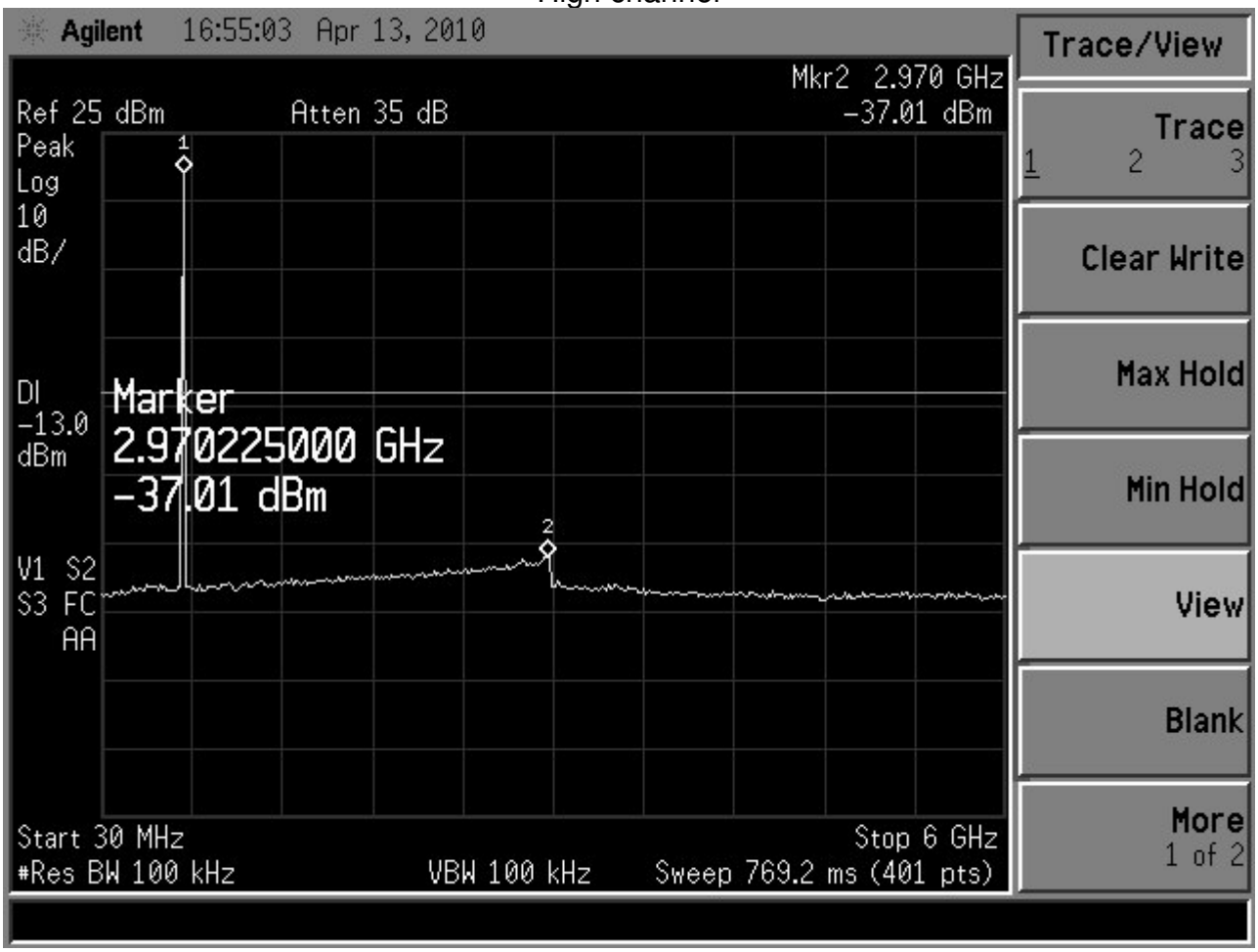
Low channel



Middle channel



High channel



5.3 Radiated Power Output measurement for FCC part 74 Per Section 74.861(e)(1)

RESULT: **Pass**

Date of testing	:	16.Mar.2010
Test specification	:	FCC Part 2 Per Section 2.1046(a)
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.17
Limits	:	FCC Part 74 Per Section 74.861(e)(1)
Kind of test site	:	3m Anechoic Chamber
Operation mode	:	Transmitting (unmodulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Measurement procedure:

1. The EUT was place on an 0.8 m high turntable in the anechoic chamber.
2. For radiated power output of the EUT, the measuring antenna was raised and lowered to obtain a maximum reading on the spectrum analyzer with the test antenna polarized vertically and horizontally. The turntable was rotated 360 to further searching the maximum reading on the spectrum analyzer. Then the max value on spectrum was recorded.
3. The EUT was removed and be replaced with a substitute dipole antenna. The length of the antenna was adjusted to a half-wave of transmitting frequency measured. The centre of the dipole antenna was placed approximately at the same location as the centre place of the EUT in step 1 and 2.
4. The dipole antenna was connected to a signal generator with a coaxial cable.
5. The signal generator is tuned to the transmitting frequency with the substitute antenna polarized both vertically and horizontally, the output level of the signal generator output was then adjusted to get a maximum reading in the spectrum with the same value recorded in the step 2.
6. The input RF power in the dipole antenna was calculated from the coaxial cable loss and the signal generator output level obtained in step 5. This value was regarded as final result and recorded in following table 2.

Note:

While in Step 2, the EUT was placed in 3 orthogonal planes to find a maximum reading.

The DUT has two power classes to choose, which are “0” for low power and “1” for high power, the worst emissions were found at high power “1” and recorded in the following table.

Measurement result:

Table 3: Measurement result of radiated output power at low, mid and high channel

Channel	Freq. (MHz)	Polarization (V/H)	Reading (SG) (dBm)	Cable loss (dB)	Antenna Gain(dB)	Transmit power (dBm)	Transmit power (mW)	Limit (mW)
Low	535.125	V	18.924	5.0	-10	3.924	2.468	250
		H	31.213	5.0	-10	16.213	41.812	250
Mid	547.725	V	17.264	5.1	-10	2.264	2.264	250
		H	30.167	5.1	-10	15.076	32.181	250
High	563.725	V	18.182	5.2	-10	2.982	1.987	250
		H	29.179	5.2	-10	13.979	24.998	250

Note:

SG means Signal Generator.

Transmit power (dBm) = Reading(SG) (dBm) - Cable loss(dB) + Antenna Gain(dB)

Transmit power (dBm) = 10Log(transmit power(mW)/1mW)

5.4 Spurious Radiation Measurement for FCC Part 74 Per Section 74.861(e)(6)(iii)

RESULT: **Pass**

Date of testing	:	16.Mar.2010
Test specification	:	FCC Part 2 Per Section 2.1053(a) and 2.1057
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.12
Limits	:	FCC Part 74 Per Section 74.861(e)(6)(iii)
Kind of test site	:	3m Full-Anechoic Chamber
Operation mode	:	Transmitting (unmodulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Measurement procedure:

1. Adjust the spectrum analyzer for the following settings:

a. RBW = 10kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.

b. VBW = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1GHz.

c. Sweep speed slow enough to maintain measurement calibration.

d. Detector Mode = Positive Peak

2. The EUT was turned on and placed on the top of a rotatable table 0.8 m above the ground with 3-orthogonal XYZ direction and be kept close enough to the measurement receiving antenna (especially for the measurement frequency range above 1 GHz). The table was then rotated 360 degrees to detect the suspected emission frequency points. The position of the worst radiation case with both horizontal and vertical receiving antenna polarization was then recorded together with the suspected emission frequency points above-mentioned.

3. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.

4. For each suspected emission frequency point recorded in step 1, the EUT was arranged to its worst case that the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to read the maximum emission.

5. The EUT was removed and be replaced with substitute antenna correspondent to the suspected frequency point mentioned in Step 3 (if necessary, characteristic frequency of the antenna is adjusted to a half-wave of the suspected frequency point). The substitute antenna was then connected to a signal generator with a coaxial cable and its center is placed approximately at the same location as the centre place of the EUT in Step 3.

6. The signal generator is tuned to the suspected frequency point mentioned in Step 3 with the substitute antenna polarized both vertically and horizontally, the output level of the signal generator output was then adjusted to get a maximum reading in the spectrum with the same value recorded in the step 3.

6. For each suspected frequency point, the input RF power in the substitute antenna was calculated from the coaxial cable loss, antenna factor and the signal generator output level obtained in step 5. This value was regarded as final result and recorded in following table 3, table 4 and table 5.

The allowed emissions for transmitters operating in the 535 MHz to 564 MHz bands are found under Part 74, Section 74.861, Paragraph (e) (6) for Low Power Auxiliary Stations. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10Log10 (mean output power in watts) dB.

To determine the Limit for Spurious Emissions the following method was used:

Maximum output power in watts:

Maximum output power in Watt: 0.0418 W (see table 2)

The emission must be reduced by:

43+10Log(0.0418) = 29.212 dB

Therefore, the Emission Limit equals:

10Log(0.0418 x1000) – 29.212 dB = –13 dBm

While testing, the EUT was placed in 3 orthogonal planes and the maximum reading was recorded in the following tables.

Note:

Two alternative AC adaptors were tested, the maximum emissions were recorded while SPS adaptor were connected.

The DUT has two power classes to choose, which are low power “0” and high power “1”, the worst emissions were found at high power “1” and recorded in the following table.

Measurement result:

Table 4: Spurious Emission measured at low channel 535.125 MHz

Freq. (MHz)	Polarization (V/H)	Reading (SG) (dBm)	Cable loss (dB)	Antenna Gain(dB)	Transmit power (dBm)	Limit (dBm)
1070.250	V	-46.35	7.4	5.25	- 48.5	-13
1605.375	V	-44.95	8.7	6.75	- 46.9	-13
2140.500	V	-70.55	10.2	6.95	- 73.8	-13
2675.625	V	-65.85	11.2	8.25	- 68.8	-13
3210.750	V	-34.35	12.5	8.65	- 38.2	-13
3745.875	V	-69.05	14.6	8.25	- 75.4	-13
4281.000	V	-27.85	15.8	8.35	- 35.3	-13
4816.125	V	-67.17	16.5	8.47	- 75.2	-13
5351.250	V	-56.56	18.2	8.66	- 66.1	-13
1070.250	H	-40.65	7.4	5.25	- 42.8	-13
1605.375	H	-32.45	8.7	6.75	- 34.4	-13
2140.500	H	-64.45	10.2	6.95	- 67.7	-13
2675.625	H	-55.05	11.2	8.25	- 58.0	-13
3210.750	H	-71.65	12.5	8.65	- 75.5	-13
3745.875	H	-68.85	14.6	8.25	- 75.2	-13
4281.000	H	-67.65	15.8	8.35	- 75.1	-13
4816.125	H	-68.07	16.5	8.47	- 76.1	-13
5351.250	H	-64.66	18.2	8.66	- 74.2	-13

Table 5: Spurious Emission measured at middle channel 547.725 MHz

Freq. (MHz)	Polarization (V/H)	Reading (SG) (dBm)	Cable loss (dB)	Antenna Gain(dB)	Transmit power (dBm)	Limit (dBm)
1095.450	V	-44.75	7.4	5.35	- 46.8	-13
1643.175	V	-43.54	8.7	6.84	- 45.4	-13
2190.900	V	-67.42	10.2	7.12	- 70.5	-13
2738.625	V	-61.05	11.2	8.25	- 64.0	-13
3286.350	V	-39.35	12.5	8.65	- 43.2	-13
3834.075	V	-62.03	14.6	8.43	- 68.2	-13
4381.800	V	-57.91	15.8	8.31	- 65.4	-13
4929.525	V	-60.43	16.5	8.43	- 68.5	-13
5477.250	V	-48.28	18.4	8.68	- 58.0	-13
1095.450	H	-40.75	7.5	5.35	- 42.8	-13
1643.175	H	-32.54	8.7	6.84	- 34.4	-13
2190.900	H	-64.62	10.3	7.12	- 67.7	-13
2738.625	H	-55.05	11.4	8.25	- 58.0	-13
3286.350	H	-71.65	12.5	8.65	- 75.5	-13
3834.075	H	-69.03	14.7	8.43	- 75.2	-13
4381.800	H	-67.61	15.8	8.31	- 75.1	-13
4929.525	H	-68.03	16.7	8.43	- 76.1	-13
5477.250	H	-64.68	18.4	8.68	- 74.2	-13

Table 6: Spurious Emission measured at high channel 563.725 MHz

Freq. (MHz)	Polarization (V/H)	Reading (SG) (dBm)	Cable loss (dB)	Antenna Gain(dB)	Transmit power (dBm)	Limit (dBm)
1127.450	V	-44.35	7.4	5.65	- 46.1	-13
1691.175	V	-35.96	8.8	6.56	- 38.2	-13
2254.900	V	-38.82	10.3	7.12	- 42.0	-13
2818.625	V	-48.75	11.3	8.35	- 51.7	-13
3382.350	V	-61.95	12.6	8.15	- 66.4	-13
3946.075	V	-61.03	14.7	8.43	- 67.3	-13
4509.800	V	-61.96	15.8	8.56	- 69.2	-13
5073.525	V	-54.12	16.8	8.72	- 62.2	-13
5637.250	V	-29.69	18.4	8.59	- 39.5	-13
1127.450	H	-43.15	7.4	5.65	- 44.9	-13
1691.175	H	-31.36	8.8	6.56	- 33.6	-13
2254.900	H	-46.92	10.3	7.12	- 50.1	-13
2818.625	H	-44.65	11.3	8.35	- 47.6	-13
3382.350	H	-63.95	12.6	8.15	- 68.4	-13
3946.075	H	-63.93	14.7	8.43	- 70.2	-13
4509.800	H	-62.06	15.8	8.56	- 69.3	-13
5073.525	H	-54.22	16.8	8.72	- 62.3	-13
5637.250	H	-32.69	18.4	8.59	- 42.5	-13

Disturbances other than those mentioned are small or not detectable.

Note: (for above mentioned three tables)

SG means Signal Generator

Transmit power (dBm) = Reading(SG) (dBm) - Cable loss(dB) + Antenna Gain(dB)

Transmit power (dBm) = 10Log(transmit power(mW)/1mW)

5.5 Modulation Characteristics measurement

RESULT: **Pass**

Date of testing	:	02.Mar.2010 / 13.Apr.2010
Test specification	:	FCC Part 2 Per Section 2.1047(a) and (b)
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.3
Limits	:	FCC Part 2 Per Section 2.1047(a) and (b)
Operation mode	:	Transmitting
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Audio frequency response:

Measurement procedure:

1) Configure the EUT as shown in diagram 3.

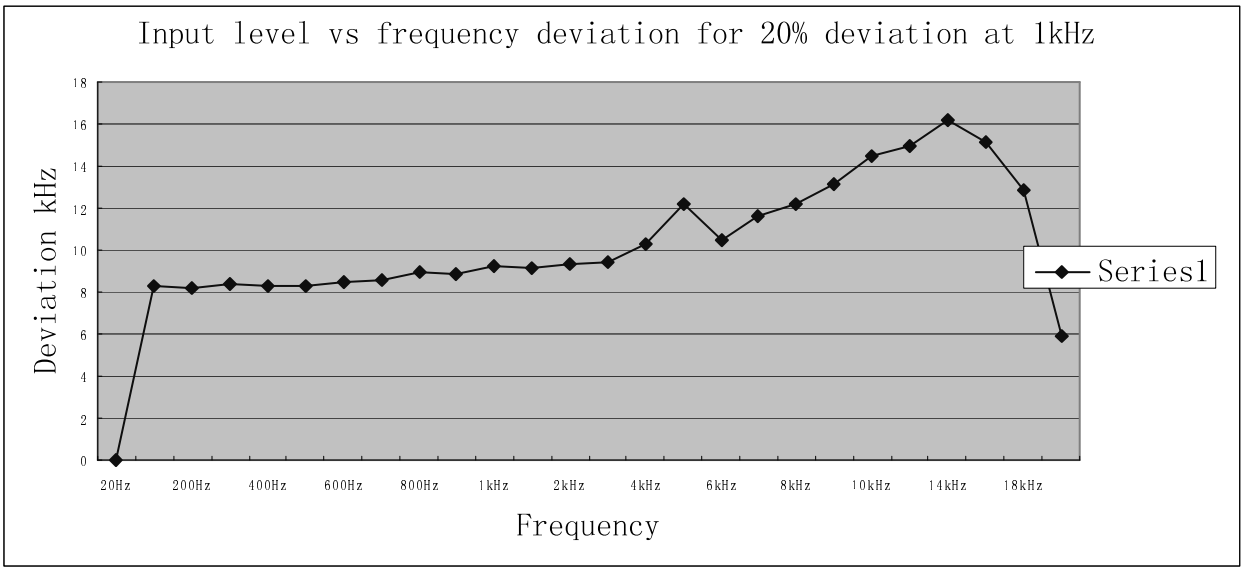
2) Adjust the audio input for 20% of rated system deviation at 1 kHz using this level as a reference (0 dB).

3) Vary the Audio frequency from 200 Hz to 20 kHz and record the frequency deviation

Measurement result:

Frequency (Hz)	Deviation (kHz)
100	8.3
200	8.2
300	8.4
400	8.3
500	8.3
600	8.5
700	8.6
800	9.0
900	8.9
1000	9.2
1500	9.1
2000	9.3
3000	9.4

4000	10.3
5000	12.2
6000	10.5
7000	11.6
8000	12.2
9000	13.1
10000	14.5
12000	15.0
13000	16.1
14000	16.2
15000	17.0
16000	15.1
17000	14.1
18000	12.9
19000	8.0
20000	5.9



Modulation limit and Necessary Bandwidth (Bn):

Measurement procedure:

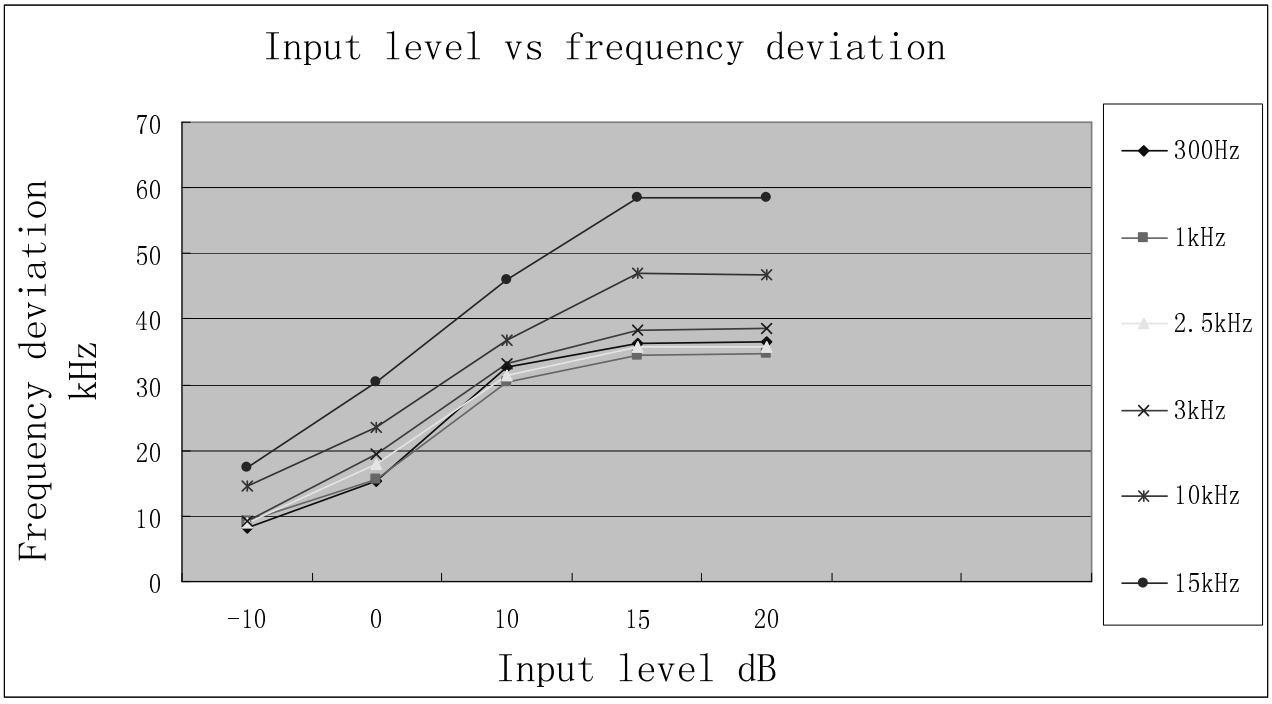
1). Configure the EUT as shown in diagram 4, adjust the audio input to produce 50 percent modulation at 2500Hz, this level is as a reference (0dB)

2). Vary the input level to at least 20dB higher than the saturation point;

2). Repeat step 1 with input frequency changing to 300Hz, 1kHz, 2.5kHz, 3kHz, 10kHz and 15kHz in sequence.

Measurement result for modulation limit:

Modulation (dB)		-10	0	10	15	20
300Hz	kHz	8.3	15.3	32.8	36.2	36.5
1kHz	kHz	9.1	15.6	30.5	34.6	34.7
2.5kHz	kHz	9	17.9	31.3	35.7	35.8
3kHz	kHz	9.2	19.5	33.1	38.2	38.5
10kHz	kHz	14.5	23.5	36.7	46.9	46.8
15kHz	kHz	17.3	30.4	46.1	58.4	58.5



Measurement result for Maximum Deviation and Necessary Bandwidth:

According to modulation limit of Modulation Characteristics, the Maximum Deviation and Necessary Bandwidth are list in the following table 8 and 9, the rule for Necessary bandwidth is according to part 2.202(g).

Table 7: Maximum Deviation

Reading:	58.5kHz
Limit:	± 75kHz

Table 8: Necessary Bandwidth (Bn)

Parameter:	M	D
Reading	15kHz	58.5kHz
Bn:	147kHz	
Limit:	200kHz	
Emission Designator:	147KF3E	
Bn=2M+2D*K Bn: operation bandwidth M: Max. Modulation Frequency D: Peak Frequency Deviation K=1		

5.6 Occupied Bandwidth and Emission Mask for FCC Part 74 Per Section 74.861(e)(3), 74.861(e)(5) and 74.861(e)(6)

RESULT: **Pass**

Date of testing	:	03.Mar.2010 / 13.Apr.2010 / 20.Apr.2010
Test specification	:	FCC Part 2 Per Section 2.1049(c)1
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.11
Limits	:	FCC Part 74 Per Section 74.861(e)(3), 74.861(e)(5) and 74.861(e)(6)
Operation mode	:	Transmitting (modulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	22°C
Humidity	:	50%

Measurement procedure:

1. Connect the EUT as diagram 4 in Section 4.5.

2. Plot the unmodulated chart shows on spectrum.

3. Set to 2500 Hz tone at an input level to produce the 50 percent modulation.

4. Set the input level 16 dB greater than that necessary to produce 50 percent modulation at 2500Hz, Emission Mask was measured with the spectrum analyzer controls set as shown on the test result;

5. Keep on the input level, Emission Mask were measured on frequencies 300Hz, 1 kHz, 2.5 kHz, 5 kHz and 15 kHz,

6. The 99% emitted energy Occupied Bandwidth were measured at frequencies 2.5 kHz, 5 kHz and 15 kHz.

Measurement result:

Please refer to appendix 1 of this report for result.

5.7 Frequency Tolerance for FCC Part 74 Per Section 74.861(e)(4)

RESULT: **Pass**

Date of testing	:	16.Mar.2010
Test specification	:	FCC Part 2 Per Section 2.1055
Guide	:	ANSI/TIA-603-C-2004, clause 2.2.2
Limits	:	FCC Part 74 Per Section 74.861(e)(4)
Operation mode	:	Transmitting (unmodulated)
Power supply	:	AC 120V to the AC/DC adaptor
Temperature	:	-30°C to 50°C
Humidity	:	50%

Measurement procedure:

A. Frequency stability versus environmental temperature

1. Setup the configuration as diagram 4 in section 4.5 for frequency measured inside an environment chamber and install new battery in the EUT.

2. Turn on EUT and set spectrum analyzer center frequency to the EUT operating frequency. Set spectrum analyzer Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 1 kHz and Frequency Span to 50kHz.Record this frequency as reference frequency.

3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

B. Frequency stability versus input voltage

1. Setup the configuration as diagram 4 for frequencies measurement at temperature range from15 ℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used.

2. Set spectrum analyzer center frequency to the EUT operating frequency. Set spectrum analyzer Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 1 kHz. Record this frequency as reference frequency.

3. Set the supply voltage to the nominal voltage of the EUT.

4. Turn the EUT on and measure the EUT operating frequency

5. Repeat step 4 with decreased supply voltage, record all measured frequencies on each voltage step.

6. Stop the test until the lowest voltage specified by the manufacturer is reached or the EUT case to emission radio signal.

Table 9: the measurement of Frequency Tolerance (temperature)

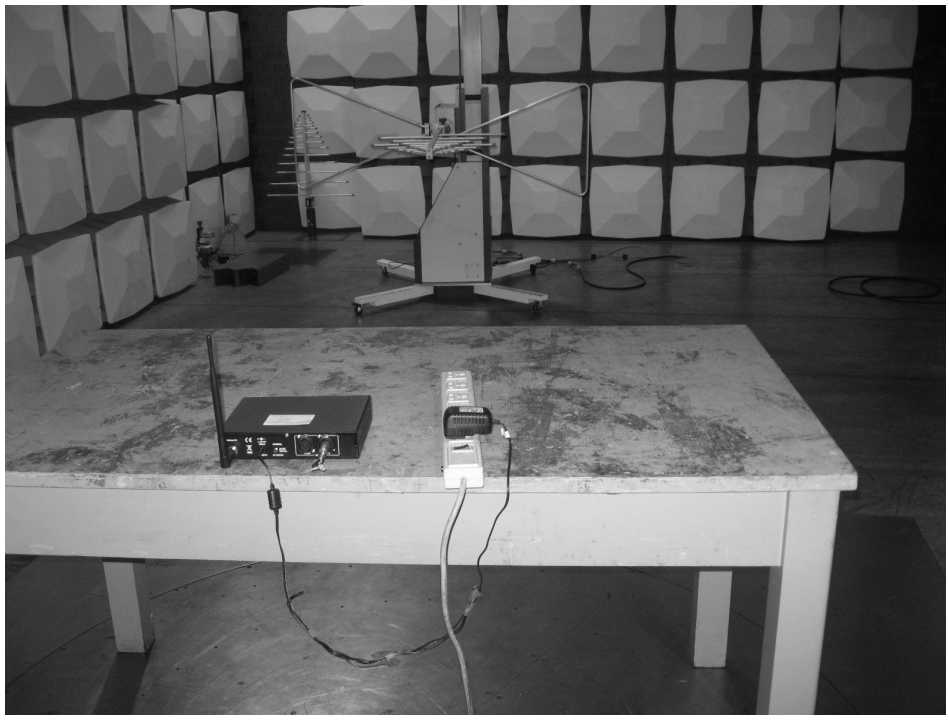
Test condition	Power supply (Input to AC/DC adaptor)	Low Frequency (MHz) (535.125)	Mid Frequency (MHz) (547.725)	High Frequency (MHz) (563.725)
-30°C	AC 120	535.12921	547.72941	563.72913
-20°C	AC 120	535.12908	547.72912	563.72908
-10°C	AC 120	535.12837	547.72786	563.72901
0°C	AC 120	535.12783	547.72774	563.72809
10°C	AC 120	535.12635	547.72632	563.72616
20°C	AC 120	535.12573	547.72578	563.72556
30°C	AC 120	535.12365	547.72313	563.72432
40°C	AC 120	535.12274	547.72136	563.72218
50°C	AC 120	535.12162	547.72065	563.71981
Frequency Error:		0.0042	0.0044	0.0052
Frequency tolerance:		0.0007%	0.0008%	0.0009%
Frequency Tolerance Limit:		0.005%		

Table 10: The measurement of Frequency Tolerance (supply voltage)

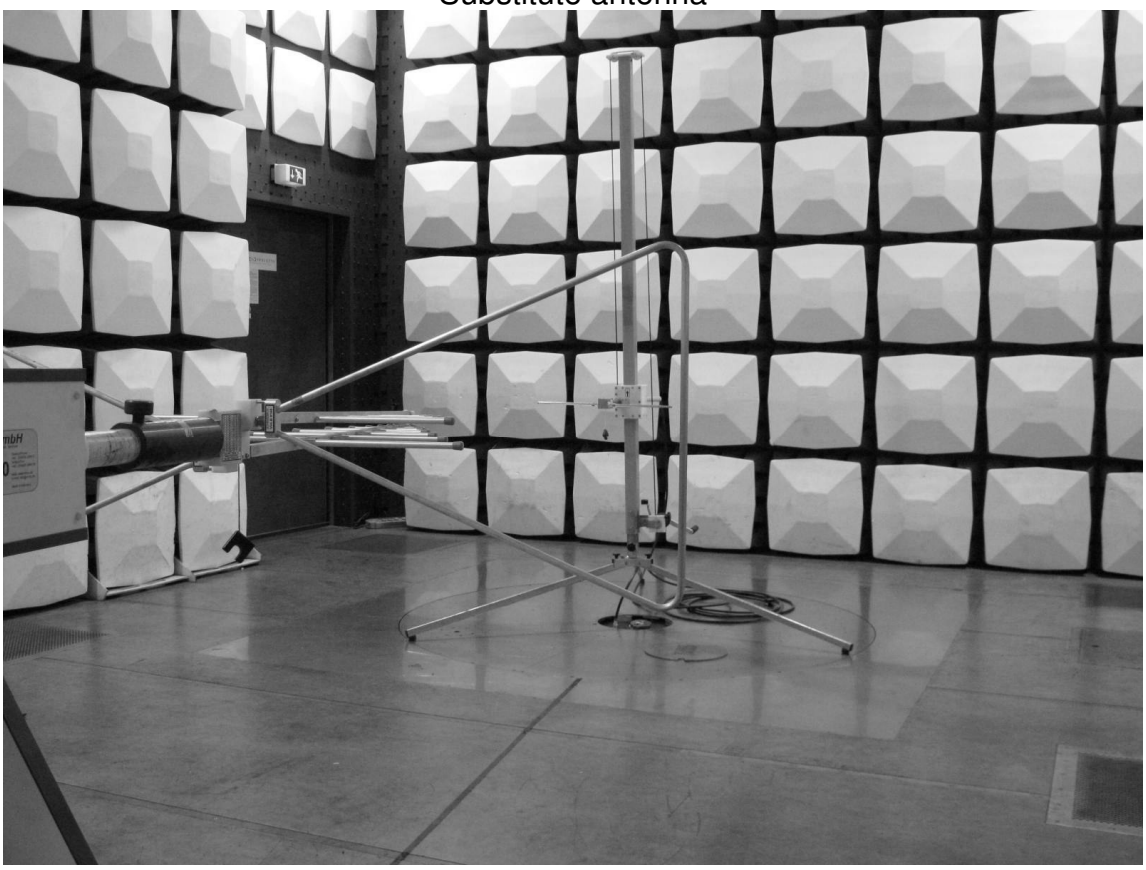
Temperature (°C)	Power supply (Input to AC/DC adaptor)	Low Frequency (MHz) (535.125)	Mid Frequency (MHz) (547.725)	High Frequency (MHz) (563.725)
25	132V	563.72490	563.72491	563.72492
25	120V	563.72517	563.72515	563.72518
25	108V	563.72642	563.72631	563.72621
Frequency Error:		0.0014	0.0013	0.0012
Frequency tolerance:		0.0003%	0.0003%	0.0003%
Frequency Tolerance Limit:		0.005%		

6 Photographs of the Test Set-Up

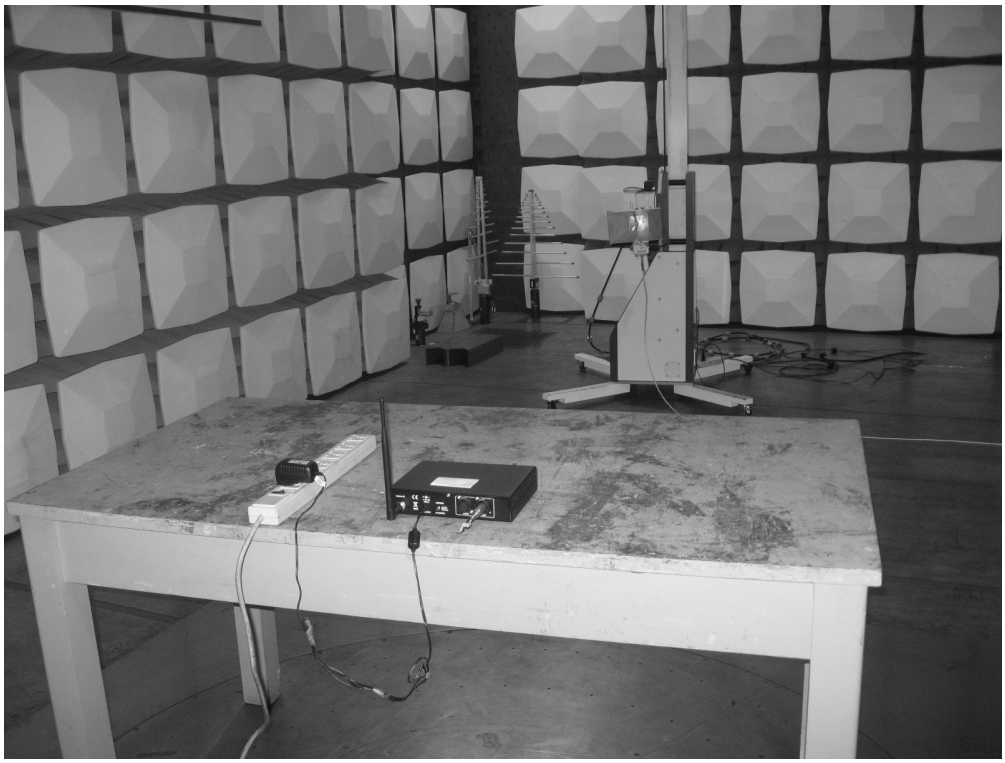
Photograph 1: Set-up for Radiation Measurement below 1GHz



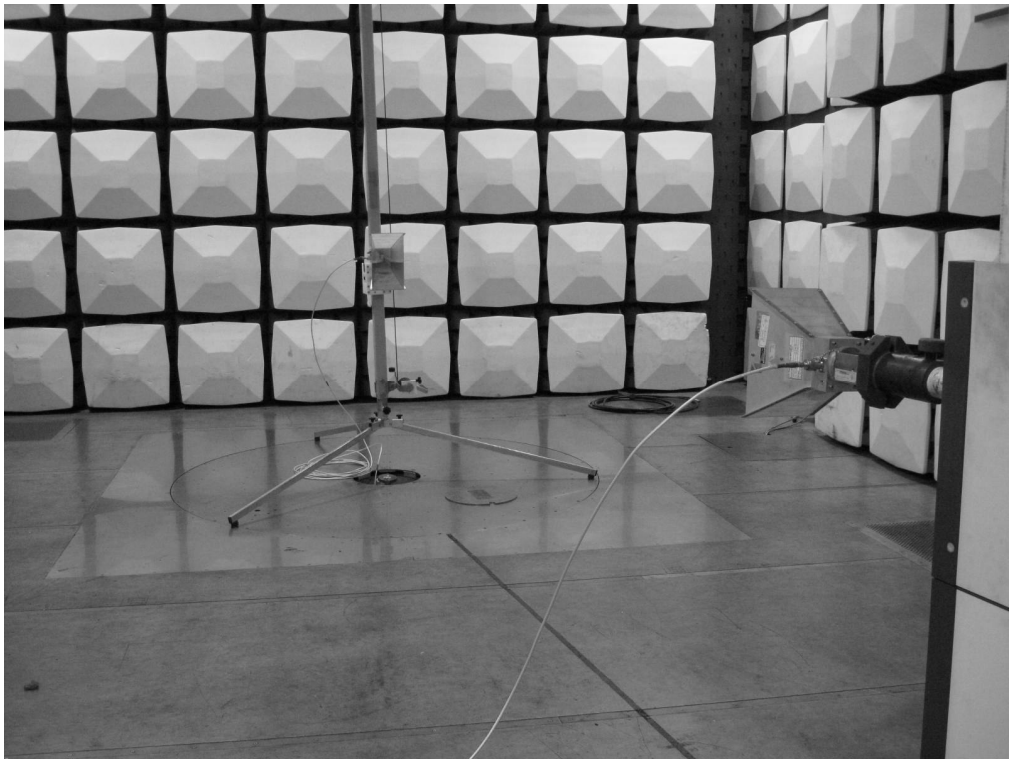
Substitute antenna



Photograph 2: Set-up for Radiation Measurement above 1GHz



Substitute antenna



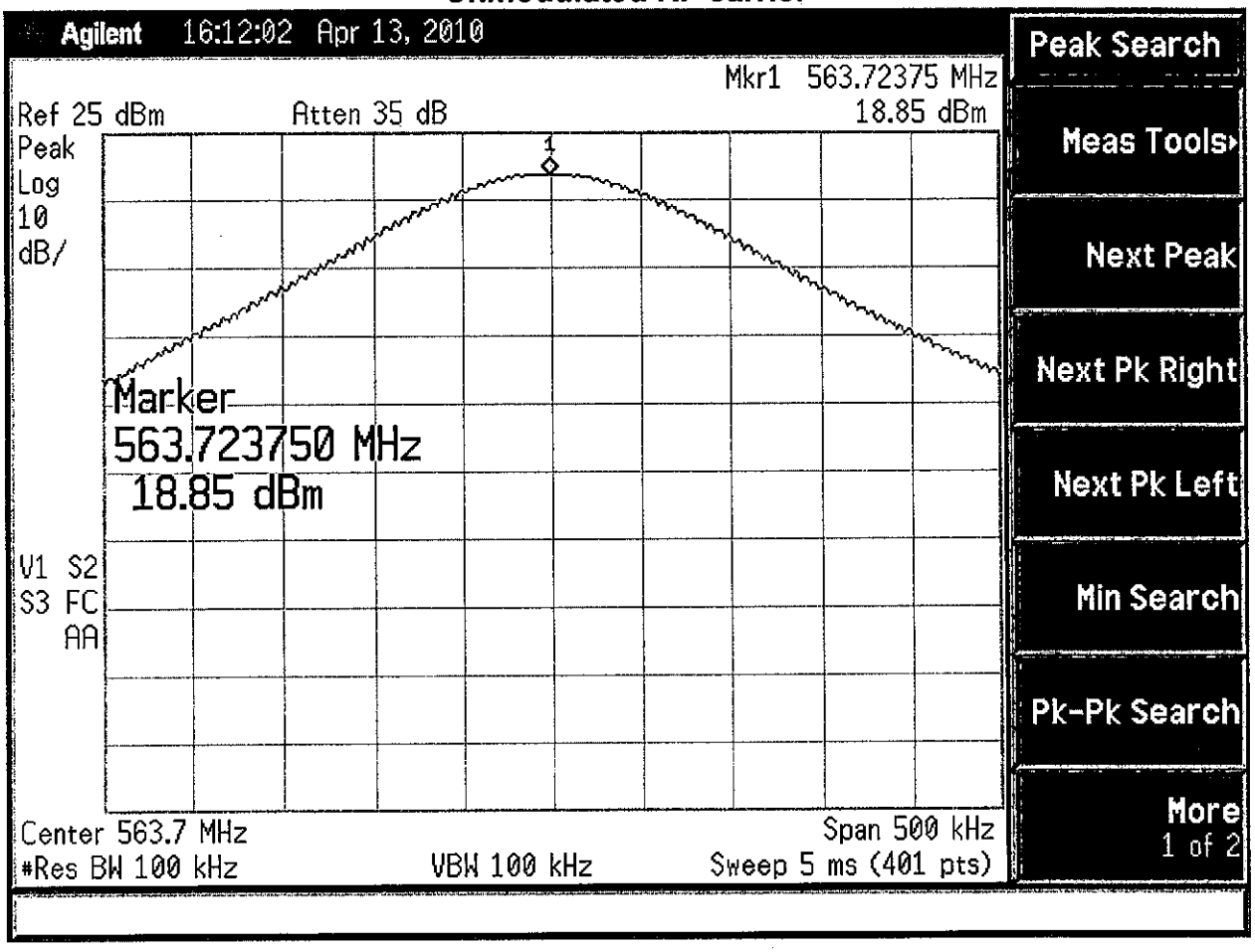
7 List of Tables

8 List of Photographs

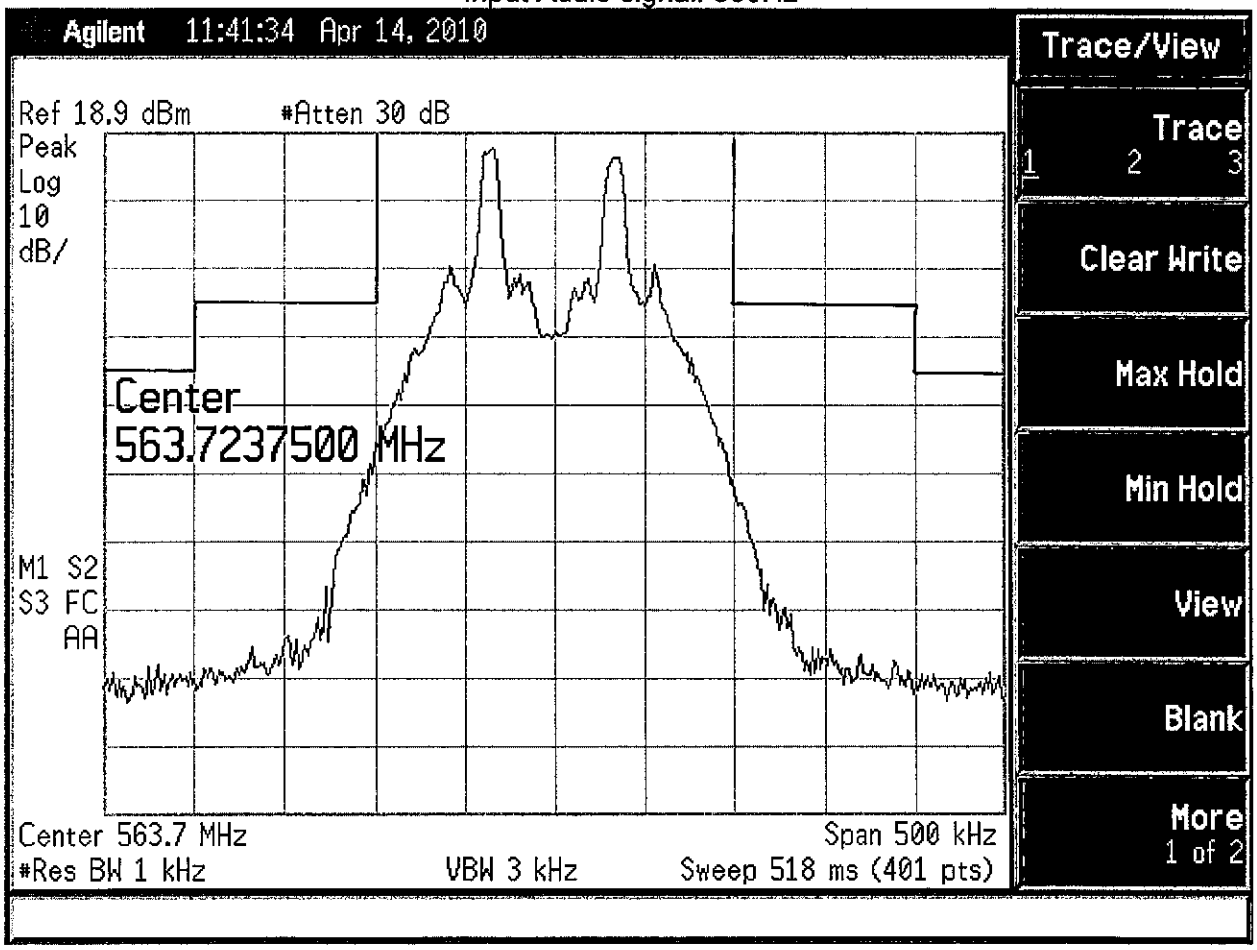
Emission Mask:

High frequency

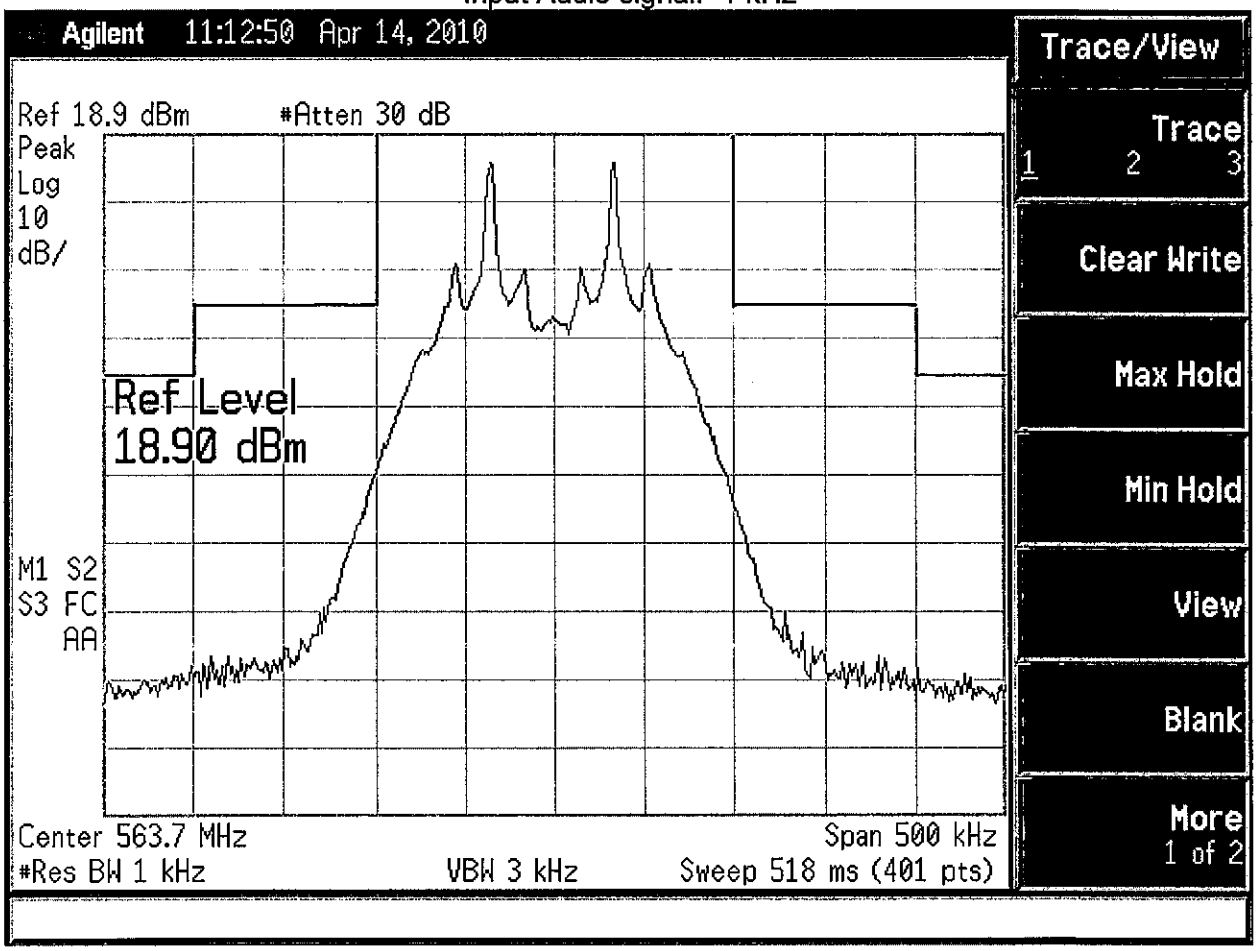
Unmodulated RF carrier



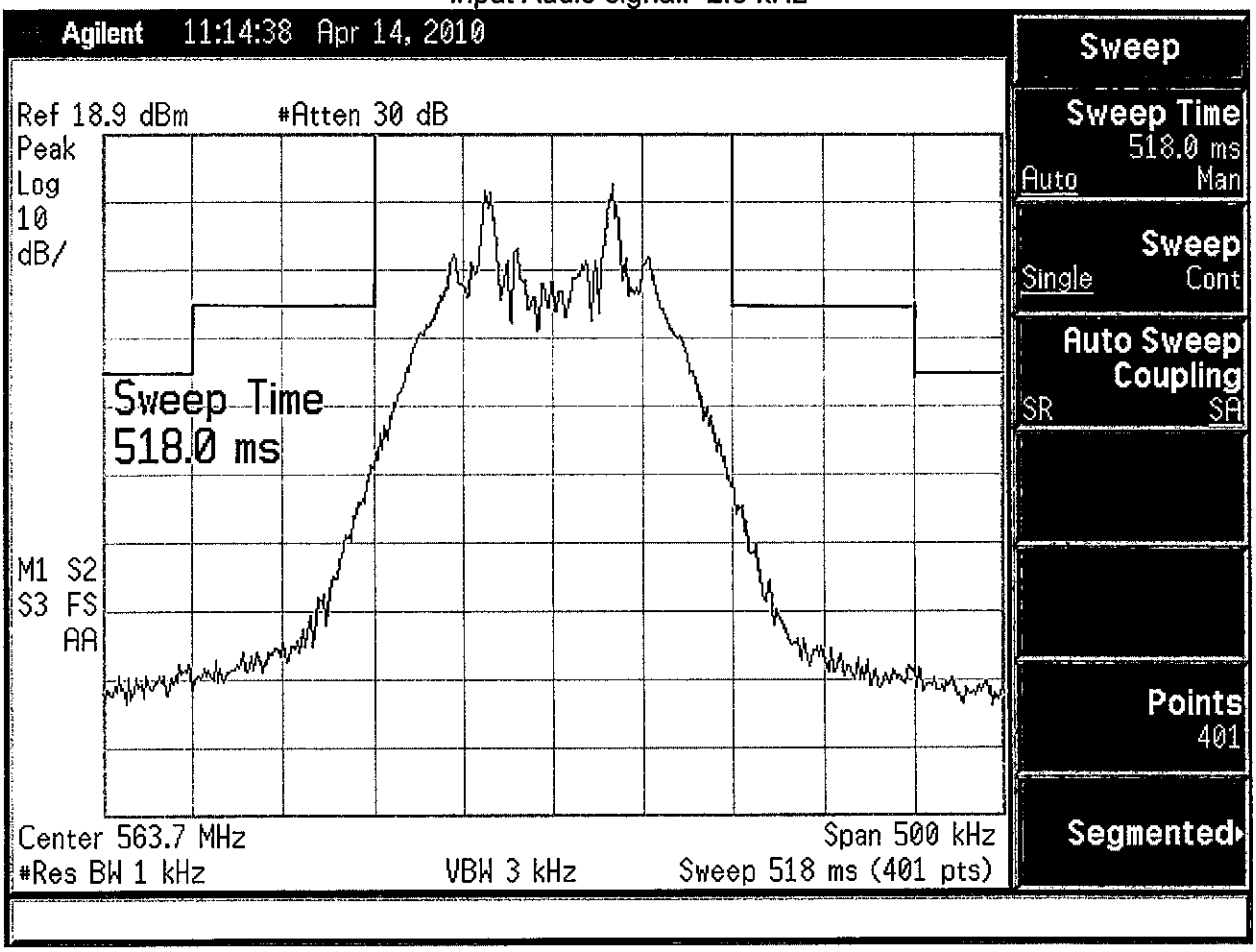
Input Audio signal: 300Hz



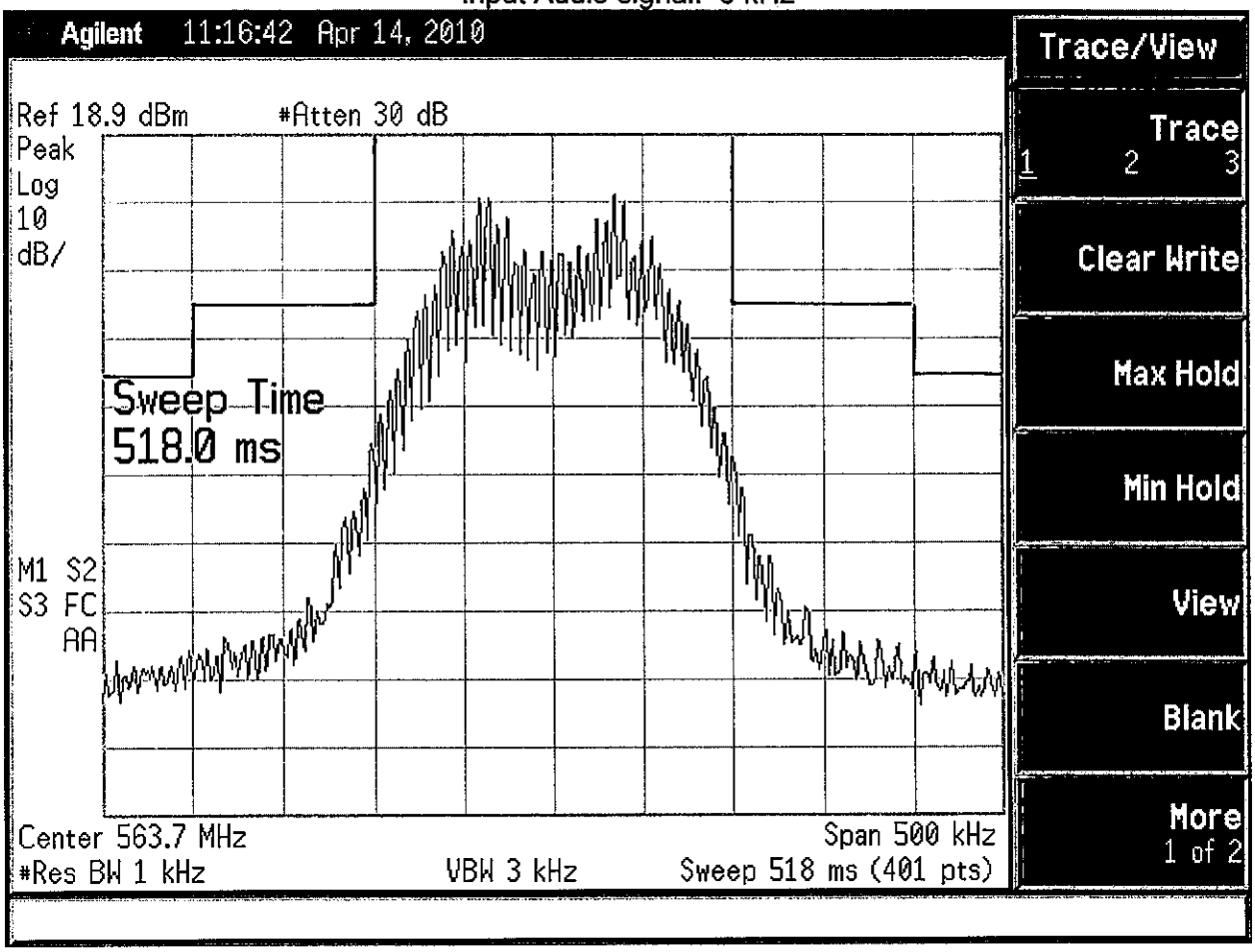
Input Audio signal: 1 kHz



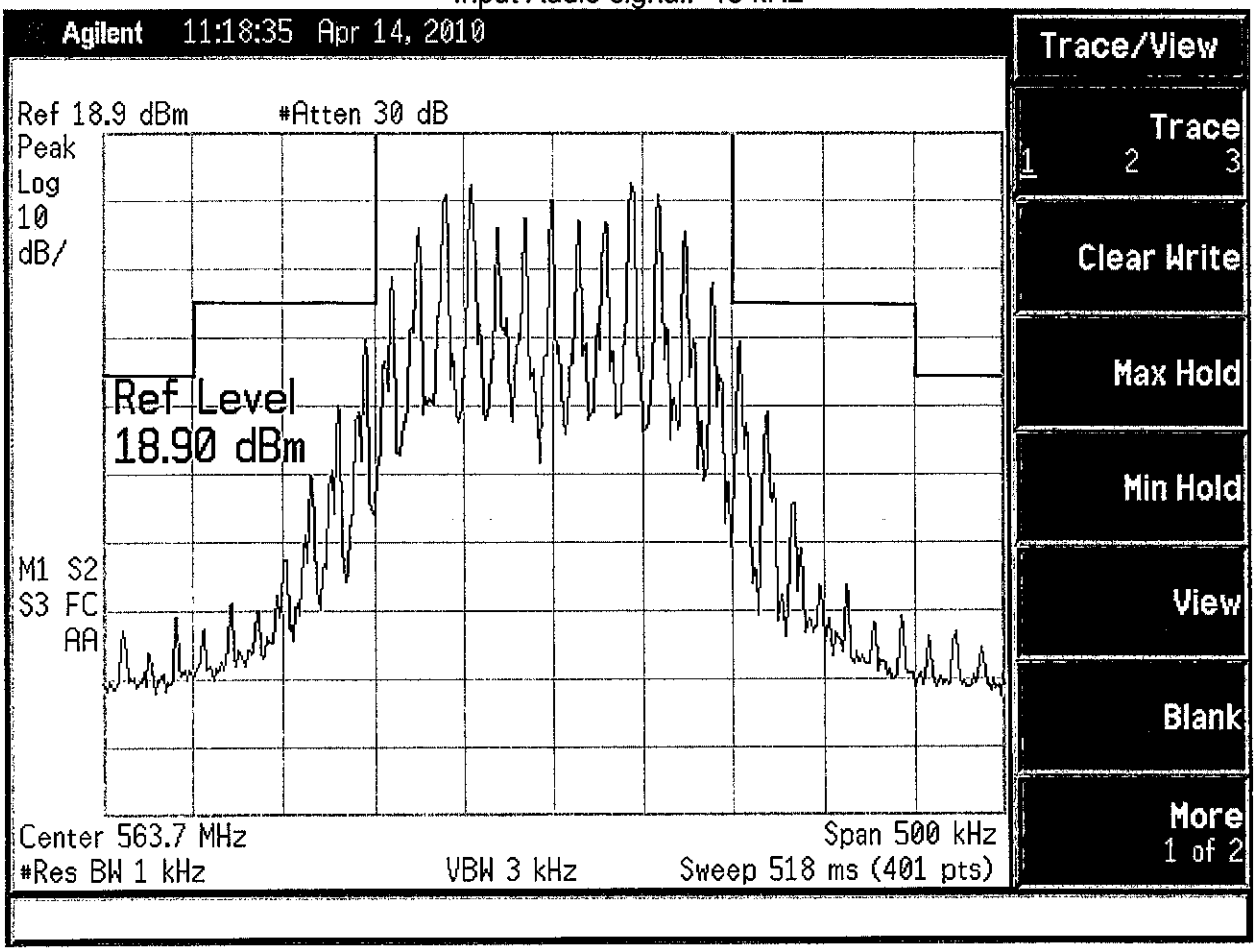
Input Audio signal: 2.5 kHz



Input Audio signal: 5 kHz

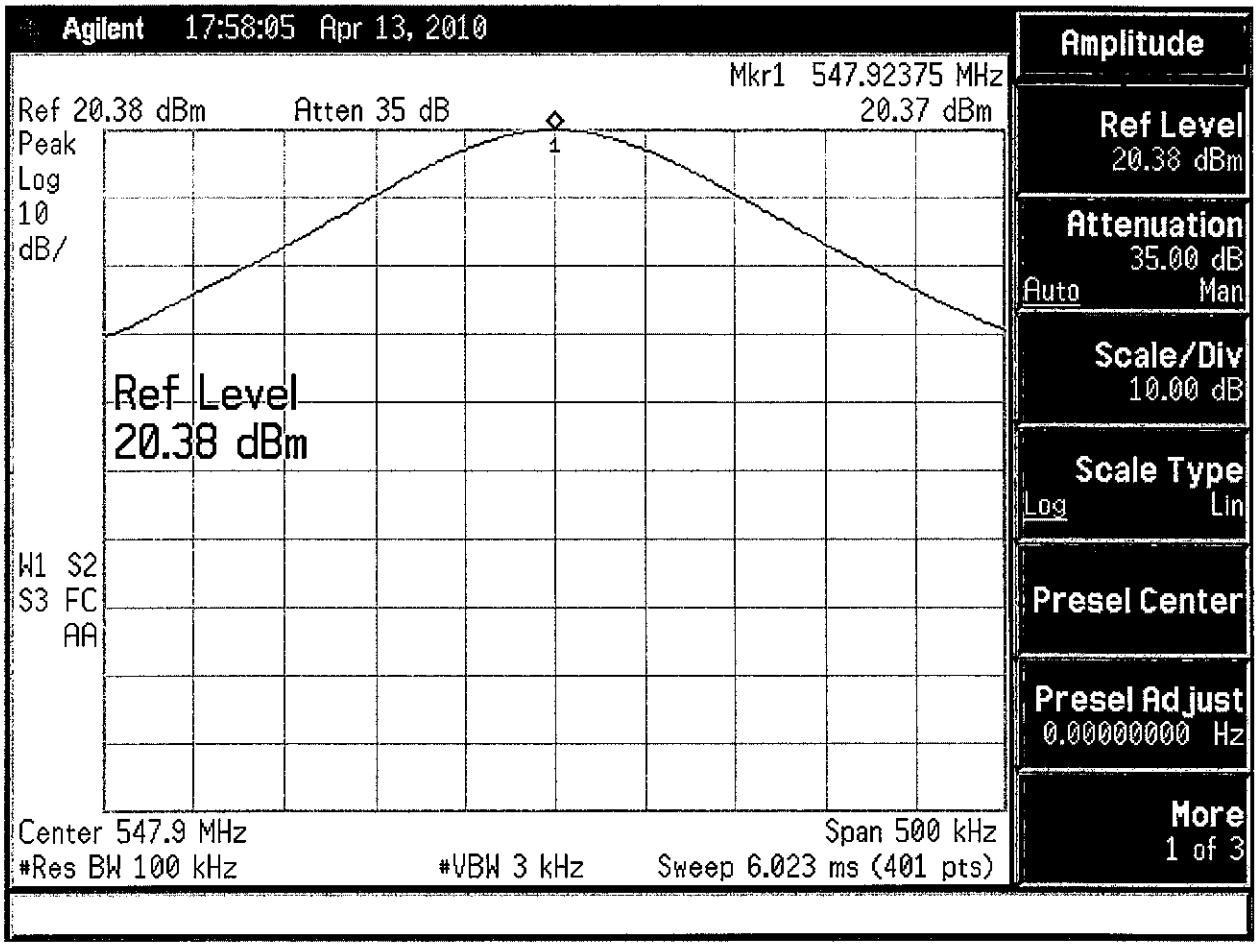


Input Audio signal: 15 kHz

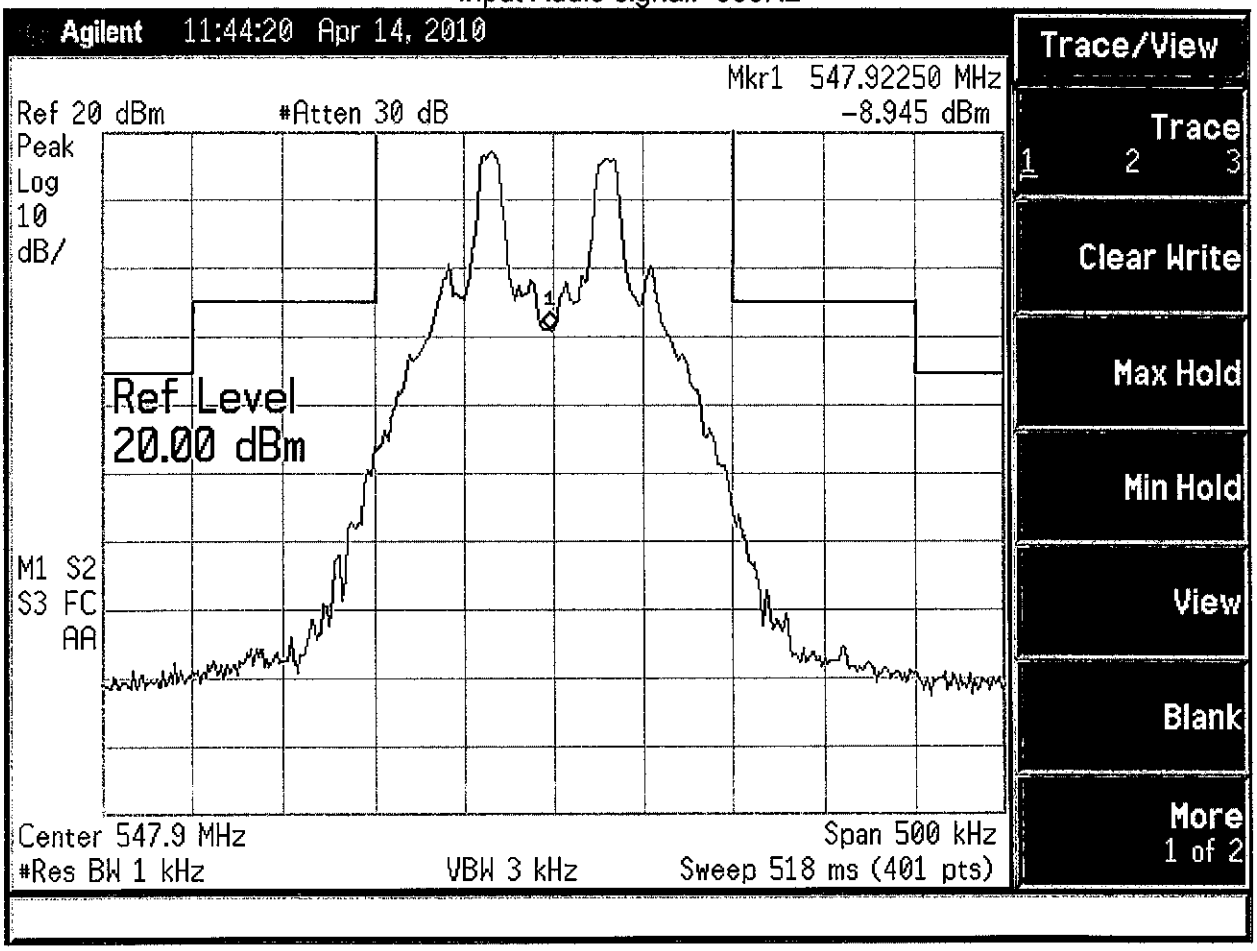


Middle frequency

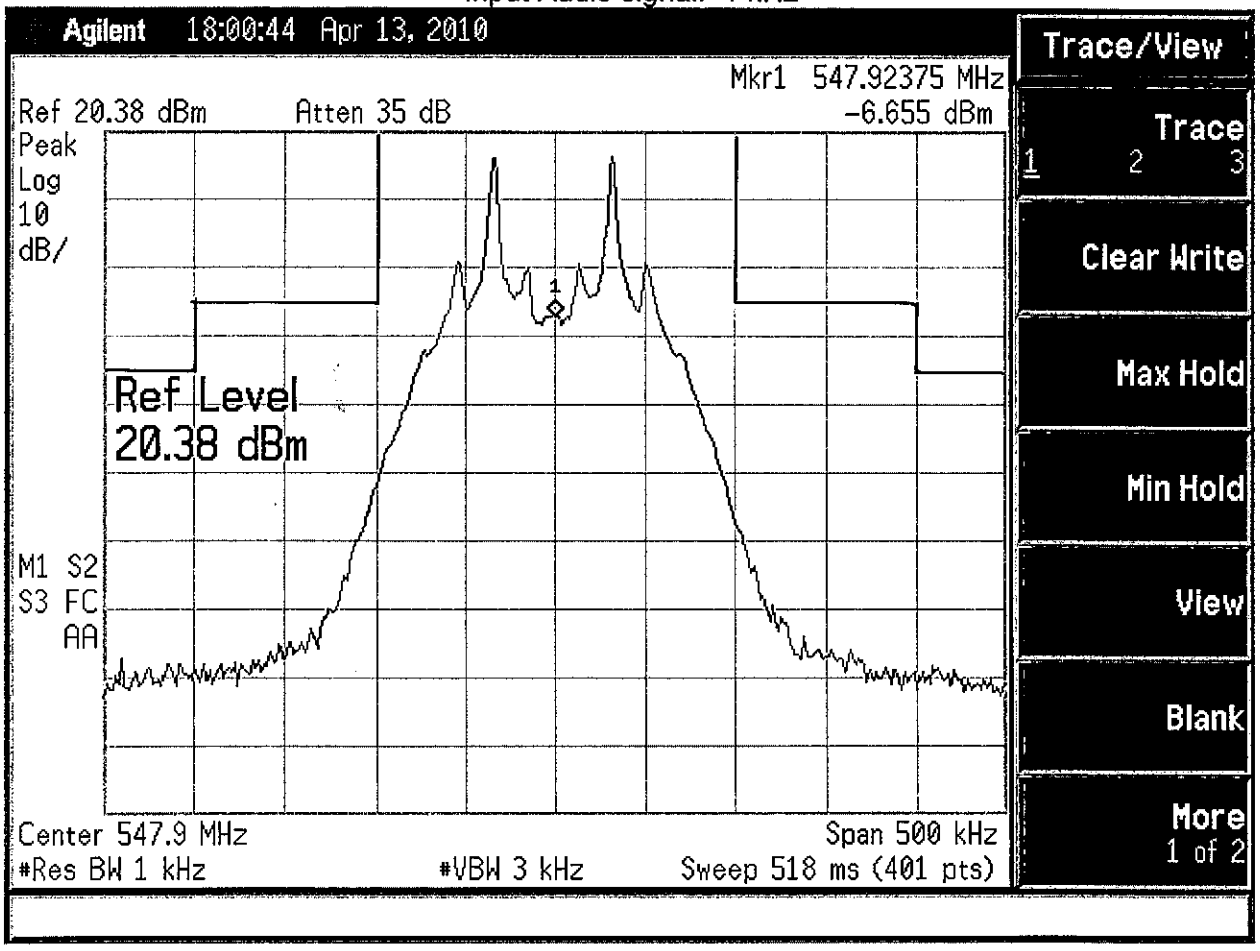
Unmodulated RF carrier



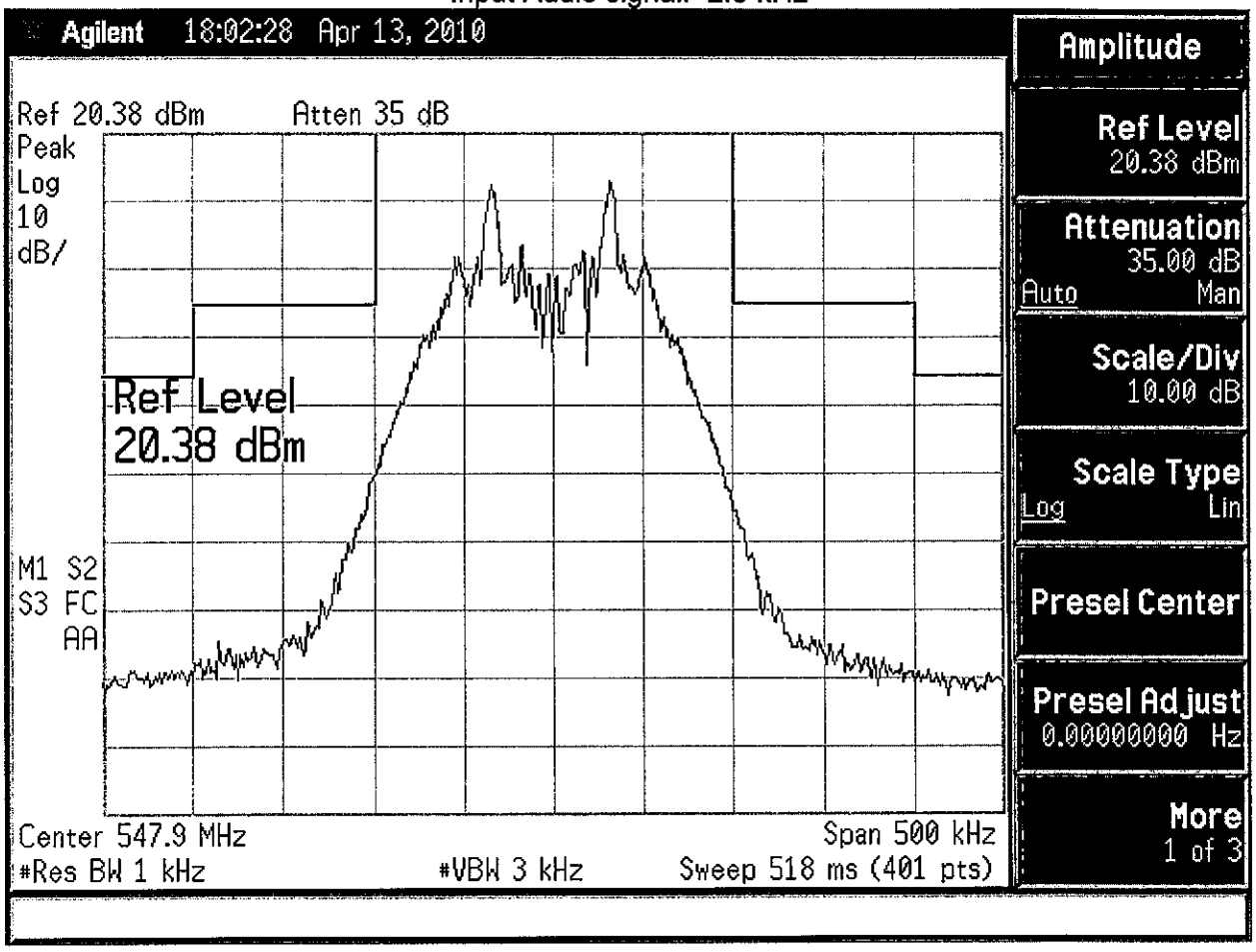
Input Audio signal: 300Hz



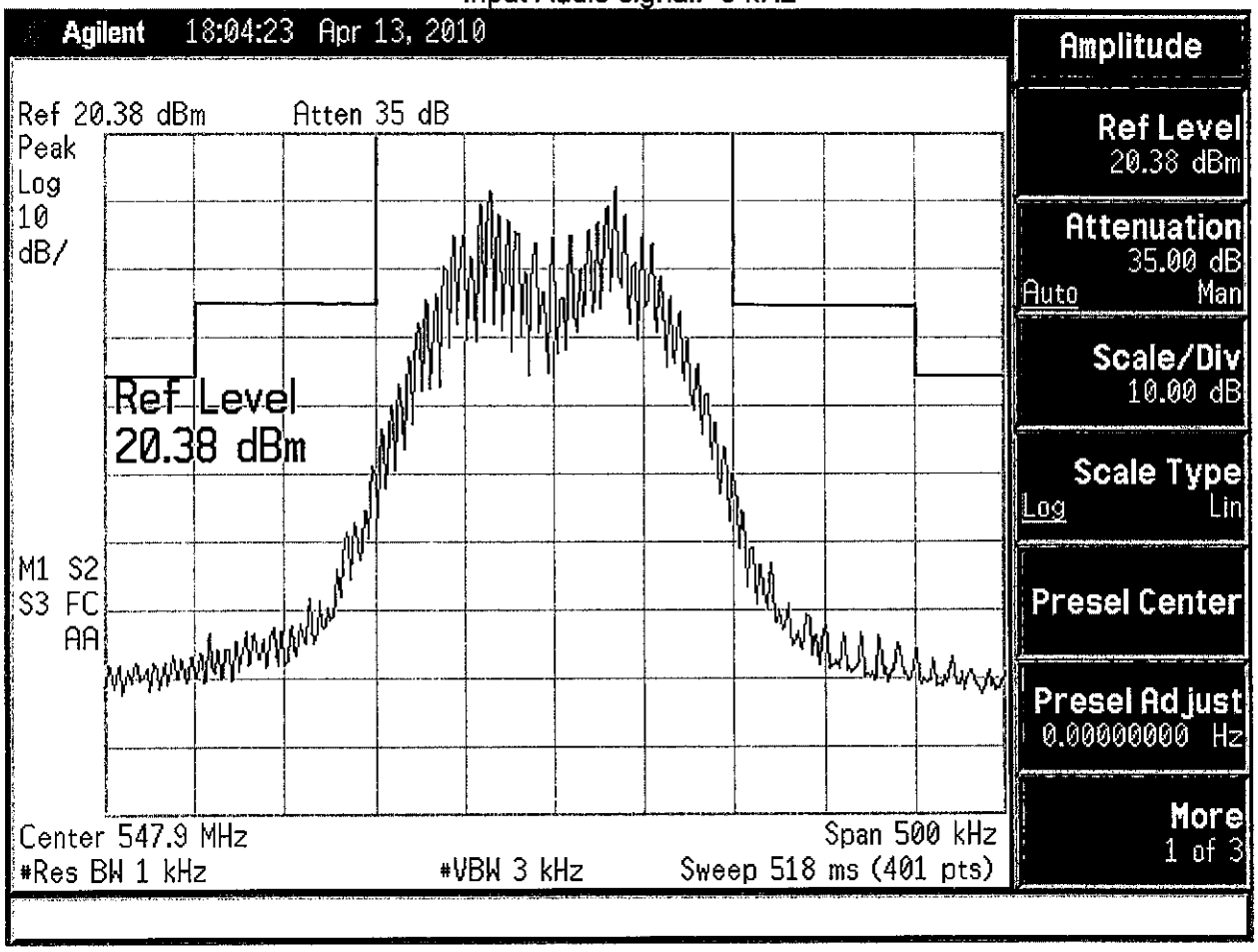
Input Audio signal: 1 kHz



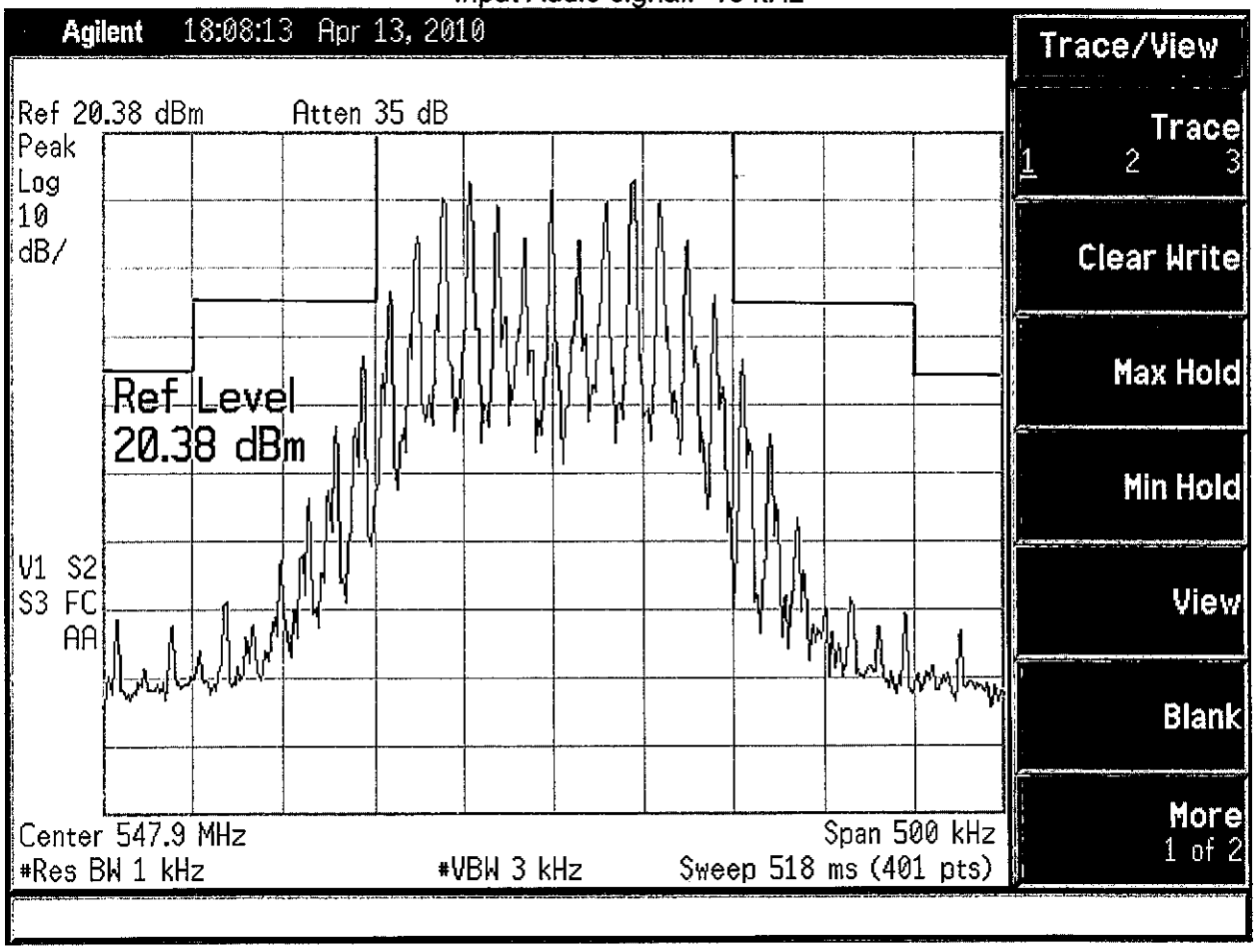
Input Audio signal: 2.5 kHz



Input Audio signal: 5 kHz

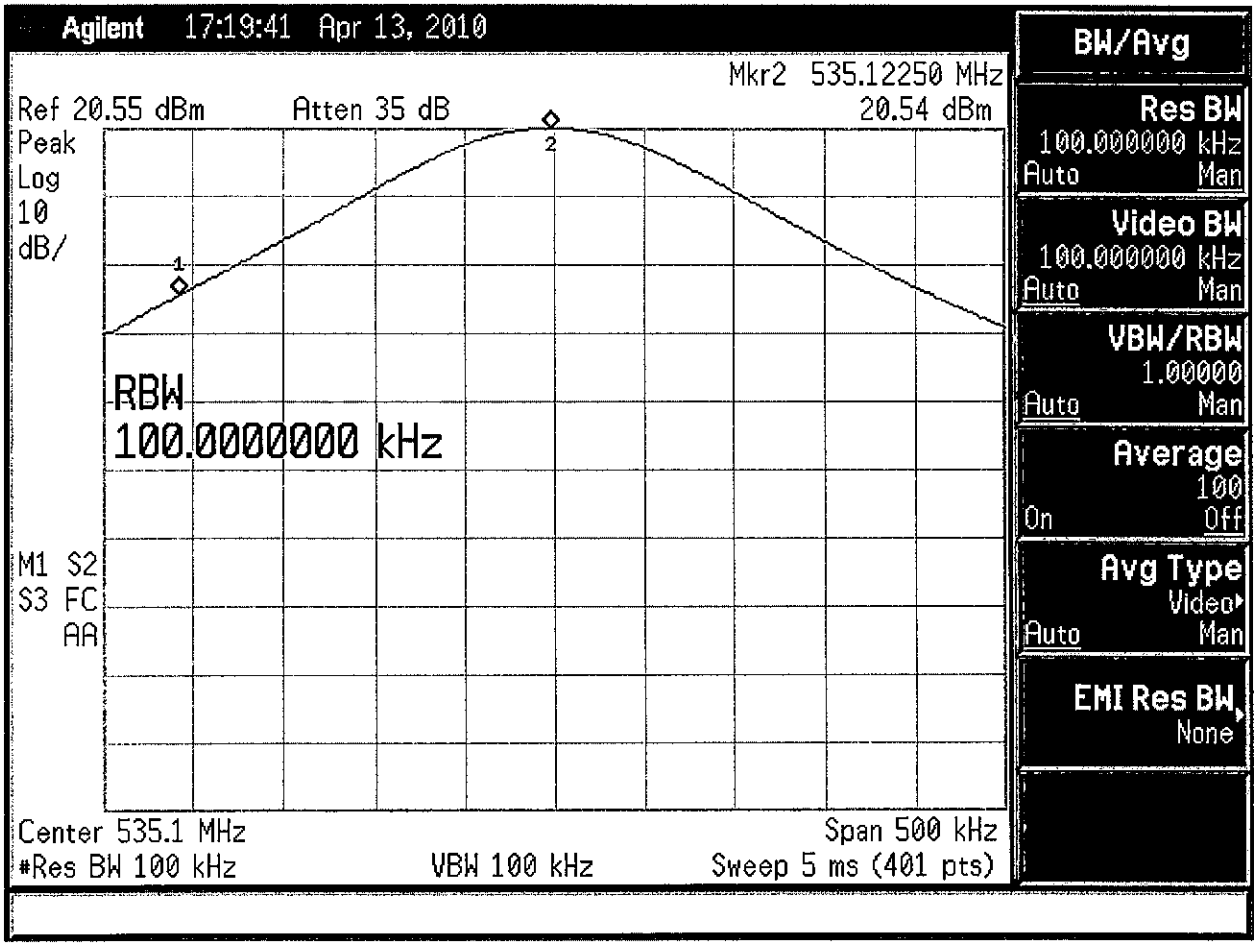


Input Audio signal: 15 kHz

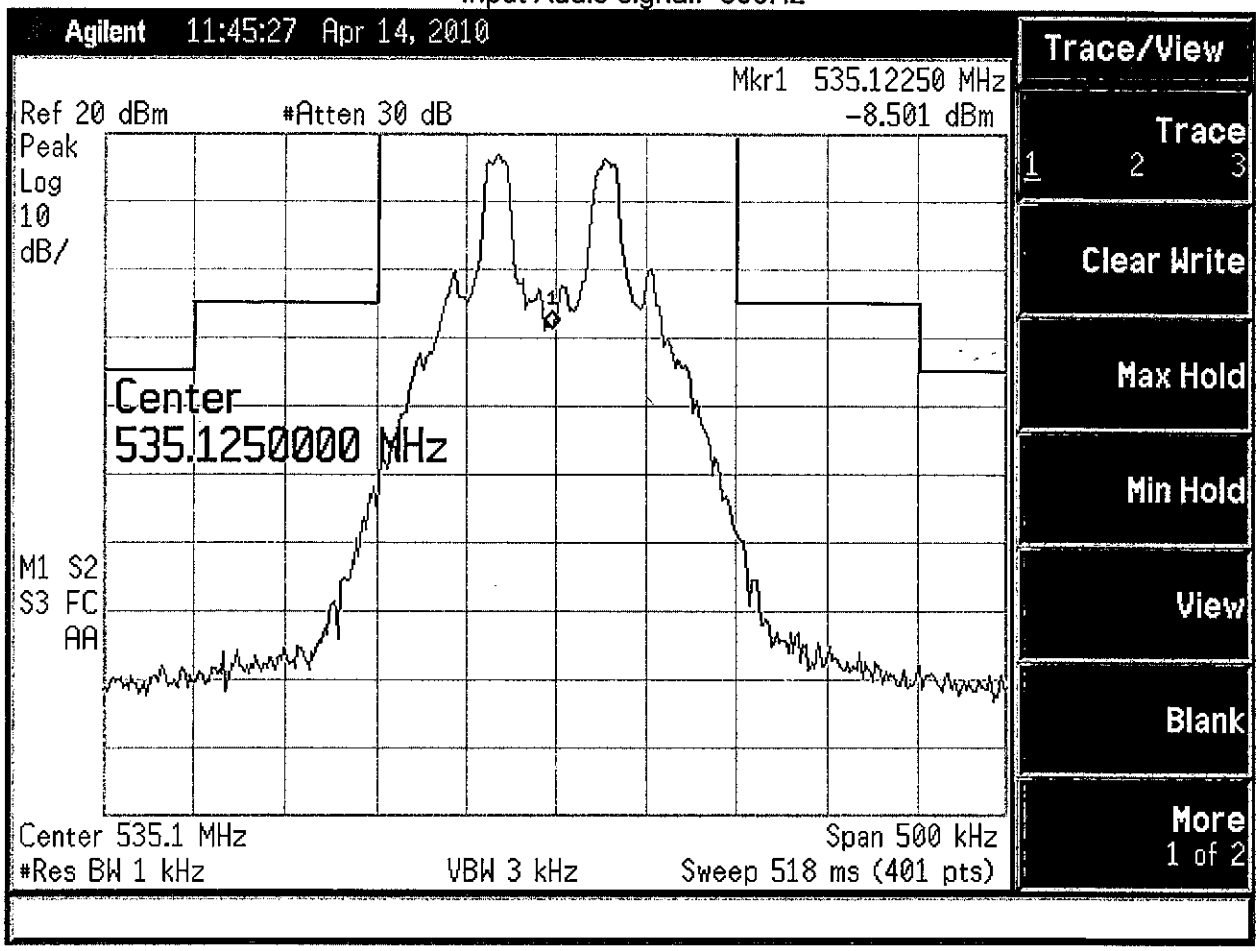


Low frequency

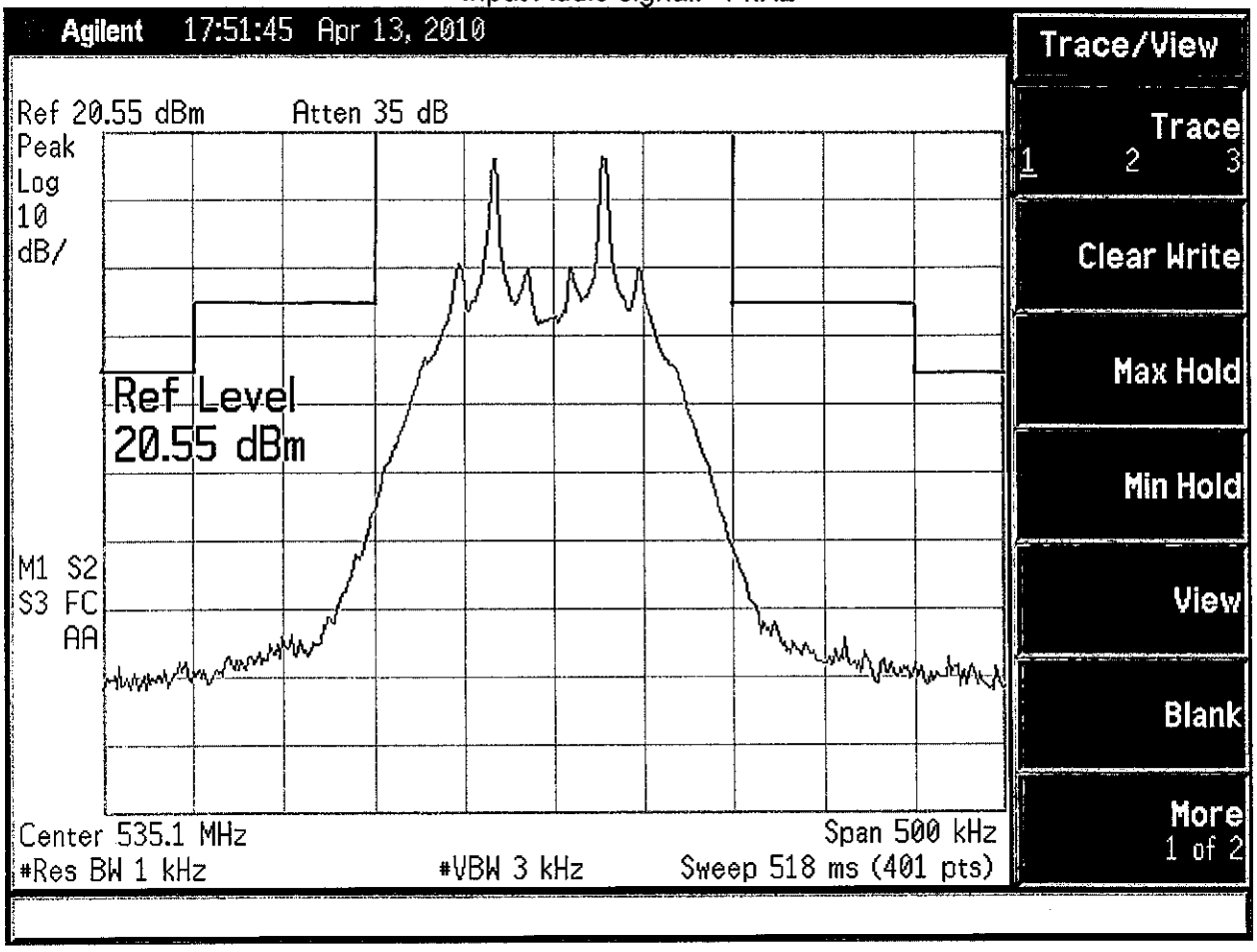
Unmodulated RF carrier



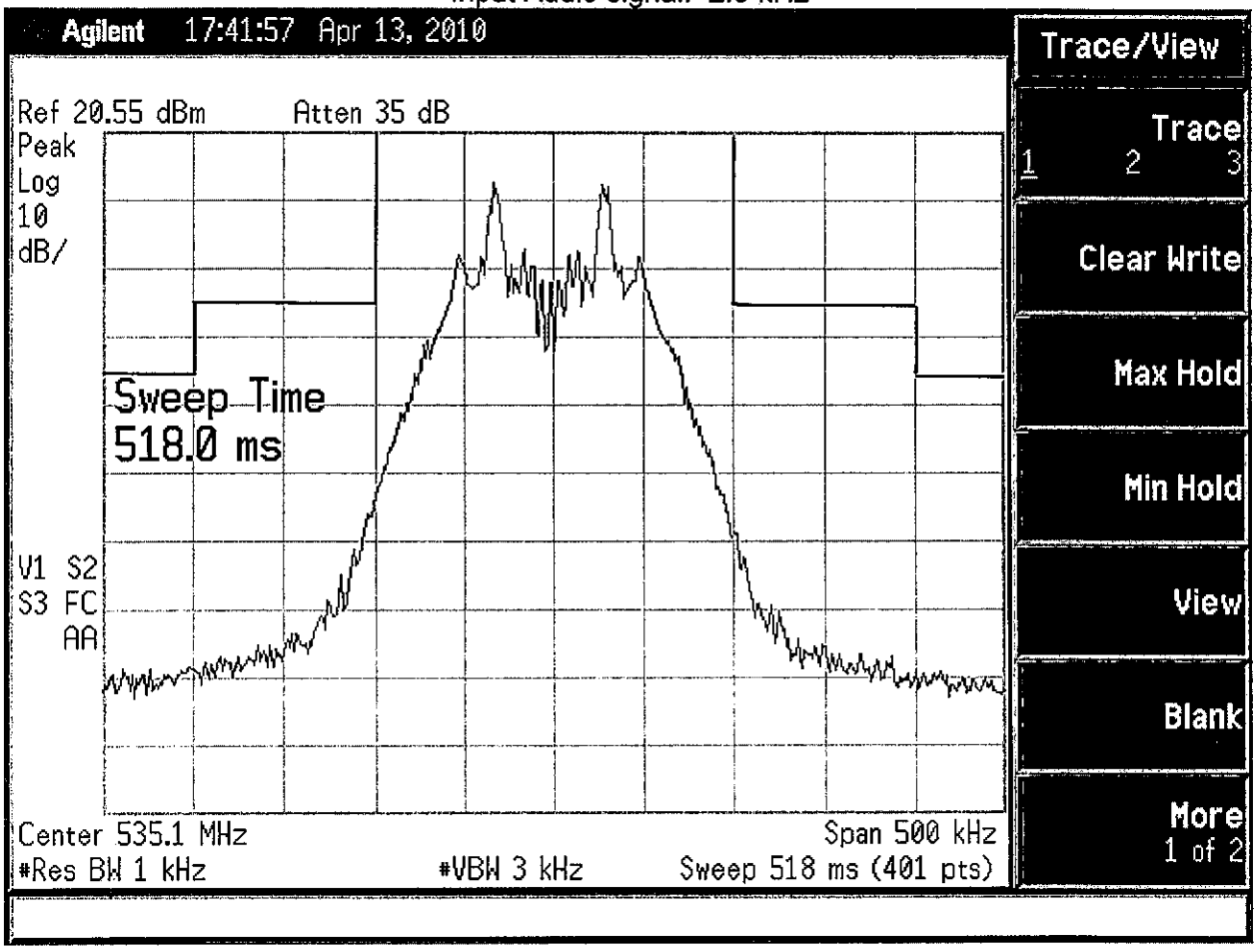
Input Audio signal: 300Hz



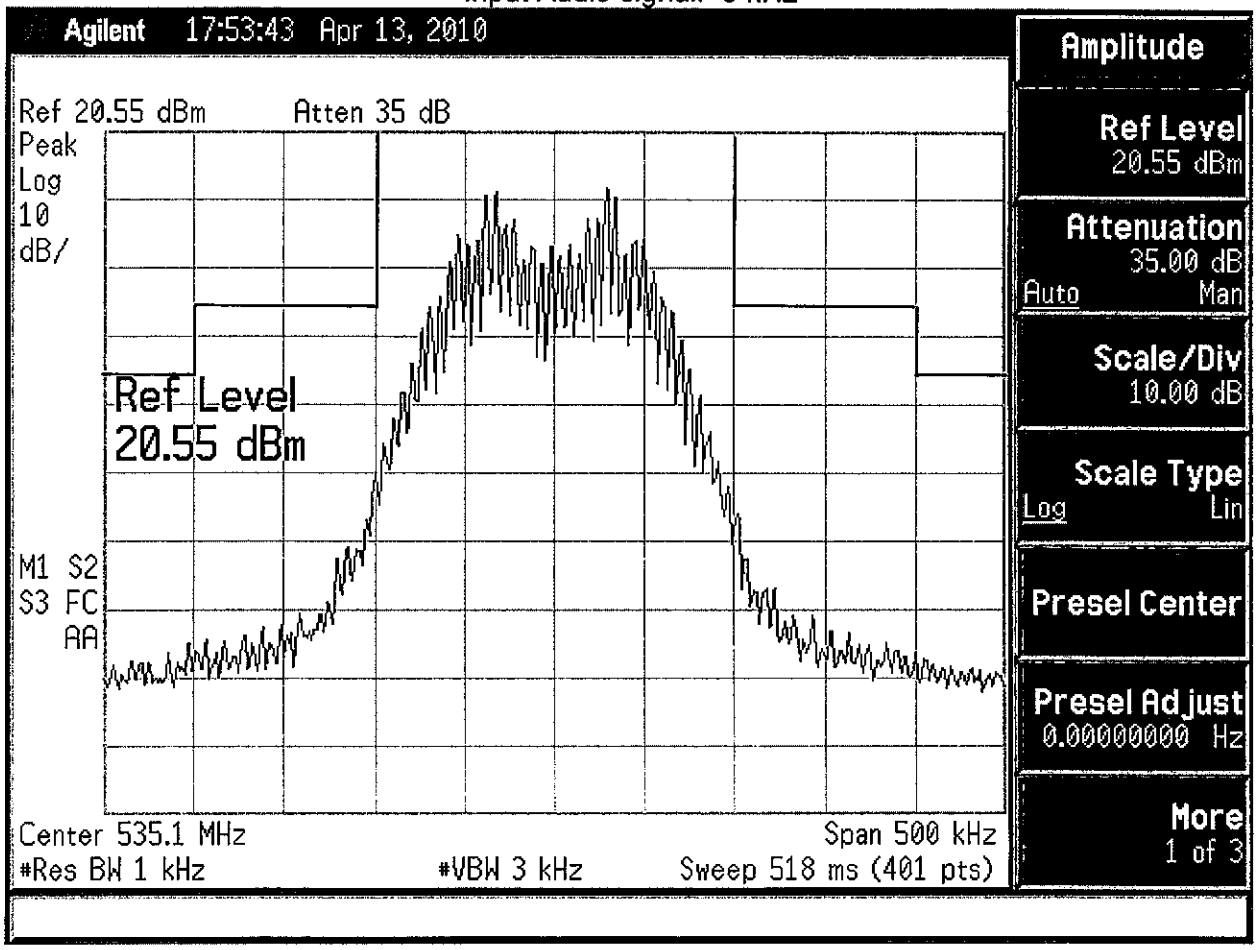
Input Audio signal: 1 kHz



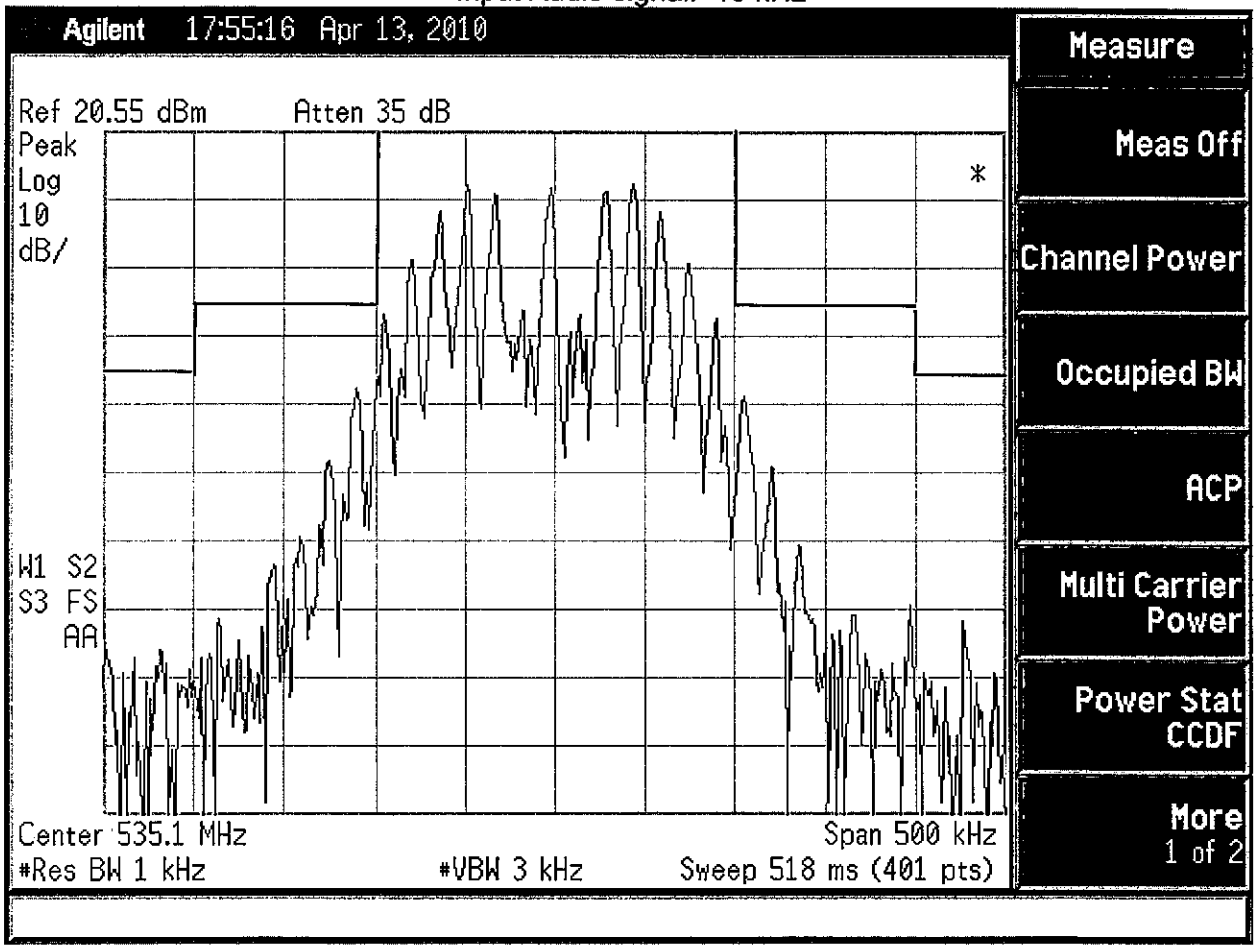
Input Audio signal: 2.5 kHz



Input Audio signal: 5 kHz



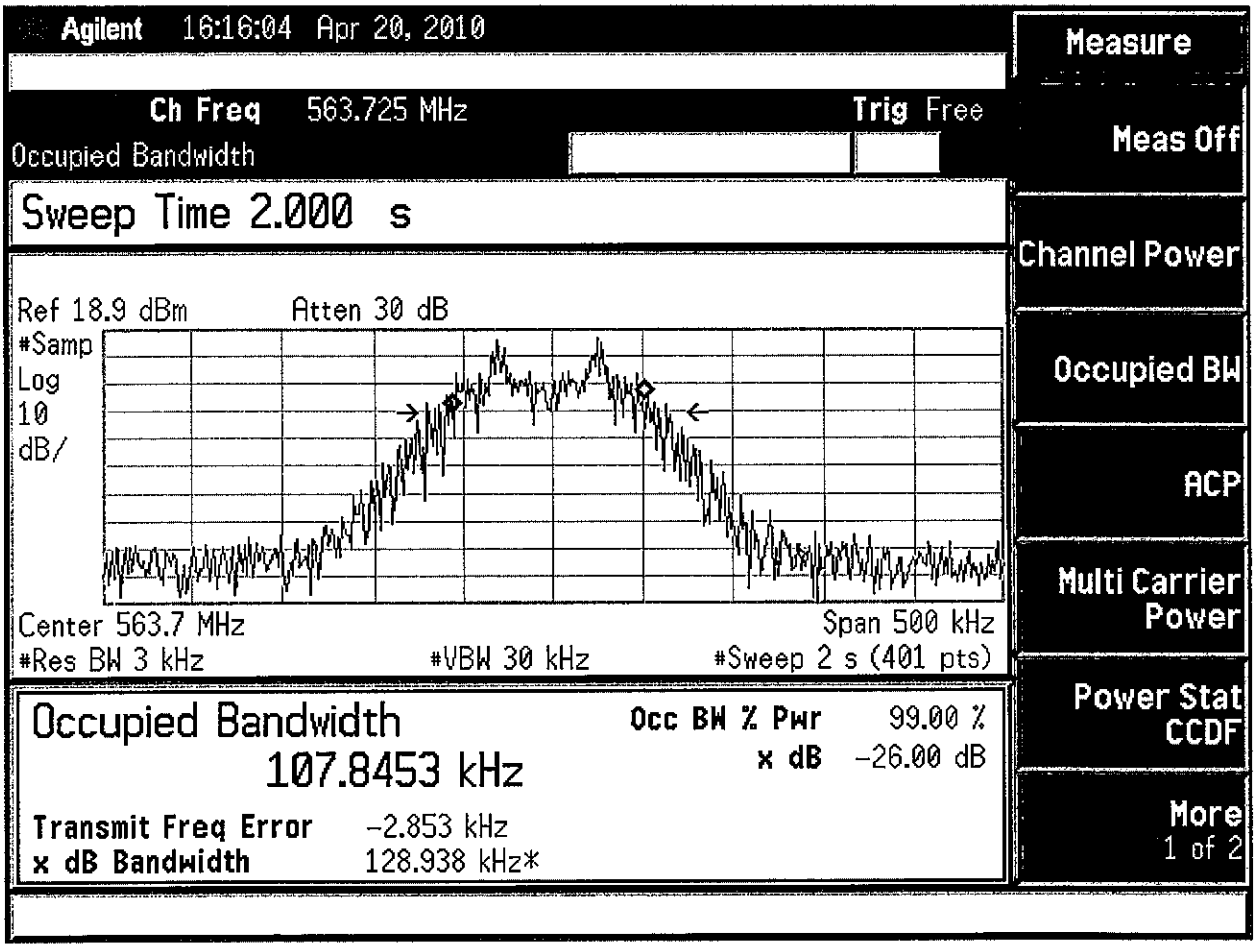
Input Audio signal: 15 kHz



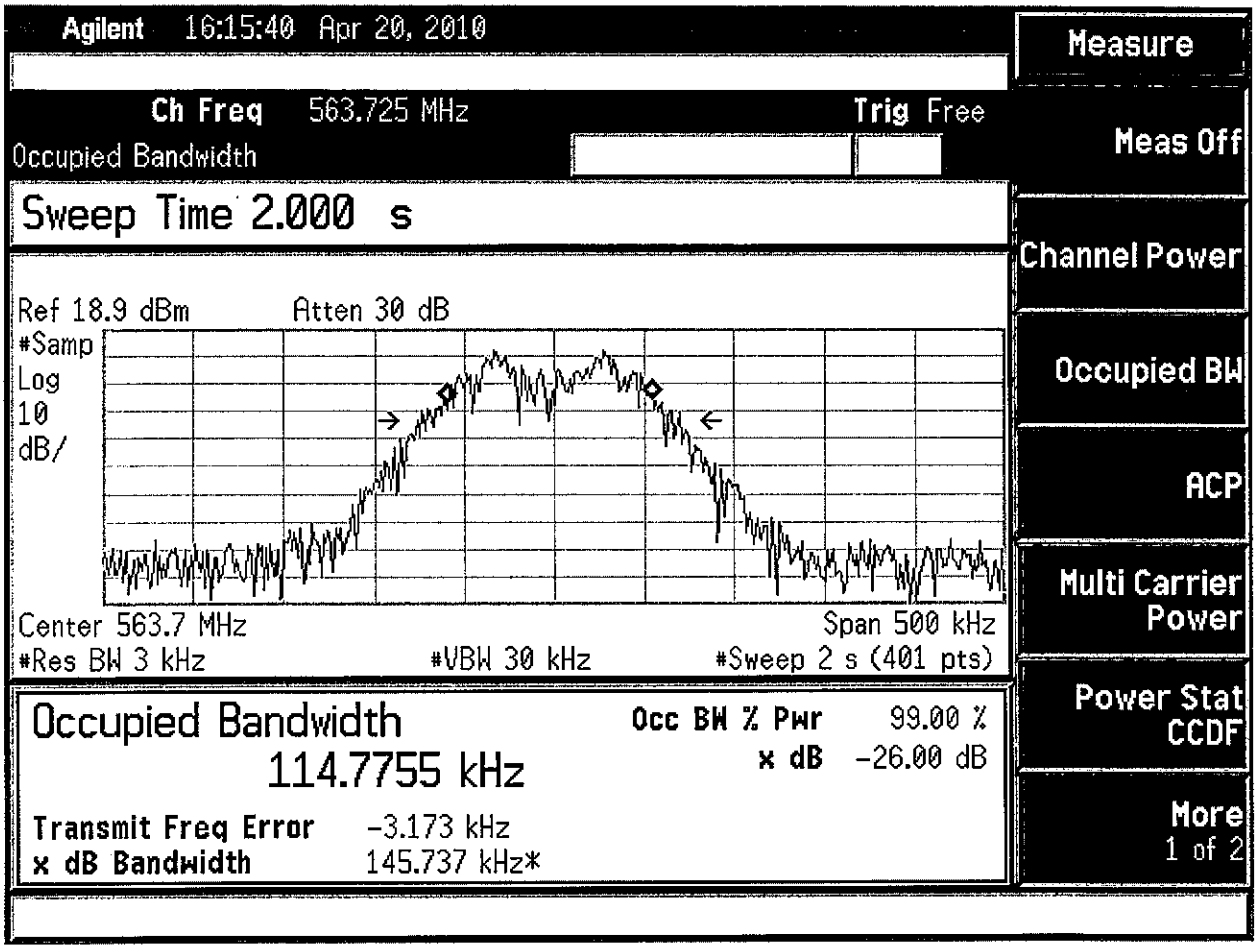
99% emitted energy Occupied Bandwidth:

High channel

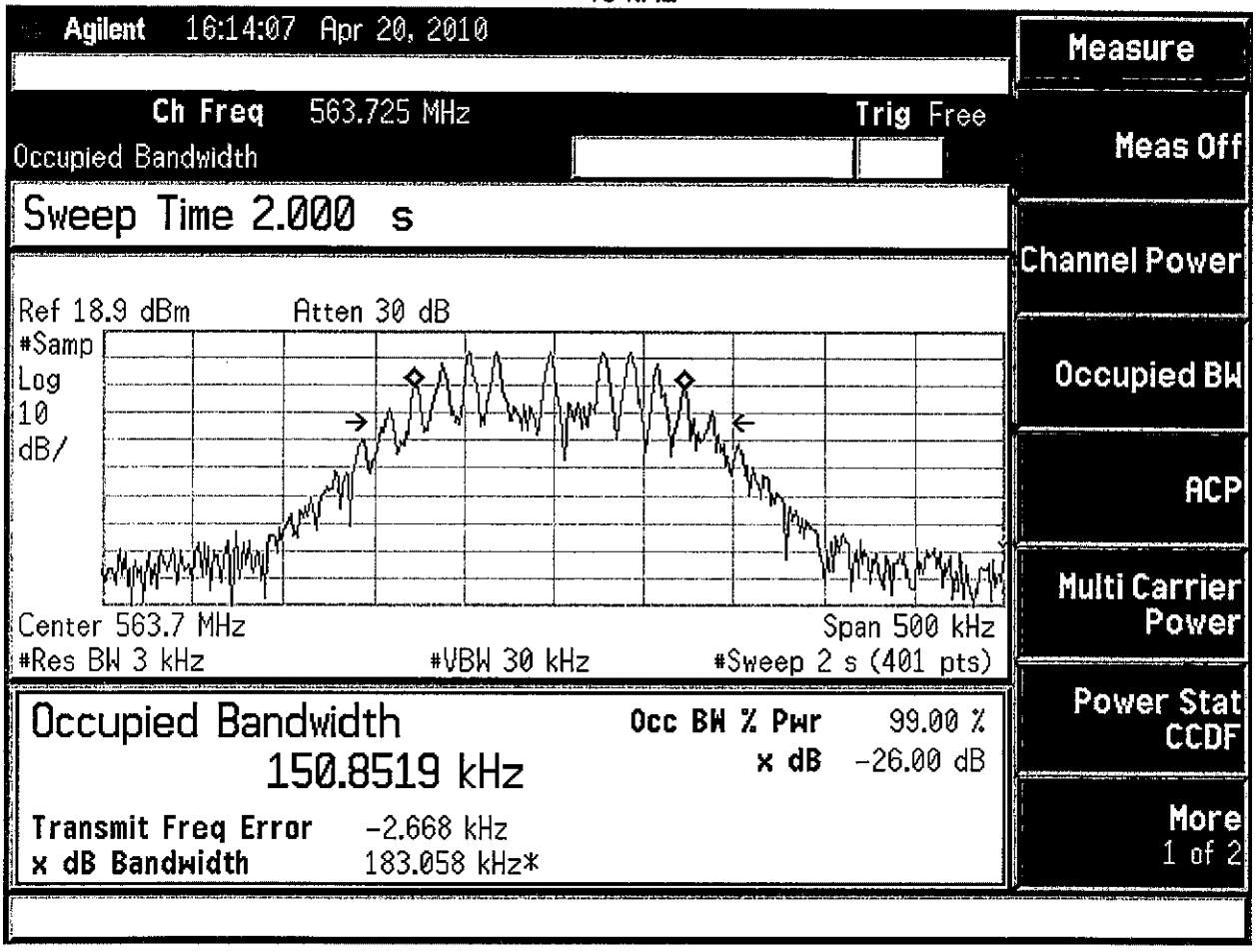
2500 kHz



5 kHz

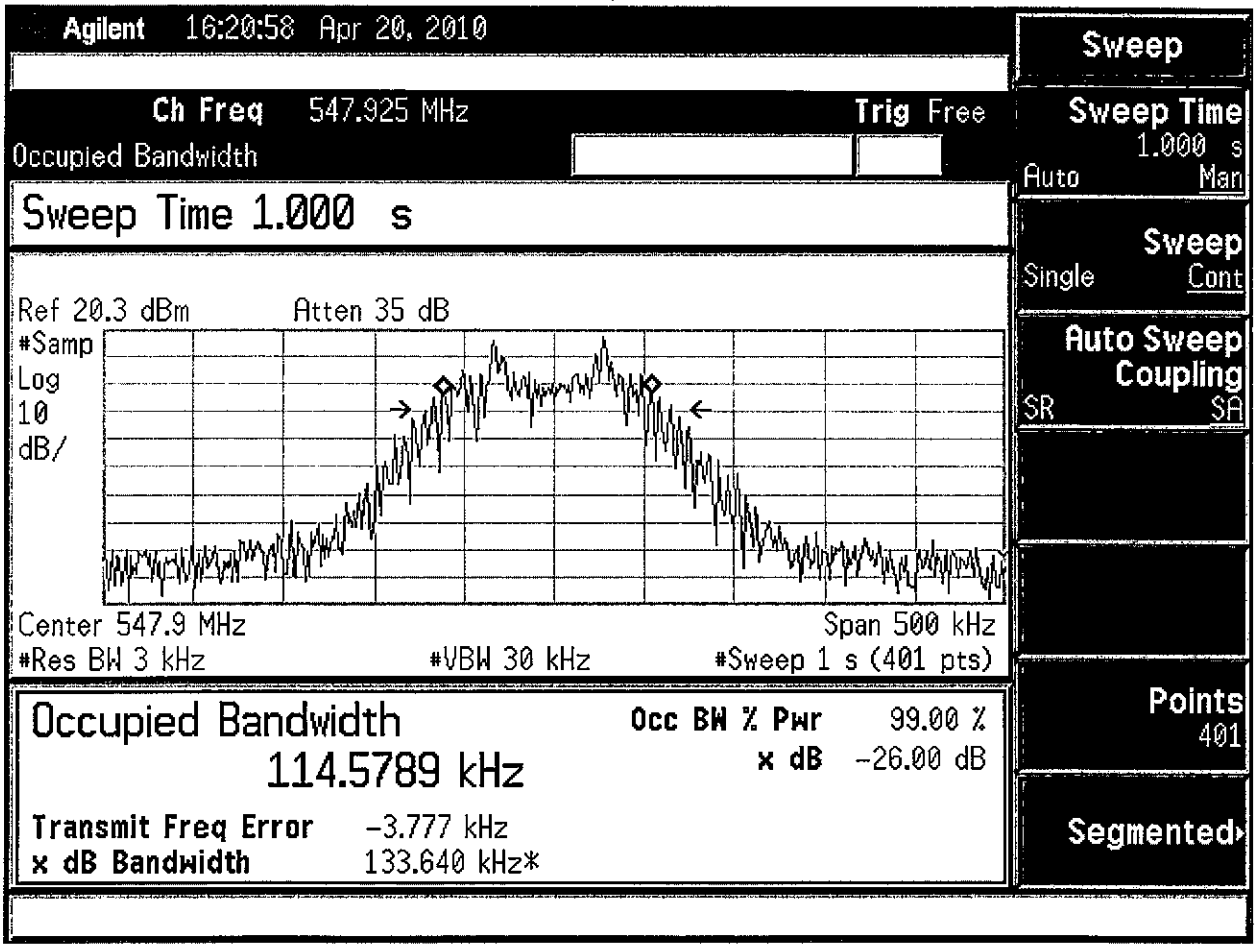

Agilent 16:15:40 Apr 20, 2010
Ch Freq 563.725 MHz
Trig Free
Occupied Bandwidth
Sweep Time 2.000 s
Ref 18.9 dBm
Atten 30 dB
#Samp
Log
10
dB/
Center 563.7 MHz
Span 500 kHz
#Res BW 3 kHz
#VBW 30 kHz
#Sweep 2 s (401 pts)
Occupied Bandwidth
114.7755 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -3.173 kHz
x dB Bandwidth 145.737 kHz*
Measure
Meas Off
Channel Power
Occupied BW
ACP
Multi Carrier Power
Power Stat CCDF
More 1 of 2

15 kHz

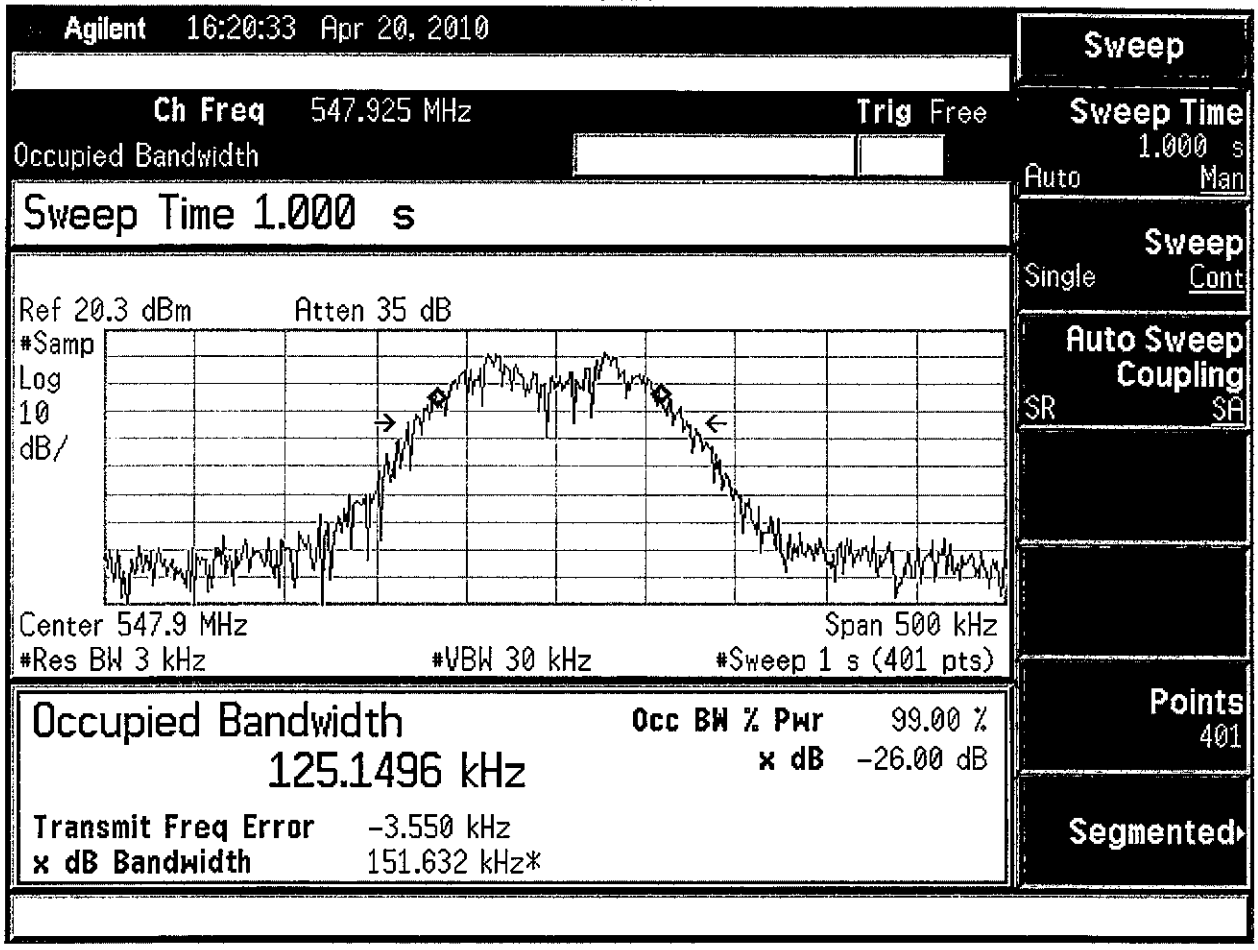

Agilent 16:14:07 Apr 20, 2010
Ch Freq 563.725 MHz
Trig Free
Occupied Bandwidth
Sweep Time 2.000 s
Ref 18.9 dBm
Atten 30 dB
#Samp
Log
10
dB/
Center 563.7 MHz
Span 500 kHz
#Res BW 3 kHz
#VBW 30 kHz
#Sweep 2 s (401 pts)
Occupied Bandwidth
150.8519 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -2.668 kHz
x dB Bandwidth 183.058 kHz*
Measure
Meas Off
Channel Power
Occupied BW
ACP
Multi Carrier Power
Power Stat CCDF
More 1 of 2

Middle channel

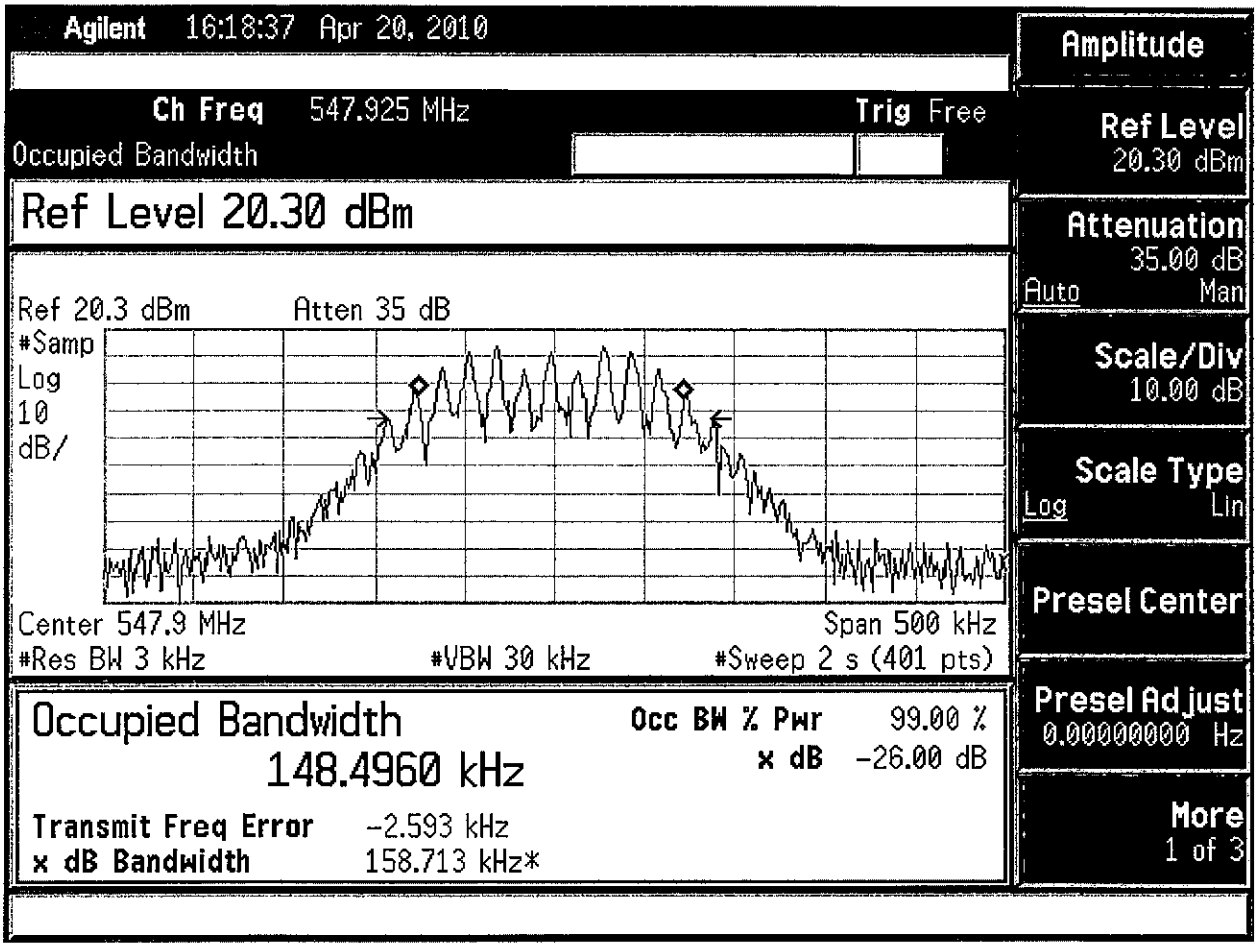
2.5 kHz



5 kHz

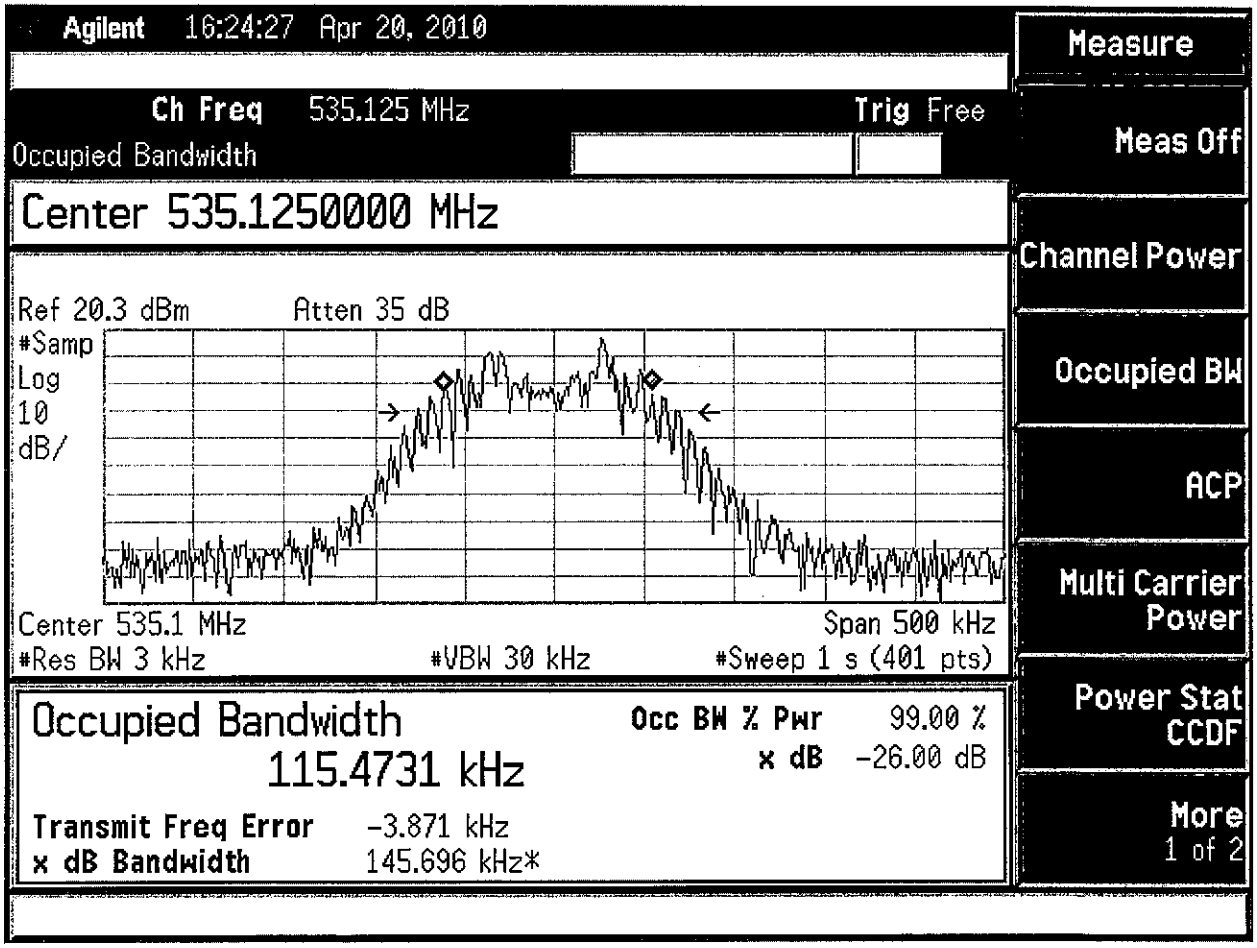

Agilent 16:20:33 Apr 20, 2010
Ch Freq 547.925 MHz
Trig Free
Occupied Bandwidth
Sweep Time 1.000 s
Ref 20.3 dBm
Atten 35 dB
#Samp
Log
10
dB/
Center 547.9 MHz
Span 500 kHz
#Res BW 3 kHz
#VBW 30 kHz
#Sweep 1 s (401 pts)
Occupied Bandwidth
125.1496 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -3.550 kHz
x dB Bandwidth 151.632 kHz*
Sweep
Sweep Time 1.000 s
Auto Man
Sweep
Single Cont
Auto Sweep Coupling
SR SA
Points 401
Segmented

15 kHz

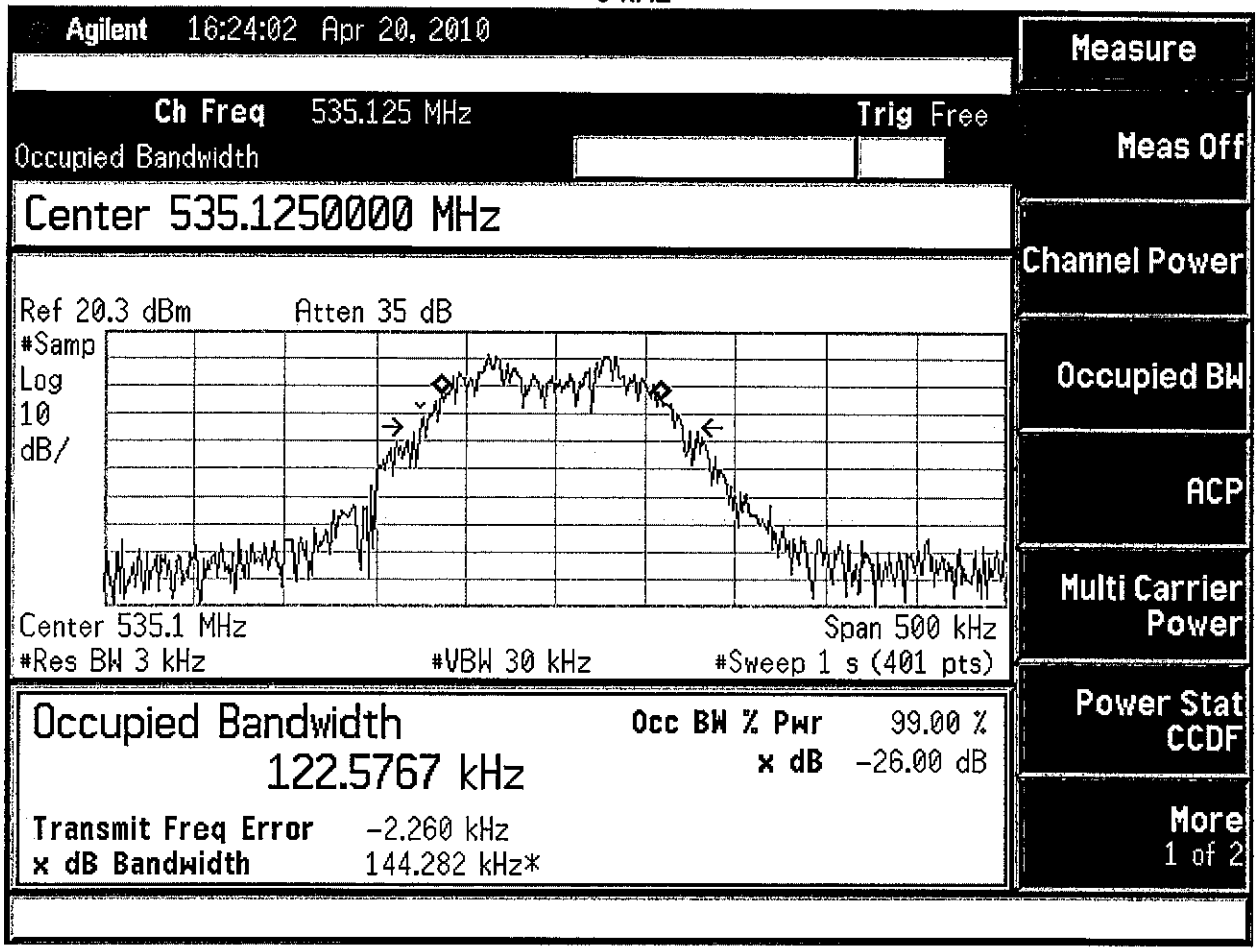

Agilent 16:18:37 Apr 20, 2010
Ch Freq 547.925 MHz
Trig Free
Occupied Bandwidth
Ref Level 20.30 dBm
Ref 20.3 dBm
Atten 35 dB
#Samp
Log
10
dB/
Center 547.9 MHz
Span 500 kHz
#Res BW 3 kHz
#VBW 30 kHz
#Sweep 2 s (401 pts)
Occupied Bandwidth
148.4960 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -2.593 kHz
x dB Bandwidth 158.713 kHz*
Amplitude
Ref Level
20.30 dBm
Attenuation
35.00 dB
Auto Man
Scale/Div
10.00 dB
Scale Type
Log Lin
Presel Center
Presel Adjust
0.00000000 Hz
More
1 of 3

Low channel

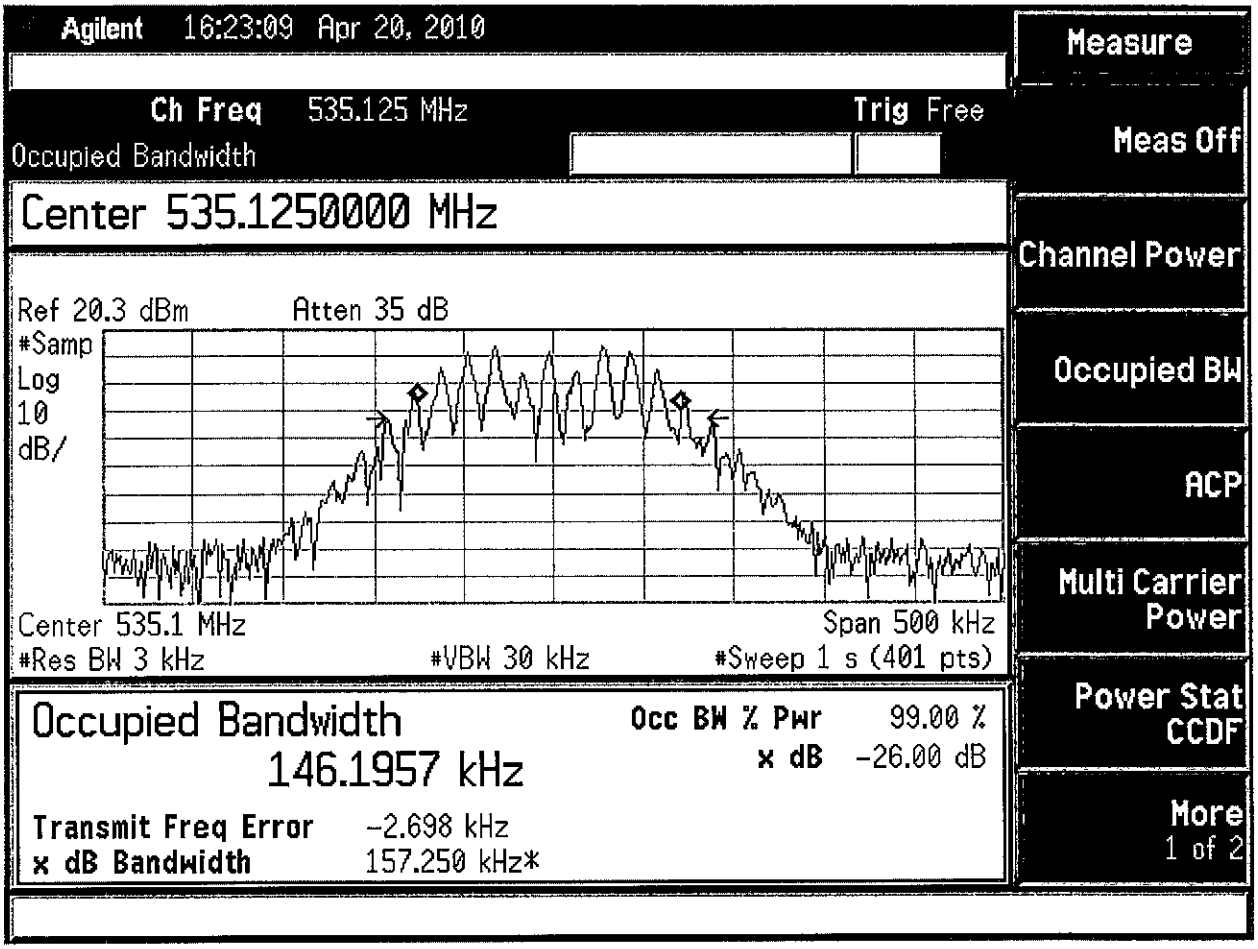
2.5 kHz



5 kHz


Agilent 16:24:02 Apr 20, 2010
Ch Freq 535.125 MHz
Trig Free
Occupied Bandwidth
Center 535.1250000 MHz
Ref 20.3 dBm
Atten 35 dB
#Samp
Log
10
dB/
Center 535.1 MHz
#Res BW 3 kHz
#VBW 30 kHz
Span 500 kHz
#Sweep 1 s (401 pts)
Occupied Bandwidth
122.5767 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -2.260 kHz
x dB Bandwidth 144.282 kHz*
Measure
Meas Off
Channel Power
Occupied BW
ACP
Multi Carrier Power
Power Stat CCDF
More 1 of 2

15 kHz


Agilent 16:23:09 Apr 20, 2010
Ch Freq 535.125 MHz
Trig Free
Occupied Bandwidth
Center 535.1250000 MHz
Ref 20.3 dBm
Atten 35 dB
#Samp
Log
10
dB/
Center 535.1 MHz
#Res BW 3 kHz
#VBW 30 kHz
Span 500 kHz
#Sweep 1 s (401 pts)
Occupied Bandwidth
146.1957 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -2.698 kHz
x dB Bandwidth 157.250 kHz*
Measure
Meas Off
Channel Power
Occupied BW
ACP
Multi Carrier Power
Power Stat CCDF
More 1 of 2