FCC CFR47 CERTIFICATION

PART 22H and 24E

TEST REPORT

FOR

DUAL-BAND TRI-MODE PCS/AMPS/CDMA CELLULAR PHONE

MODEL NUMBER: VT-7U

FCC ID: GKRVT-7U

REPORT NUMBER: 04I2845-1

ISSUE DATE: OCTOBER 25, 2004

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1. TEST RESULT CERTIFICATION

COMPANY NAME: COMPAL ELECTRONICS, INC.

EUT DESCRIPTION: DUAL-BAND TRI-MODE PCS/AMPS/CDMA CELLULAR PHONE

MODEL NUMBER: VT-7U

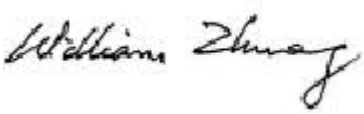
DATE TESTED: 9/17/2004 –10/25/2004

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 22 Subpart H and 24 Subpart E

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 22 Subpart H-Cellular Radiotelephone Service and 24 Subpart E-Broadband PCS. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Tested By:



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Released For CCS By:

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2. EUT DESCRIPTION

This equipment is a Dual-band and tri-mode (PCS-CDMA/Cellular-CDMA/AMPS) portable mobile station of which frequency range are 1850 ~1990MHz and 824～894MHz. It has an antenna gain of 1dBi, which has an output power of 24.3dBm (AMPS, ERP), 26.1dBm (CDMA, ERP), and 29.3dBm (PCS, EIRP).

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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7. TEST SETUP, PROCEDURE AND RESULT

7.1. SECTION 2.1046: RF POWER OUTPUT

INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Peak / Average Power Sensor	**Agilent**	**E9327A**	**US40440755**	**11/7/2004**
Peak Power Meter	**Agilent**	**E4416A**	**GB41291160**	**11/7/2004**
EMI Receiver, 9 kHz ~ 2.9 GHz	**HP**	**8542E**	**3942A00286**	**11/20/2004**
RF Filter Section	**HP**	**85420E**	**3705A00256**	**11/20/2004**
Spectrum Analyzer 20 Hz ~ 44 GHz	**Agilent**	**E4446A**	**US42070220**	**1/13/2005**
Signal Generator, 2 ~ 40 GHz	**R & S**	**SMP04**	**DE 34210**	**5/25/2005**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**2238**	**2/4/2005**
Antenna, Tuned Dipoe	**CDI**	**ROBERTS**	**117**	**5/15/2005**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**6717**	**2/4/2005**

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MEASUREMENT PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.

3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be placed 0.80 meter above the ground plane, the X, Y, and Z positions shall be tested and the worst case reported. The transmitter shall be switched on with typical modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

8). The maximum signal level detected by the measuring receiver shall be noted.

9). The transmitter shall be replaced by a tuned dipole (substitution antenna).

10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

11). The substitution antenna shall be connected to a calibrated signal generator.

12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

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14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

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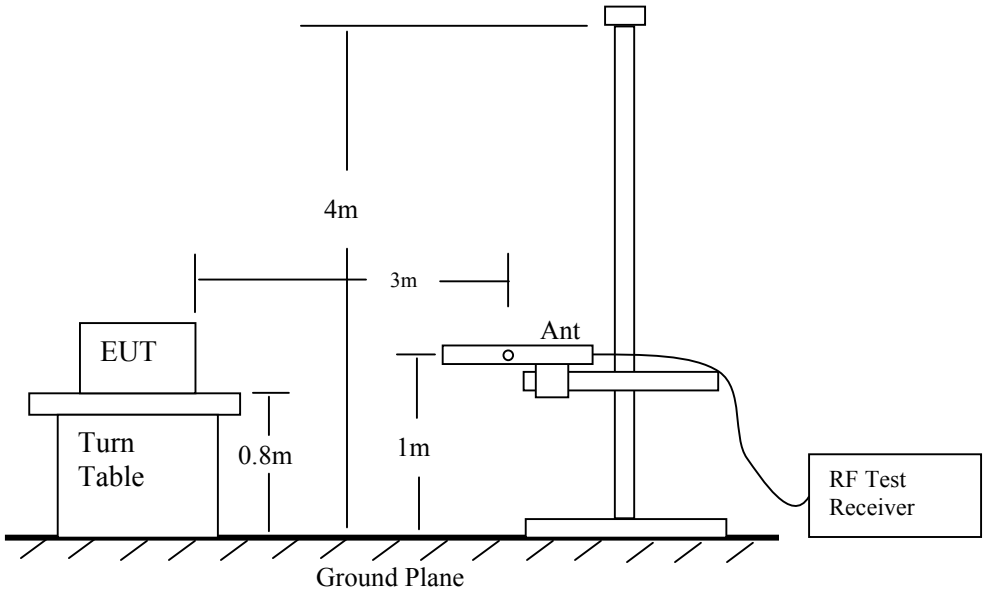
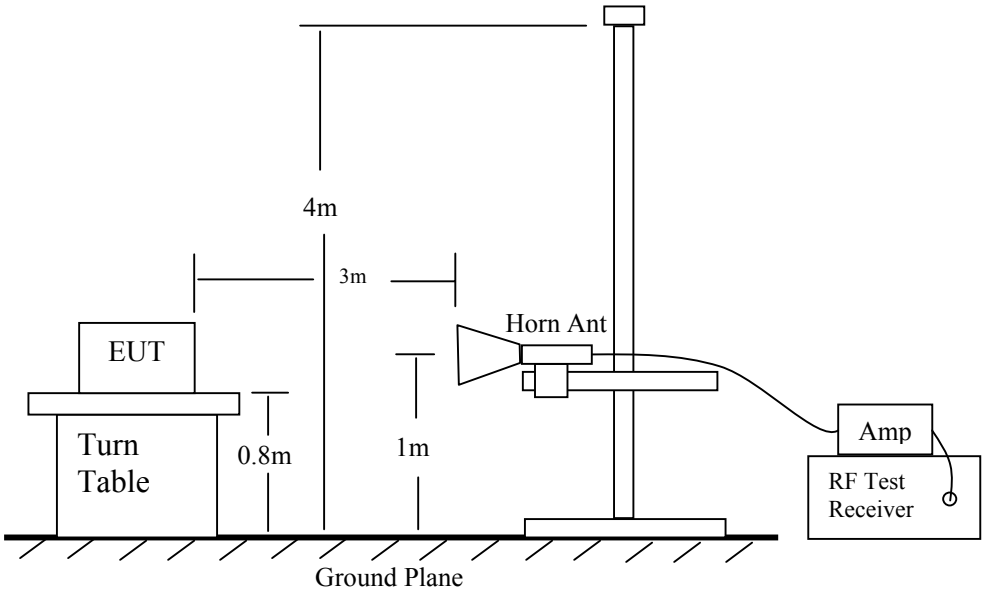


Radiated Emission Measurement 30 to 1000 MHz



Radiated Emission Above 1000 MHz

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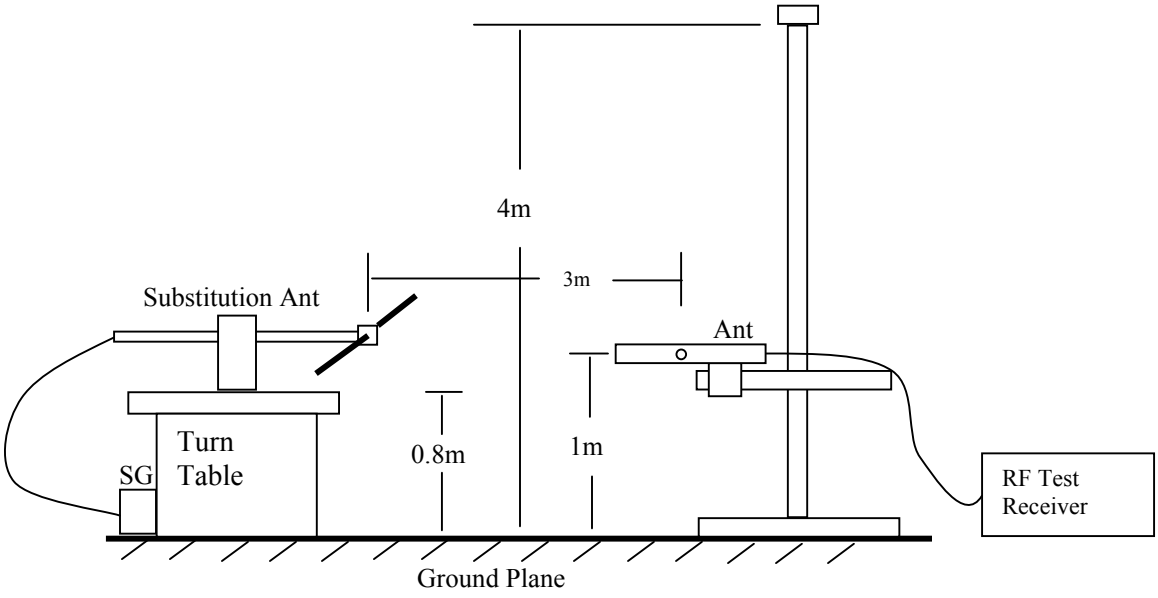
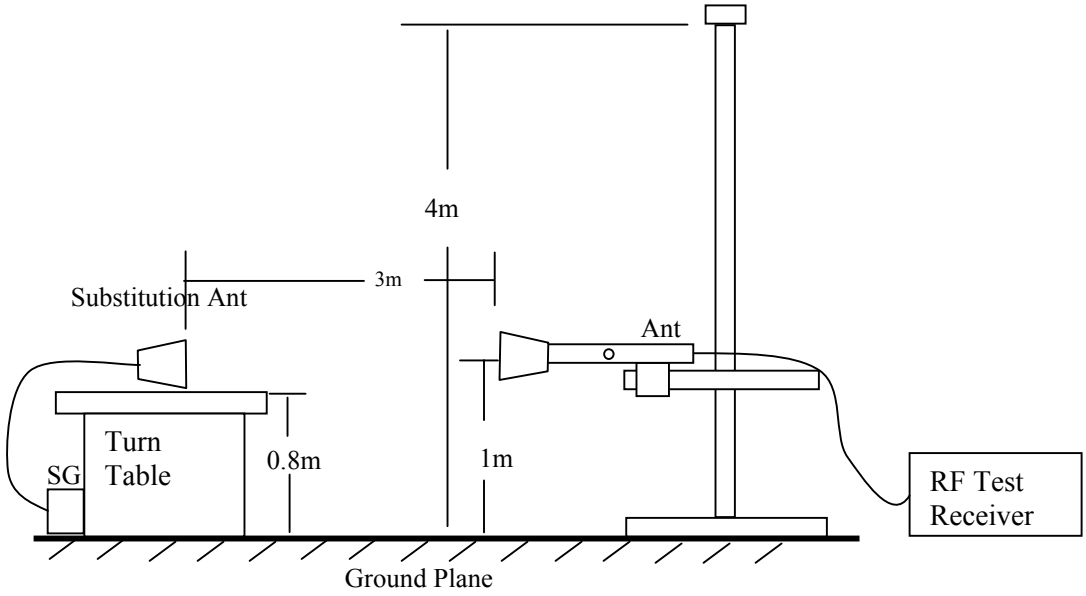


Radiated Emission – Substitution Method Set-up



Radiated Emission – Substitution Method Set-up

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X position:

Y position:

Z position:

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Test result:

AMPS Output Power (ERP):

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Channel										
824.04	94.0	H	23.2	3.4	6.7	4.6	24.3	38.5	-14.1	
824.04	87.0	V	16.7	3.4	6.7	4.6	17.8	38.5	-20.7	
Mid Channel										
836.59	92.5	H	21.8	3.5	6.7	4.6	22.9	38.5	-15.5	
836.59	86.8	V	16.6	3.5	6.7	4.6	17.7	38.5	-20.7	
High Channel										
848.97	93.5	H	23.0	3.5	6.7	4.6	24.1	38.5	-14.4	
848.97	90.0	V	20.0	3.5	6.7	4.6	21.0	38.5	-17.4	

RBW = VBW = 1MHz

CDMA Output Power (ERP):

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Channel										
824.98	93.9	H	23.1	3.4	6.7	4.6	24.2	38.5	-14.2	
824.98	90.5	V	20.2	3.4	6.7	4.6	21.3	38.5	-17.2	
Mid Channel										
835.89	94.0	H	23.3	3.5	6.7	4.6	24.4	38.5	-14.0	
835.89	92.0	V	21.8	3.5	6.7	4.6	22.9	38.5	-15.5	
High Channel										
848.31	95.5	H	25.0	3.5	6.7	4.6	26.1	38.5	-12.4	
848.31	90.5	V	20.5	3.5	6.7	4.6	21.5	38.5	-16.9	

RBW=VBW=3MHz

PCS Output Power (ERP):

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Channel										
1.852	90.5	H	22.8	1.4	7.8	5.7	29.3	33.0	-3.7	
1.852	86.5	V	18.1	1.4	7.8	5.7	24.6	33.0	-8.4	
Mid Channel										
1.880	89.0	H	21.5	1.4	7.9	5.7	28.0	33.0	-5.0	
1.880	87.5	V	19.3	1.4	7.9	5.7	25.8	33.0	-7.2	
High Channel										
1.909	89.8	H	22.4	1.4	7.9	5.8	29.0	33.0	-4.0	
1.909	85.7	V	17.6	1.4	7.9	5.8	24.1	33.0	-8.9	

RBW = VBW = 3MHz

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Output Power:

AMPS

	Ch.#	Freq. (MHz)	Peak Power ERP (dBm)	Avg. Power Meter (dBm)	Setting
Low Ch.	991	824.04	24.3	26.60	53
Mid Ch.	383	836.49	22.9	26.59	52
High Ch.	799	848.97	24.1	26.65	51

RF Cable Loss: 0.5 dB

CDMA

	Ch.#	Freq. (MHz)	Peak Power ERP (dBm)	Avg. Power Meter (dBm)	Setting
Low Ch.	1015	824.70	24.2	24.08	126
Mid Ch.	363	835.89	24.4	24.03	126
High Ch.	775	848.31	26.1	24.05	127

RF Cable Loss: 0.5 dB

PCS

	Ch.#	Freq. (MHz)	Peak Power EIRP (dBm)	Avg. Power Meter (dBm)	Setting
Low Ch.	25	1851.25	29.3	23.56	128
Mid Ch.	600	1880.00	28.0	23.6	126
High Ch.	1175	1908.75	29.0	23.58	128

RF Cable Loss: 0.9 dB

Note: Antenna Gain is 1.0 dBi

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7.1. SECTION 2.1047: MODULATION CHARACTERISTICS

PROVISIONS APPLICABLE

According to CFR 47 section 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 22.915 (d) _ Audio Filter Characteristics

(1) For mobile stations, these signals must be attenuated, relative to the level at 1KHz, as follows:

- (i) In the frequency ranges of 3.0 to 5.9Khz and 6.1 to 15.0KHz, signals must be attenuated by at least 40 log (f / 3) dB, where f is the frequency of the signal in KHz.
- (ii) In the frequency ranges of 5.9 to 6.1KHz, signals must be attenuated at least 35dB.
- (iii) In the frequency ranges above 15KHz, signals must be attenuated at least 28dB.

MEASUREMENT METHOD

Modulation Limit

1). Configure the EUT as shown below, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0 dB) and vary the input level from -20 to +20 dB. Record the frequency deviation obtained as a function of the input level.

2). Repeat step 1 with input frequency changing to 300, 1004, 1500Hz, and 2500 Hz in sequence.

Audio Frequency Response

1). Configure the EUT as shown below.

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 100 Hz to 10 KHz and record the frequency deviation.

4). Audio Frequency Response = 20 $\log_{10}$ (Deviation of test frequency / Deviation of 1KHz reference).

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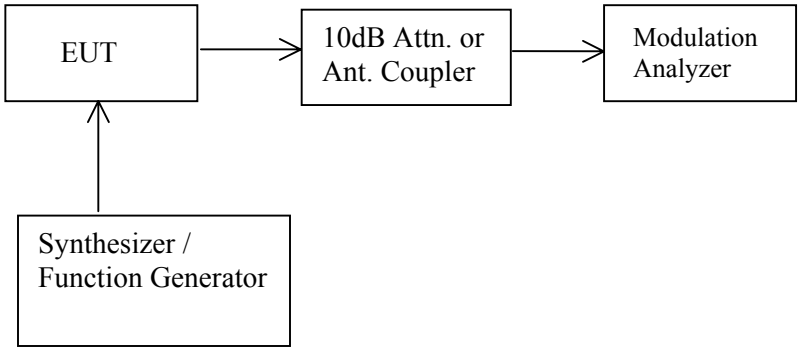
TETS SETUP



Modulation characteristic measurement configuration

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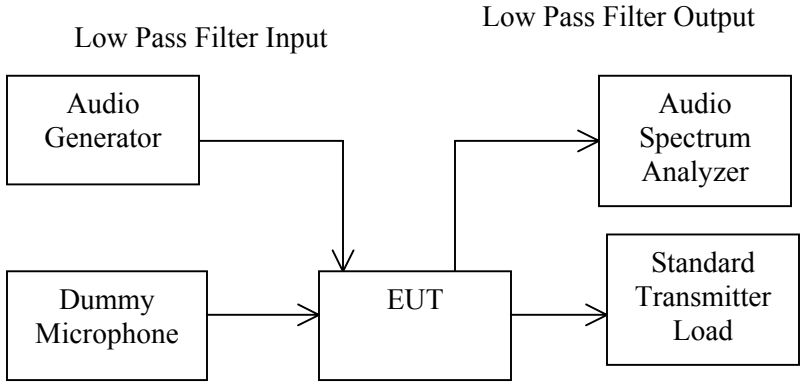
Audio Low Pass Filter Response

1). Configure the EUT as shown below.
2). Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
3). Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.
4). Apply 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.
5). Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV_{REF}.
6). Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.
7). Record audio spectrum analyzer levels, at the frequency in step 6).
8). Record the dB level on the audio spectrum analyzer as LEV_{FREQ}.
9). Calculate the audio frequency response at the test frequency as:
low pass filter response = LEV_{FREQ} - LEV_{REF}
10). Repeat the 6) through 9) for all the desired test frequencies.

TEST SETUP



Audio low pass filter response measurement configuration

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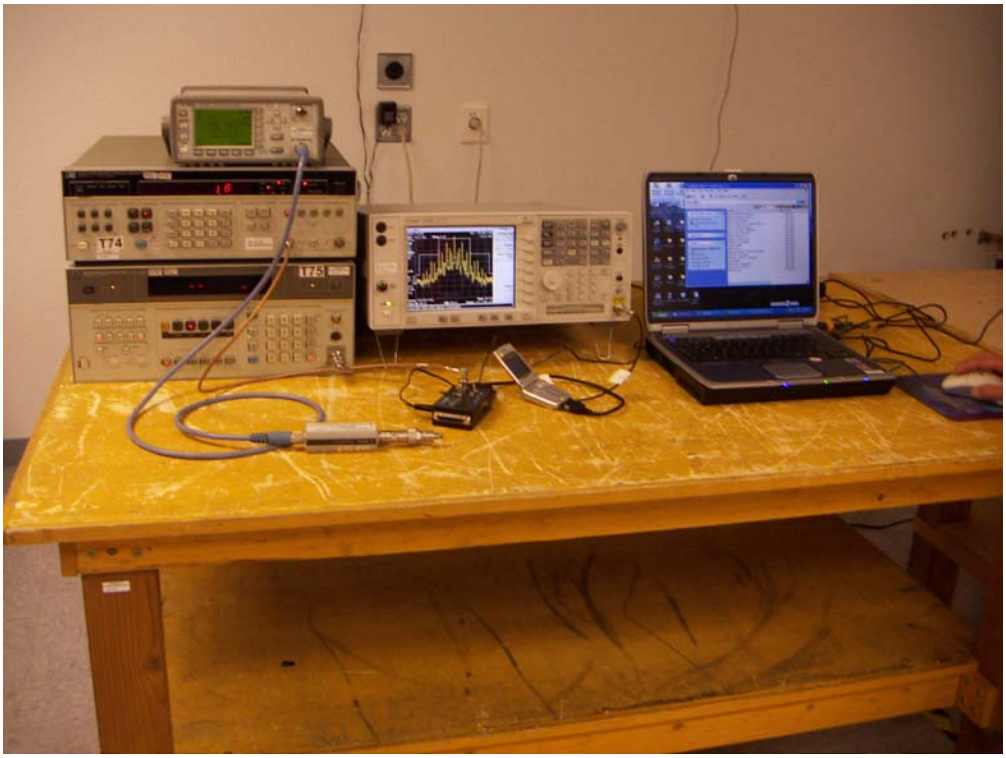

MEASUREMENT INSTRUMENT

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Spectrum Analyzer	**HP**	**E4446A**	**US42510266**	**7/23/2005**
Function Generator	**HP**	**3325A**	**2652A24749**	**5/8/2005**
Modulation Analyzer	**HP**	**8901B**	**3438A05272**	**6/23/2005**

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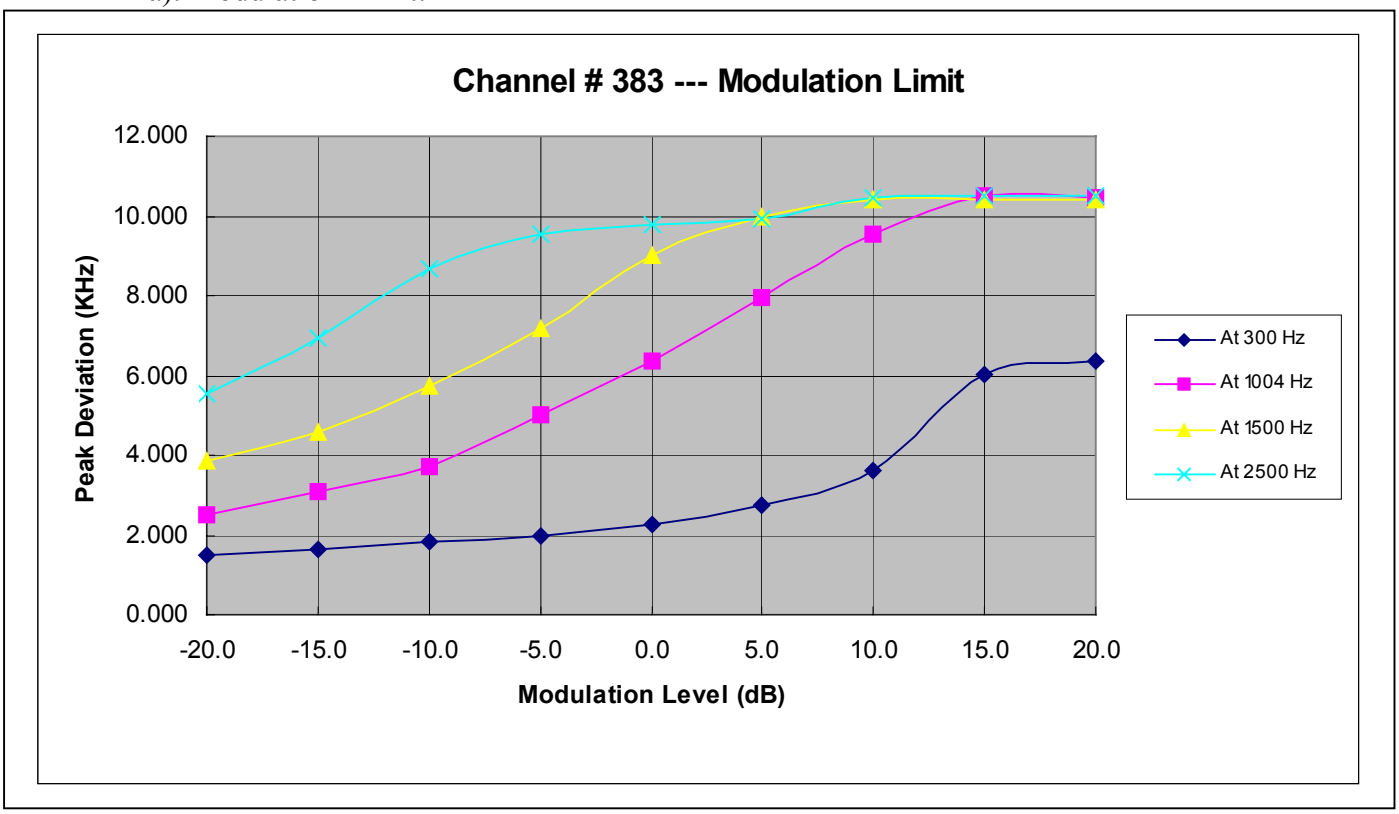
MEASUREMENT RESULT:

a). Modulation Limit:



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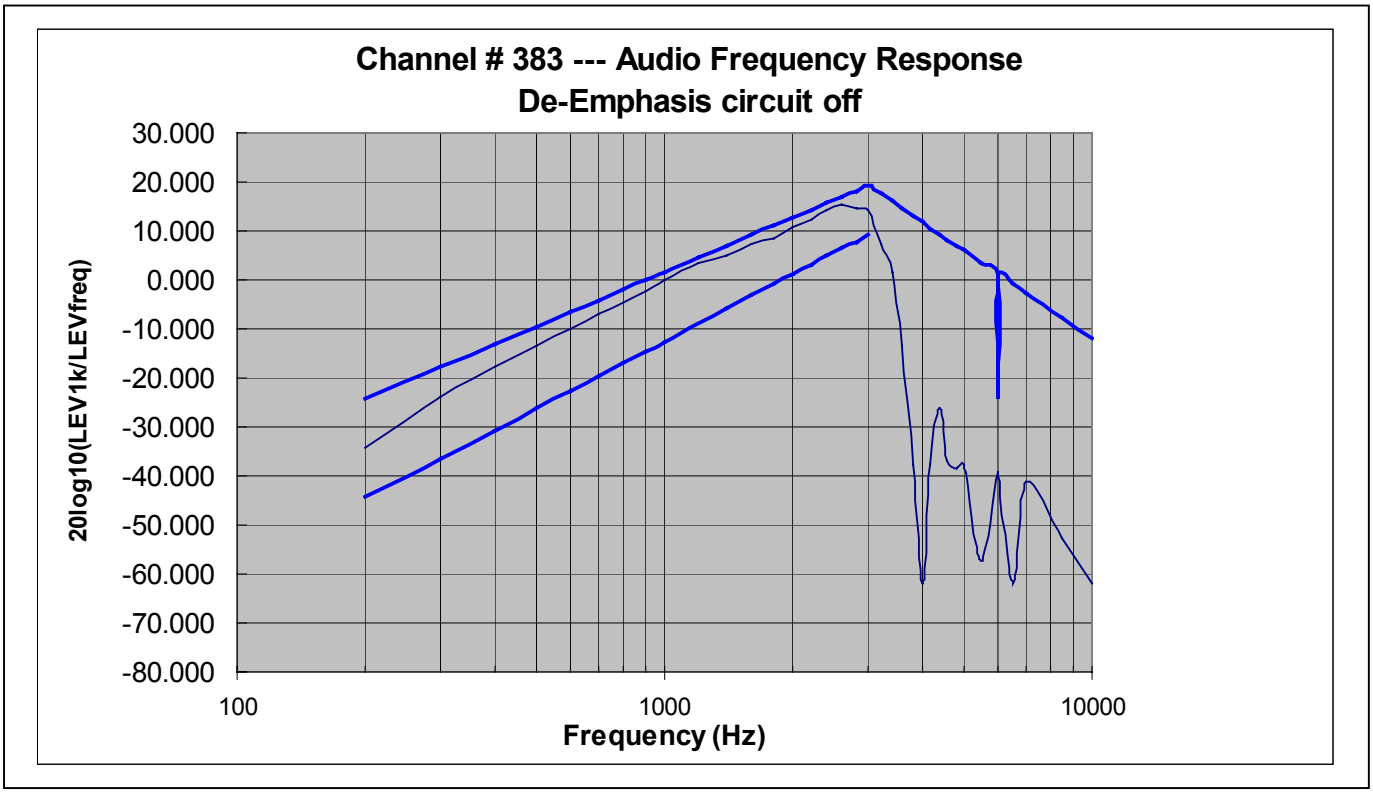
b). Audio Frequency Response:



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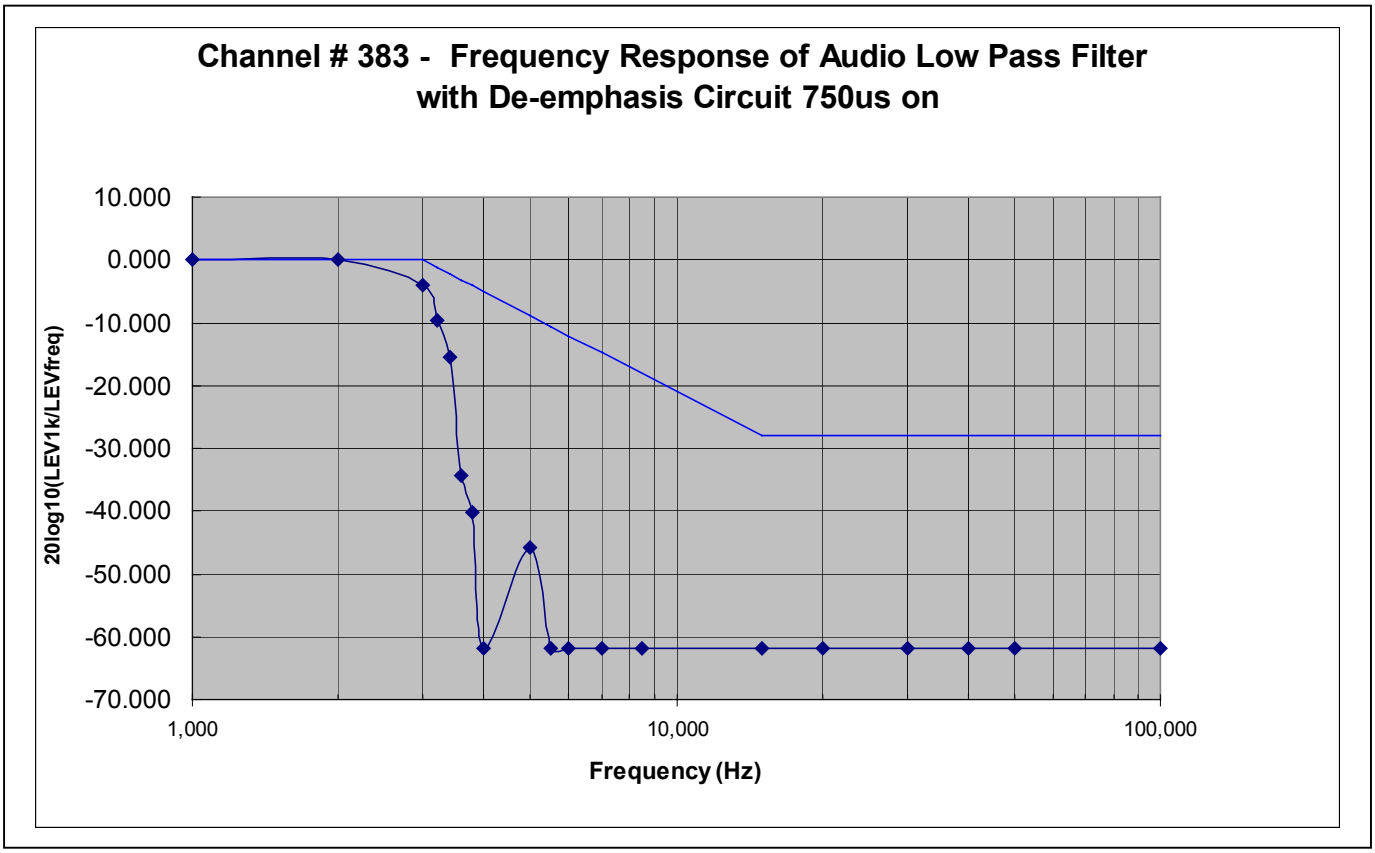
c). Audio low pass filter response:



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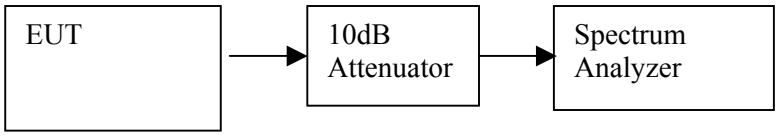
7.2. SECTION 2.1049: OCCUPIED BANDWIDTH

TEST SETUP



TEST PROCEDURE

The EUT's output RF connector (made solely for the purpose of the test) was connected with a short cable to the spectrum analyzer, RES BW was set to about 1% of emission BW , -26 dBc display line was placed on the screen (or 99% bandwidth), the occupied BW is the delta frequency between the two points where the display line intersects the signal trace.

RESULT

No non-compliance noted, reference only.

AMPS

Channel	Frequency (MHz)	99% BW (MHz)	-26dBc BW (MHz)
Low	824.05	0.0397027	0.04577
Middle	836.50	0.0395305	0.040594
High	848.98	0.0396498	0.040582

CDMA:

Channel	Frequency (MHz)	99% BW (MHz)	-26dBc BW (MHz)
Low	824.70	1.2585	1.367
Middle	835.89	1.2610	1.407
High	848.31	1.2672	1.387

PCS:

Channel	Frequency (MHz)	99% BW (MHz)	-26dBc BW (MHz)
Low	1851.25	1.2655	1.363
Middle	1880	1.2668	1.386
High	1908.75	1.2717	1.354

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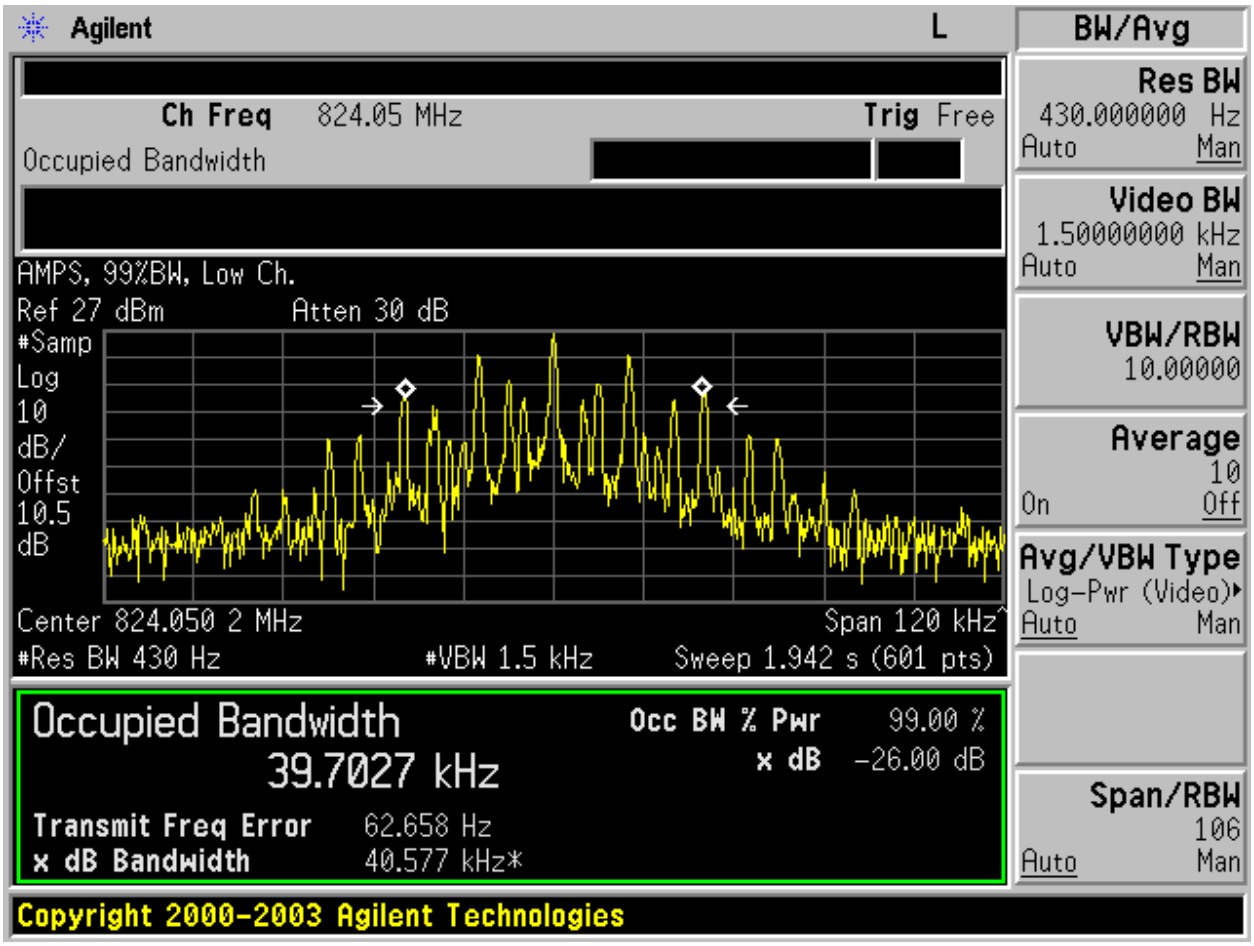
OCCUPIED BANDWIDTH FOR AMPS MODULATION

AMPS, Low Channel



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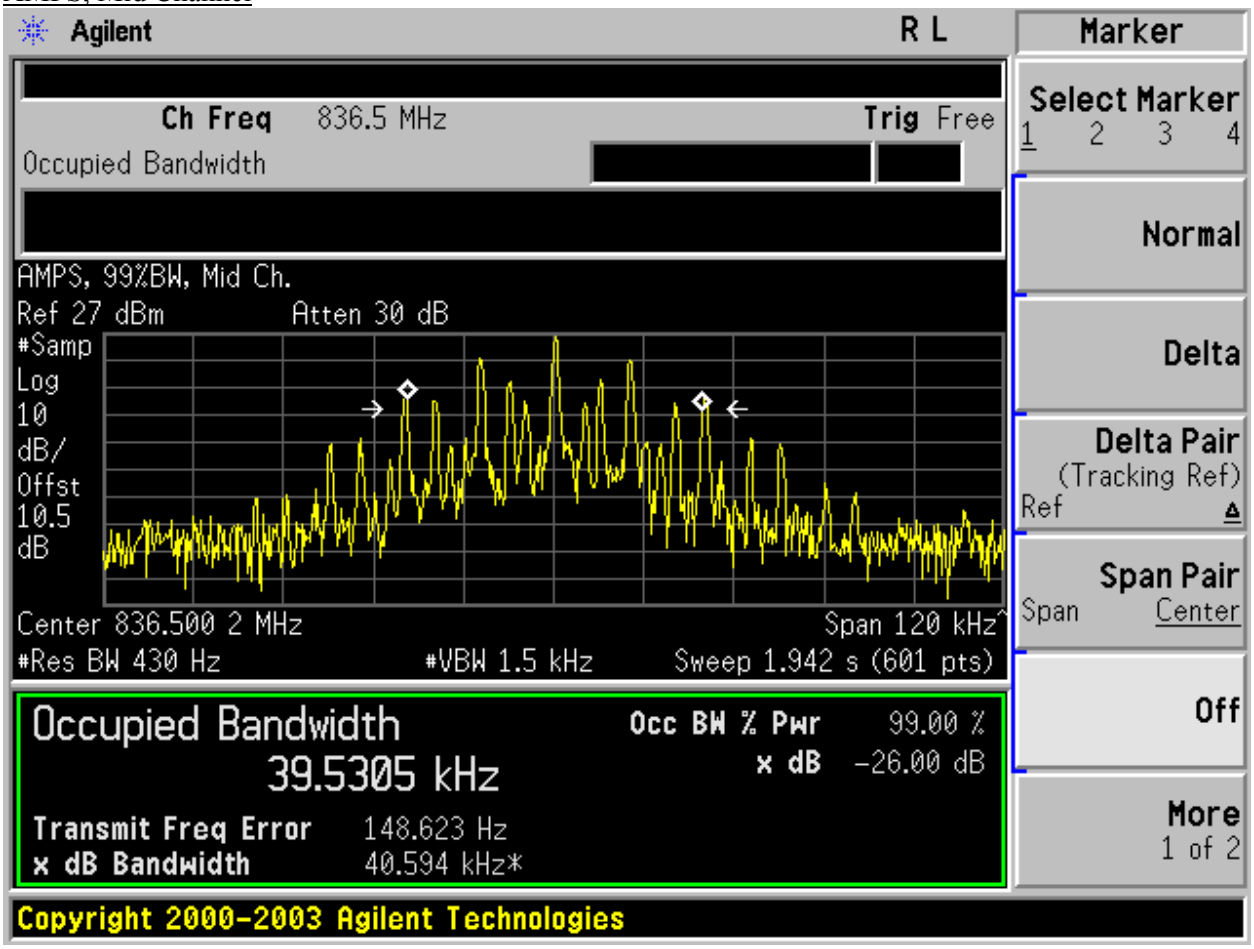
AMPS, Mid Channel



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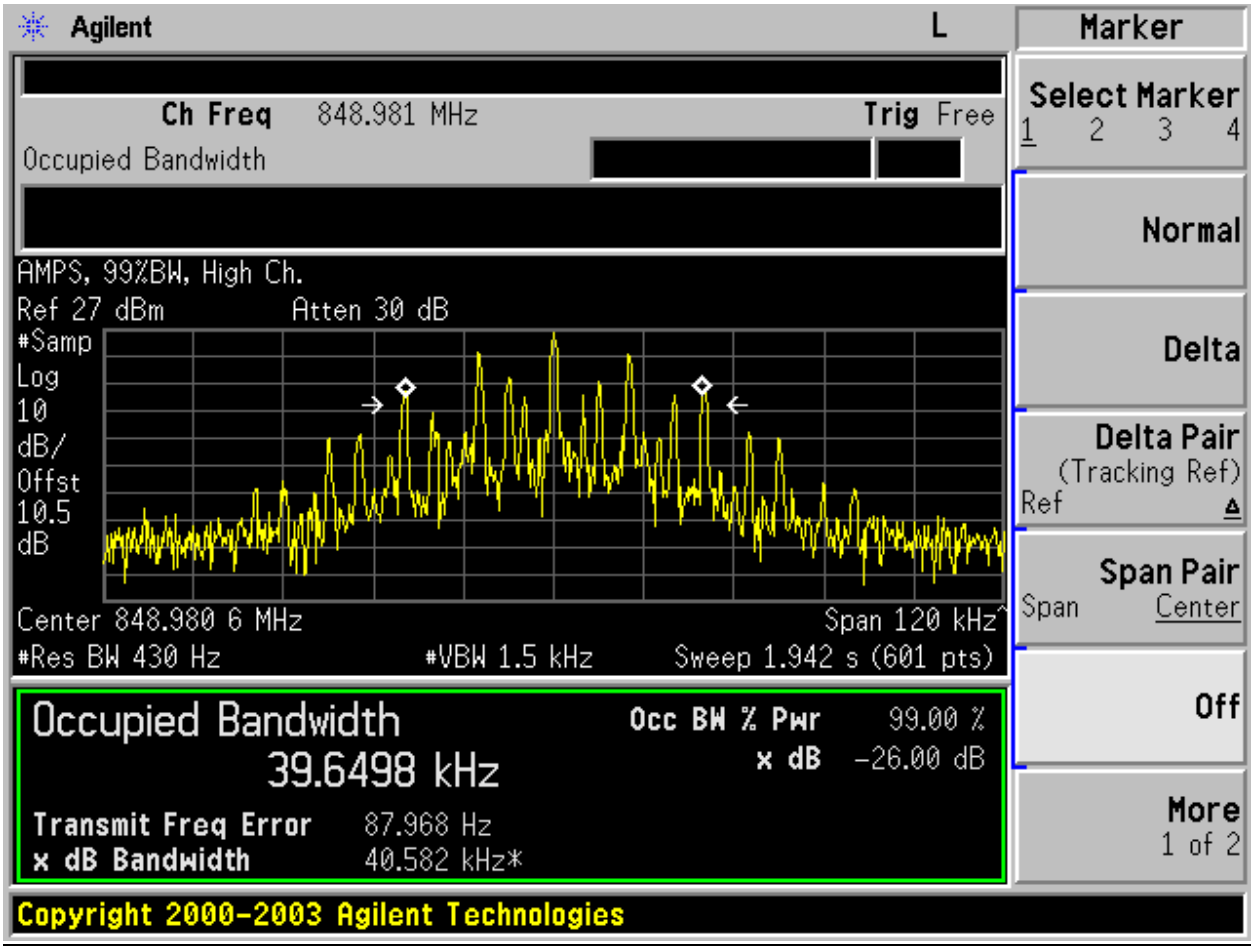
AMPS, High Channel



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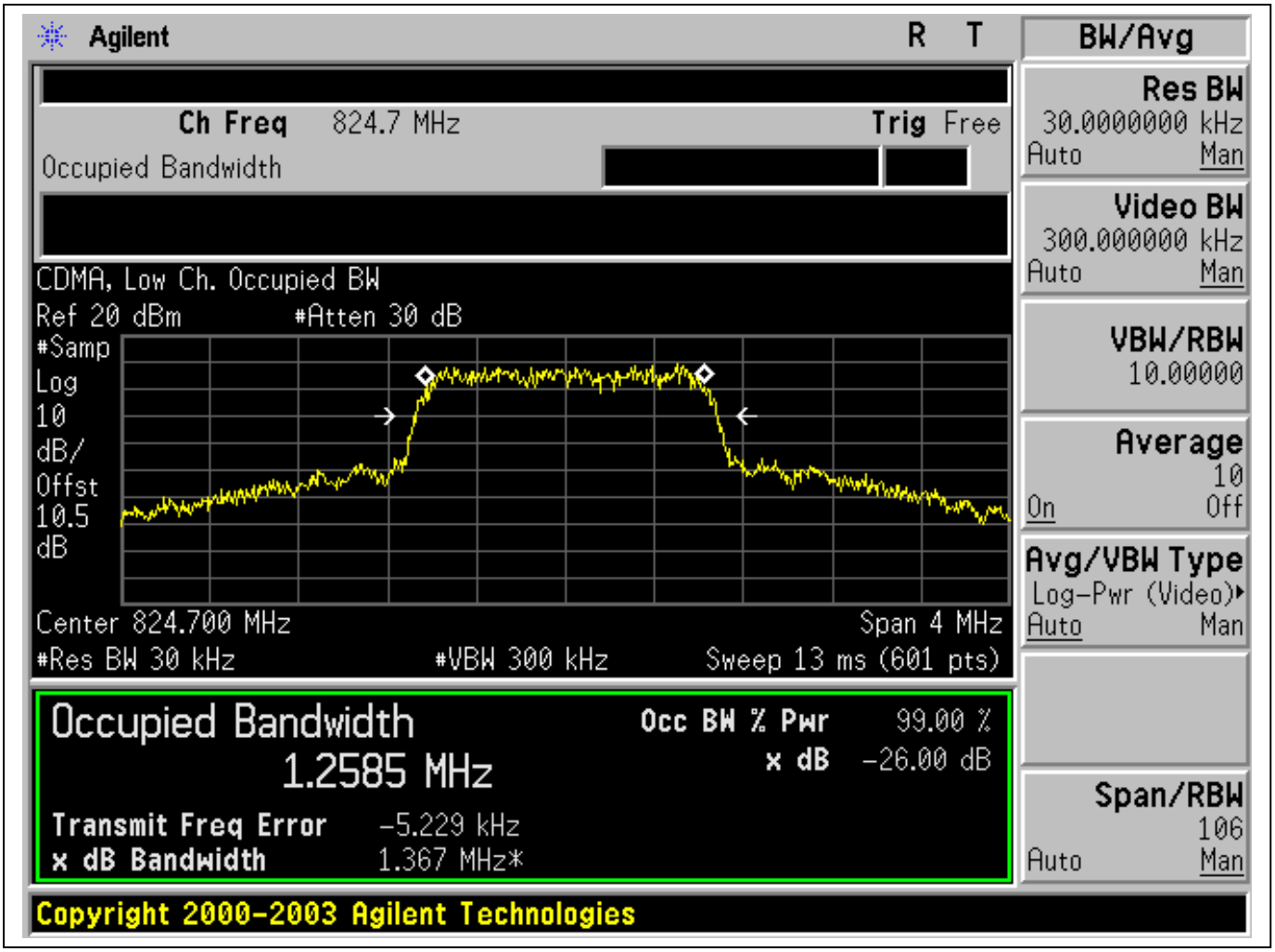
OCCUPIED BANDWIDTH FOR CDMA MODULATION:

CDMA, Low Channel:



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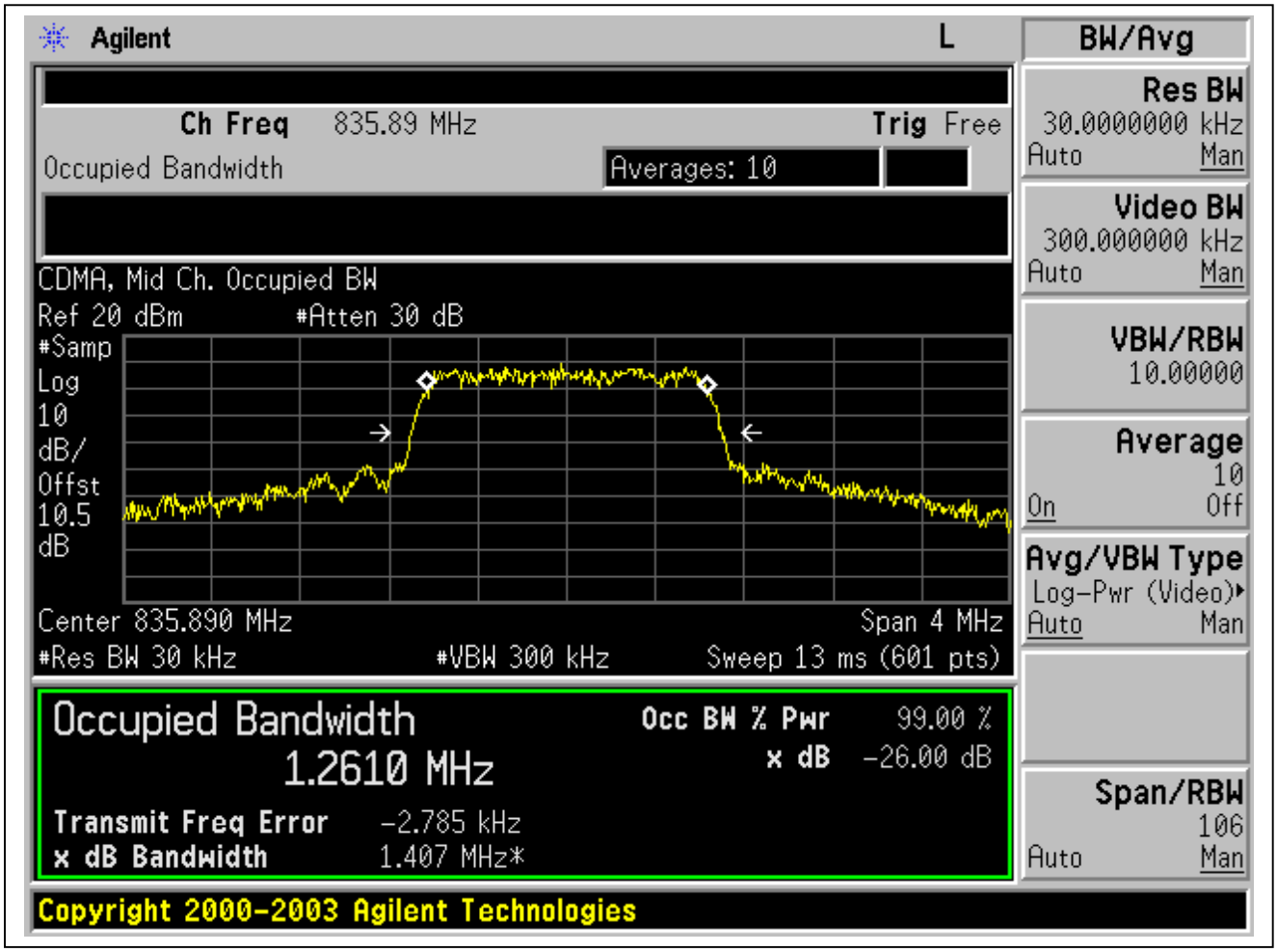
CDMA, Mid Channel:



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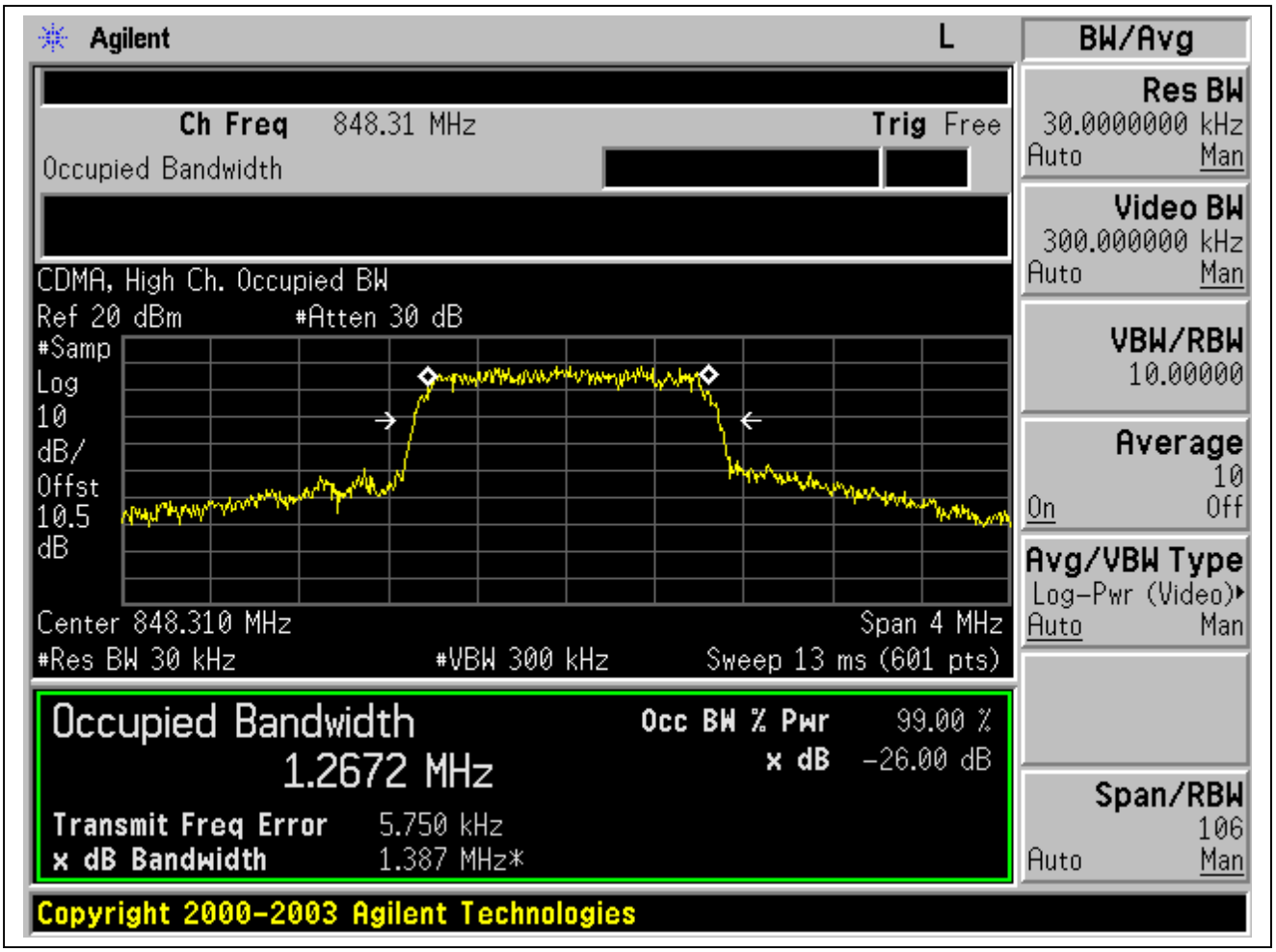
CDMA, High Channel:



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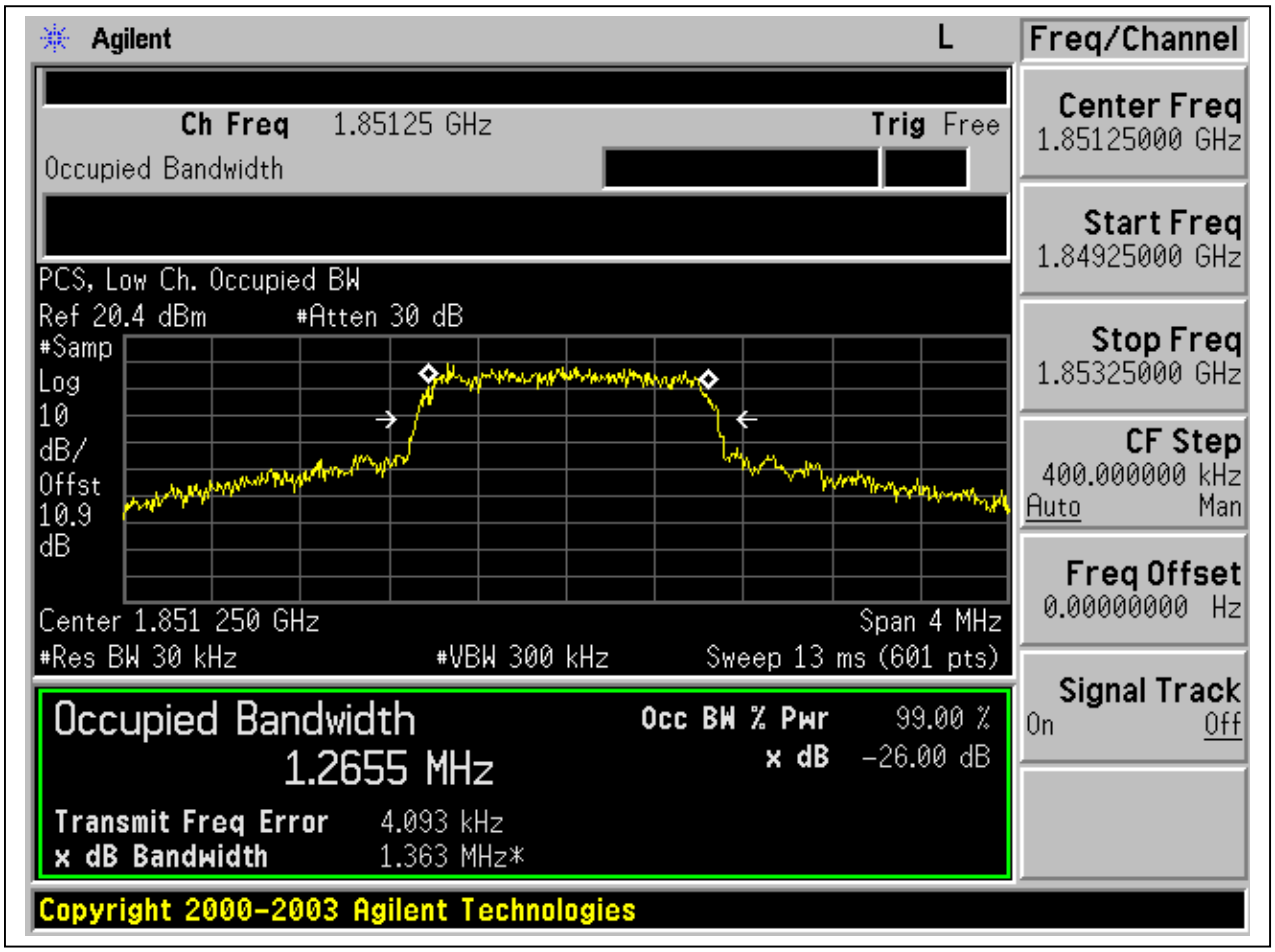
OCCUPIED BANDWIDTH FOR PCS MODULATION:

PCS, Low Channel:



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PCS, Mid Channel:

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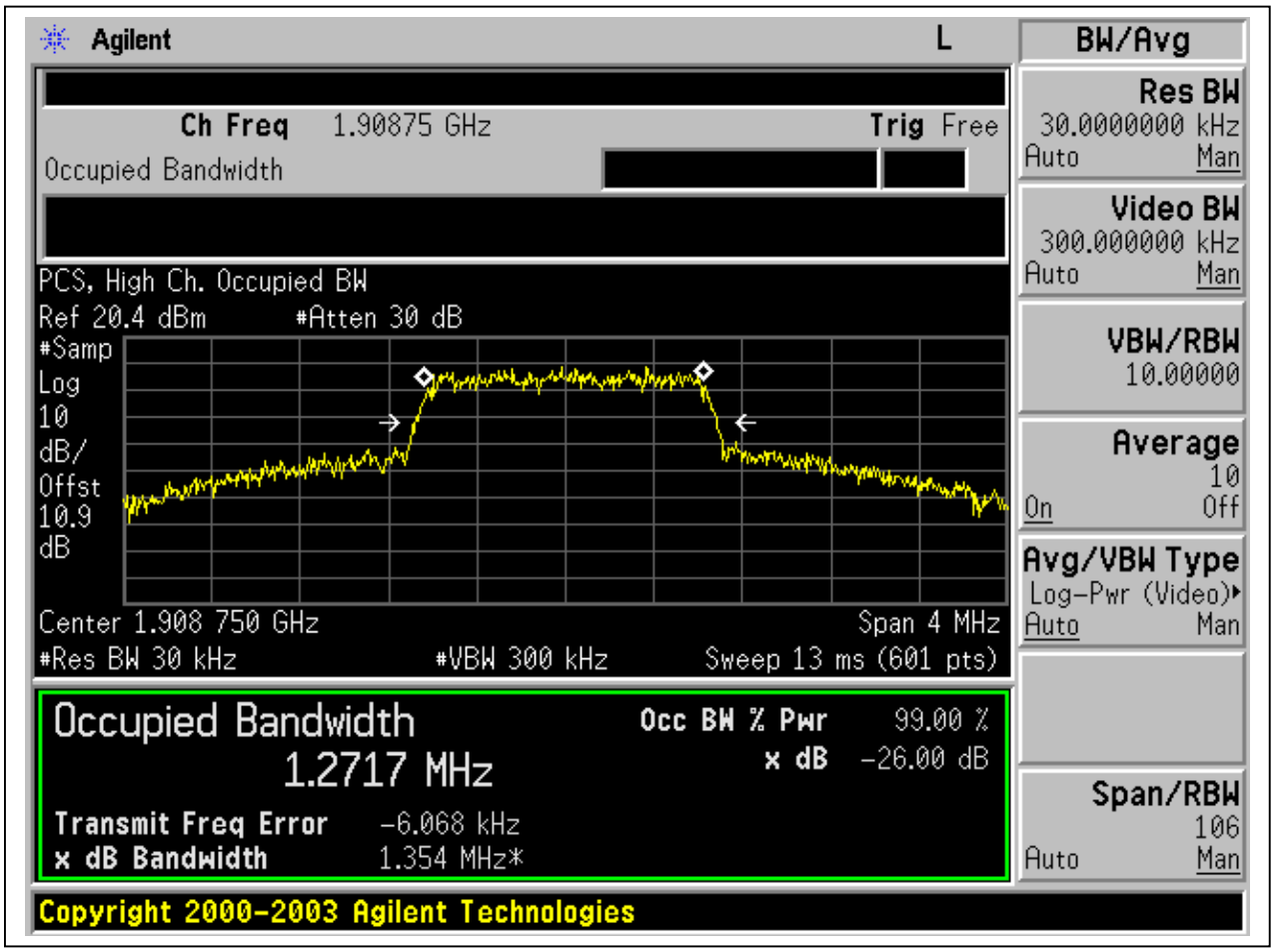
PCS, High Channel:



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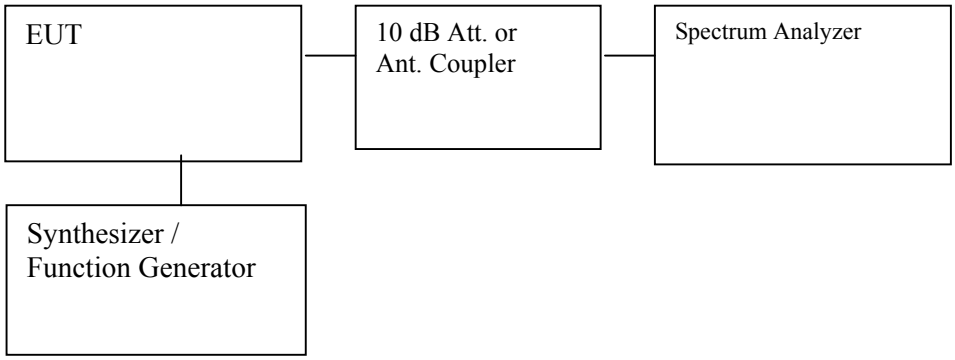
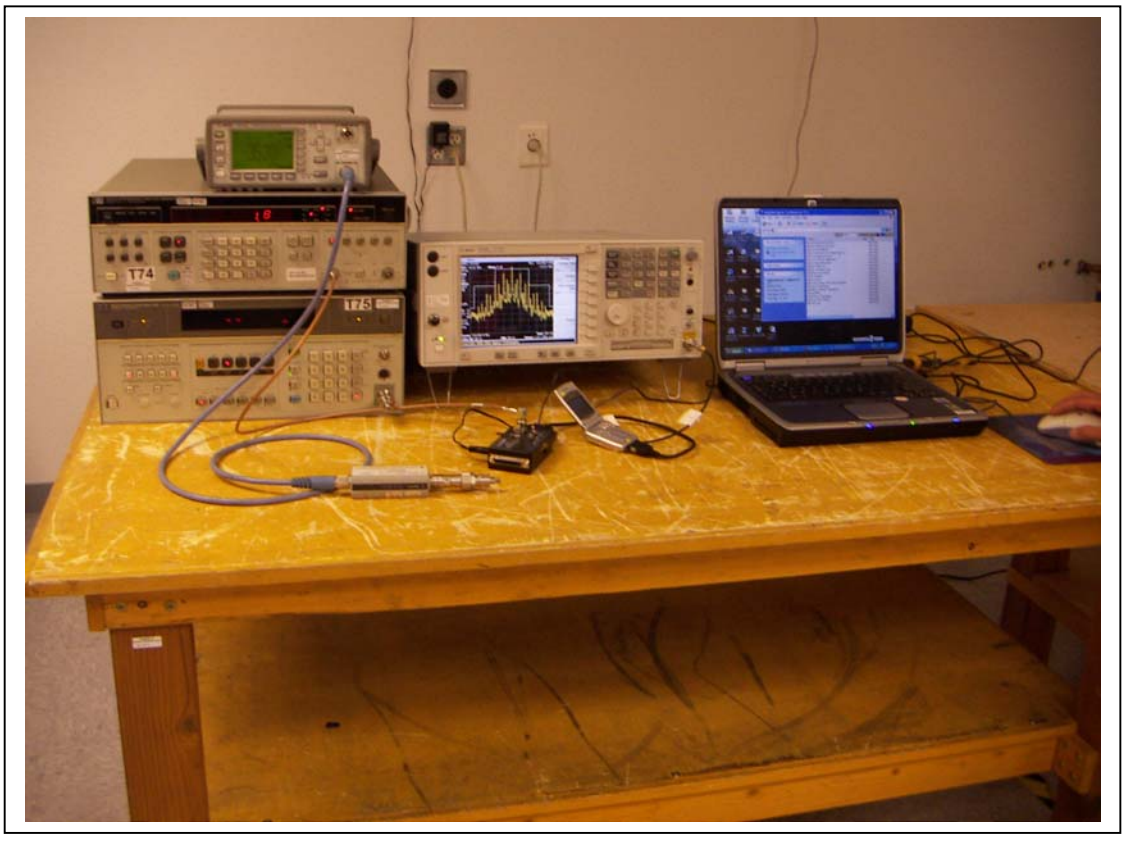
7.3. OCCUPIED BANDWIDTH FOR AMPS MODULATION:

PROVISIONS APPLICABLE
According to CFR 47 section 22.917, the authorized bandwidth for emission type of F3E unit is 20 KHz.



Set-up Photo



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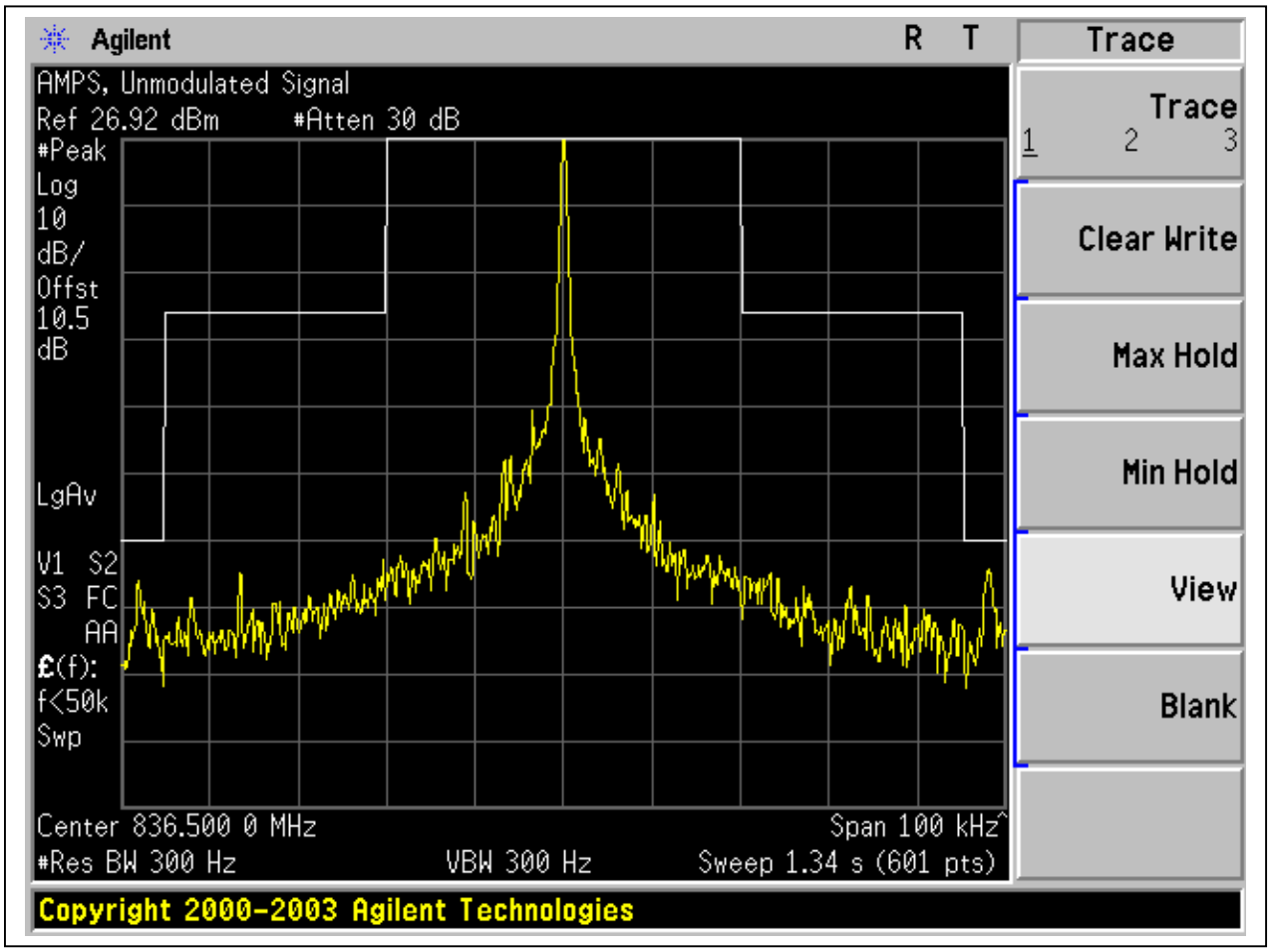
7.3.1. Un-modulated Signal

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz

Limit:
N/A

Test Result:



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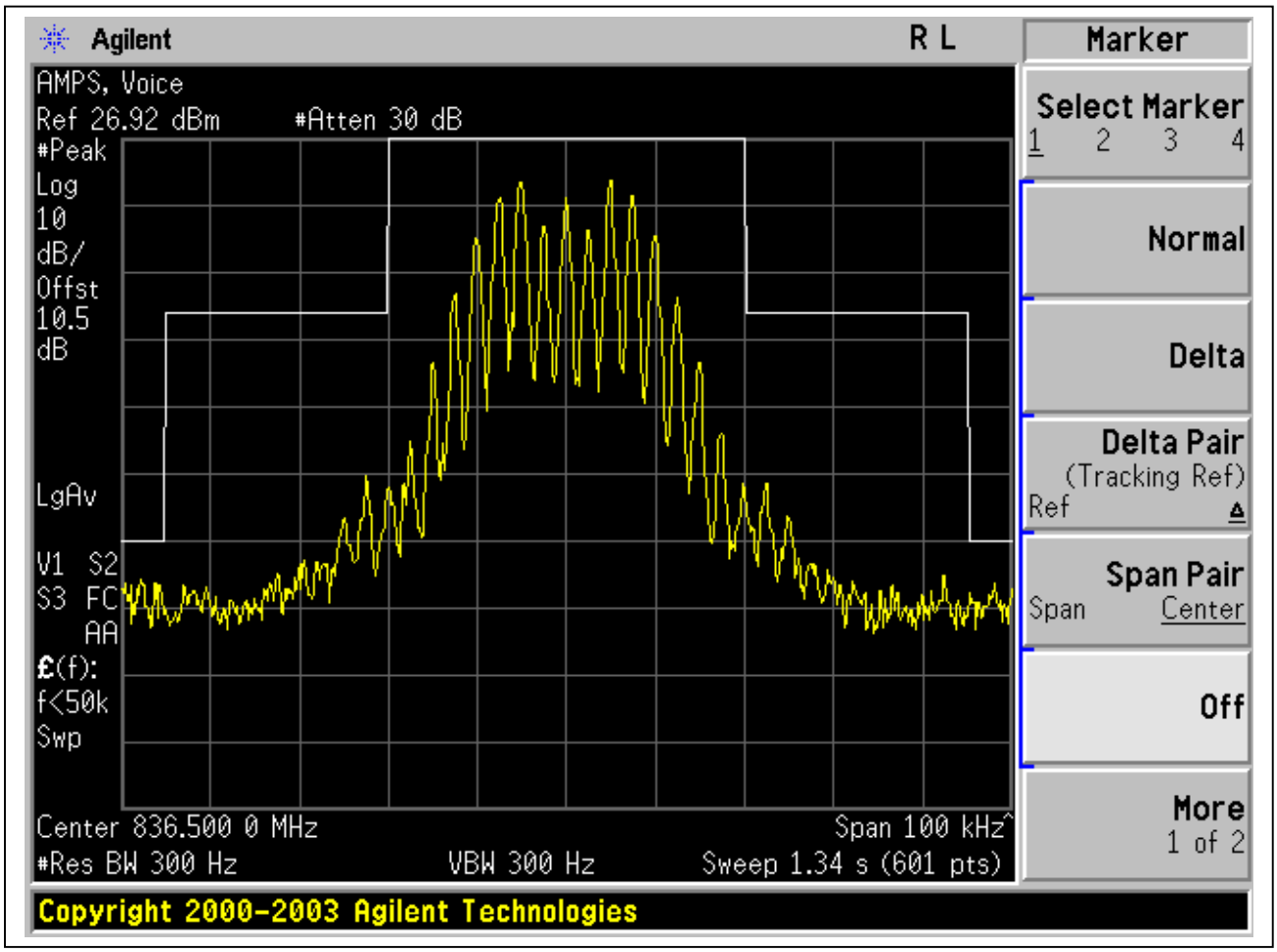
7.3.2. Voice

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz
Audio Tone = 2.5KHz
Audio Level = 16dB greater than level required to produce ±6KHz

Limit (22.917b):

a. On any frequency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation

Test Result:



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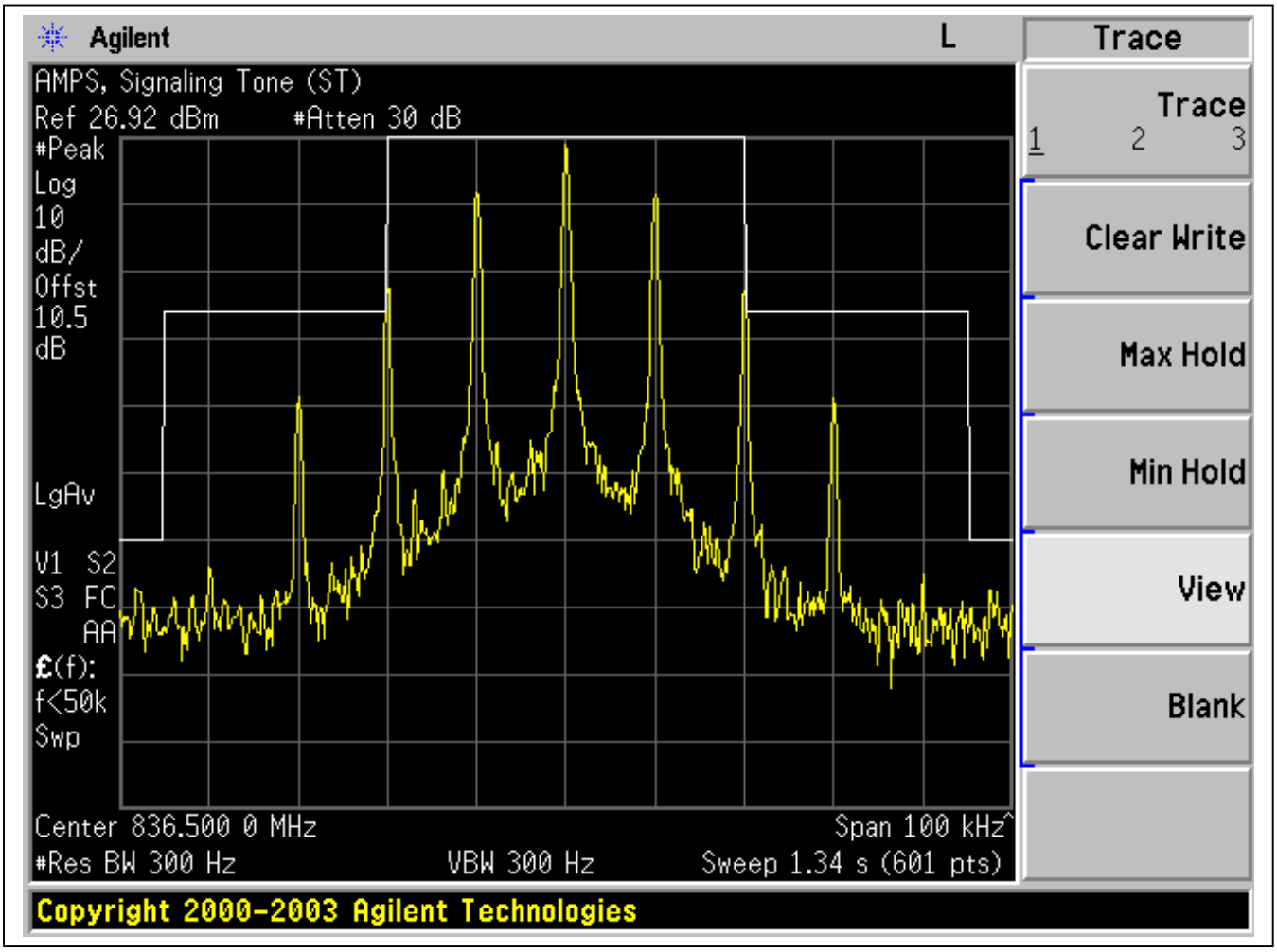
Signaling Tone (ST)



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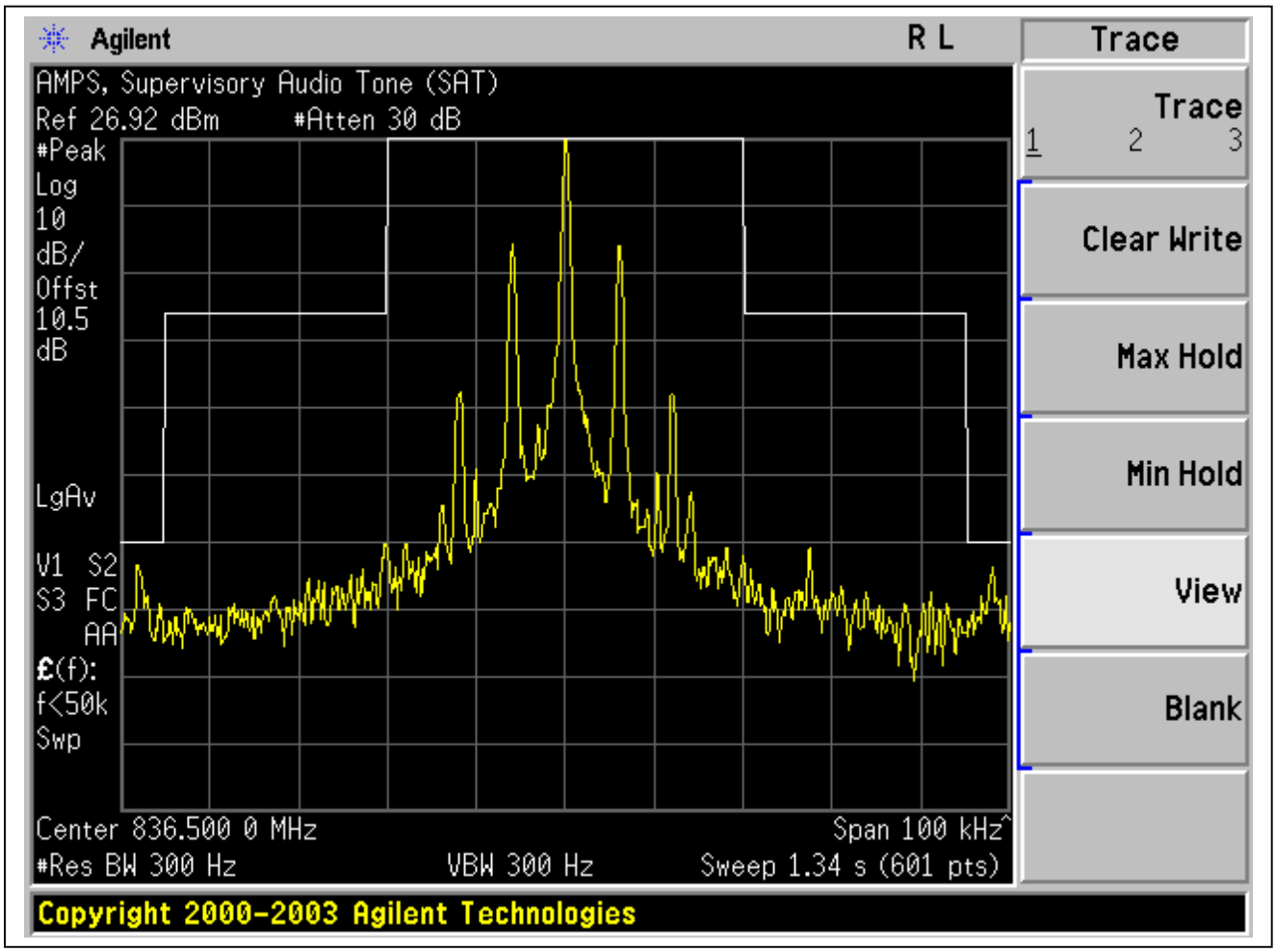
Supervisory Audio Tone (SAT)



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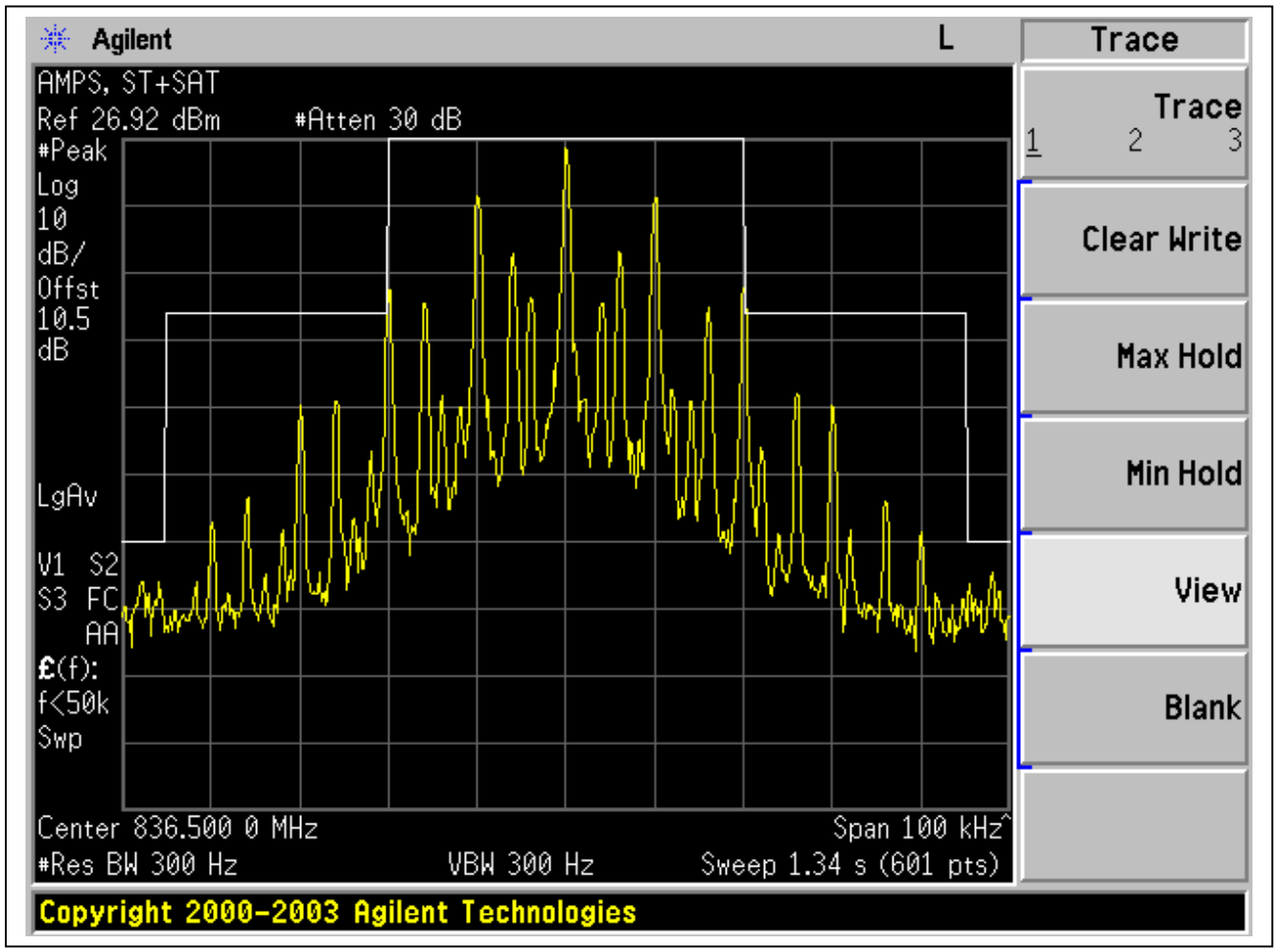
7.3.3. Signaling Tone (ST) + Supervisory Audio Tone (SAT)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz
Signal Tone = 10KHz

Limit (22.917d):

a. On any frequency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to and including 90KHz, the sideband is at least 45dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 90KHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation.

Test Result:



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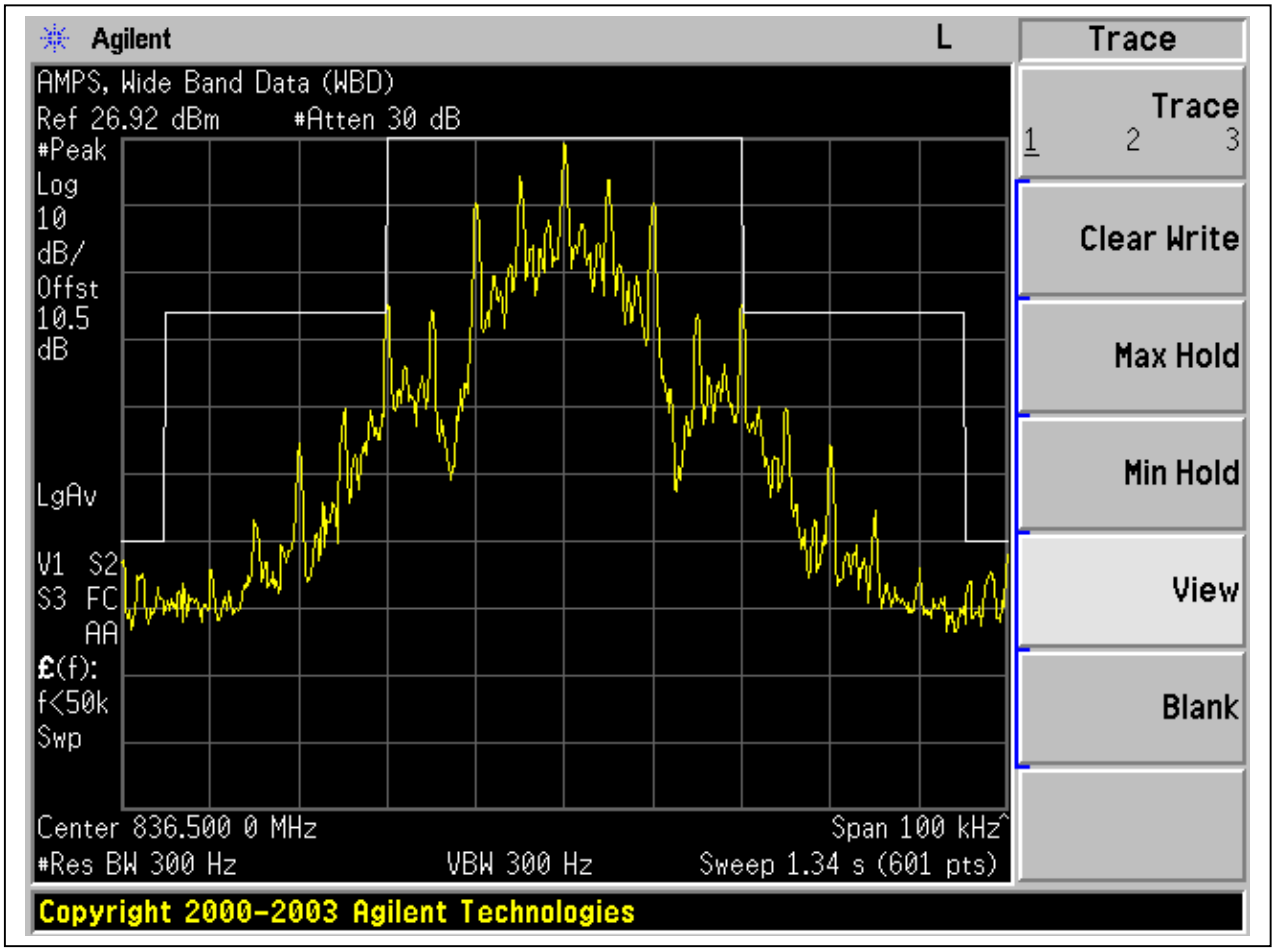
7.3.4. Wide Band Data (WBD)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz

Limit (22.917d):

a. On any frequency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to and including 90KHz, the sideband is at least 45dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 90KHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation.

Test Result:



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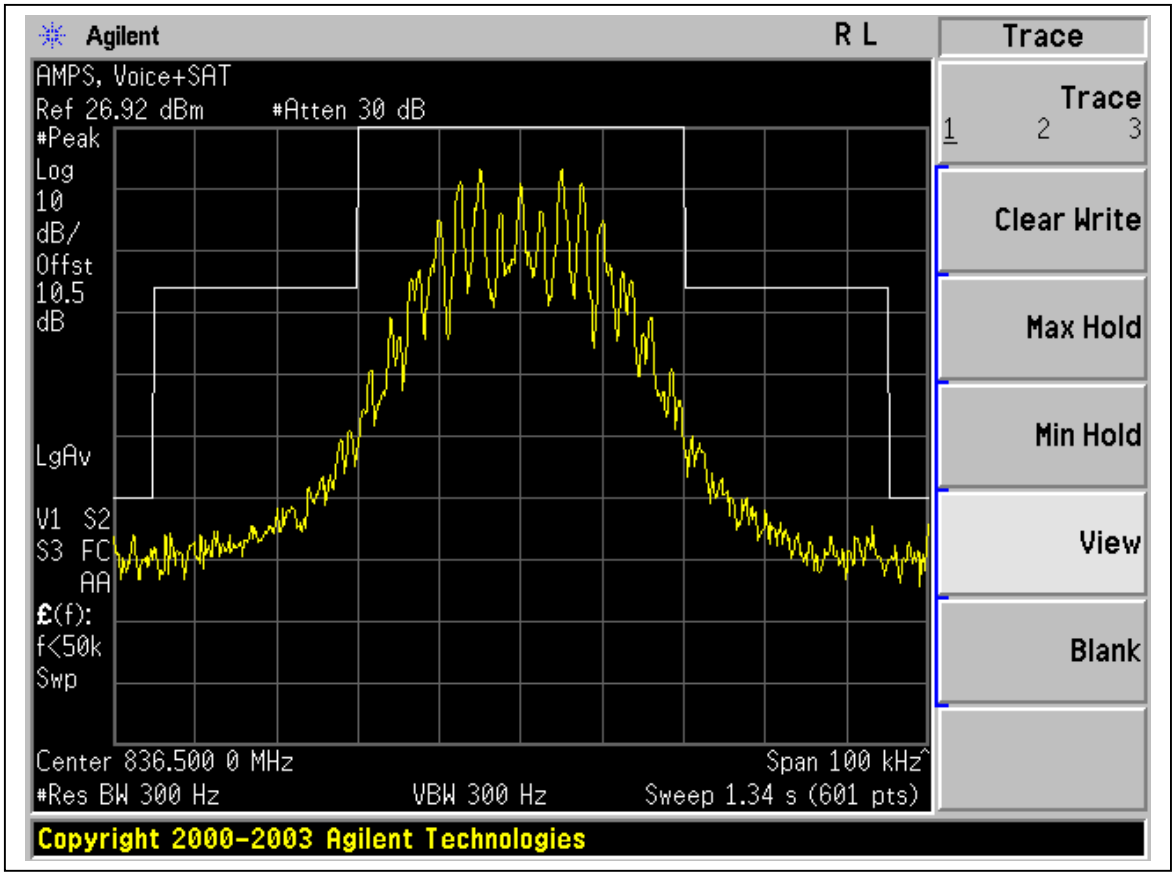
7.3.5. Voice + Supervisory Audio Tone (SAT)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz
Audio Tone = 2.5KHz
Audio Level = 16dB greater than level required to produce ±8KHz (Minimum level from technical specifications)

Limit (22.917b):

b. On any frequency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation

Test Result:



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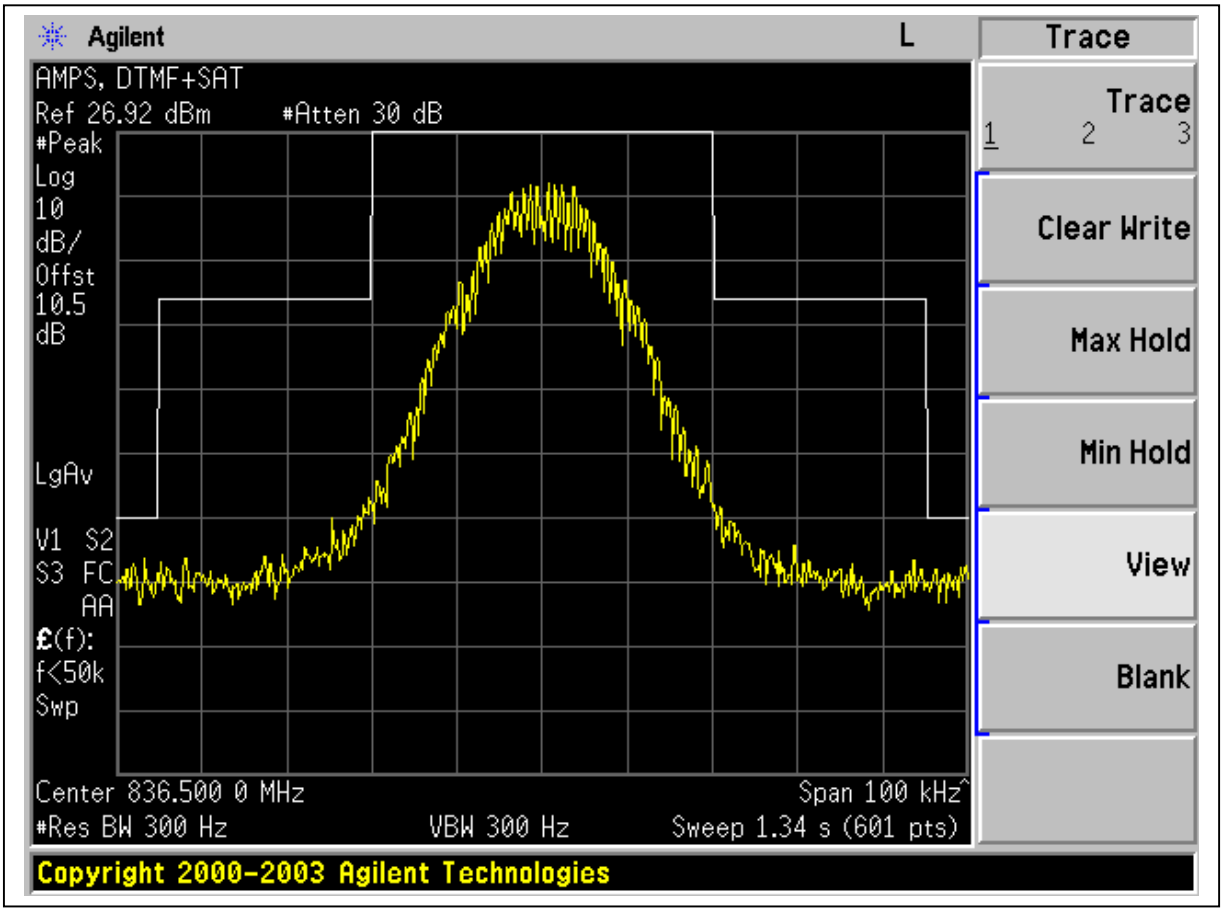
7.3.6. DTMF + Supervisory Audio Tone (SAT)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz

Limit (22.917d):

a. On any frequency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to and including 90KHz, the sideband is at least 45dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 90KHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation.

Test Result:



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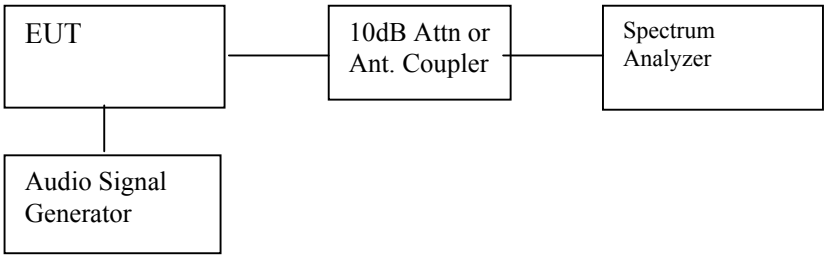
7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Peak Power Meter	**Agilent**	**E4416A**	**GB41291160**	**11/7/2004**
Spectrum Analyzer	**HP**	**E4446A**	**US42510266**	**7/23/2005**
Function Generator	**HP**	**3325A**	**2652A24749**	**5/8/2005**
Modulation Analyzer	**HP**	**8901B**	**3438A05272**	**6/23/2005**

TEST SETUP



TEST PROCEDURE

1) RF signal or three balanced signals (intermodulation measurement) were applied to the RF input. One set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the –13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 15 MHz to 10x*f*o of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance for spurious, harmonics, and intermodulation emissions.

3) 22.917(f); Mobile emissions in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed –80dBm at the transmit antenna connector.

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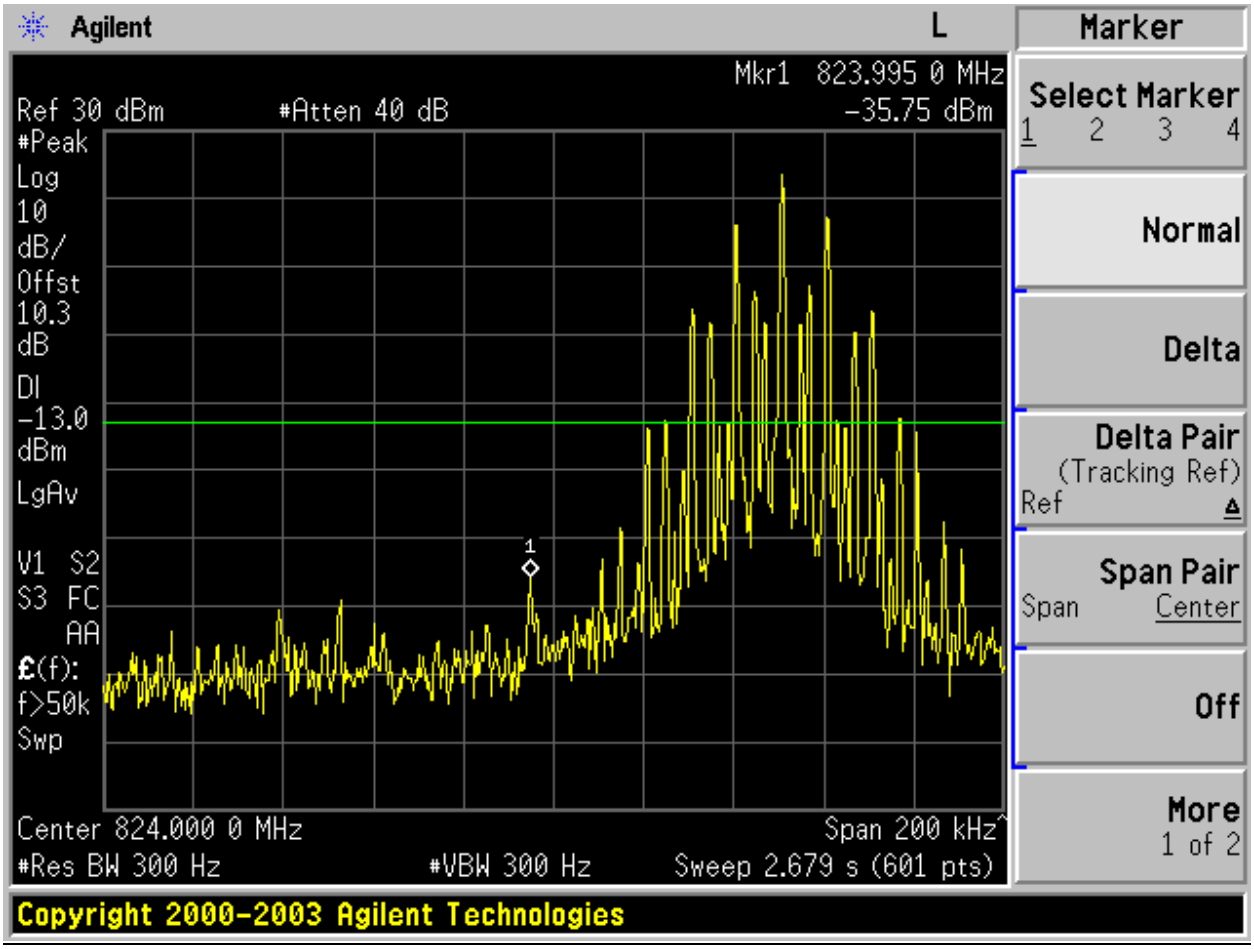
RESULT:

AMPS Modulation: Low / Mid / High,, Band Edge, Out-Of-Band Emissions, Mobile Emissions in Base Frequency Range

Low Channel Band Edge



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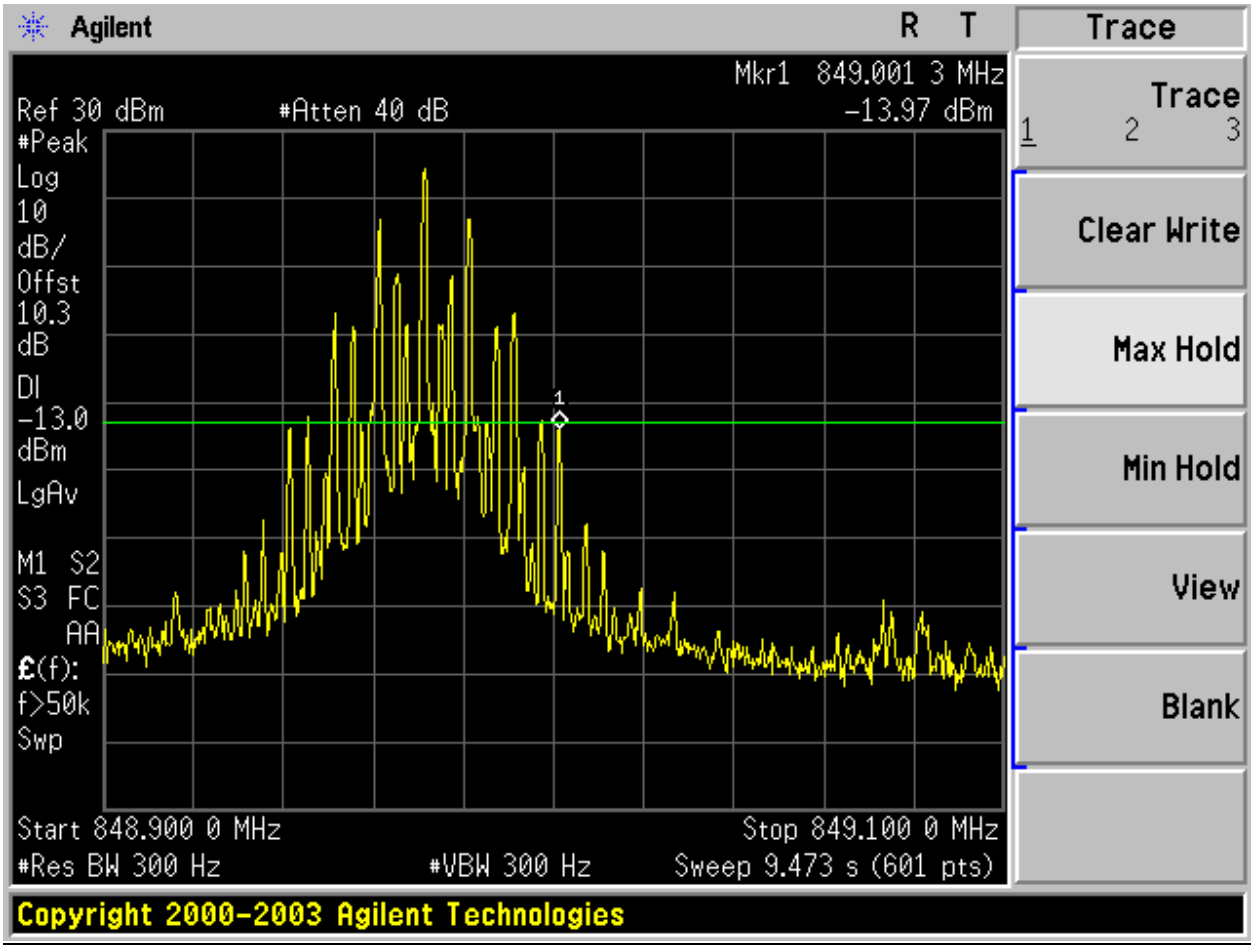
High Channel Band Edge



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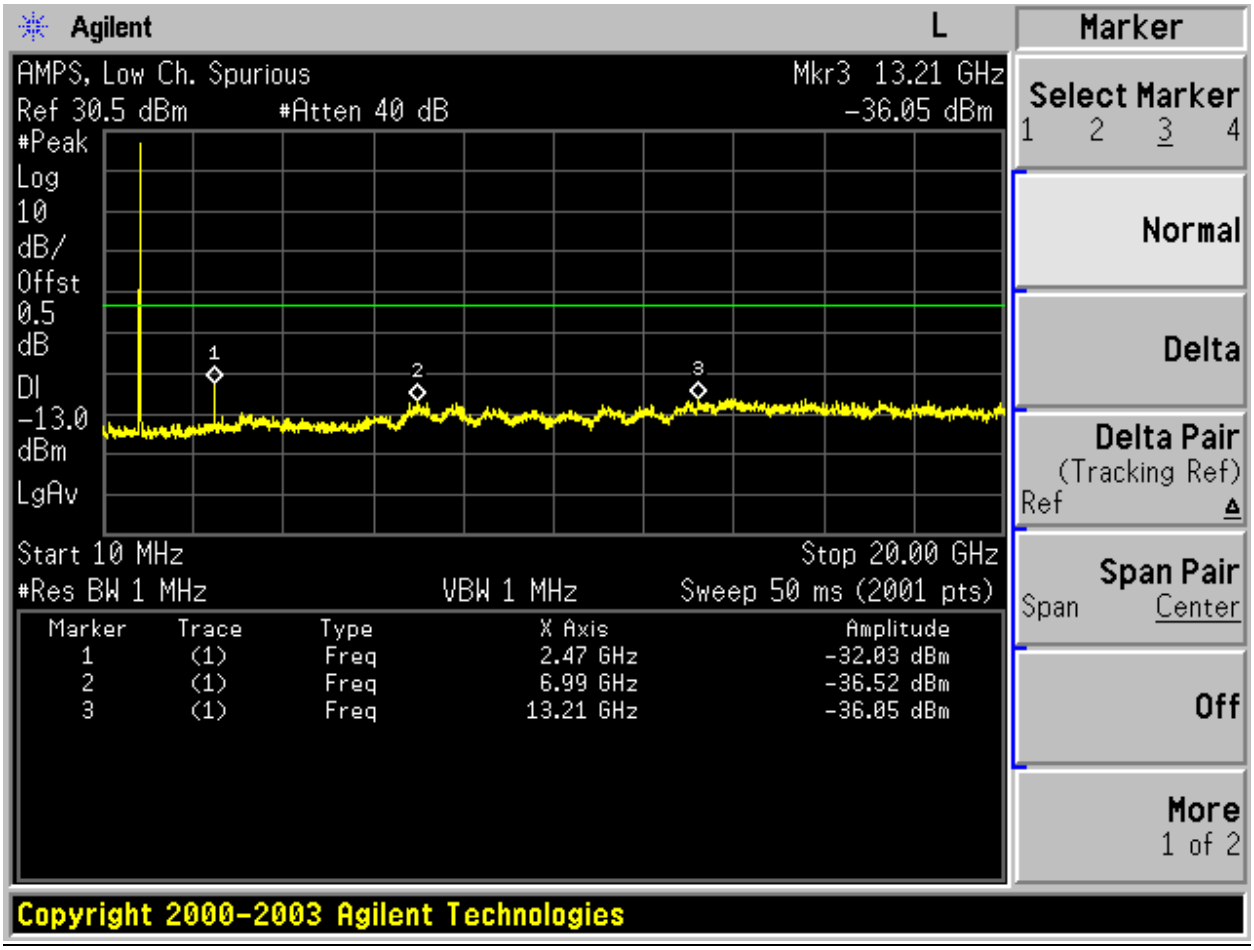
Low Channel, Out-Of-Band Emissions



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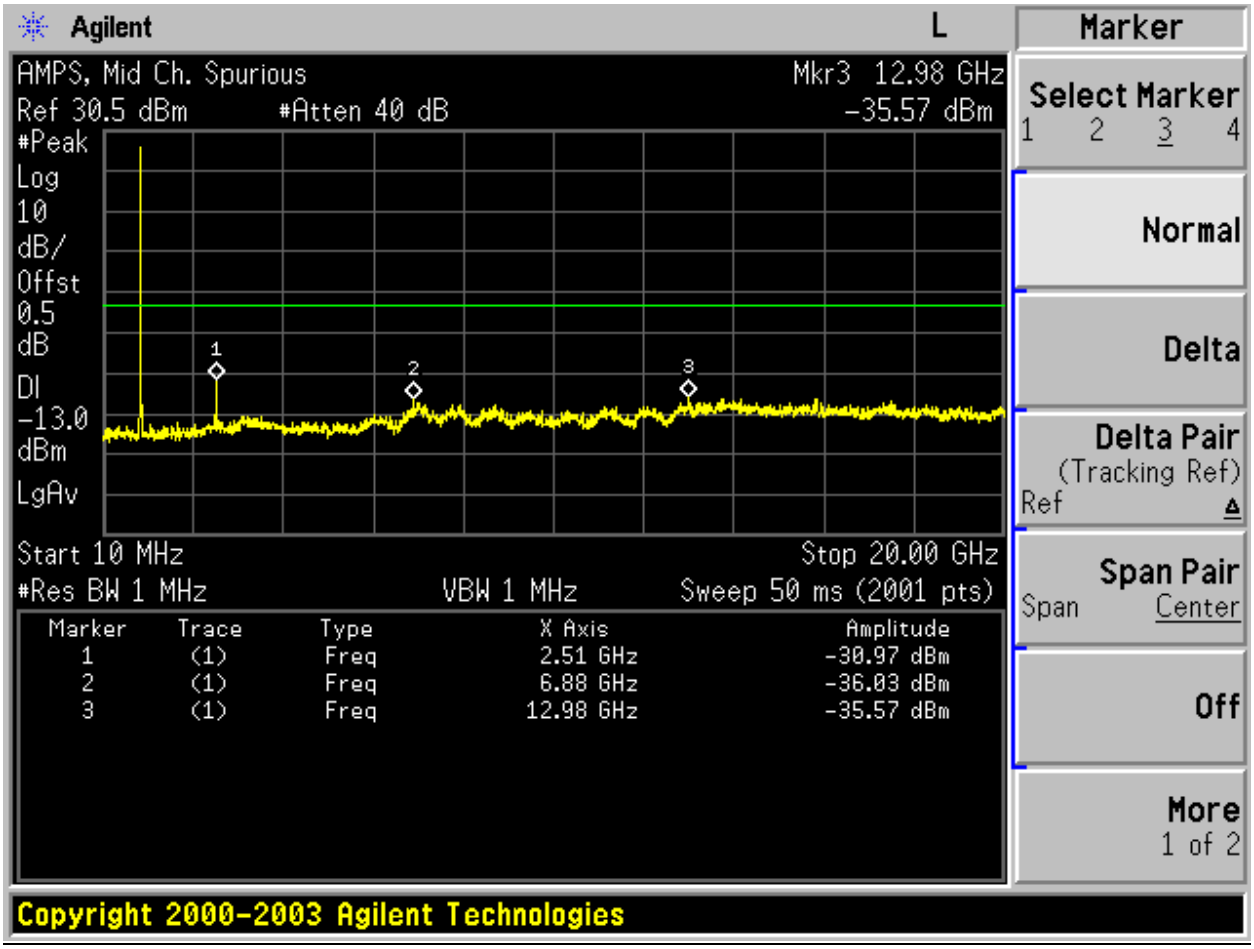
Mid Channel, Out-Of-Band Emissions



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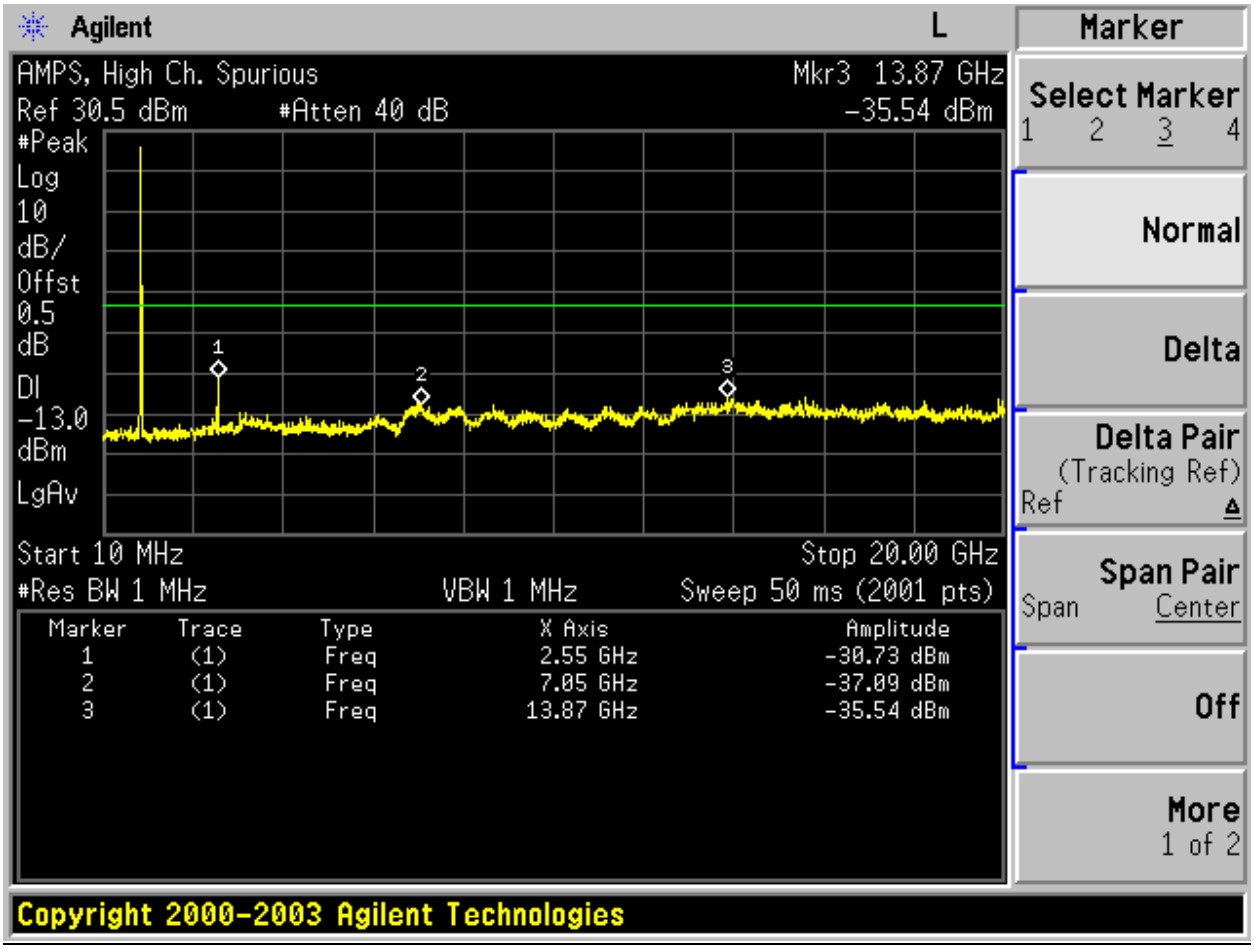
High Channel, Out-Of-Band Emissions



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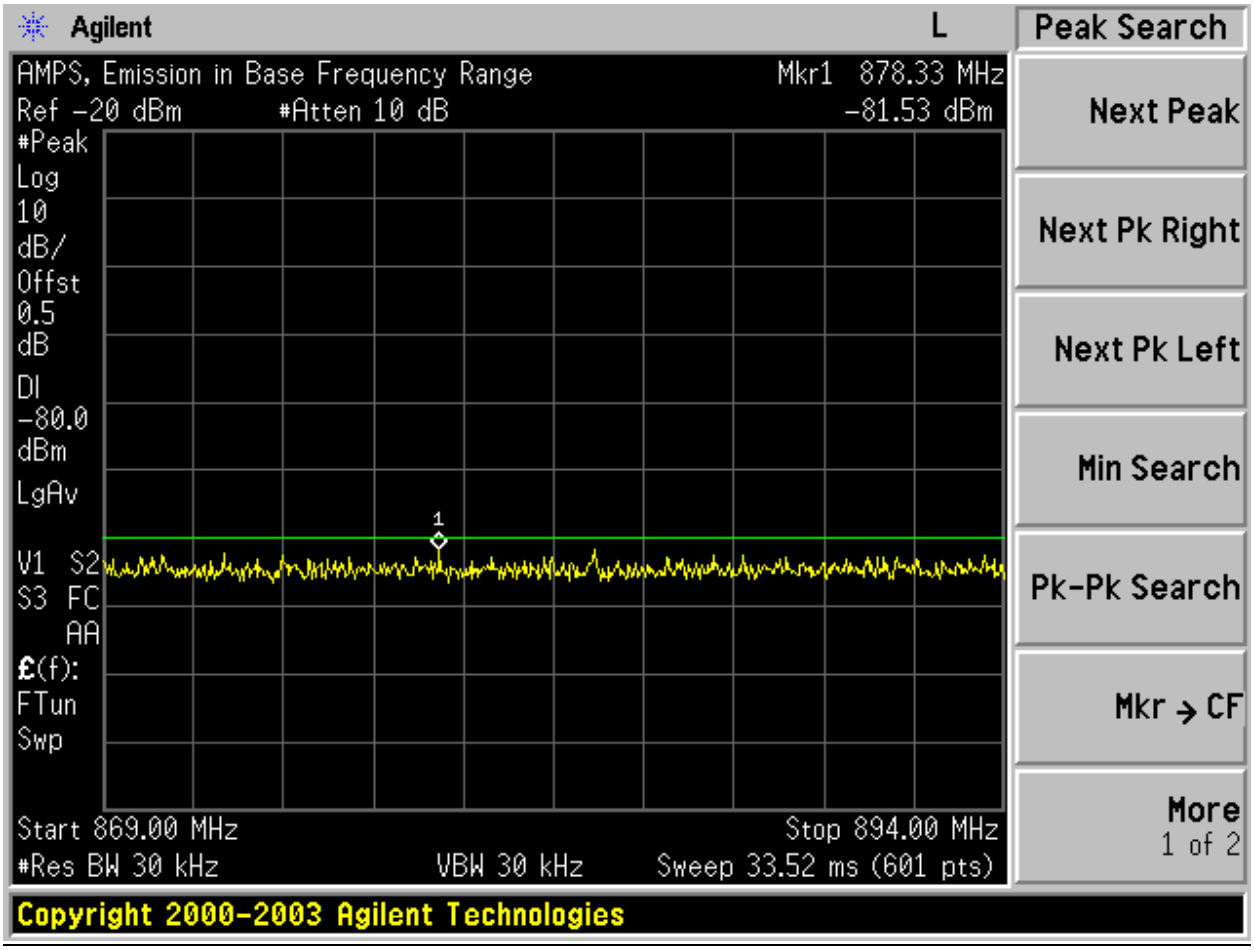
AMPS Mobile Emissions in Base Frequency Range:



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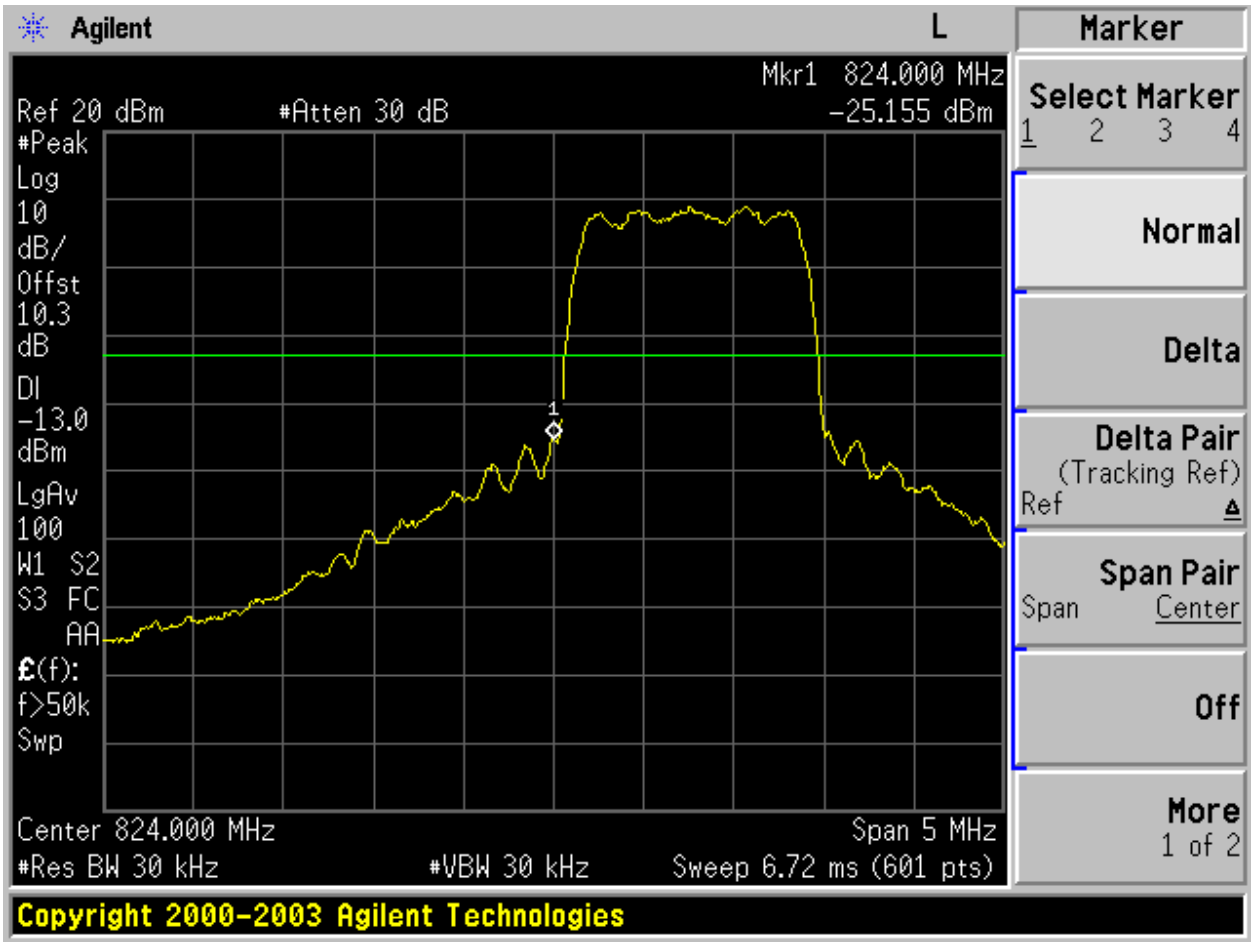
RESULT:

CDMA Modulation: Low / Mid / High, Band Edge, Out-Of-Band Emissions, Mobile Emissions in Base Frequency Range:

Low Channel Band Edge



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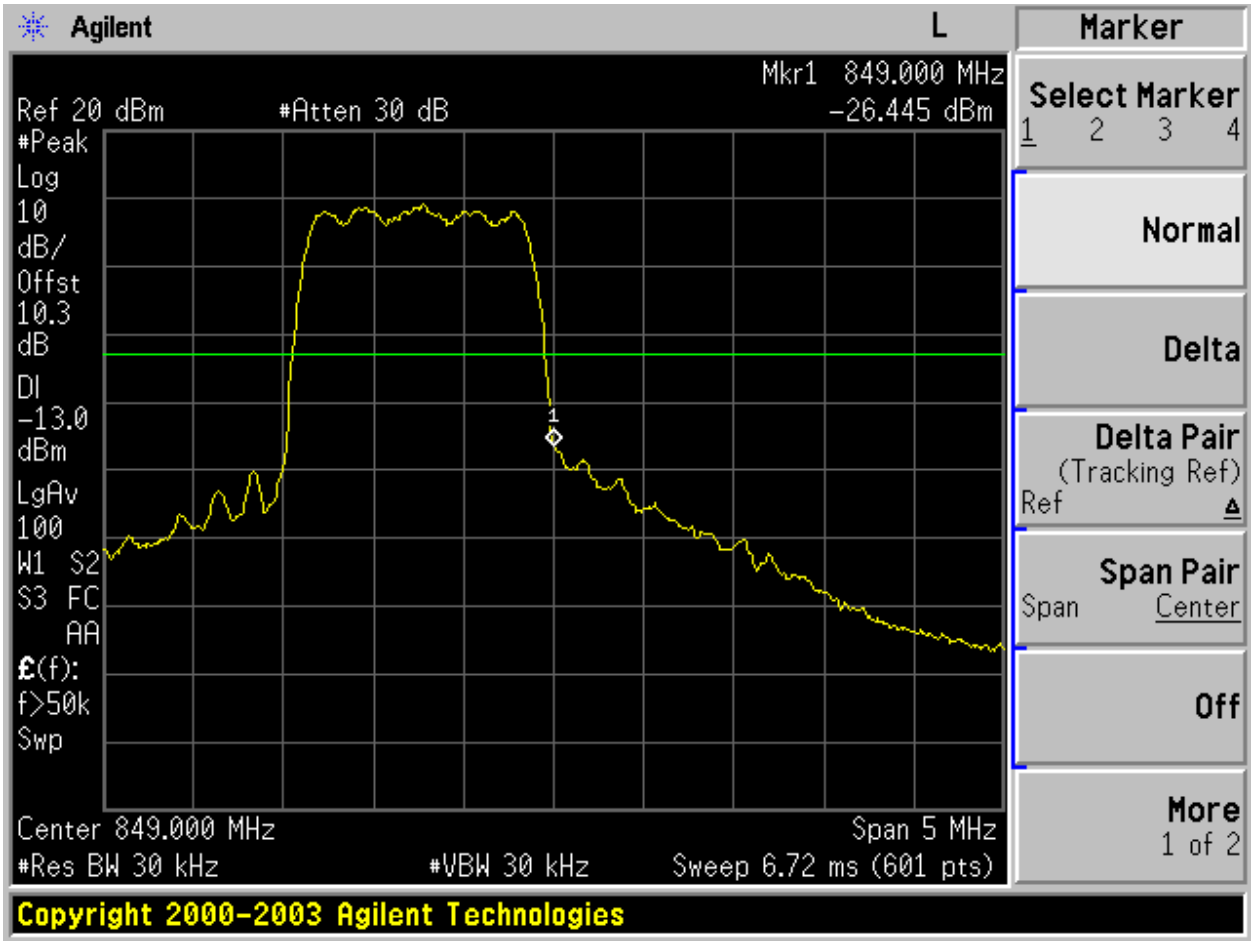
High Channel Band Edge



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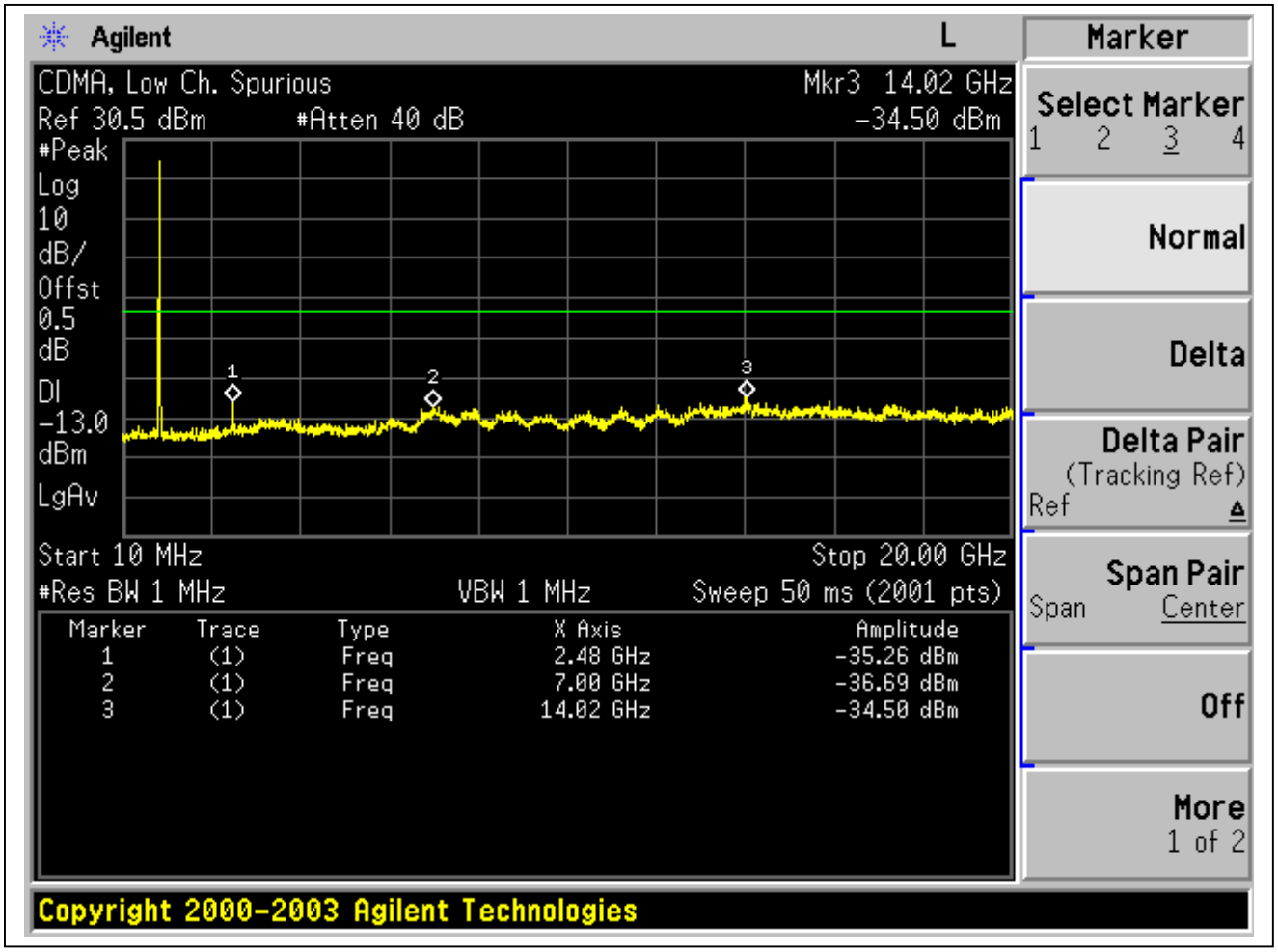
Low Channel, Out-Of-Band Emissions



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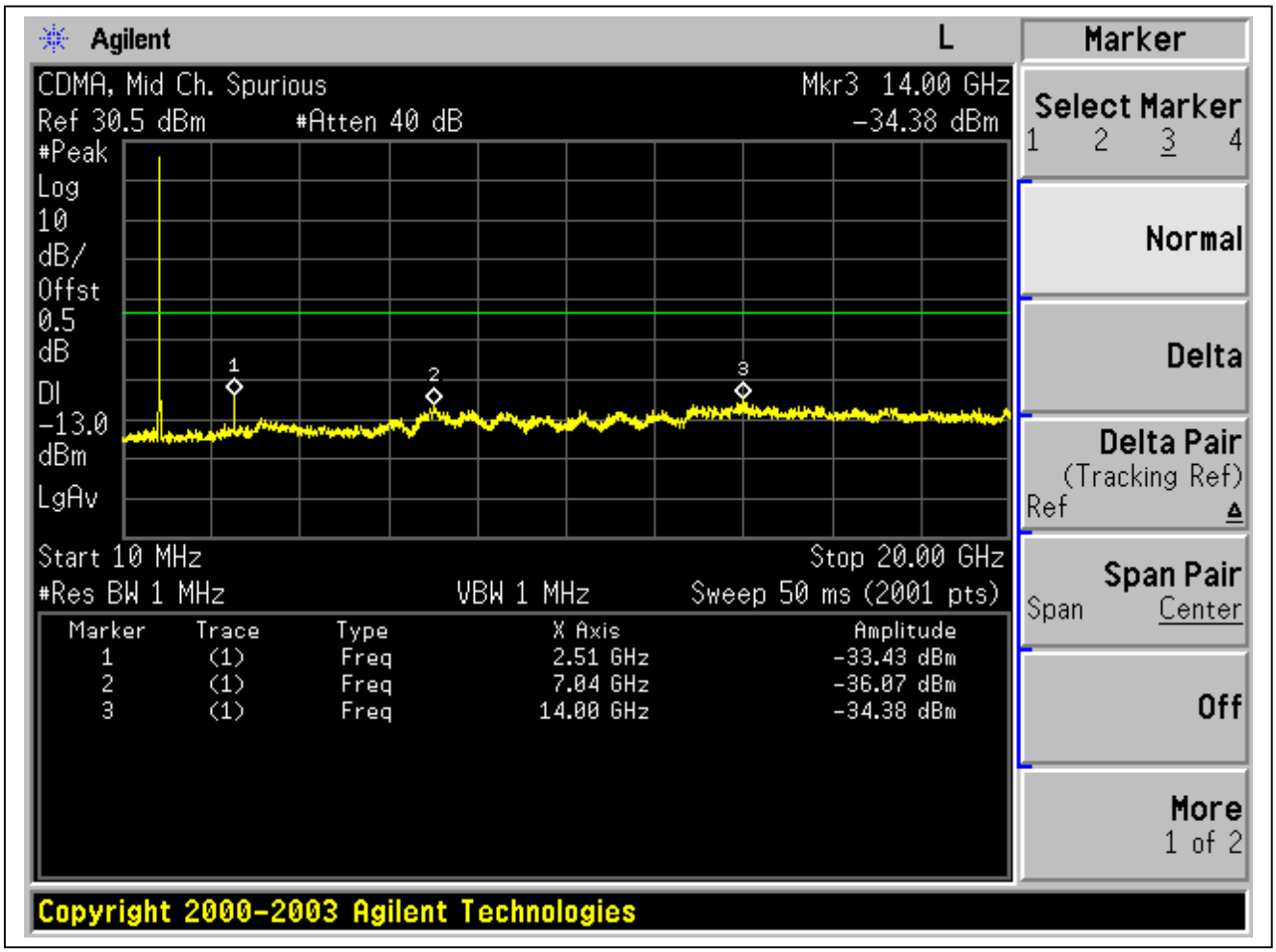
Mid Channel, Out-Of-Band Emissions



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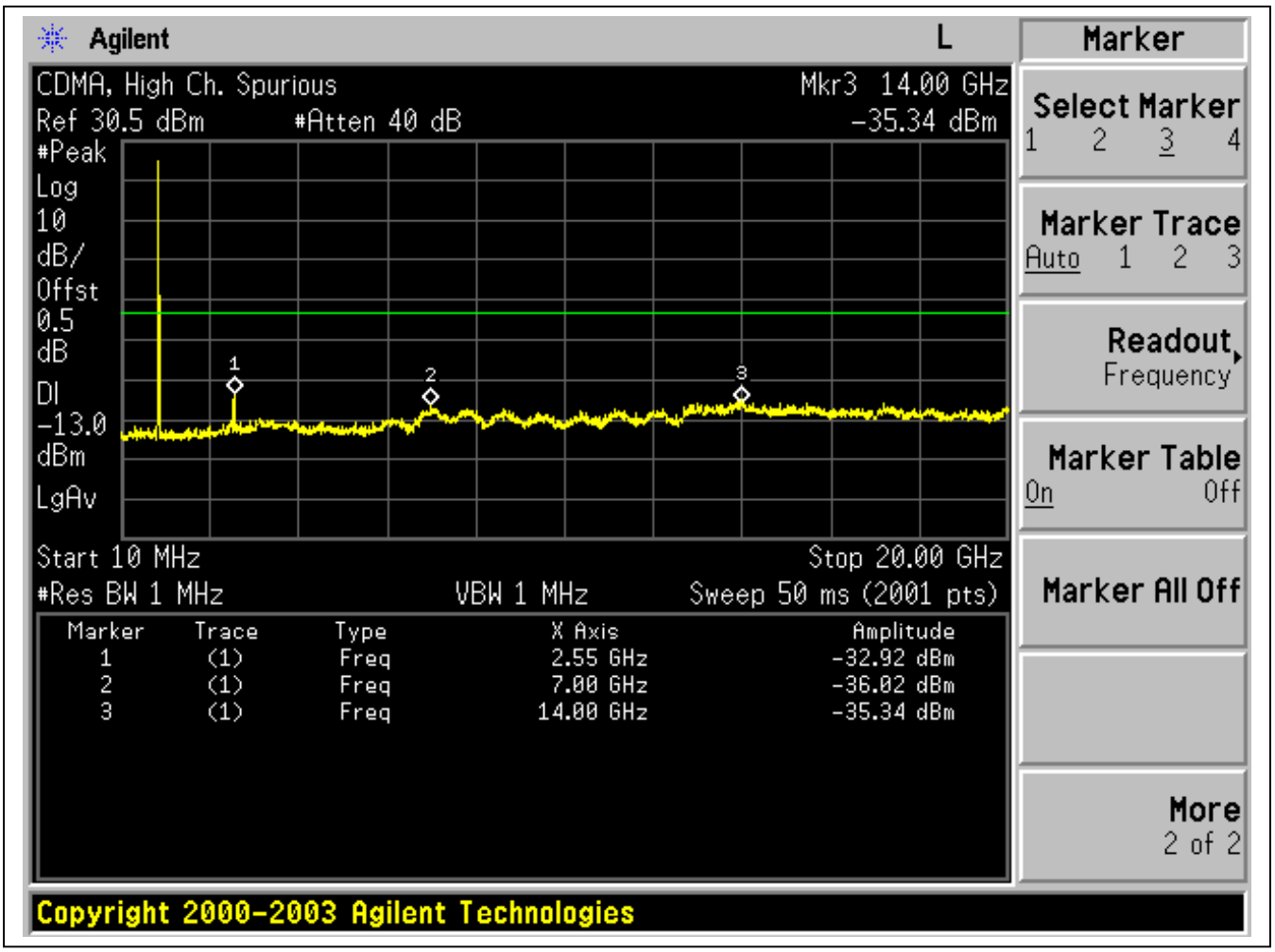
High Channel, Out-Of-Band Emissions



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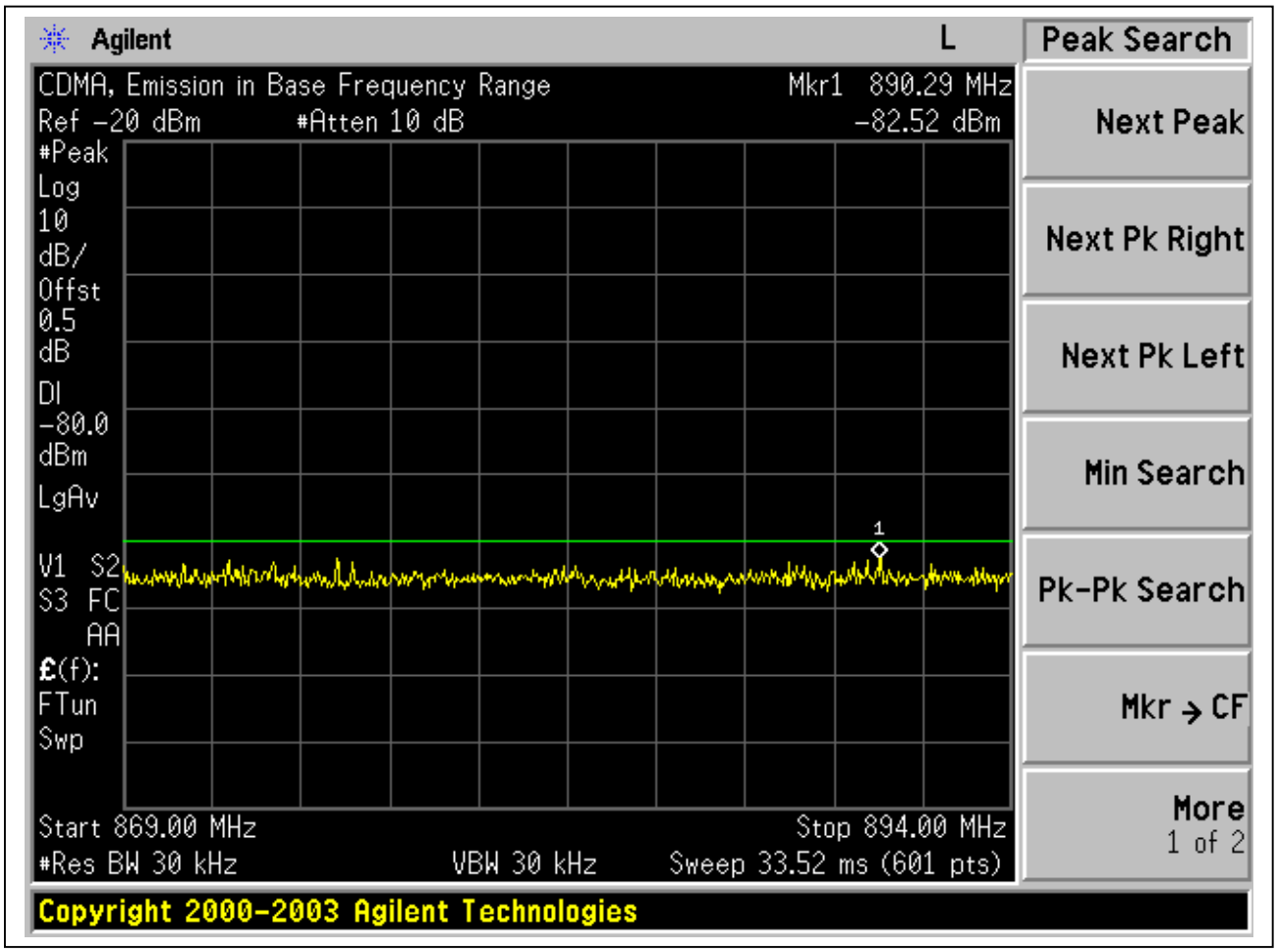
CDMA Mobile Emissions in Base Frequency Range:



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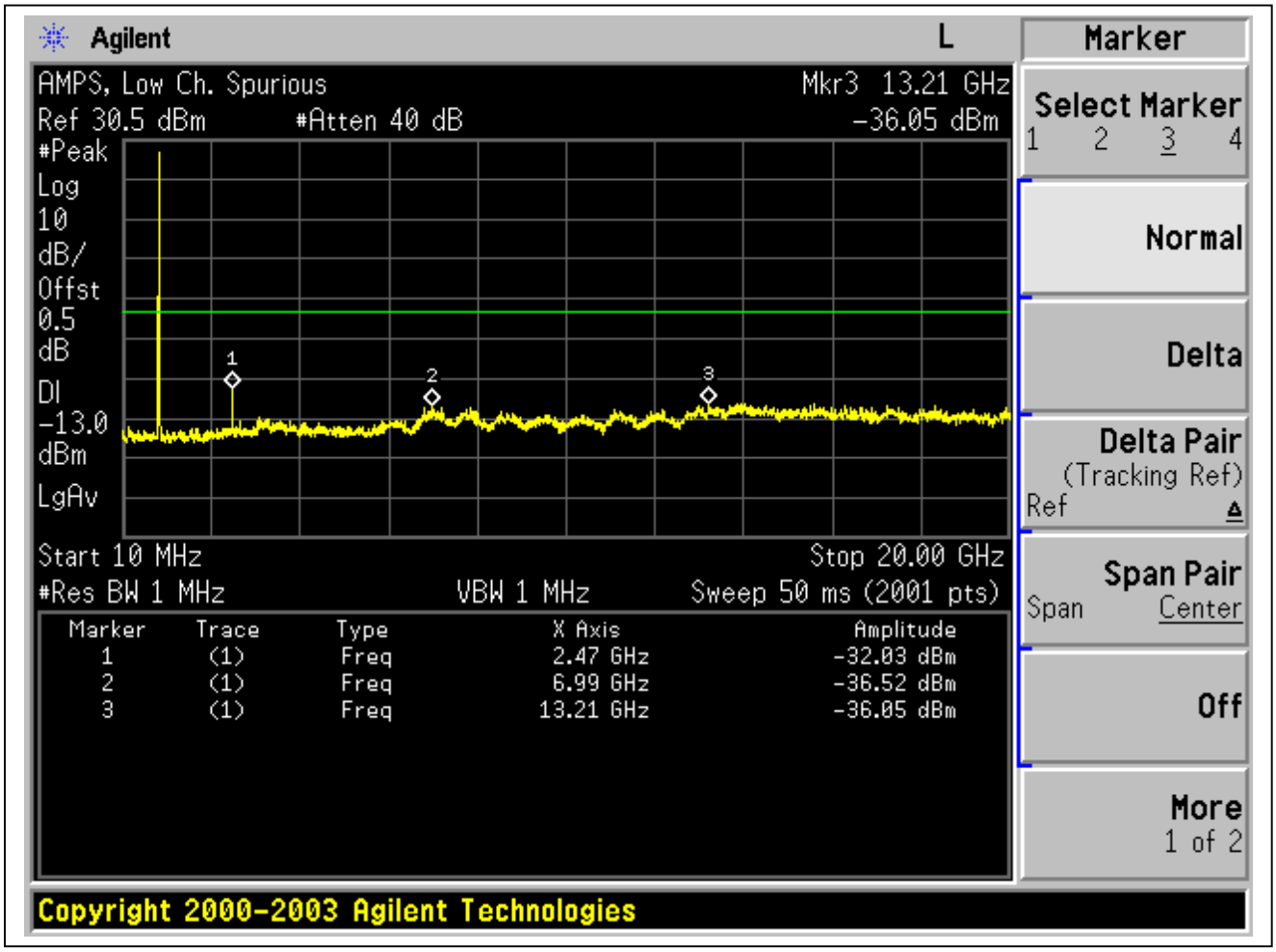
AMPS Modulation: Low / Mid / High, Out-Of-Band Emissions, Mobile Emissions in Base Frequency Range:

Low Channel Out-Of-Band Emissions



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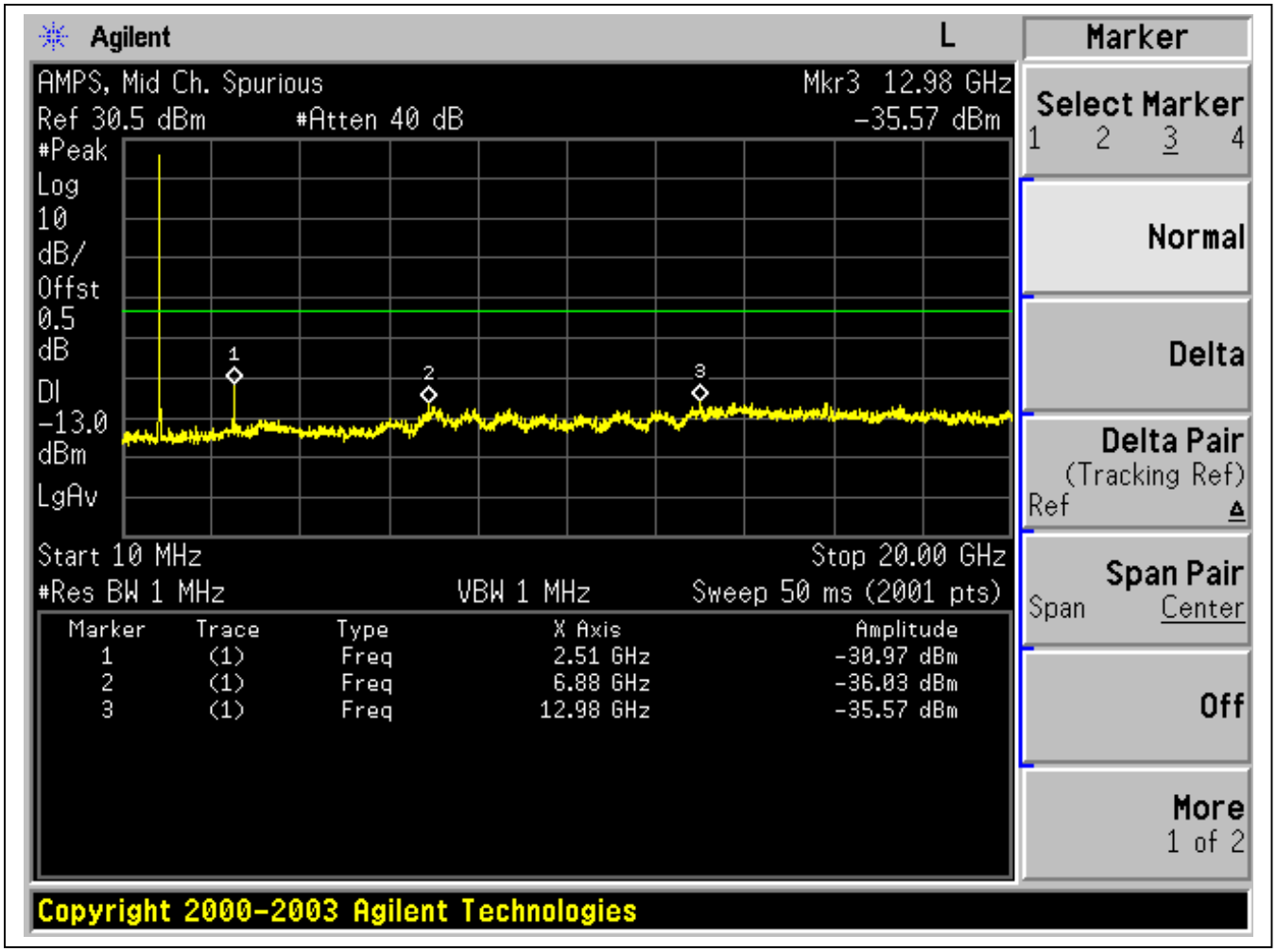
Mid Channel Out-Of-Band Emissions



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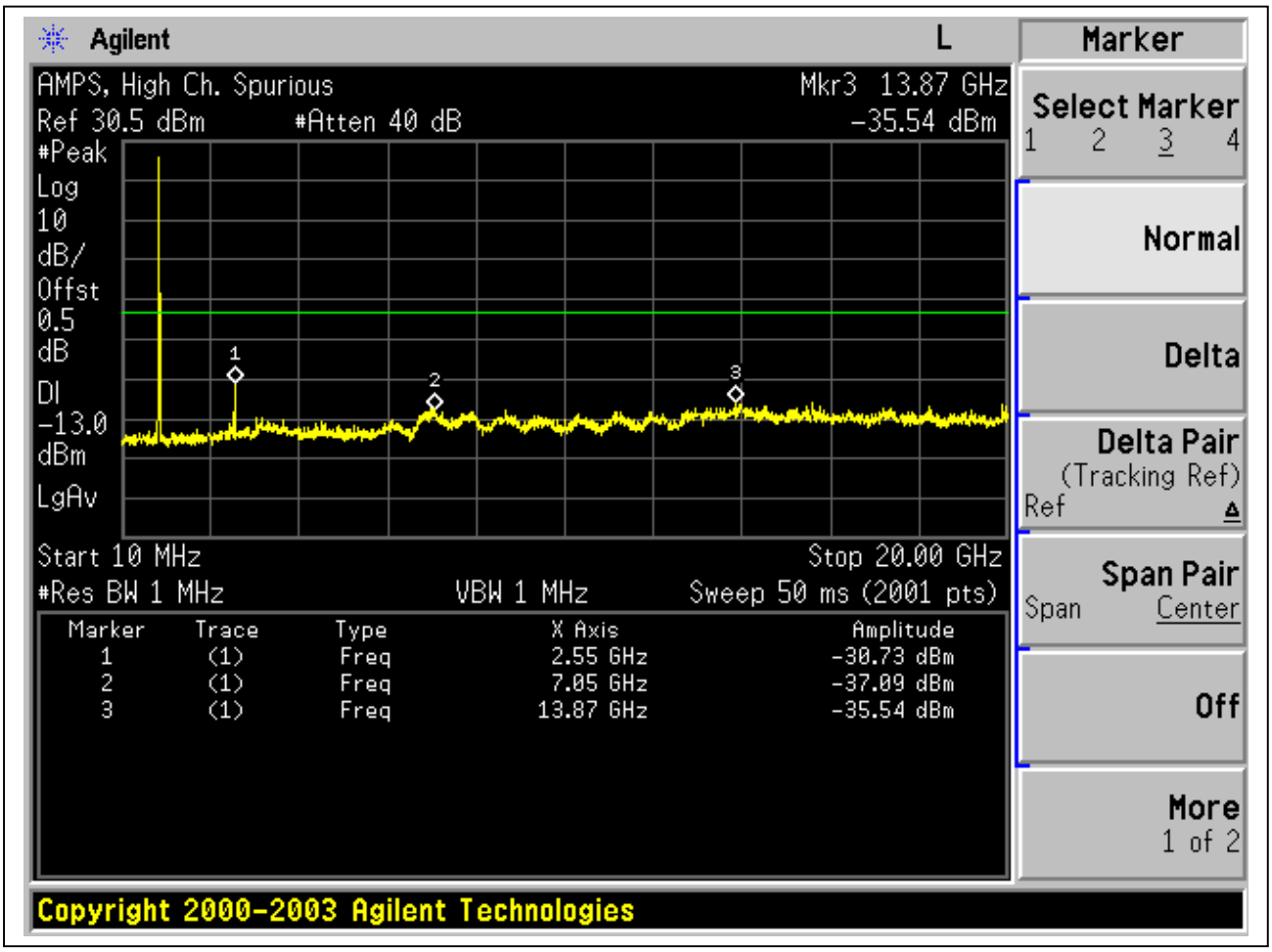
High Channel Out-Of-Band Emissions



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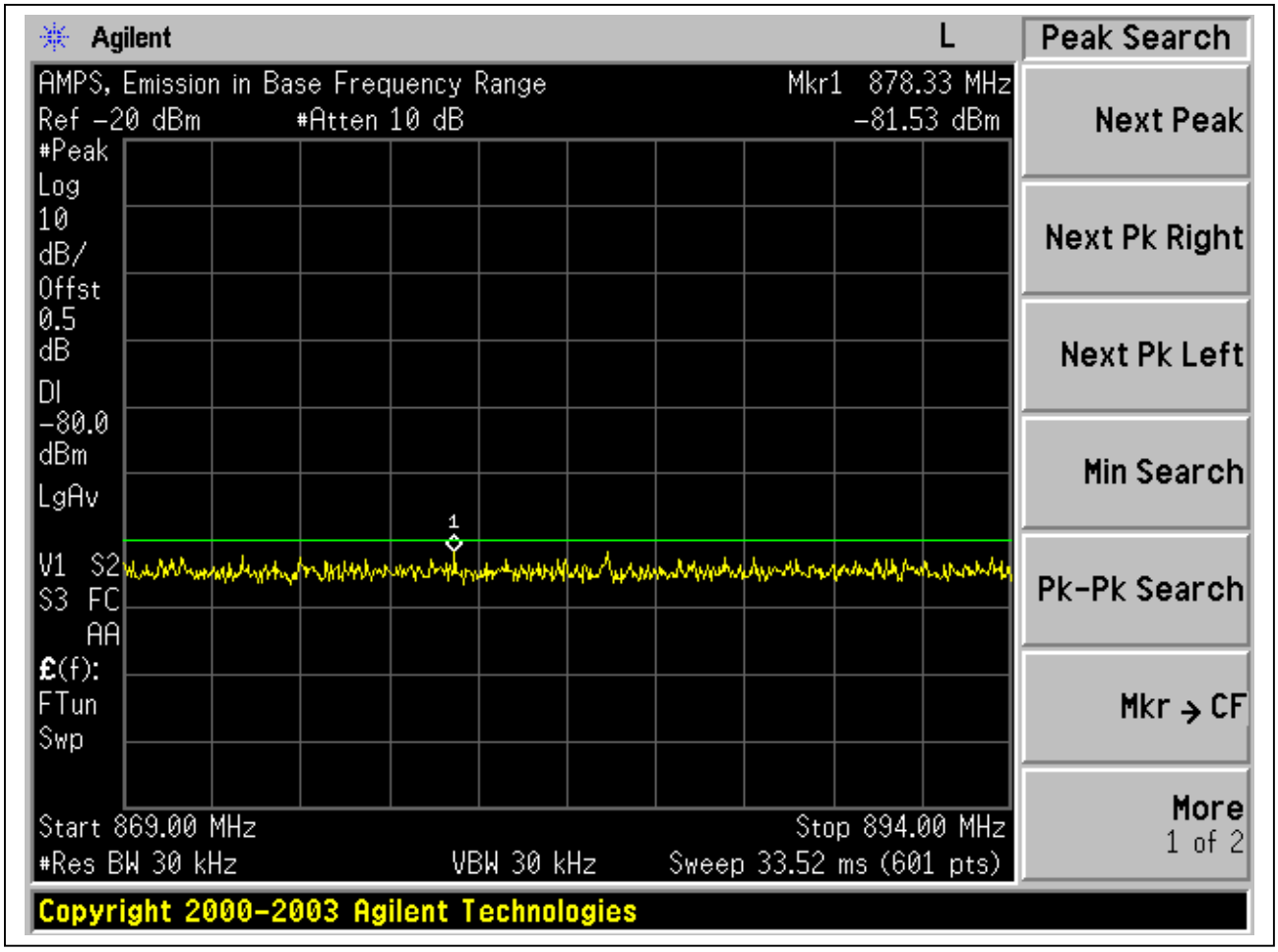
AMPS Mobile Emissions in Base Frequency Range:



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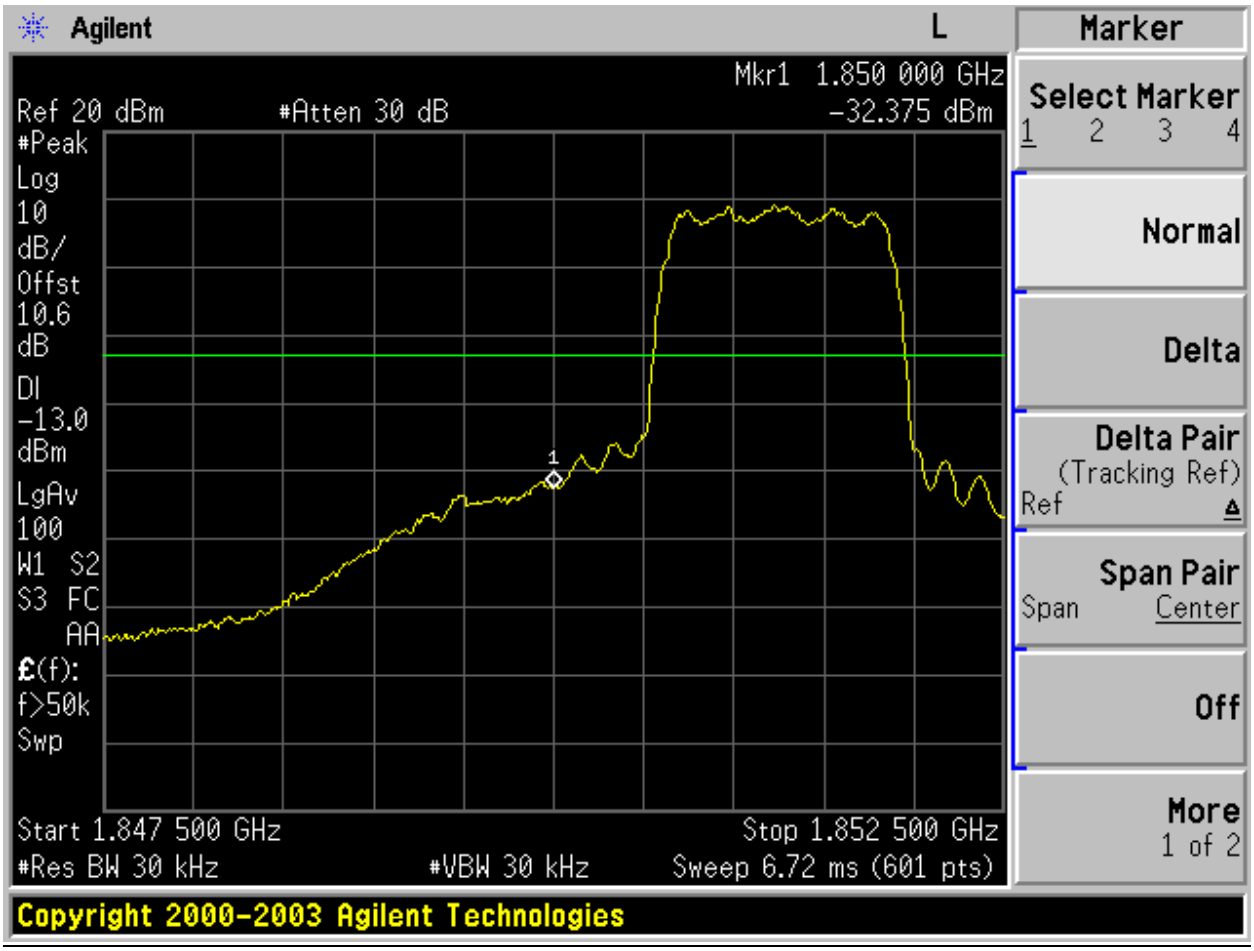
PCS Modulation: Low / Mid / High, Band Edge, Out-Of-Band Emissions:

Low Channel Band Edge



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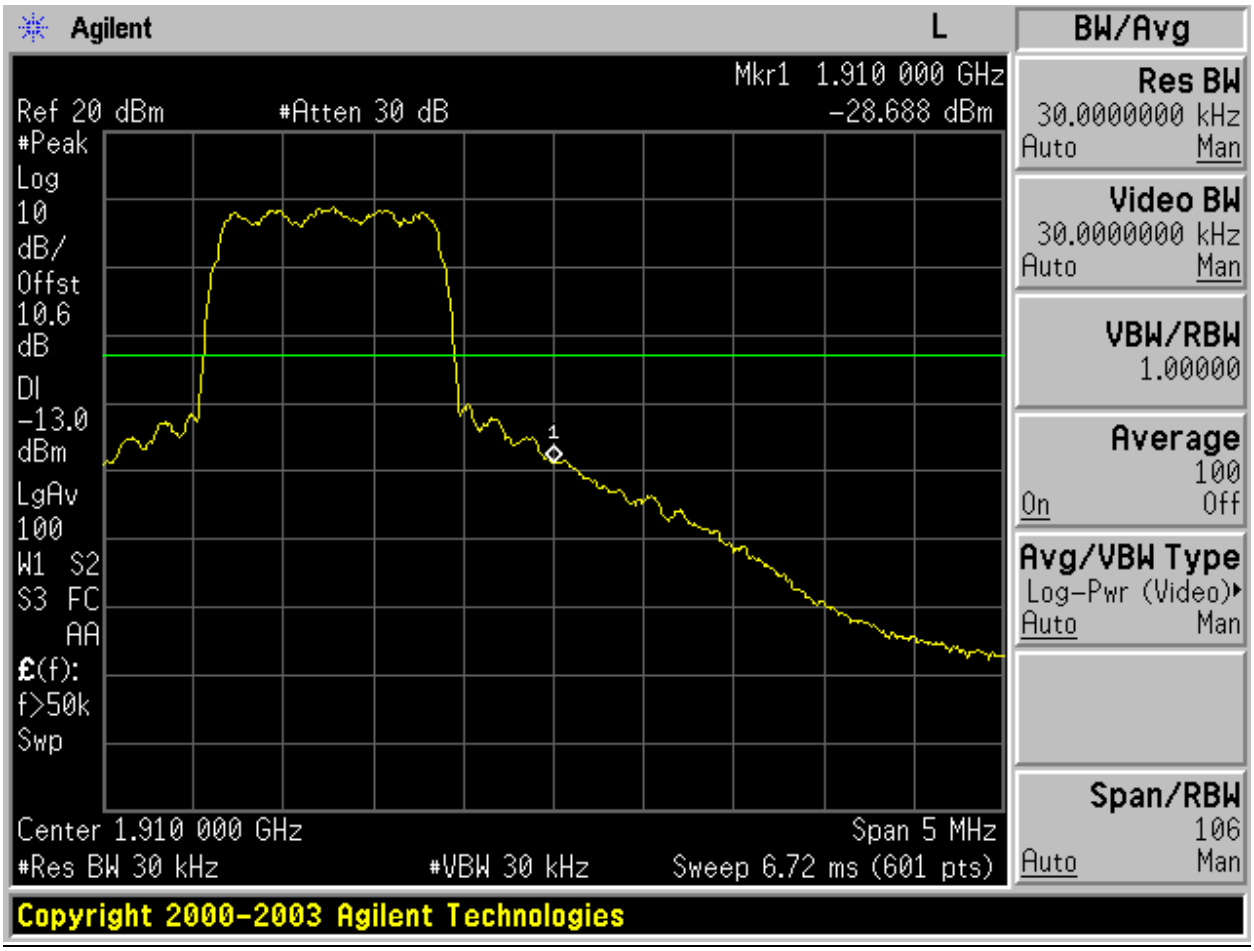
High Channel Band Edge



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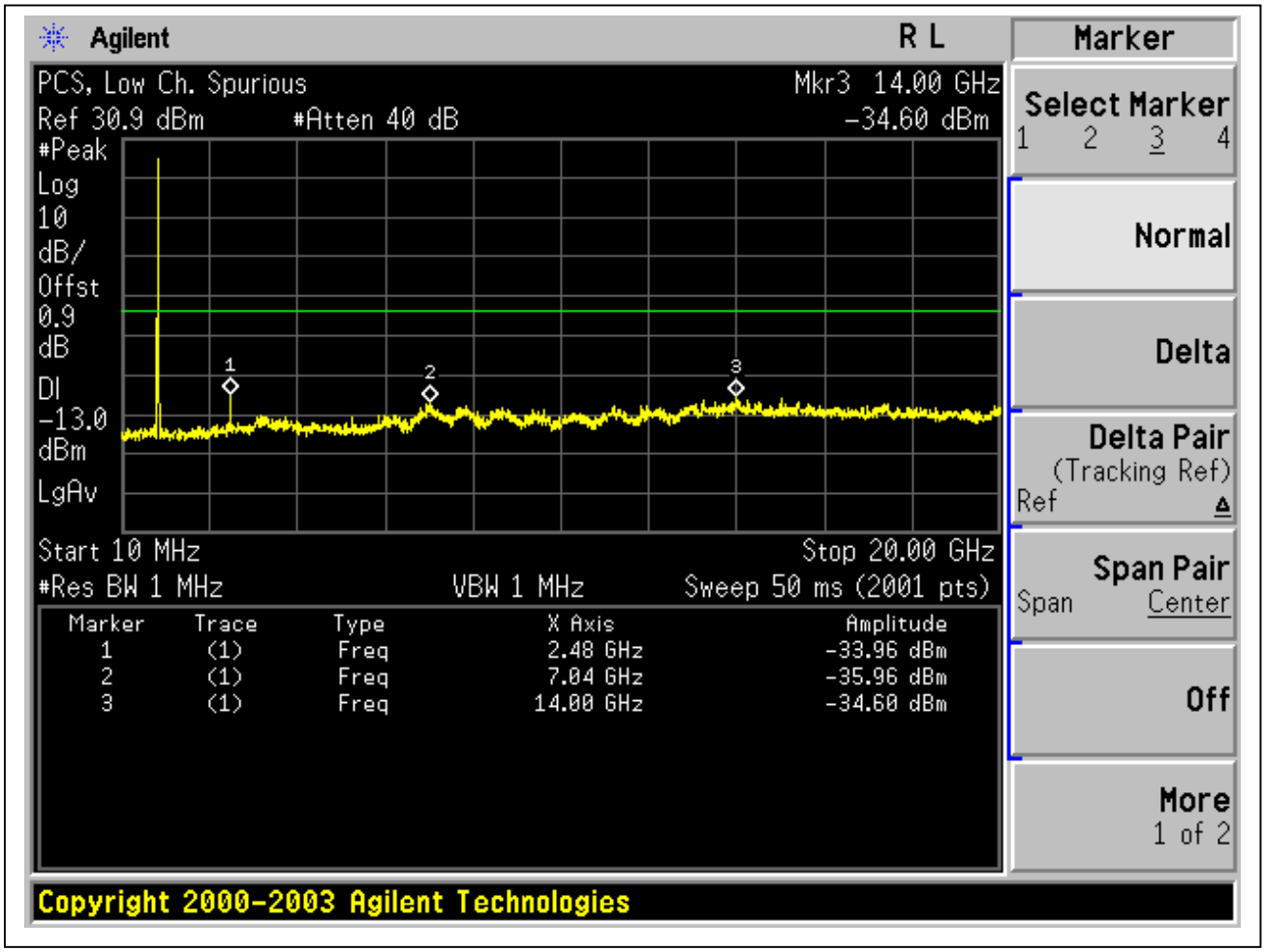
Low Channel Out-Of-Band Emissions



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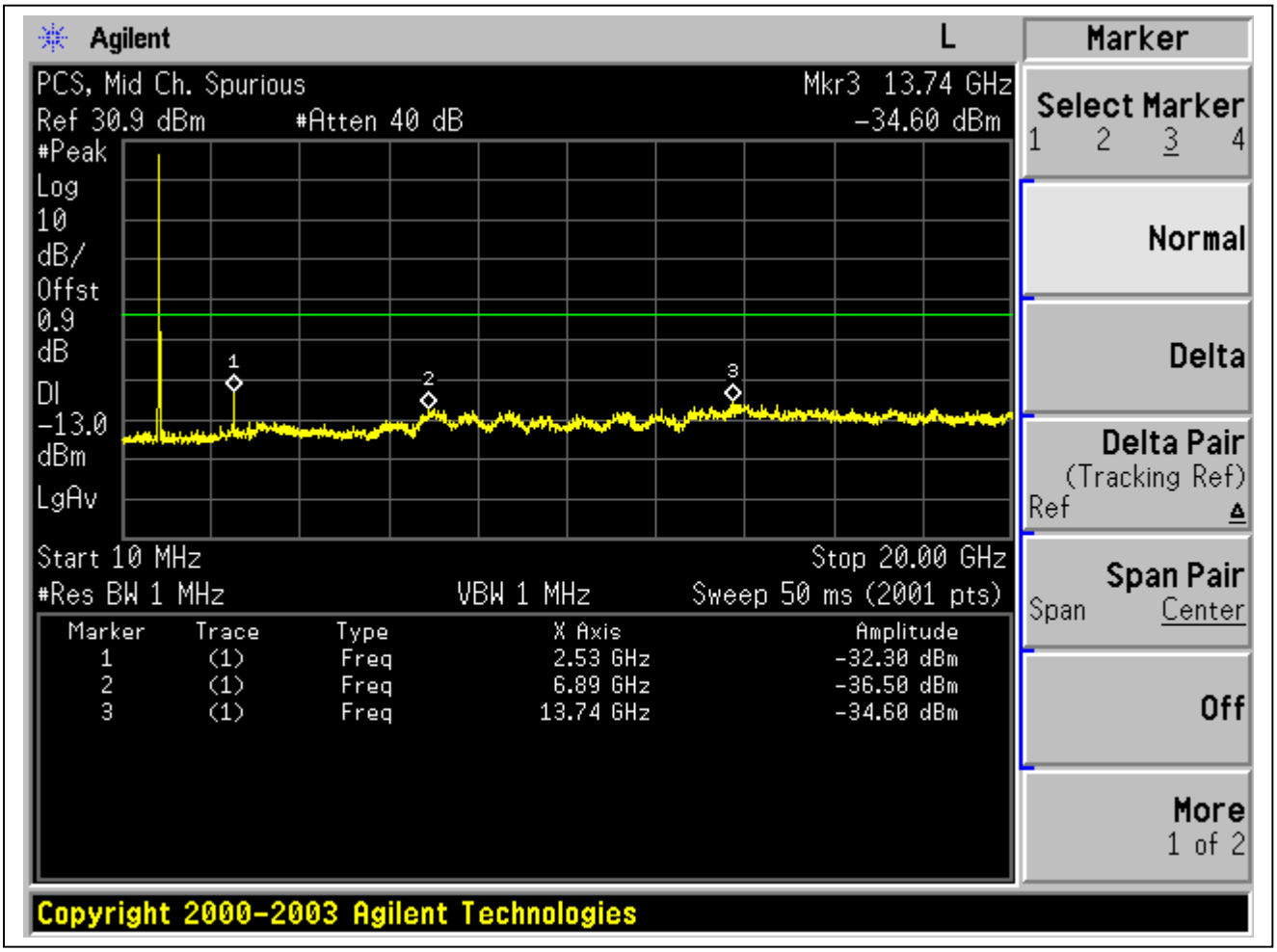
Mid Channel Out-Of-Band Emissions



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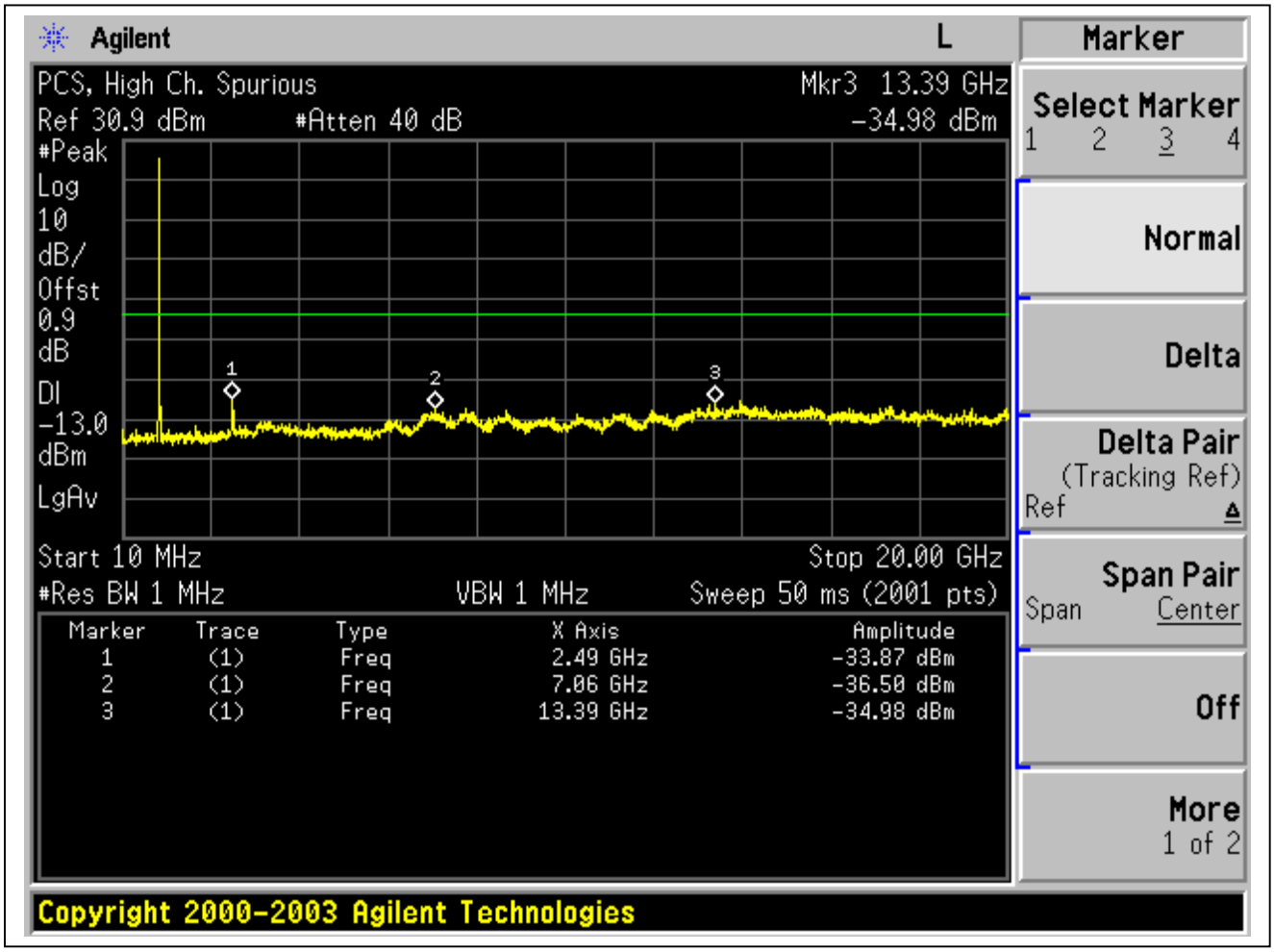
High Channel Out-Of-Band Emissions



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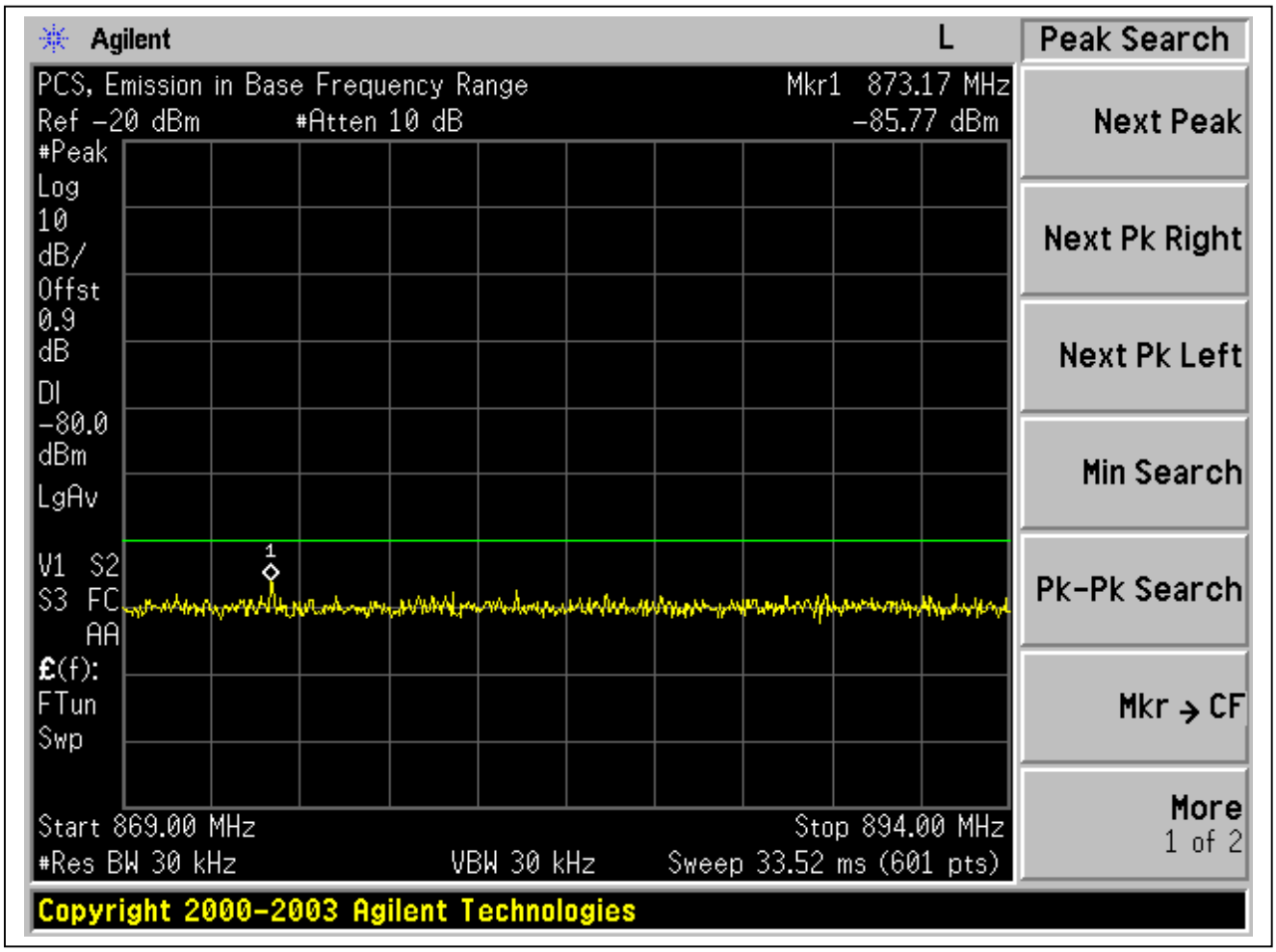
PCS Mobile Emissions in Base Frequency Range:



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7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Spectrum Analyzer	**Agilent**	**E4446A**	**MY43360112**	**1/13/2005**
Amplifier 1-26GHz	**MITEQ**	**NSP2600-SP**	**924342**	**4/25/2005**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3117**	**29310**	**12/26/2004**

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

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TEST SETUP

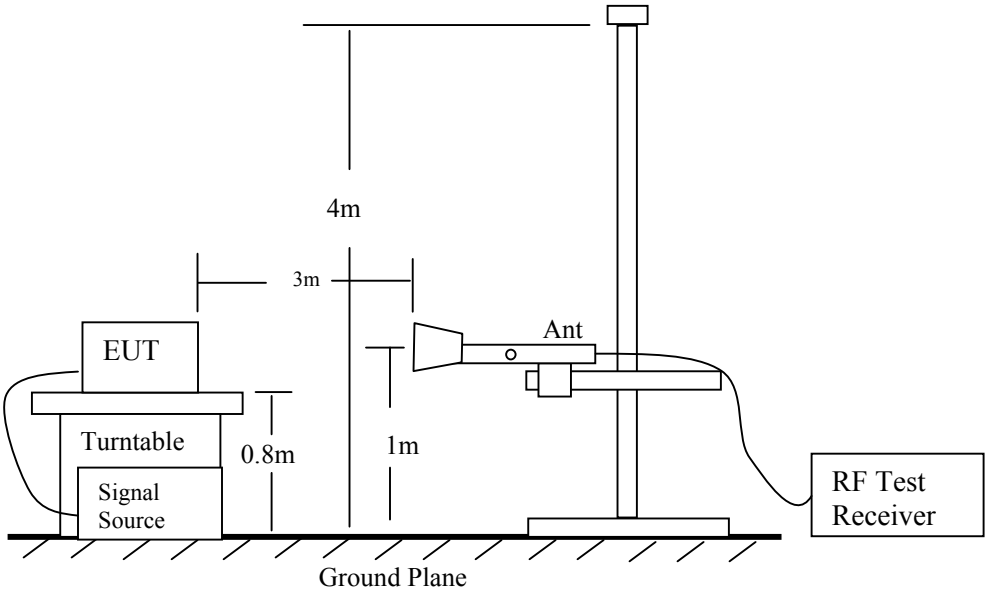

Fig 1: Radiated Emission Measurement

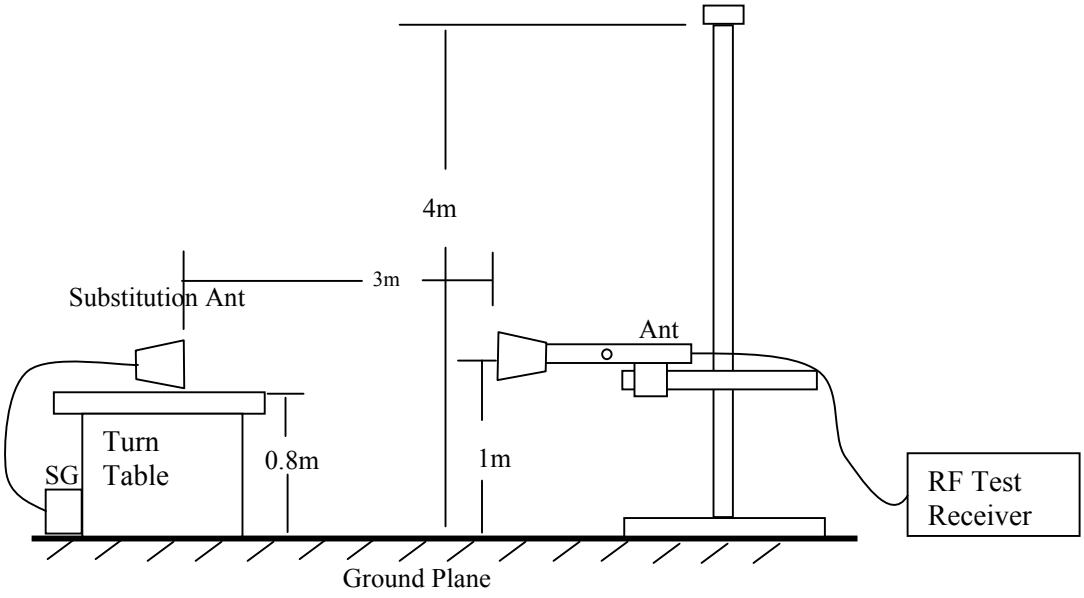

Fig 2: Radiated Emission – Substitution Method set-up

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TEST PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 1m from the EUT to correspond to the frequency of the transmitter.
3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8). The maximum signal level detected by the measuring receiver shall be noted.
9). The transmitter shall be replaced by a substitution antenna.
10). The substitution antenna shall be oriented for vertical polarization.
11). The substitution antenna shall be connected to a calibrated signal generator.
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

RESULT

No non-compliance noted, as shown below

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CDMA: Low, Mid, & High Channels:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
CDMA										
Z is the worst Position										
Harmonc & Spurious										
Low Channel										
1.648	53.8	V	-59.2	1.6	7.5	5.4	-53.2	-13.0	-40.2	
1.648	53.0	H	-59.3	1.6	7.5	5.4	-53.4	-13.0	-40.4	
2.474	62.2	V	-47.4	1.9	8.6	6.4	-40.8	-13.0	-27.8	
2.474	67.8	H	-41.7	1.9	8.6	6.4	-35.0	-13.0	-22.0	
3.299	46.0	V	-61.6	2.3	9.3	7.2	-54.6	-13.0	-41.6	Noise Floor
3.299	46.0	H	-61.4	2.3	9.3	7.2	-54.4	-13.0	-41.4	Noise Floor
Mid Channel										
1.671	58.8	H	-53.4	1.6	7.6	5.4	-47.4	-13.0	-34.4	
1.671	55.6	V	-57.3	1.6	7.6	5.4	-51.3	-13.0	-38.3	
2.508	72.5	H	-36.9	1.9	8.6	6.4	-30.2	-13.0	-17.2	
2.508	65.3	V	-44.2	1.9	8.6	6.4	-37.6	-13.0	-24.6	
3.344	54.7	H	-52.7	2.3	9.3	7.2	-45.7	-13.0	-32.7	
3.344	50.9	V	-56.6	2.3	9.3	7.2	-49.6	-13.0	-36.6	
High Channel										
1.697	54.0	V	-58.8	1.6	7.6	5.5	-52.8	-13.0	-39.8	
1.697	50.2	H	-61.8	1.6	7.6	5.5	-55.8	-13.0	-42.8	
2.545	59.9	V	-49.5	2.0	8.6	6.5	-42.9	-13.0	-29.9	
2.545	63.7	H	-45.6	2.0	8.6	6.5	-38.9	-13.0	-25.9	
3.393	47.1	V	-60.3	2.3	9.4	7.2	-53.3	-13.0	-40.3	
3.393	48.9	H	-58.4	2.3	9.4	7.2	-51.4	-13.0	-38.4	

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AMPS: Low, Mid, & High Channels:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
AMPS										
Z is the worst Position										
Harmonc & Spurious										
Low Channel										
1.648	56.4	V	-56.6	1.6	7.5	5.4	-50.7	-13.0	-37.7	
1.648	58.5	H	-53.8	1.6	7.5	5.4	-47.9	-13.0	-34.9	
2.472	59.7	V	-50.0	1.9	8.6	6.4	-43.4	-13.0	-30.4	
2.472	69.0	H	-40.5	1.9	8.6	6.4	-33.9	-13.0	-20.9	
3.296	46.0	V	-61.6	2.3	9.3	7.2	-54.6	-13.0	-41.6	Noise Floor
3.296	50.9	H	-56.6	2.3	9.3	7.2	-49.6	-13.0	-36.6	Noise Floor
Mid Channel										
1.673	62.4	H	-49.7	1.6	7.6	5.4	-43.8	-13.0	-30.8	
1.673	57.6	V	-55.2	1.6	7.6	5.4	-49.2	-13.0	-36.2	
2.509	75.6	H	-33.8	1.9	8.6	6.4	-27.1	-13.0	-14.1	
2.509	66.8	V	-42.8	1.9	8.6	6.4	-36.2	-13.0	-23.2	
3.346	56.6	H	-50.8	2.3	9.3	7.2	-43.8	-13.0	-30.8	
3.346	54.3	V	-53.2	2.3	9.3	7.2	-46.2	-13.0	-33.2	
4.182	51.7	H	-54.0	2.7	9.9	7.8	-46.8	-13.0	-33.8	
4.182	46.9	V	-59.2	2.7	9.9	7.8	-52.0	-13.0	-39.0	
High Channel										
1.698	53.9	V	-58.8	1.6	7.6	5.5	-52.8	-13.0	-39.8	
1.698	60.6	H	-51.4	1.6	7.6	5.5	-45.4	-13.0	-32.4	
2.547	65.1	V	-44.4	2.0	8.6	6.5	-37.7	-13.0	-24.7	
2.547	70.2	H	-39.0	2.0	8.6	6.5	-32.3	-13.0	-19.3	
3.396	54.3	V	-53.1	2.3	9.4	7.2	-46.1	-13.0	-33.1	
3.396	55.7	H	-51.6	2.3	9.4	7.2	-44.6	-13.0	-31.6	
4.244	49.2	V	-56.9	2.7	10.0	7.8	-49.6	-13.0	-36.6	
4.244	53.3	H	-52.4	2.7	10.0	7.8	-45.2	-13.0	-32.2	

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PCS: Low, Mid, & High Channels:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
PCS										
Z Position is the Worst position										
High Channel										
3.818	70.7	V	-35.9	2.5	9.6	7.5	-28.8	-13.0	-15.8	
3.818	74.9	H	-31.6	2.5	9.6	7.5	-24.5	-13.0	-11.5	
5.727	59.3	H	-43.6	3.4	11.2	9.1	-35.7	-13.0	-22.7	
5.727	64.0	V	-39.9	3.4	11.2	9.1	-32.0	-13.0	-19.0	
7.636	59.2	V	-41.6	3.7	11.5	9.3	-33.8	-13.0	-20.8	
7.636	61.5	H	-38.6	3.7	11.5	9.3	-30.8	-13.0	-17.8	
9.545	57.0	H	-39.9	4.1	11.1	9.0	-32.9	-13.0	-19.9	
9.545	56.5	V	-40.5	4.1	11.1	9.0	-33.5	-13.0	-20.5	
11.450	51.7	V	-44.1	4.6	12.7	10.5	-36.1	-13.0	-23.1	Noise Floor
Mid Channel										
3.761	73.8	H	-32.8	2.5	9.6	7.4	-25.7	-13.0	-12.7	
3.761	70.3	V	-36.4	2.5	9.6	7.4	-29.3	-13.0	-16.3	
5.641	60.0	H	-43.0	3.3	11.2	9.0	-35.1	-13.0	-22.1	
5.641	56.3	V	-47.6	3.3	11.2	9.0	-39.8	-13.0	-26.8	
7.520	59.3	H	-40.9	3.7	11.5	9.4	-33.1	-13.0	-20.1	
7.520	58.4	V	-42.7	3.7	11.5	9.4	-34.9	-13.0	-21.9	
9.400	59.0	H	-38.1	4.1	10.8	8.7	-31.4	-13.0	-18.4	
9.400	52.9	V	-44.1	4.1	10.8	8.7	-37.4	-13.0	-24.4	
11.280	55.9	H	-39.5	4.6	12.7	10.5	-31.4	-13.0	-18.4	
11.280	52.0	V	-44.0	4.6	12.7	10.5	-35.9	-13.0	-22.9	
Low Channel										
3.703	68.1	V	-38.7	2.5	9.6	7.4	-31.6	-13.0	-18.6	
3.703	66.4	H	-40.3	2.5	9.6	7.4	-33.2	-13.0	-20.2	
5.554	59.7	V	-44.3	3.3	11.1	9.0	-36.5	-13.0	-23.5	
5.554	58.0	H	-45.0	3.3	11.1	9.0	-37.1	-13.0	-24.1	
7.405	56.6	V	-44.7	3.7	11.6	9.4	-36.8	-13.0	-23.8	
7.405	58.5	H	-42.0	3.7	11.6	9.4	-34.1	-13.0	-21.1	
9.256	51.7	V	-45.5	4.0	10.5	8.4	-39.0	-13.0	-26.0	
9.256	53.3	H	-43.9	4.0	10.5	8.4	-37.4	-13.0	-24.4	

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7.6. SECTION 2.1055: FREQUENCY STABILITY

INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Spectrum Analyzer	**Agilent**	**E4446A**	**MY43360112**	**1/13/2005**
Spectrum Analyzer, 26.5 GHz	**HP**	**8593EM**	**3710A00205**	**10/1/2004**
Temperature / Humidity Chamber	**Thermotron**	**SE 600-10-10**	**29800**	**4/26/2005**

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
800-1000	Peak	300 Hz	300 Hz

TEST SETUP

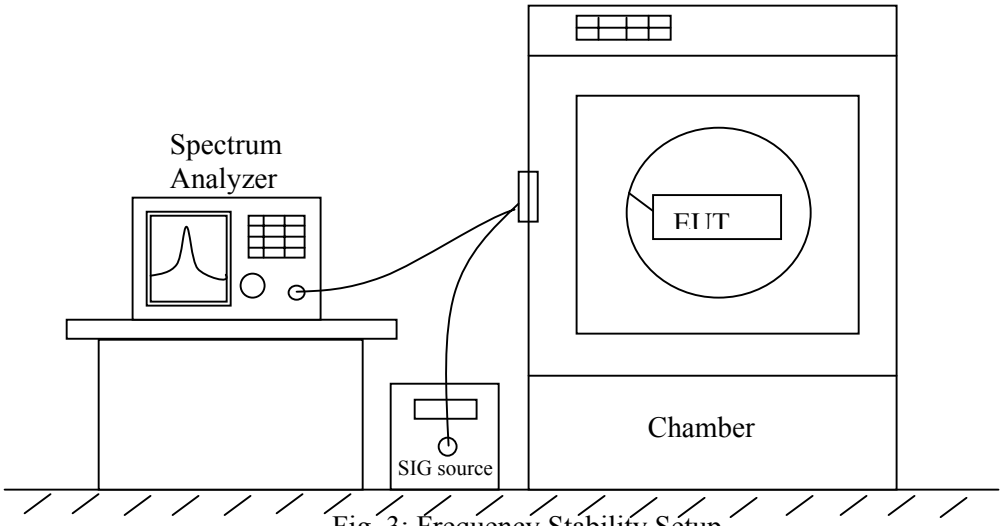

Fig. 3: Frequency Stability Setup

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Test Setup Photos

COMPLIANCE CERTIFICATION SERVICES DOCUMENT NO: CCSUP4031A
561F MONTEREY ROAD, MORGAN HILL, CA 95037 USA TEL: (408) 463-0885 FAX: (408) 463-0888
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TEST PROCEDURE

- **Frequency stability versus environmental temperature**

1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Turn EUT off and set Chamber temperature to -30°C.
3). Allow sufficient time (approximately 20 to 30 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
4). Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

- **Frequency stability versus AC input voltage**

1). Setup the configuration per figure 6 and set chamber temperature to 25°C. Use a variable AC power supply to power the EUT and set AC output voltage to EUT nominal input AC voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Slowly reduce the EUT input voltage to specified extreme voltage variation (±15%) and record the maximum frequency change.

RESULT

No non-compliance noted, as shown below because the EUT uses the same OSC in both receiver and transmitter LO circuit. As a result, the frequency does not shift in Frequency Stability Test.

Frequency stability versus environmental temperature

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Reference Frequency: AMPS Mid Channel 836.490000MHz @ 25?C Limit: to stay ± 2.5 ppm = 2091.251 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (?C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm**
3.70	50	836.50081	-0.598	± 2.5
3.70	40	836.50051	-0.239	± 2.5
3.70	30	836.50071	-0.478	± 2.5
3.70	***25***	***836.50031***	***0***	***± 2.5***
3.70	20	836.50051	-0.239	± 2.5
3.70	10	836.50081	-0.598	± 2.5
3.70	0	836.50101	-0.837	± 2.5
3.70	-10	836.50081	-0.598	± 2.5
3.70	-20	836.50041	-0.120	± 2.5
3.70	-30	836.50091	-0.717	± 2.5
2.8 (end point)	25	836.50200	-2.020	± 2.5
3.15	25	836.50071	-0.478	± 2.5
4.26	25	836.50011	0.239	± 2.5

Reference Frequency: CDMA Mid Channel 835.89000MHz @ 25?C Limit: to stay ± 2.5 ppm = 2091.452 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (?C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm**
3.70	50	836.57967	1.230	± 2.5
3.70	40	836.58024	0.556	± 2.5
3.70	30	836.58011	0.710	± 2.5
3.70	***25***	***836.58070***	***0.000***	***± 2.5***
3.70	20	836.58102	-0.375	± 2.5
3.70	10	836.58113	-0.506	± 2.5
3.70	0	836.58225	-1.853	± 2.5
3.70	-10	836.58186	-1.384	± 2.5
3.70	-20	836.58185	-1.367	± 2.5
3.70	-30	836.58177	-1.278	± 2.5
2.8 (end point)	25	836.58225	-1.851	± 2.5
3.15	25	836.57931	1.659	± 2.5

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Reference Frequency: PCS Mid Channel 1880.00000MHz @ 25?C Limit: to stay ± 2.5 ppm = 4701.715 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (?C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.70	50	1880.68596	-0.082	± 2.5
3.70	40	1880.68519	0.326	± 2.5
3.70	30	1880.68623	-0.226	± 2.5
3.70	***25***	***1880.68580***	***0***	***± 2.5***
3.70	20	1880.68510	0.375	± 2.5
3.70	10	1880.68447	0.707	± 2.5
3.70	0	1880.68647	-0.356	± 2.5
3.70	-10	1880.68671	-0.481	± 2.5
3.70	-20	1880.68633	-0.278	± 2.5
3.70	-30	1880.68615	-0.183	± 2.5
3.15 (end point)	25	1880.68615	-0.183	± 2.5
3.15	25	1880.68615	-0.183	± 2.5
4.26	25	1880.68423	0.840	± 2.5

END OF REPORT

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