

# FCC PART 90 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

For

## CANAM TECHNOLOGY, INC.

5318 East 2<sup>nd</sup> Street #700  
Long Beach, CA90803

**FCC ID: TCJM4-CHOLC-800UL**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> Signal Booster
<b>Test Engineer:</b> Daniel Deng 	
<b>Report No.:</b> R0506021	
<b>Report Date:</b> 2005-06-12 	
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**Note:** The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

**TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
OBJECTIVE .....	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY .....	3
TEST FACILITY .....	3
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
JUSTIFICATION .....	5
BLOCK DIAGRAM.....	5
EQUIPMENT MODIFICATIONS .....	5
LOCAL SUPPORT EQUIPMENT.....	5
INTERFACE PORTS AND CABLING.....	5
CONFIGURATION OF TEST SYSTEM .....	6
TEST SETUP BLOCK DIAGRAM.....	6
<b>SUMMARY OF TEST RESULTS .....</b>	<b>7</b>
<b>§2.1046 AND §90.219 – CONDUCTED OUTPUT POWER.....</b>	<b>8</b>
PROVISION APPLICABLE.....	8
TEST EQUIPMENT LIST AND DETAILS.....	8
ENVIRONMENTAL CONDITIONS .....	8
TEST RESULTS .....	8
<b>§2.1049, AND § 90.209 – OCCUPIED BANDWIDTH.....</b>	<b>9</b>
APPLICABLE STANDARD .....	9
TEST PROCEDURE .....	9
TEST EQUIPMENT .....	9
ENVIRONMENTAL CONDITIONS .....	9
TEST RESULTS .....	9
<b>§2.1051 AND §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....</b>	<b>11</b>
APPLICABLE STANDARD .....	11
TEST PROCEDURE .....	11
TEST EQUIPMENT .....	11
ENVIRONMENTAL CONDITIONS .....	11
TEST RESULTS .....	11
<b>§2.1053 AND §90.210 - FIELD STRENGHT OF SPURIOUS EMISSIONS .....</b>	<b>15</b>
APPLICABLE STANDARD .....	15
TEST PROCEDURE .....	15
TEST EQUIPMENT .....	15
ENVIRONMENTAL CONDITIONS .....	15
TEST RESULT .....	16
<b>§2.1051 &amp; §90.210 - TWO-TONE INTERMODULATION TEST .....</b>	<b>17</b>
APPLICABLE STANDARDS .....	17
TEST PROCEDURE .....	17
TEST EQUIPMENT .....	17
TEST RESULTS .....	17
PLOTS OF TWO-TONE TEST RESULT.....	17
<b>§2.1055 (D) AND §90.213- FREQUENCY STABILITY .....</b>	<b>20</b>
<b>§90.214 - TRANSIENT FREQUENCY BEHAVIOR.....</b>	<b>21</b>

## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *Canam Technology, Inc.* FCC ID: *TCJM4-CHOLC-800UL* or the “EUT” as referred to in this report is a Signal Booster, which measures approximately 273.0mmL x 234.0mmW x 27.2mmH.

*\*The test data gathered are from production sample serial number 101 provided by the manufacturer.*

### Objective

This type approval report is prepared on behalf of *Canam Technology, Inc.* in accordance with Part 2 and Part 90 of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, frequency stability, transient frequency behavior and radiated margin.

### Related Submittal(s)/Grant(s)

No Related Submittals

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, TIA/EIA-603C-2004, ANSI 63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations is attached hereinafter and can also be found at

<http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The host system was configured for testing according to TIA/EIA-603C-2004.

The EUT was tested in the normal (native) operating mode to represent *worst-case* results during the final qualification test.

### Block Diagram

Please refer to Exhibit D.

### Equipment Modifications

No modifications were made to the EUT.

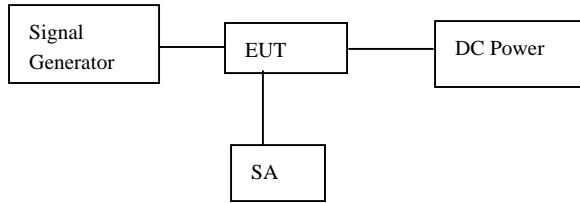
### Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
R&S	Signal Generator	SMIQ03	DE23746	N/A
BK Precision	DC Power Supply	1740	26502000233	N/A

### Interface Ports and Cabling

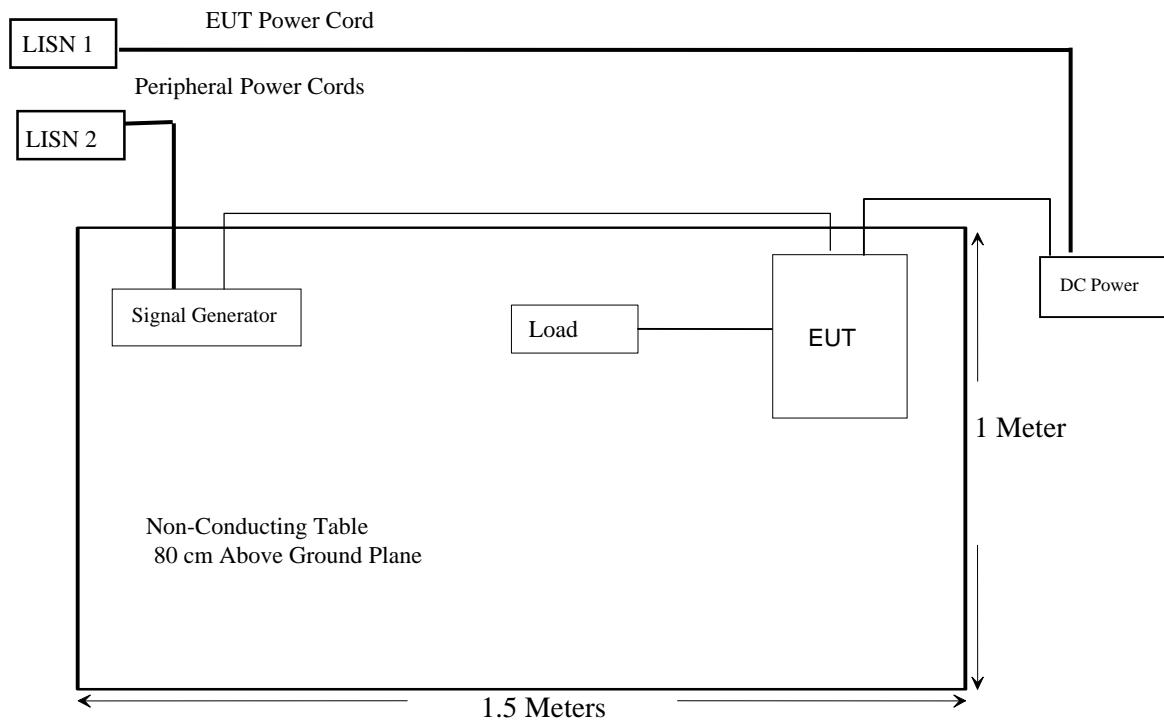
Cable Description	Length (M)	From	To
Serial Cable	1.5	EUT Com in port	Laptop
Power cable	1.5	EUT Power DC In port	DC Power Supply

## Configuration of Test System



## Test Setup Block Diagram

The setup block diagram is for FCC Part90 Field Strength of Spurious Emission



**SUMMARY OF TEST RESULTS**

FCC RULE	DESCRIPTION OF TEST	RESULT
§2.1046 §90.219	Conducted Output Power	Compliant
§ 2.1047 § 90.207	Modulation Characteristics	N/A
§ 2.1049 § 90.209	Emission, Occupied Bandwidth	Compliant
§ 2.1051 § 90.210	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1053 § 90.210	Field Strength of Spurious Emissions	Compliant
§ 2.1055 § 90.213	Frequency Stability VS. Temperature Frequency Stability VS. Voltage	N/A
§ 90.210	Two-Tone Test	Compliant
§ 90.214	Transient Frequency Behavior	N/A

## §2.1046 and §90.219 – CONDUCTED OUTPUT POWER

### Provision Applicable

Per FCC §2.1046 and §90.219: (b) Class A narrowband signal boosters must be equipped with automatic gain control circuitry which will limit the total effective radiated power (ERP) of the unit to a maximum of 5 watts under all conditions. Class B broadband signal boosters are limited to 5 watts ERP for each authorized frequency that the booster is designed to amplify.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10
Rohde & Schwarz	Generator, Signal	SMIQ03	DE23746	2005-05-02

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1013 mbar

*The testing was performed by Daniel Deng on 2005-06-02.*

### Test Results

Input Power = -10dBm

Channel	Frequency (MHZ)	Power (dBm)
Low	806	-1.53
Mid	815	0.64
High	824	-1.72

## **§2.1049, and § 90.209 – OCCUPIED BANDWIDTH**

### **Applicable Standard**

§2.1049, §90.209 and §90.210

### **Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band  $\pm 50$  KHz from the carrier frequency.

### **Test Equipment**

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10
Rohde & Schwarz	Generator, Signal	SMIQ03	DE23746	2005-05-02

\* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

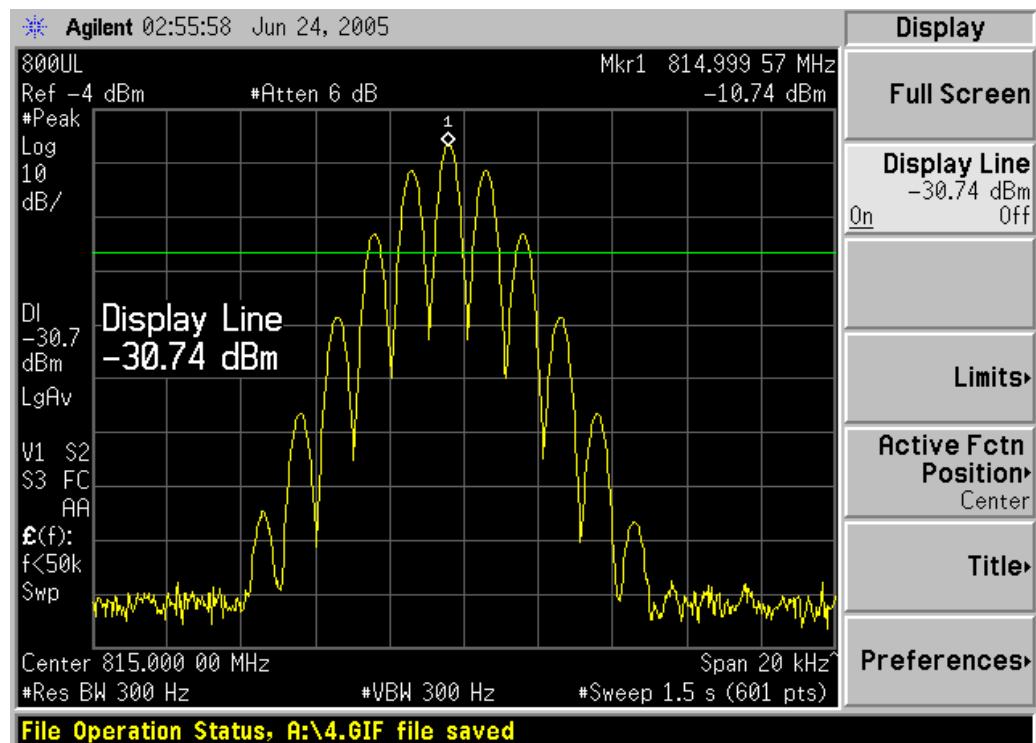
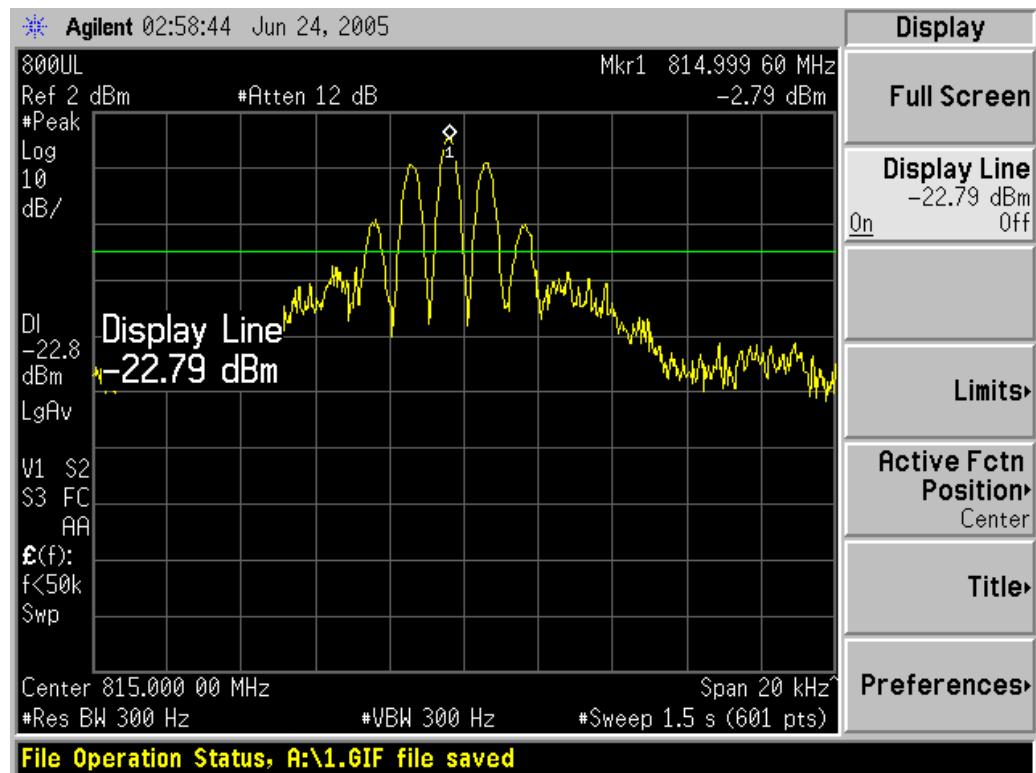
### **Environmental Conditions**

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1013mbar

*The testing was performed by Daniel Deng on 2005-06-02.*

### **Test Results**

Please refer to the hereinafter plots. (Input Signal Power = -10dBm)

**Mid Channel:****In****Out**

## §2.1051 and §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standard

§2.1051 and §90.210

### Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10
Rohde & Schwarz	Generator, Signal	SMIQ03	DE23746	2005-05-02

\* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

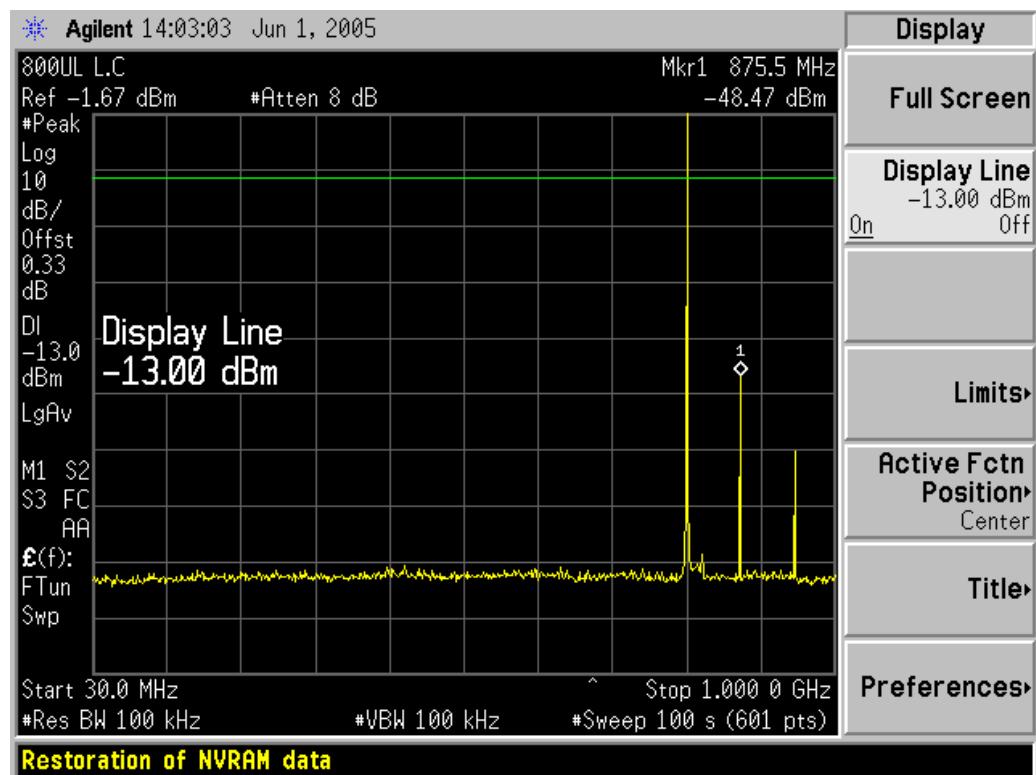
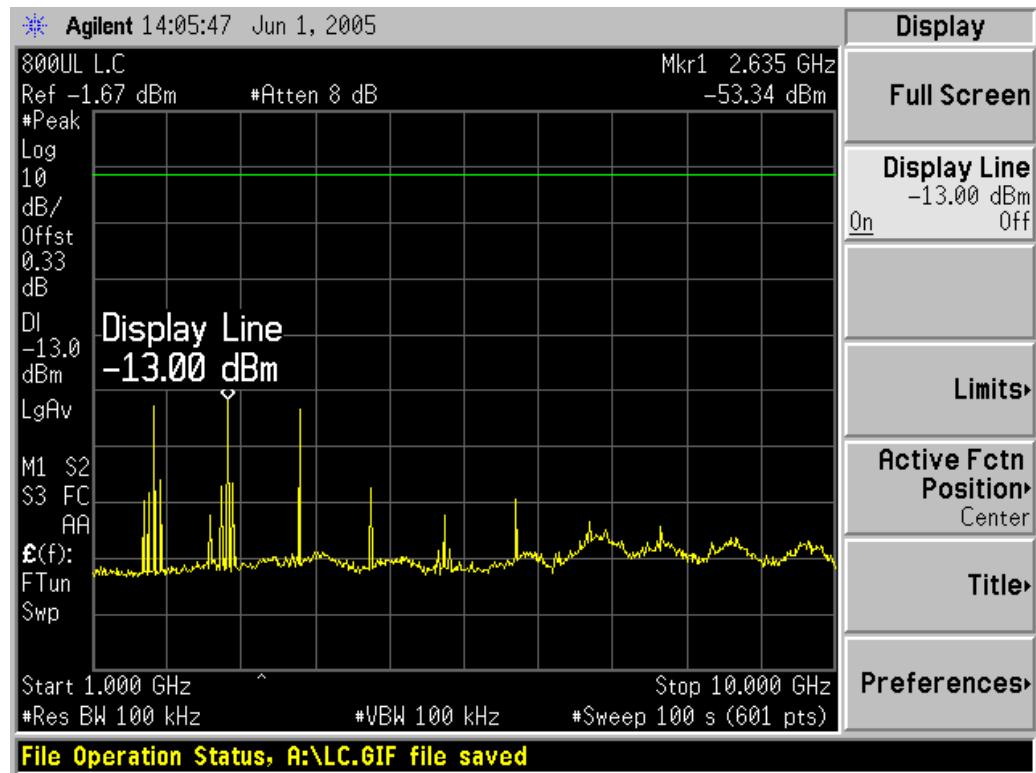
### Environmental Conditions

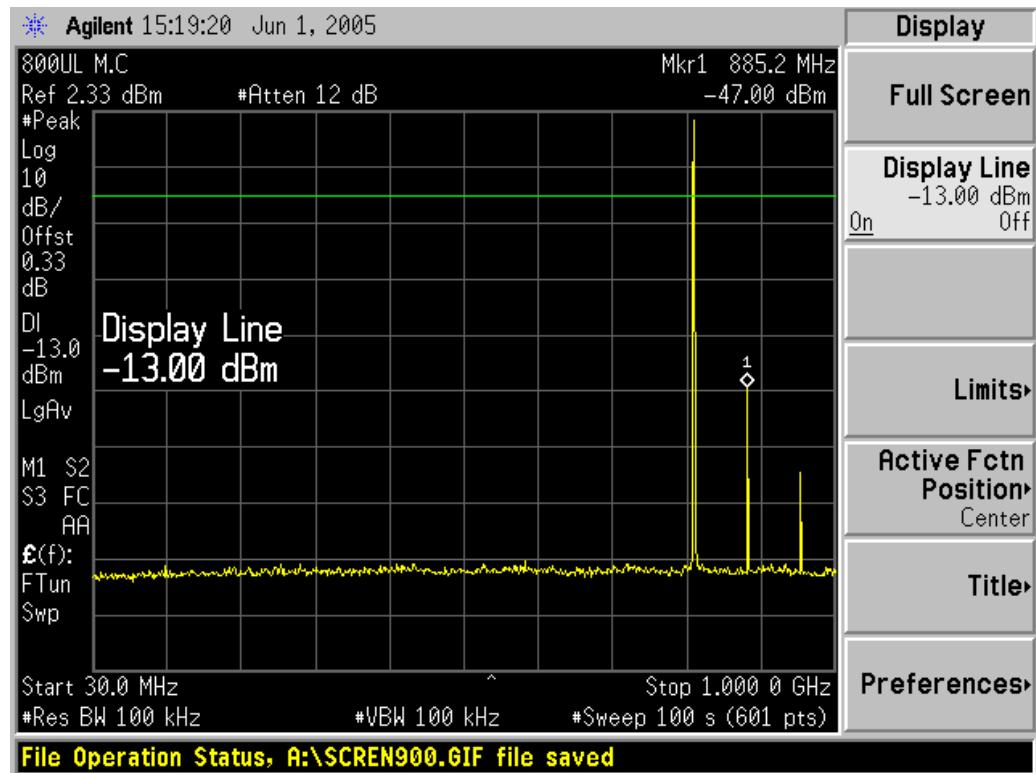
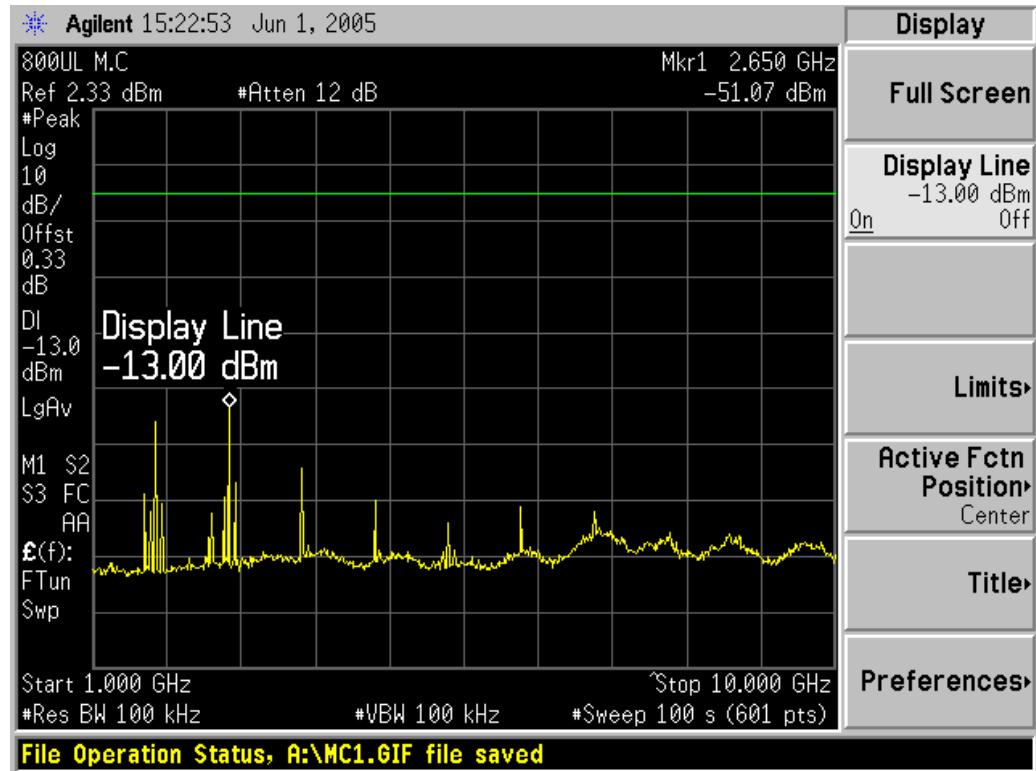
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Relative Humidity:	45%
ATM Pressure:	1013mbar

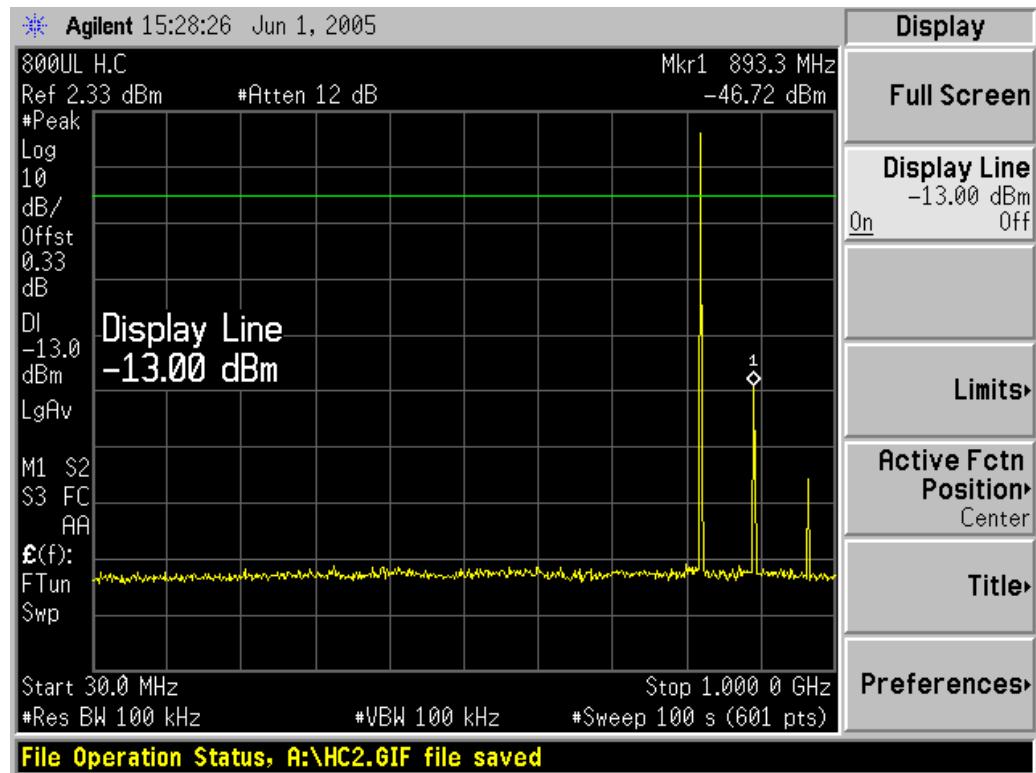
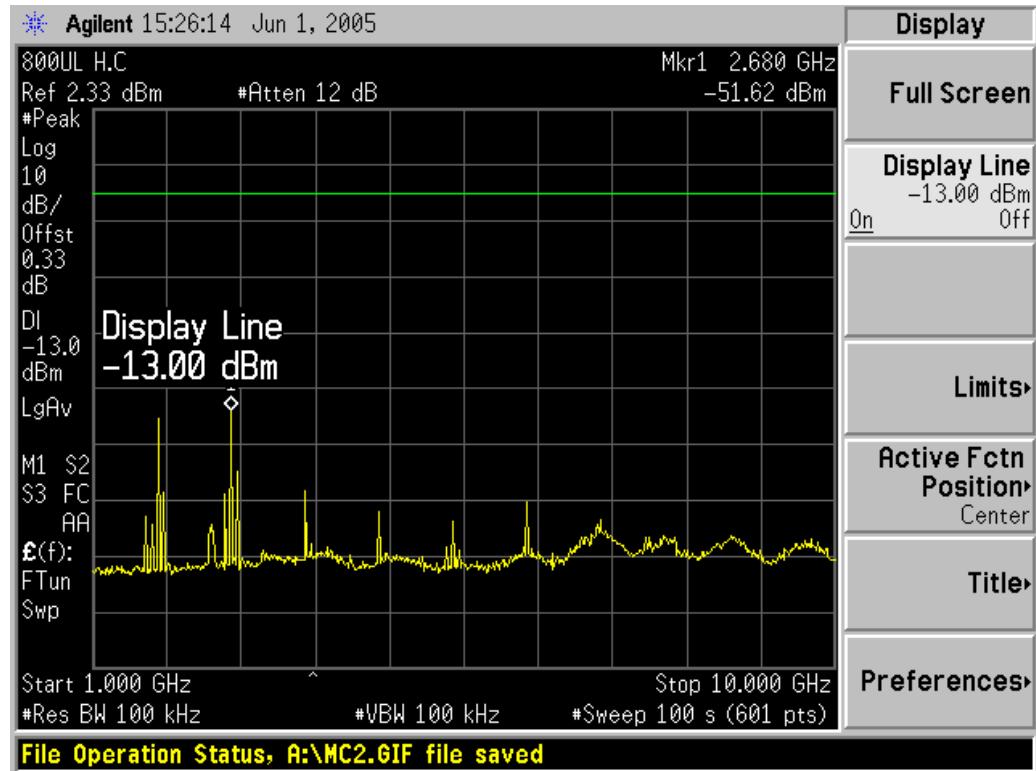
*The testing was performed by Daniel Dneg on 2005-06-02.*

### Test Results

Please refer to the hereinafter plots.

**Low Channel 1****Low Channel 2**

**Mid Channel 1****Mid Channel 2**

**High Channel 1****High Channel 2**

## §2.1053 and §90.210 - FIELD STRENGHT OF SPURIOUS EMISSIONS

### Applicable Standard

§2.1053 and §90.210

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TXpwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \log_{10} (\text{power out in Watts})$  for EUT with a 25KHz channel bandwidth.

### Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
Sunol Sciences	Antenna	JB1	A013105-3	2005-02-11
Rohde & Schwarz	Generator, Signal	SMIQ03	DE223746	2005-05-02
Rohde & Schwarz	Test Receiver	ESCI	1166.5950.03	2004-11-01
Agilent	Pre-Amplifier	8447D	2944A10187	2004-10-24

\* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1013mbar

The testing was performed by Daniel Deng on 2005-06-02.

**Test Result**

-41.3 dB at 2635.50 MHz

Indicated		Table	Test Antenna		Substituted		Antenna	Cable	Absolute	FCC 90	
Frequency	Ampl.		Angle	Height	Polar	Frequency	Level	Gain	Loss	Level	Limit
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
2635.50	18.95	60	1.3	V	2635.50	-62.1	9.3	1.5	-54.3	-13	-41.3
2635.50	17.89	0	1.4	H	2635.50	-63.3	9.3	1.5	-55.5	-13	-42.5
875.5	22.65	0	1.5	V	875.50	-62.8	6.4	0.9	-57.3	-13	-44.3
875.5	20.26	90	1.5	H	875.50	-65.3	6.4	0.9	-59.8	-13	-46.8
945.85	16.65	0	1.5	V	945.85	-69.2	6.9	0.9	-63.2	-13	-50.2
945.85	15.67	0	1.4	H	945.85	-70.3	6.9	0.9	-64.3	-13	-51.3

## §2.1051 & §90.210 - TWO-TONE INTERMODULATION TEST

### Applicable Standards

According to §2.1051 & §90.210, Intermodulation products must be attenuated below the rated power of the EUT by at least  $43 + 10\log(P)$ , equivalent to -13 dBm.

### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 30 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic. Two input signals are equal in level (and can be raised equally), were send to the EUT.

### Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde&Schwarz	Generator, Signal	SMIQ03	DE23746	2005-05-02
Agilent	Generator, Signal	E4438C	MY42081680	2005-03-05
Agilent	Analyzer	E4446A	US44300386	2004-11-10
HP	Plotter	HP7470A	2541A4965S	N/R

\* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Results

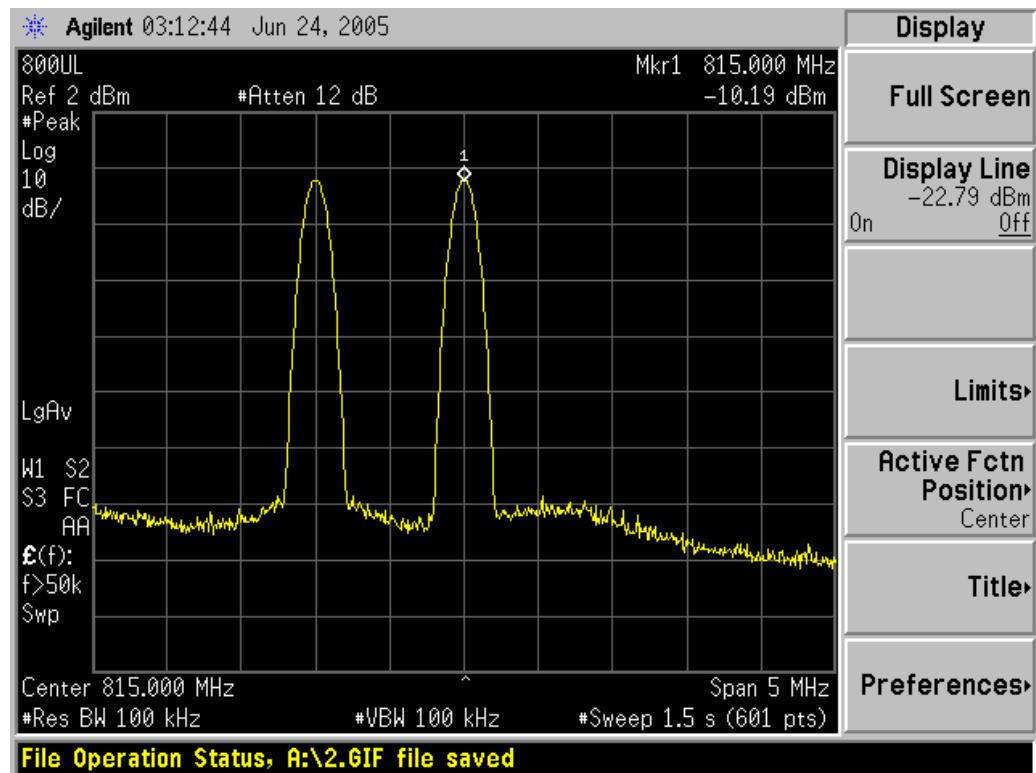
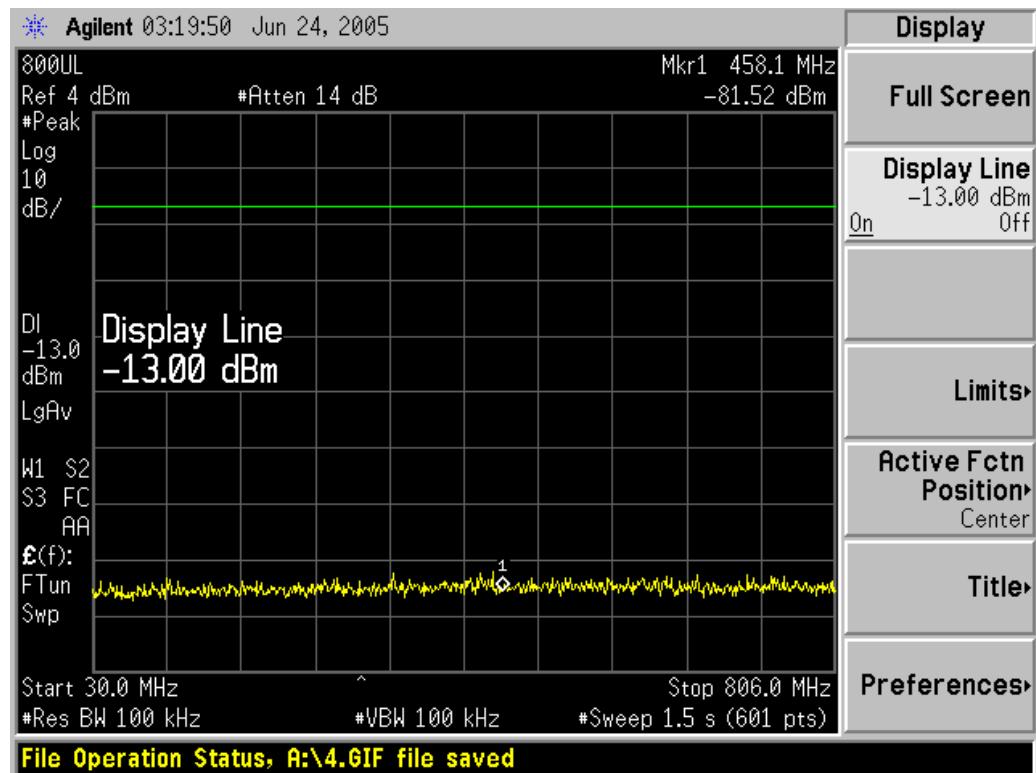
#### Environmental Conditions

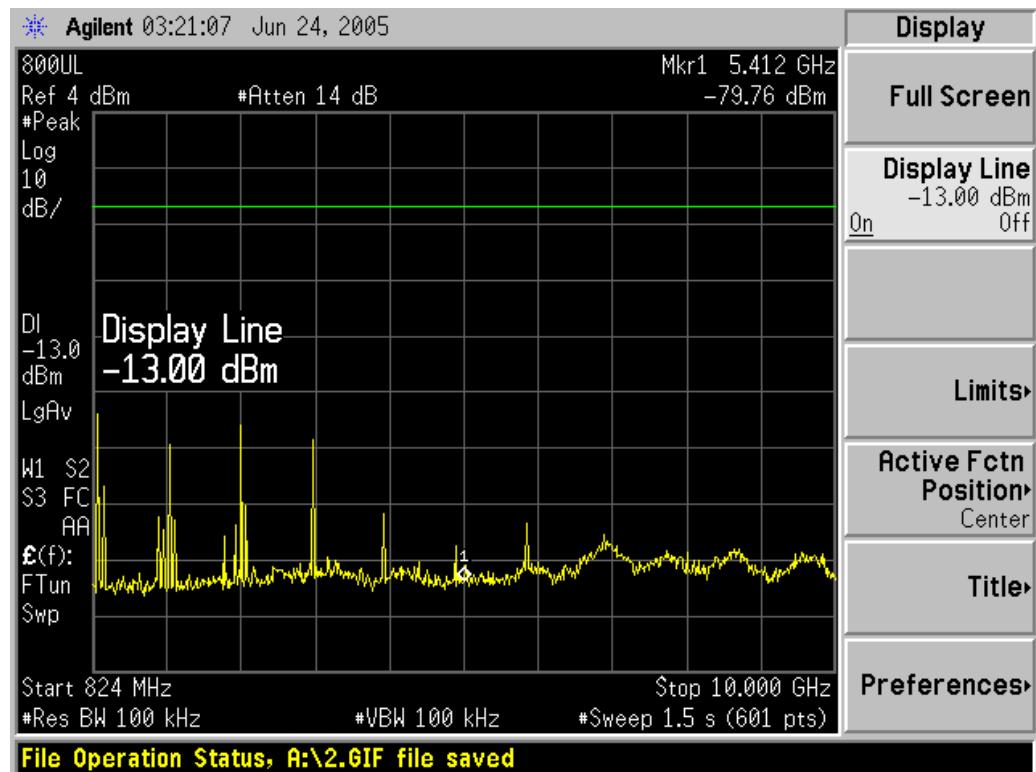
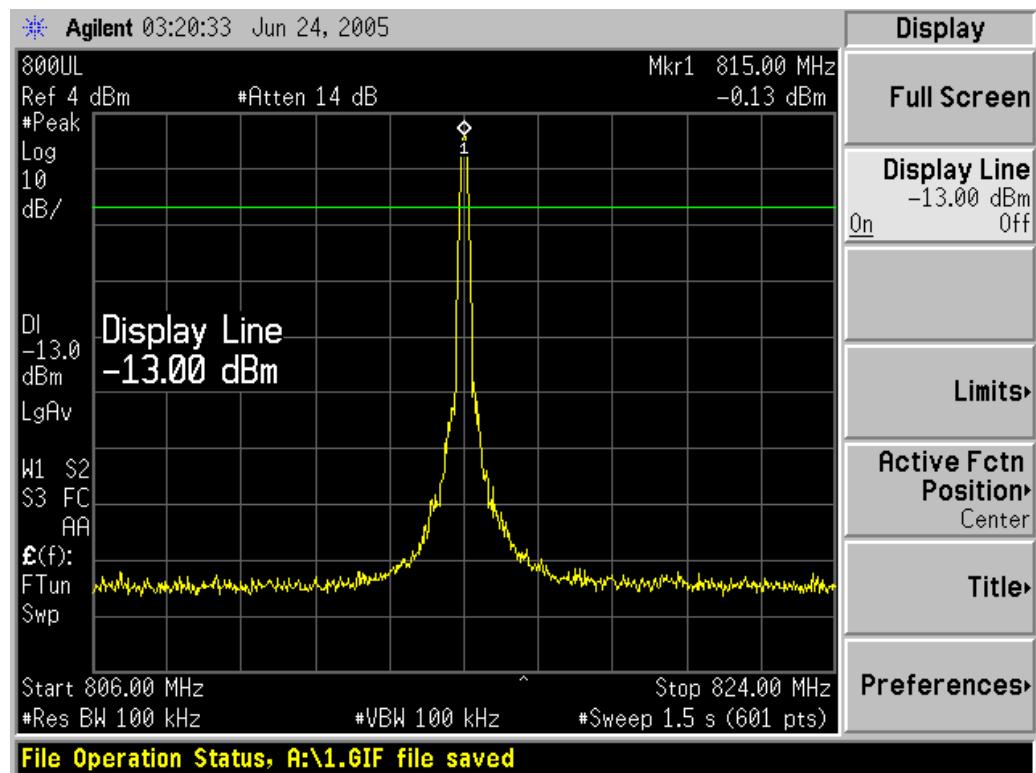
Temperature:	21° C
Relative Humidity:	43%
ATM Pressure:	1020 mbar

The testing was performed by Daniel Deng on 2005-06-25.

### Plots of Two-Tone Test Result

Please refer to plots hereinafter.

**In****Out**



**§2.1055 (d) and §90.213- FREQUENCY STABILITY**

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Not Applicable

## **§90.214 - TRANSIENT FREQUENCY BEHAVIOR**

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Not Applicable