Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE TEST REPORT

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MODEL: OpenSky M-803 Mobile Radio

FCC ID: BV8M803M

February 17, 2005

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2003	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2003	§15.109: RADIATED EMISSIONS LIMITS
PART 90: 2003	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.4-2003	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA 603- 2002	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA –102.CAAA; 2002	DIGITAL C4FM/CQPSK TRANSCEIVER MEASUREMENT METHODS

Frequency Range (MHz)	Output Power (W) Conducted	Emission Designator
806-824*	25*	11K8F1E*
806-824*	25*	11K8F1D*
821-824	25.8	13K0F3E
866-869	25.8	13K0F3E
806-821	26.0	16K0F3E
851-866	26.0	16K0F3E
806-824/851-869	26.0	8K4F1D/F1E

* As stated on original grant

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2005017/QRTL05-026

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1 GENERAL INFORMATION

The following Class II permissive change report is prepared on behalf of **M/A-COM, Inc**. in accordance with the Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) was the **OpenSky M-803M Mobile Radio; FCC ID: BV8M803M**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2003. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is a Class II permissive change report for FCC ID: BV8M803M, originally certified October 15, 2001.

1.3 DESCRIPTION OF CHANGE IN DEVICE

Optional OCF and P25 modulation platforms were added to the existing radio hardware.

1.4 PRODUCT DESCRIPTION

The EUT is a mobile radio that operates in the 800 MHz SMR and NPSPAC frequency bands. The rated RF output power is programmable to 25.0 watts.

Trade Name	OpenSky M-803 Mobile Radio
Use of Product	Voice and data communication
Type Modulation	GFSK, FM
Bit Rate	19200 bps
Max. Deviation	5 kHz
RF Output	25 W programmable
Frequency Range	806-824 MHz and 851-869 MHz
Max. Number of Channels	830 normal, 830 Talk Around
Antenna(e) Gain	0 dBi and 3 dBi (detachable)
External Input	Audio and Digital

2 CONFORMANCE STATEMENT

Standards Referenced for This Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	§15.109: Radiated Emissions Limits
Part 90: 2003	Private Land Mobile Radio Services
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals
ANSI/TIA/EIA 603 - 2002	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods

Frequency Range (MHz)	Output Power (W) Conducted	Emission Designator
806-824*	25*	11K8F1E*
806-824*	25*	11K8F1D*
821-824	25.8	13K0F3E
866-869	25.8	13K0F3E
806-821	26.0	16K0F3E
851-866	26.0	16K0F3E
806-824/851-869	26.0	8K4F1D/F1E

* As stated on original grant

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature: Richard B. McMurray Date: February 17, 2005

Typed/Printed Name: Rick McMurray Position: Vice President of Operations

Signature: Daniel Biggs Date: February 17, 2005

Typed/Printed Name: Daniel W. Biggs Position: Test Engineer

3 TESTED SYSTEM DETAILS

The EUT was received for testing on February 8, 2005. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. There are multiple configurations of the M-803 Mobile Radio series. Model number MAMROS0015 – Trunk Mount Mobile Radio Unit Half Duplex with GPS system was provided for testing.

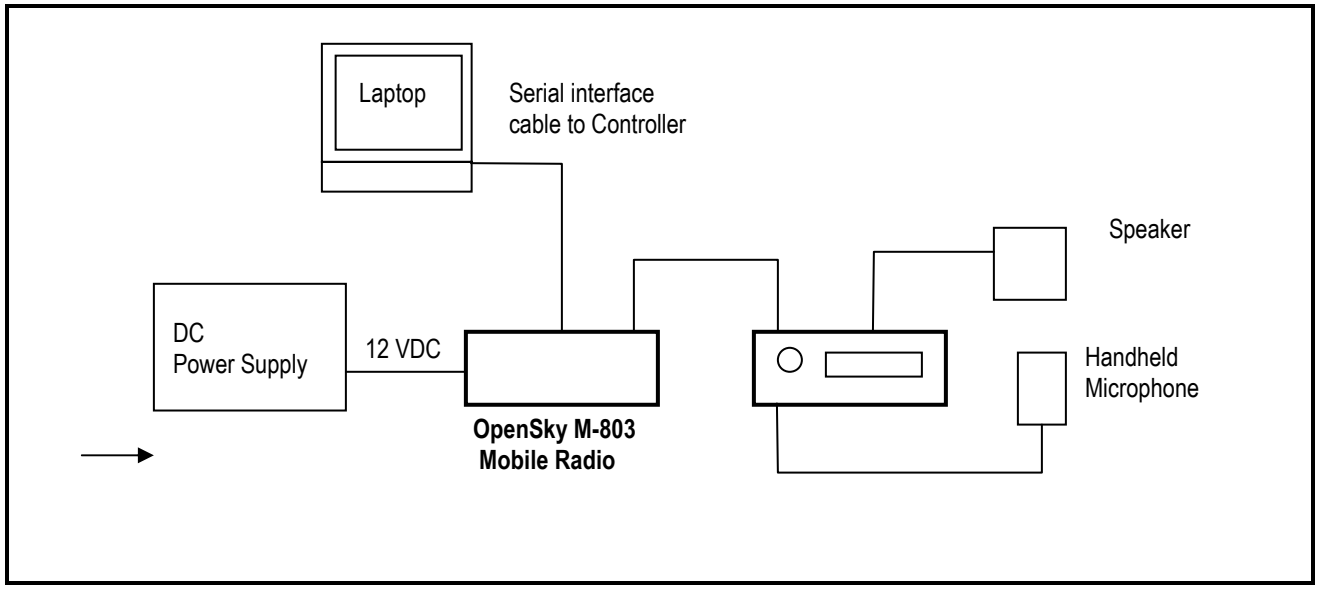
TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Mobile Radio	M/A-Com, Inc.	M-803	MAMROS0019	BV8M803M	16484
Control head	M/A-Com, Inc.	CH-103	MACDOS0003	N/A	16485
Microphone	M/A-Com, Inc.	N/A	1000005928-0001	N/A	16490
Antenna	M/A-Com, Inc.	ASPA	1860	N/A	16489
Speaker	M/A-Com, Inc.	N/A	LS102824V10R1A	N/A	16481

TABLE 3-2: SUPPORT EQUIPMENT

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook computer	N/A	N/A	N/A	N/A	N/A
RS-232 interface cable	N/A	DB-9	N/A	N/A	16500
Power Supply	M/A-Com, Inc.	N/A	N/A	N/A	16498

FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM



4 FCC RULES AND REGULATIONS PART 2 §2.1033(C)(8) VOLTAGES AND CURRENTS THROUGH THE FINAL AMPLIFYING STAGE

Nominal DC Voltage: 13.8 VDC
Current: 9 AMPS

5 FCC RULES AND REGULATIONS PART 90 §90.541 AND PART 2 §2.1046(A): RF POWER OUTPUT: CONDUCTED

5.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, Section 2.2.1.

The EUT was connected to a coaxial attenuator having a 50Ω load impedance.

5.2 TEST DATA

TABLE 5-1: RF POWER OUTPUT (HIGH POWER): CARRIER OUTPUT POWER (UNMODULATED)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
A001N	806.0125	25.41
A300N	813.4875	25.64
A600N	820.9875	26.00
A601N	821.0125	25.82
A830N	823.9875	25.82
A001T	851.0125	25.23
A300T	858.4875	23.44
A600T	865.9875	21.23
A601T	866.0125	20.89
A830T	868.9875	20.28

* Measurement accuracy: +/- .02 dB (logarithmic mode)

TABLE 5-2: RF POWER OUTPUT (RATED POWER)

Rated Power (W)
25

TABLE 5-3: TEST EQUIPMENT FOR TESTING RF POWER OUTPUT - CONDUCTED

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184/901186	Agilent	E4416A/E9323A	Power Meter/ Sensor	GB41050573/US420.52510380	08/02/05

TEST PERSONNEL:

Daniel Biggs		February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

6 FCC RULES AND REGULATIONS PART 90 §90.543(C) AND PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

6.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, Section 2.2.13.

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

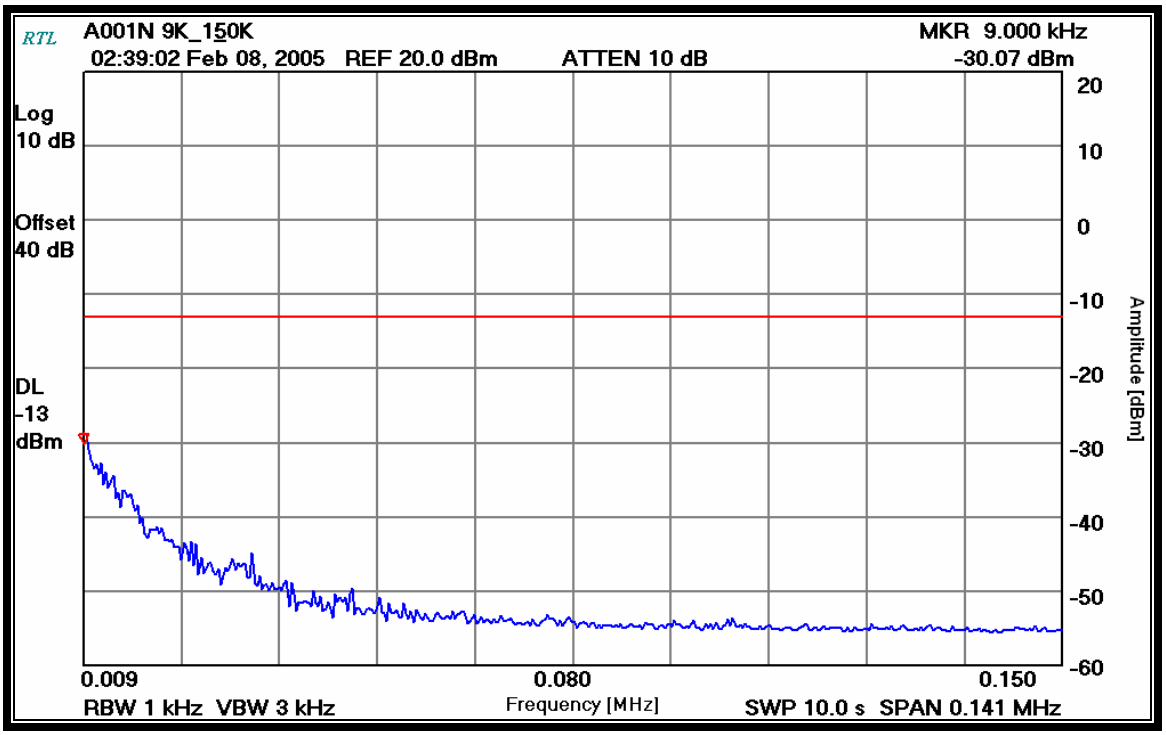
6.2 TEST DATA

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc.

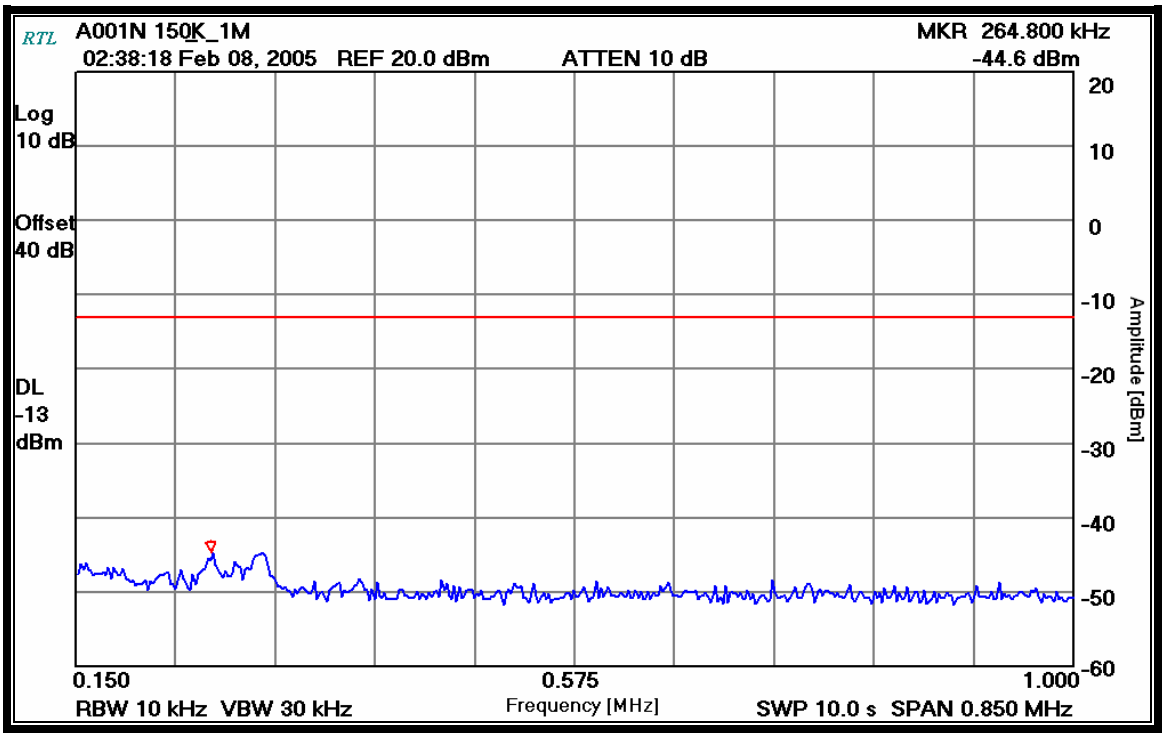
Limits: P(dBm) – (43 + 10xLOG P(W))

The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

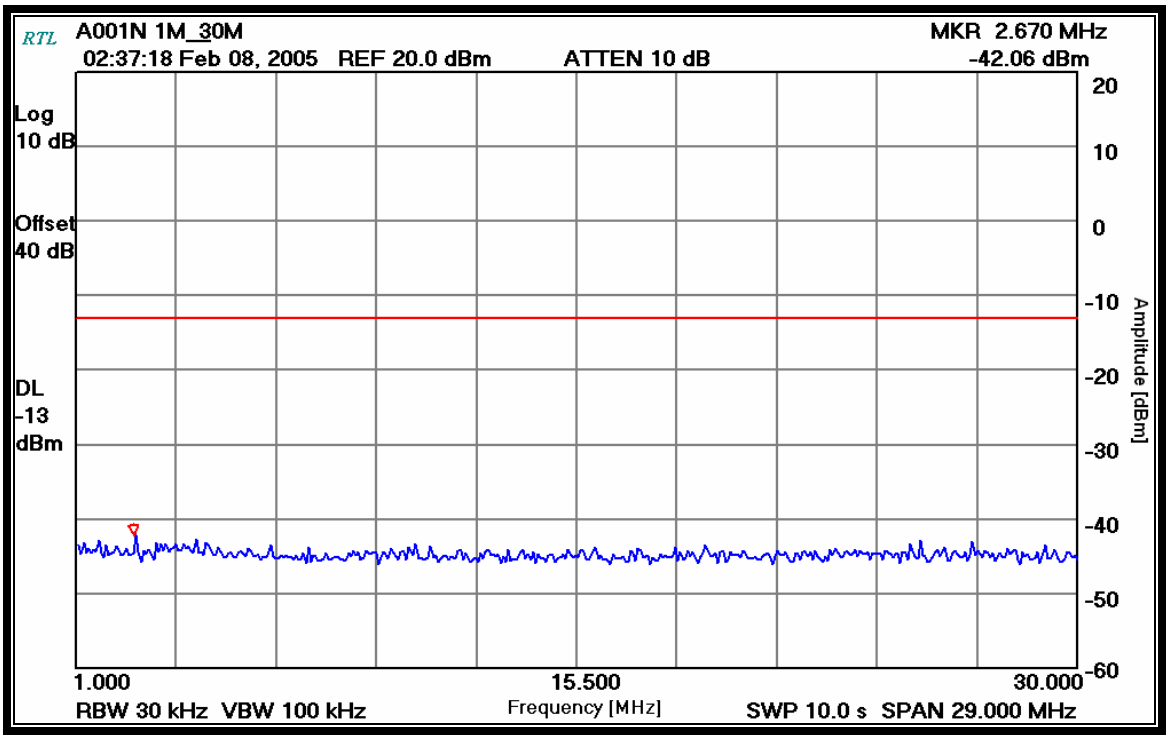
PLOT 6-1: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (9 KHZ – 150 KHZ)



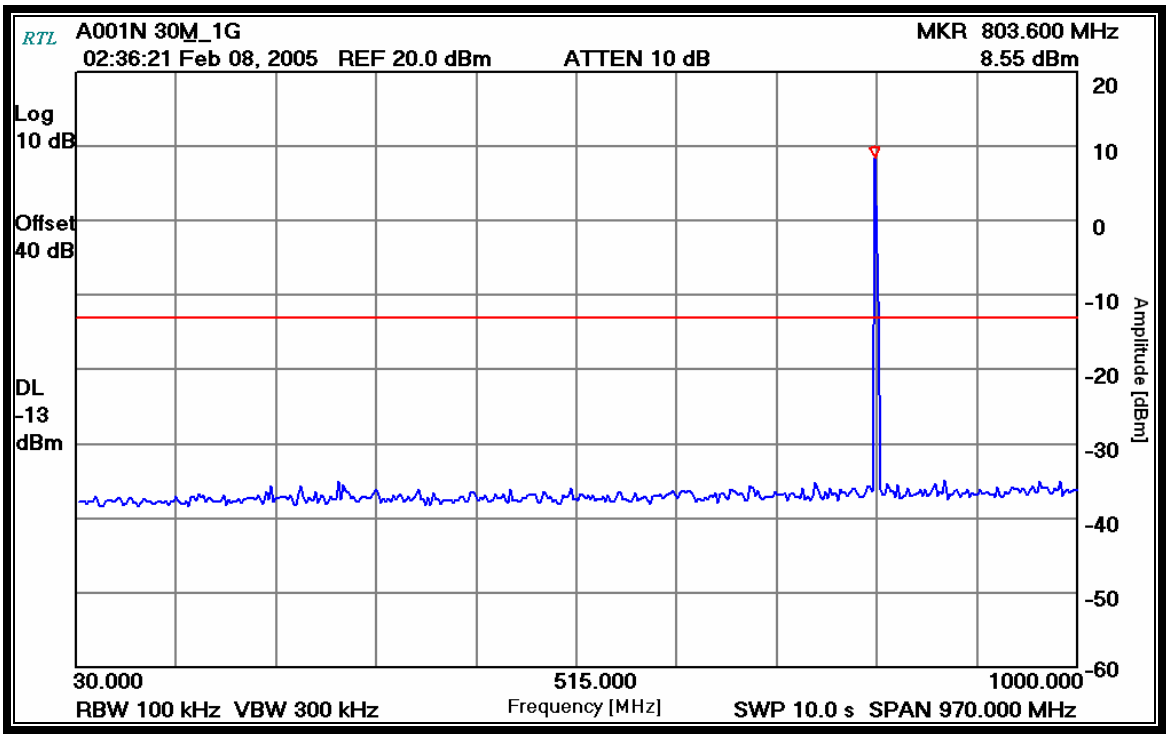
PLOT 6-2: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (150 KHZ – 1 MHZ)



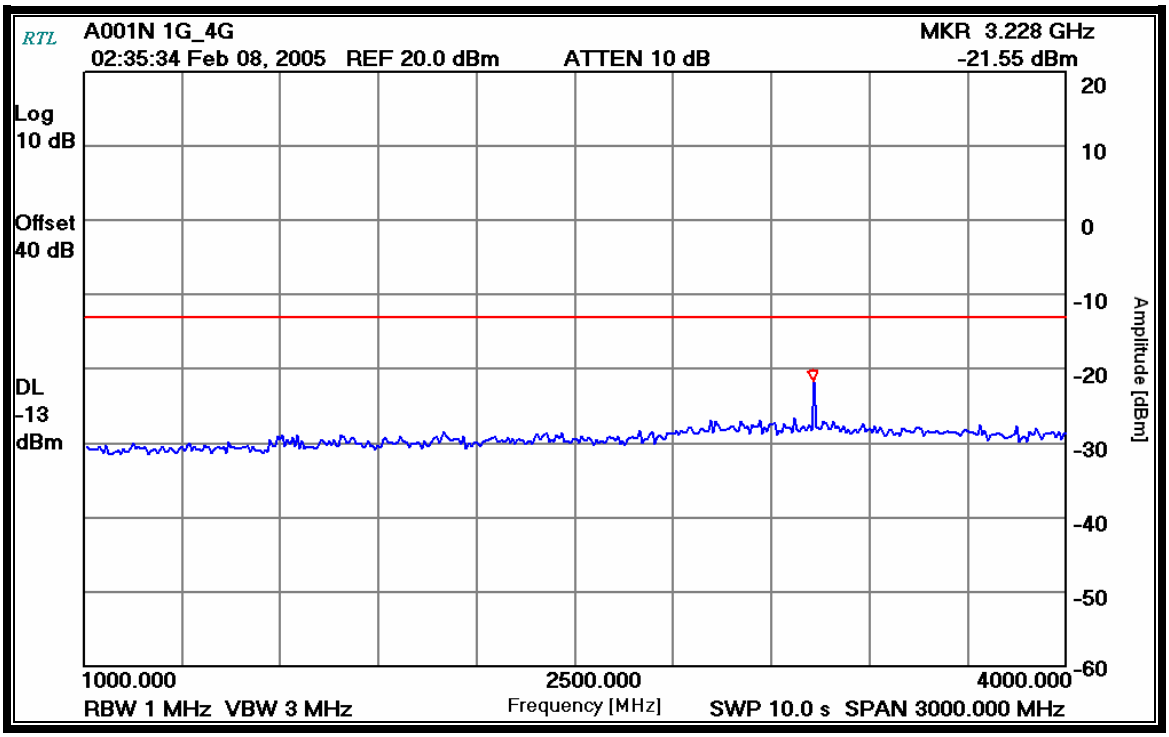
PLOT 6-3: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (1 MHZ – 30 MHZ)



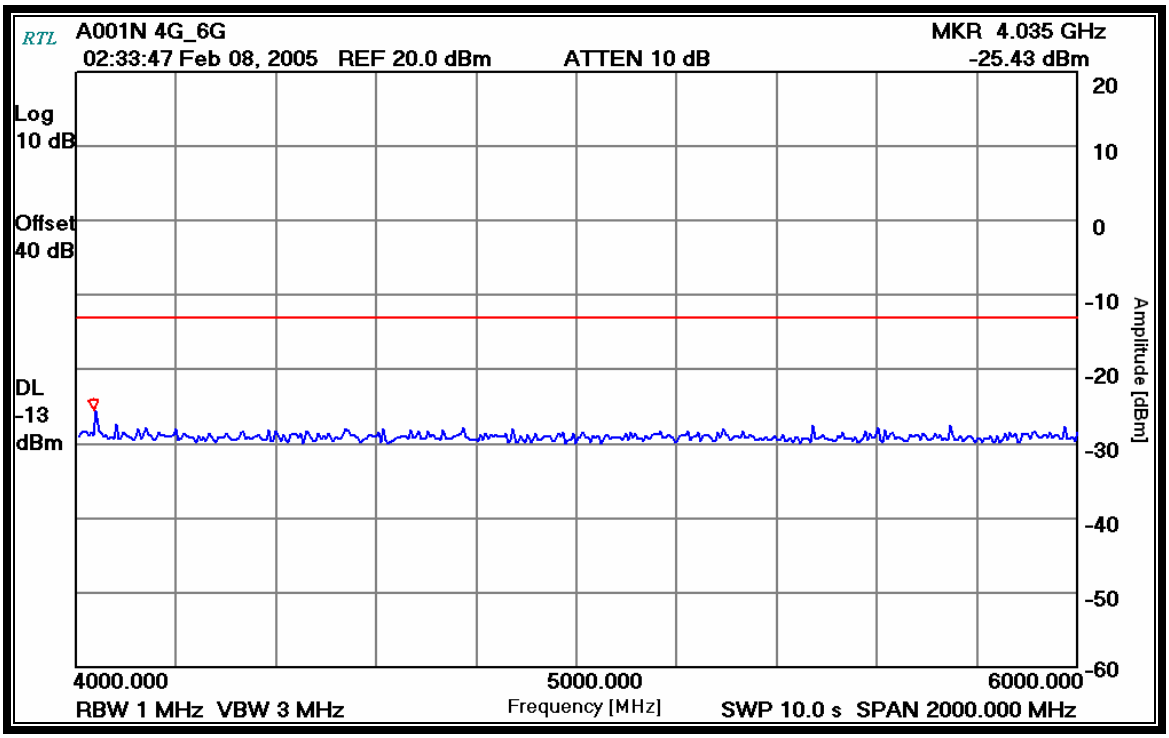
PLOT 6-4: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (30 MHZ – 1 GHZ)



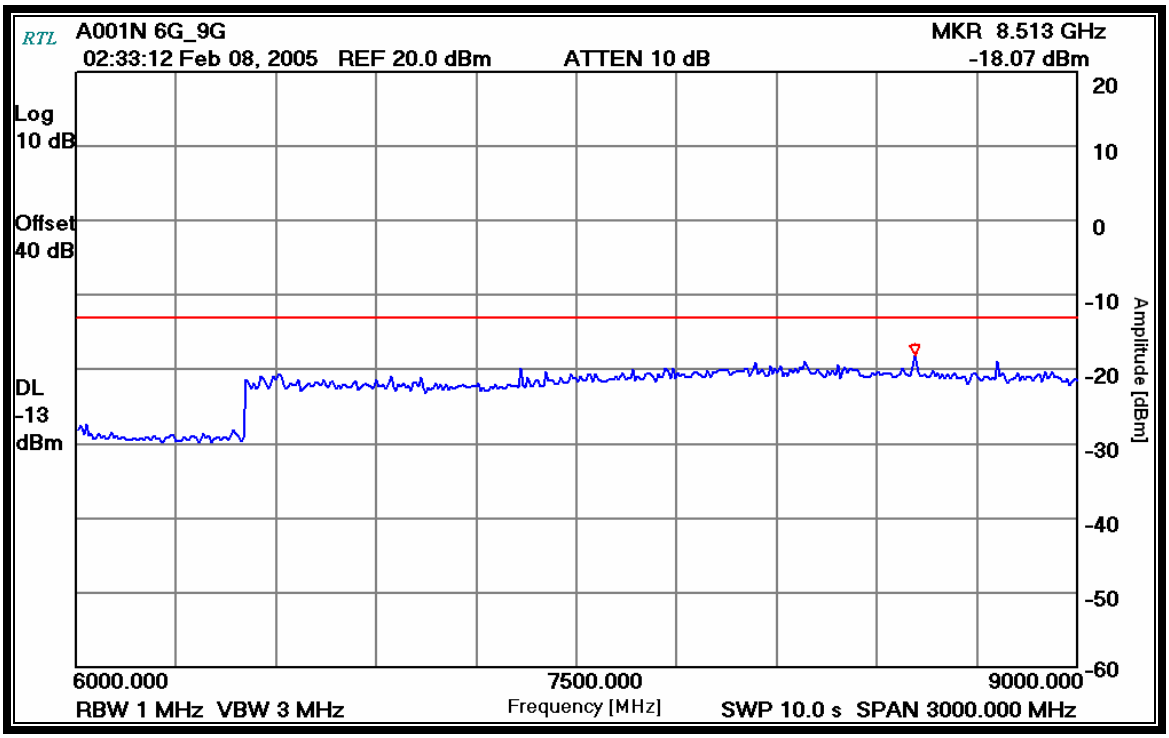
PLOT 6-5: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (1 GHZ – 4 GHZ)



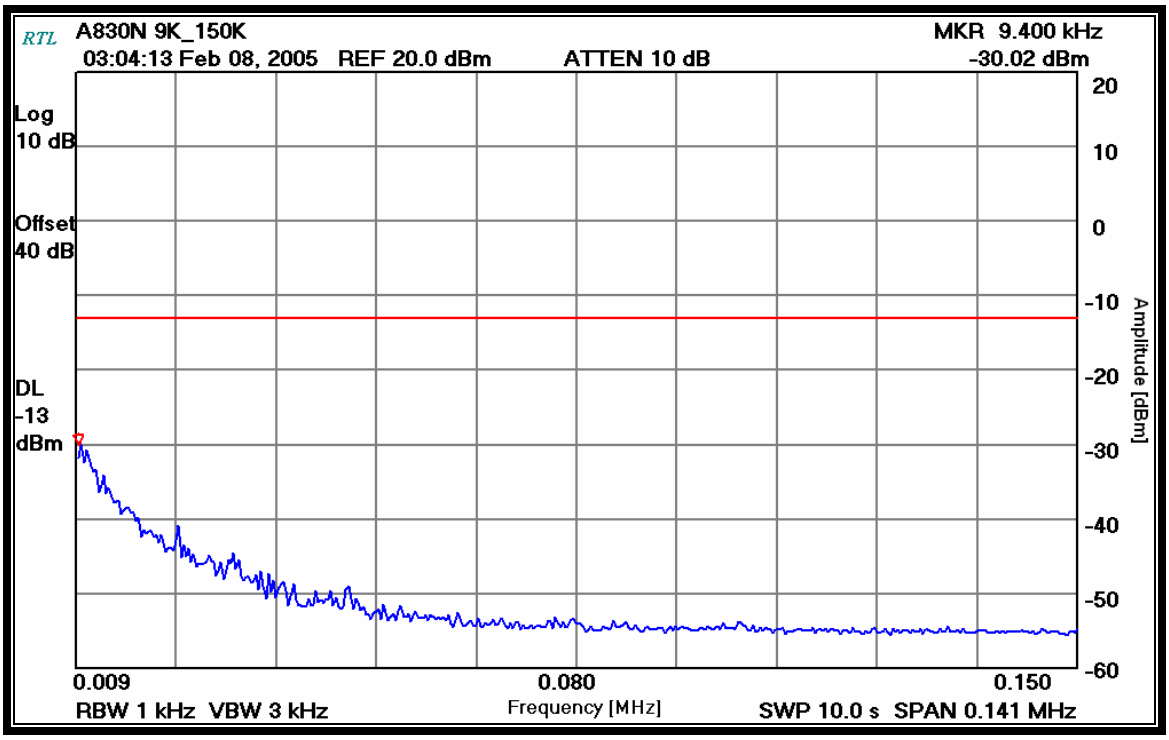
PLOT 6-6: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (4 GHZ – 6 GHZ)



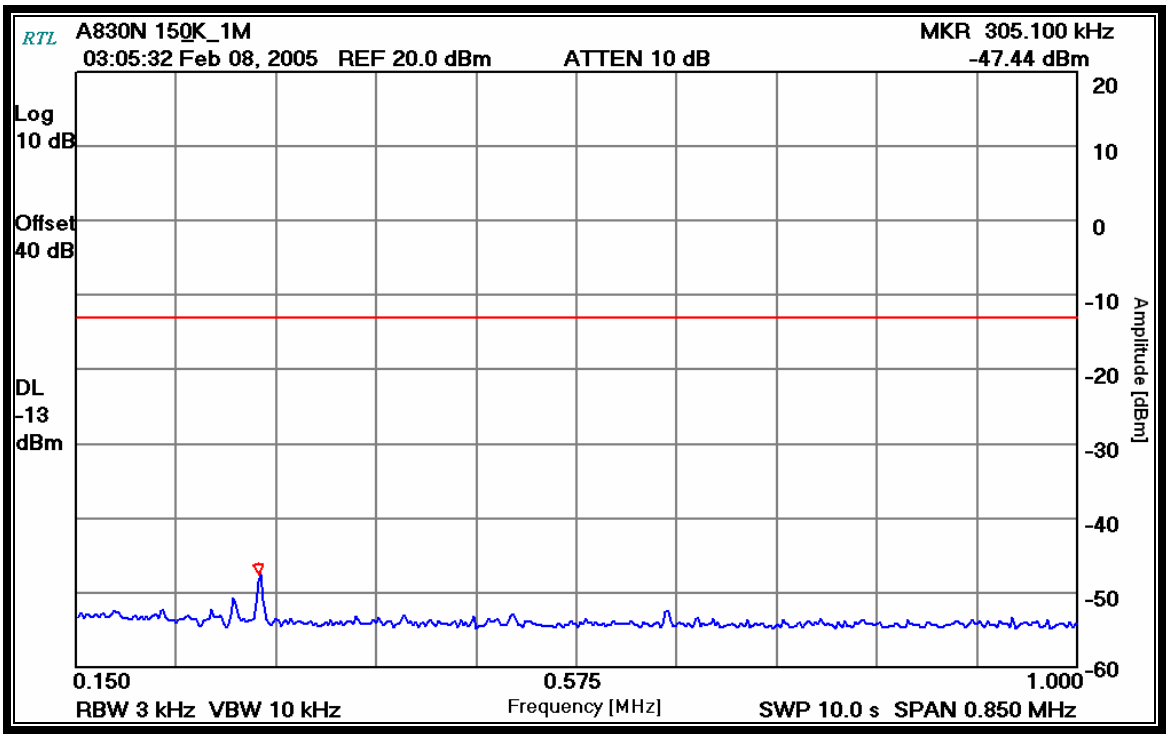
PLOT 6-7: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001N – 806.0125 MHZ (6 GHZ – 9 GHZ)



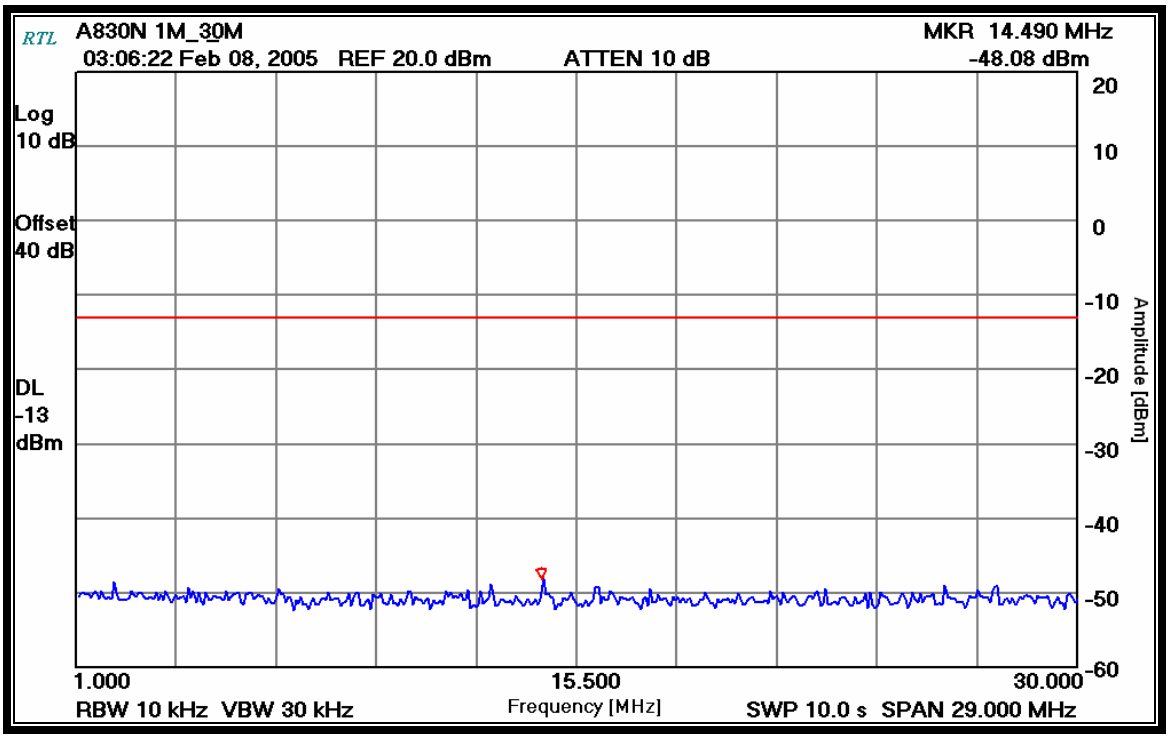
PLOT 6-8: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (9 KHZ – 150 KHZ)



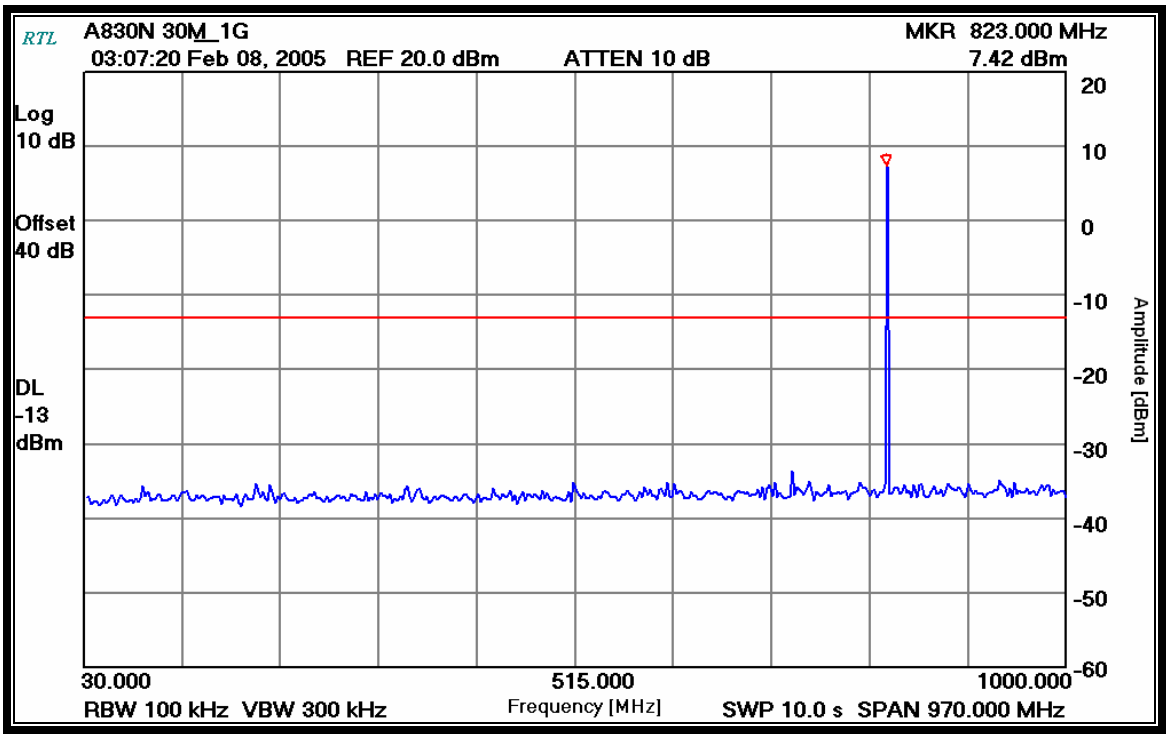
PLOT 6-9: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (150 KHZ – 1 MHZ)



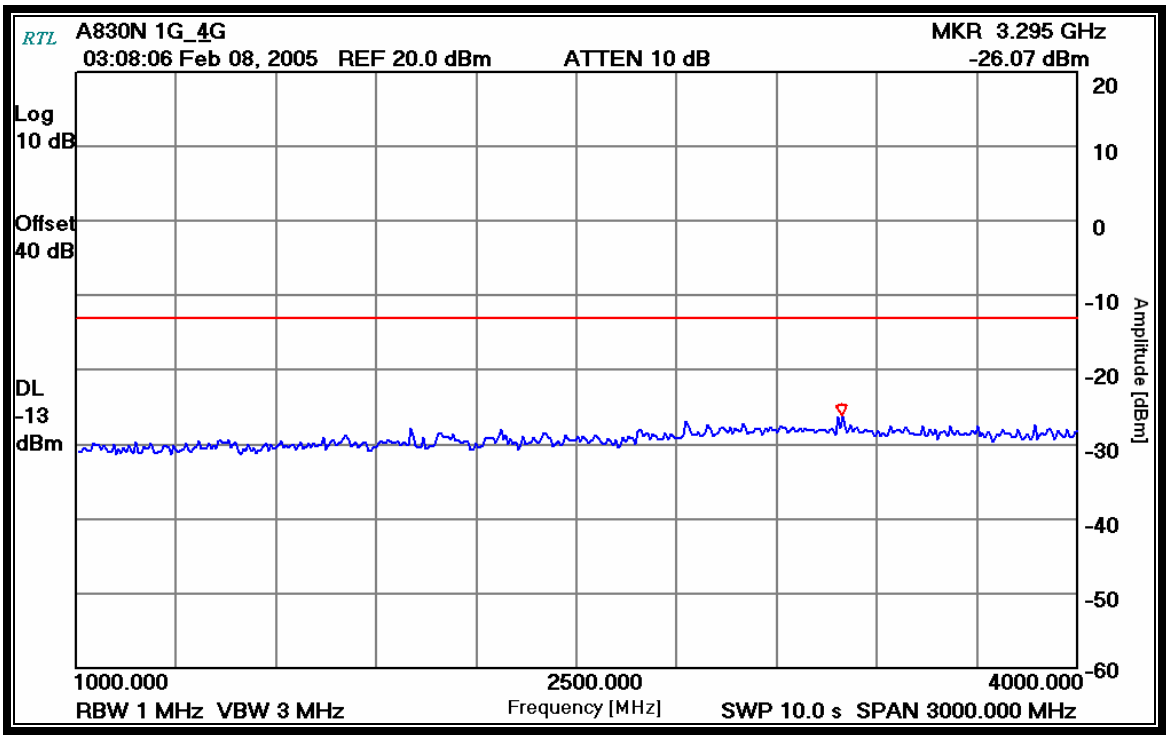
PLOT 6-10: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (1 MHZ – 30 MHZ)



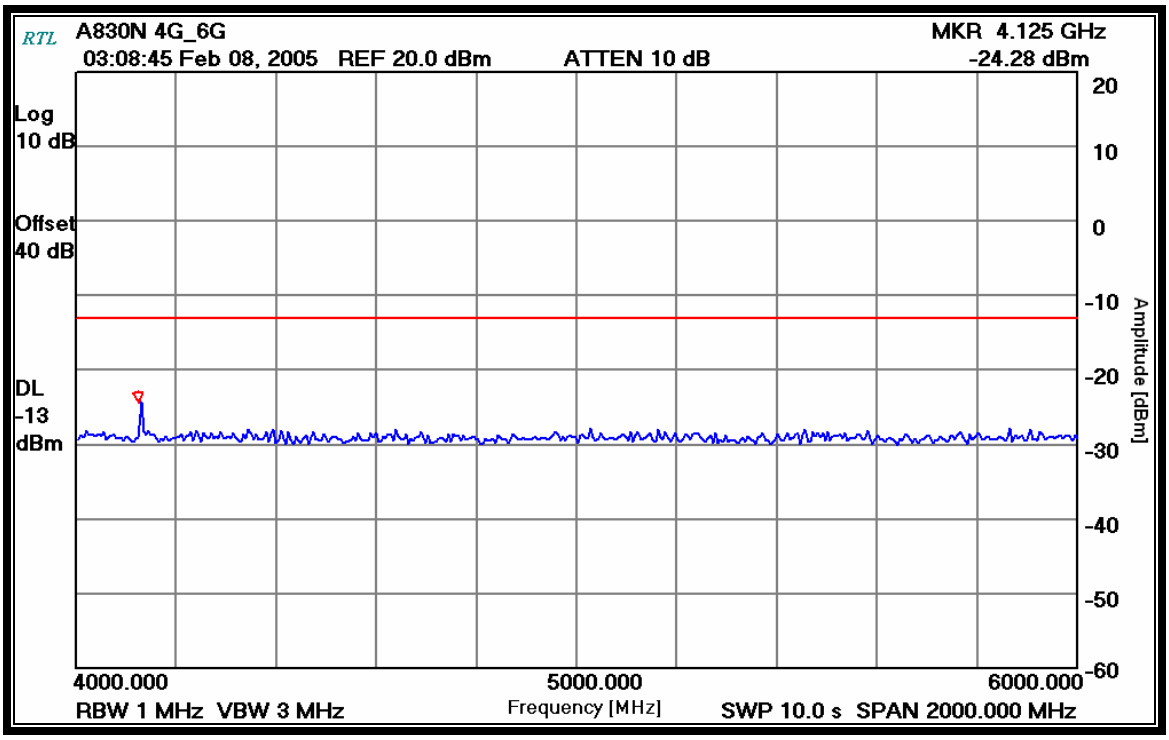
PLOT 6-11: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (30 MHZ – 1 GHZ)



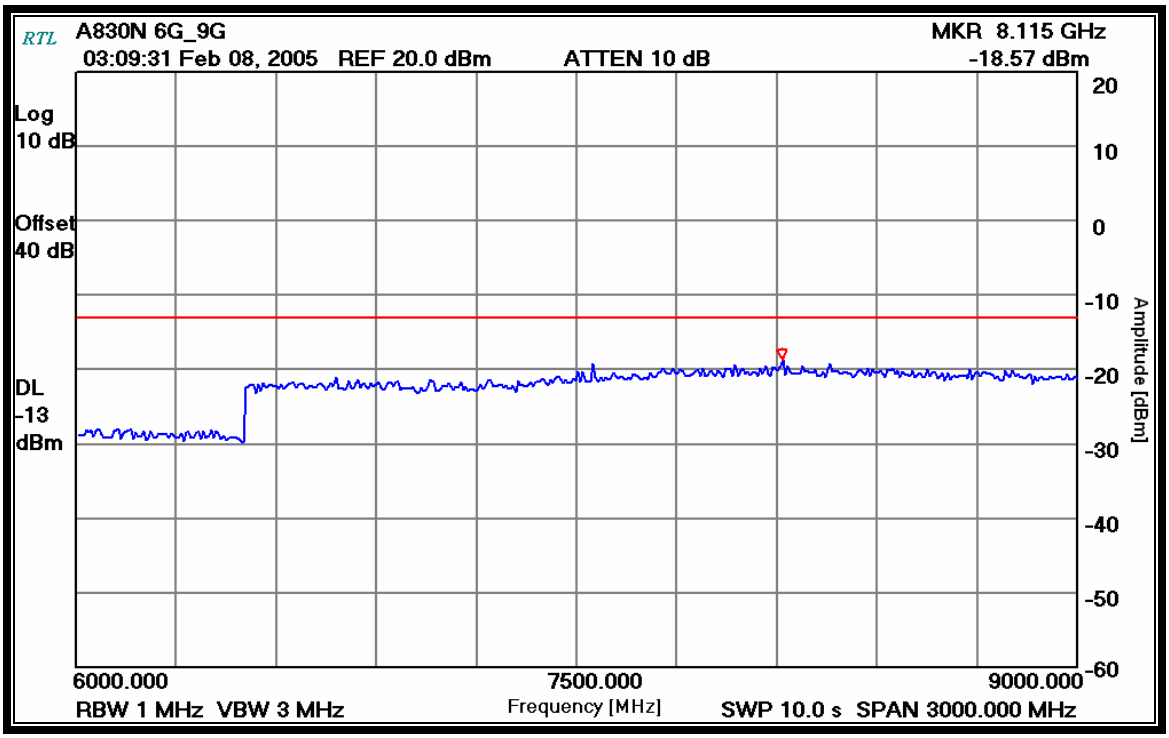
PLOT 6-12: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (1 GHZ – 4 GHZ)



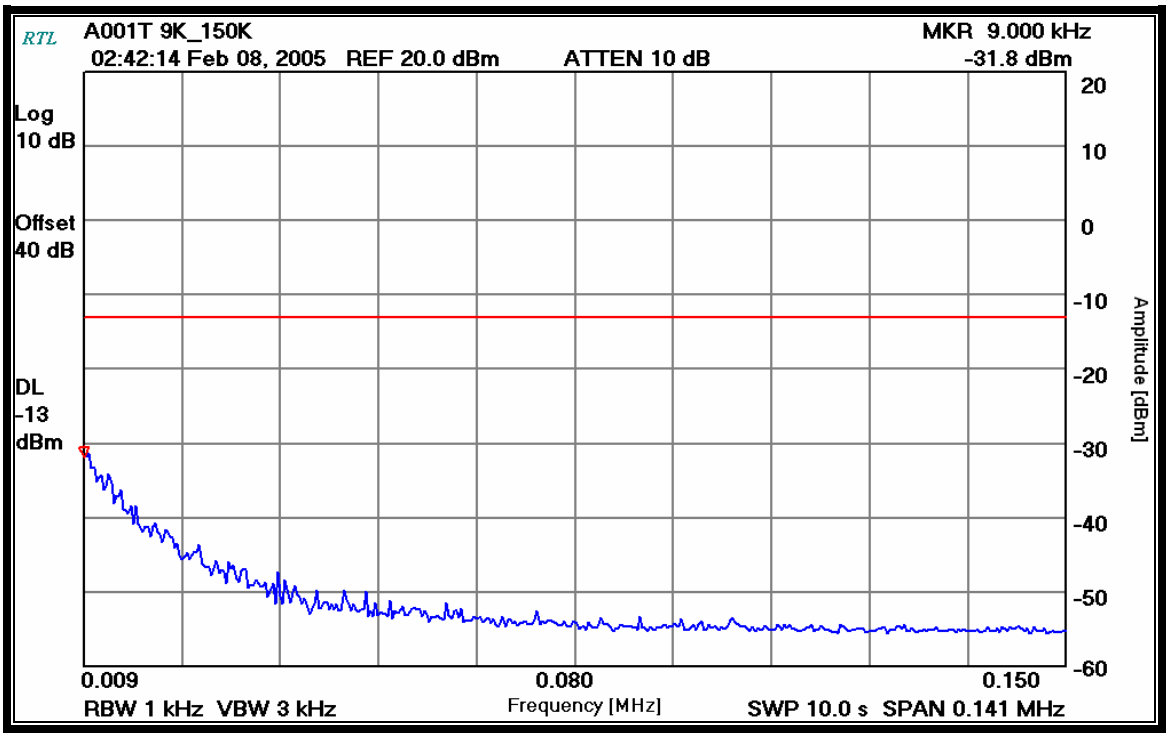
PLOT 6-13: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (4 GHZ – 6 GHZ)



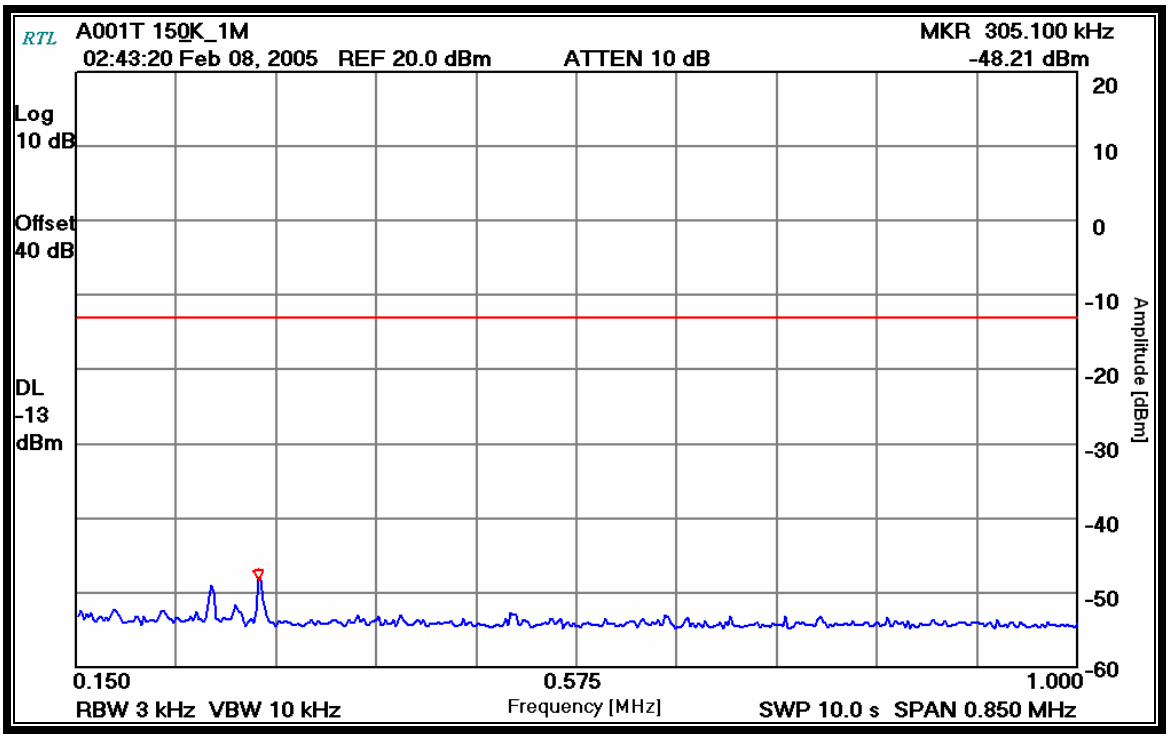
PLOT 6-14: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830N – 823.9875 MHZ (6 GHZ – 9 GHZ)



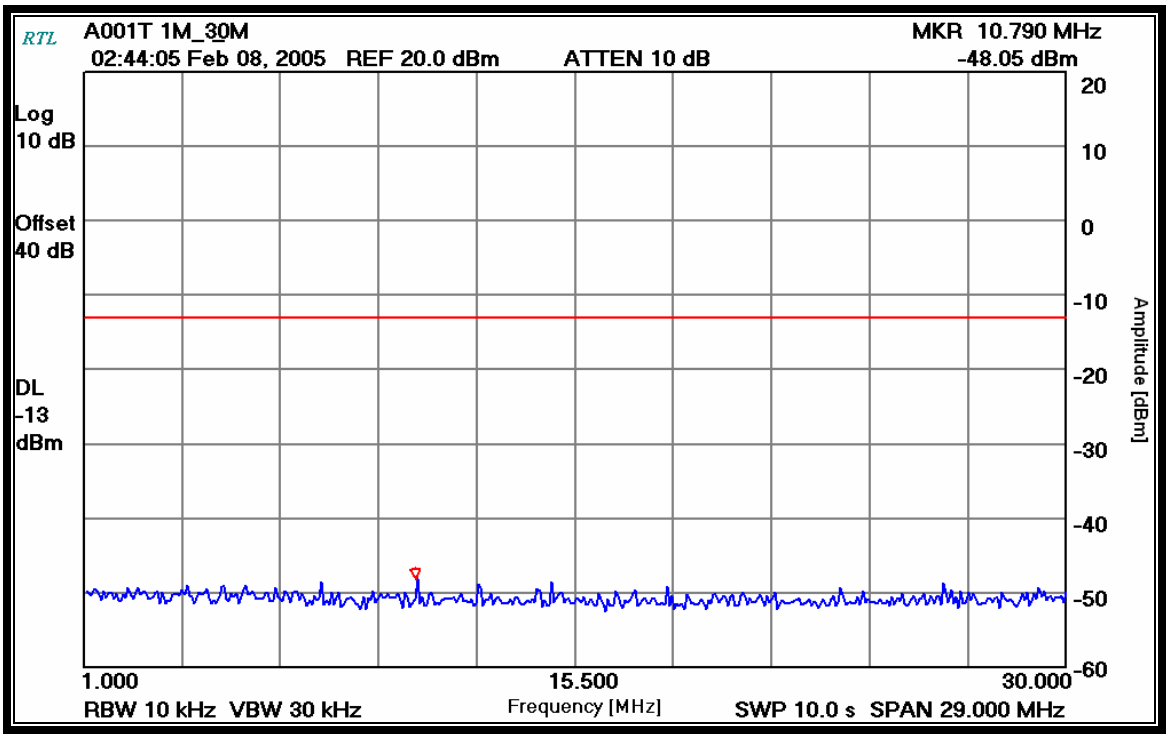
PLOT 6-15: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (9 KHZ – 150 KHZ)



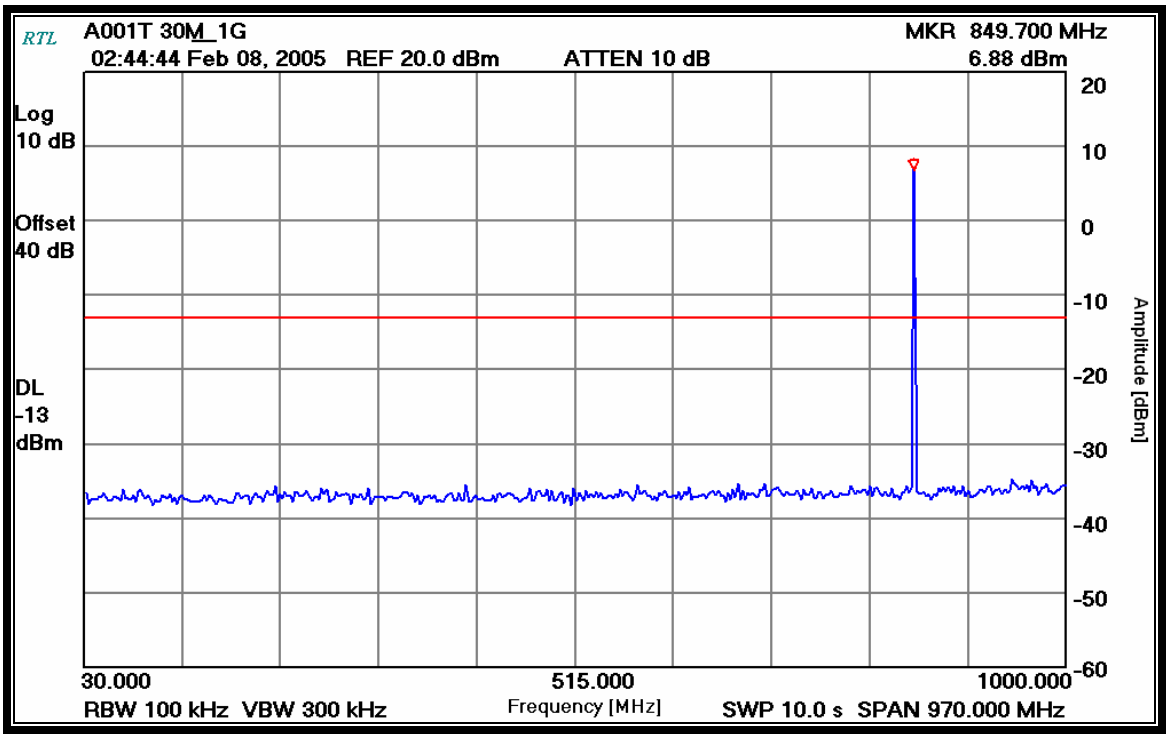
PLOT 6-16: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (150 KHZ – 1 MHZ)



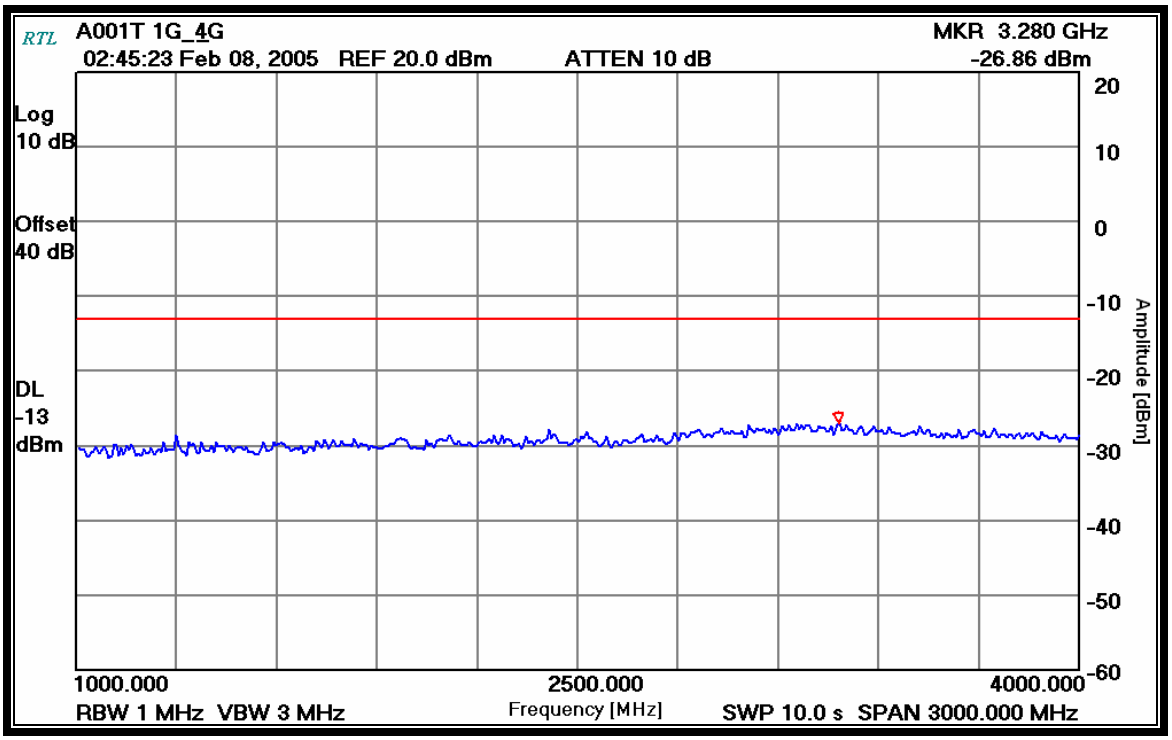
PLOT 6-17: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (1 MHZ – 30 MHZ)



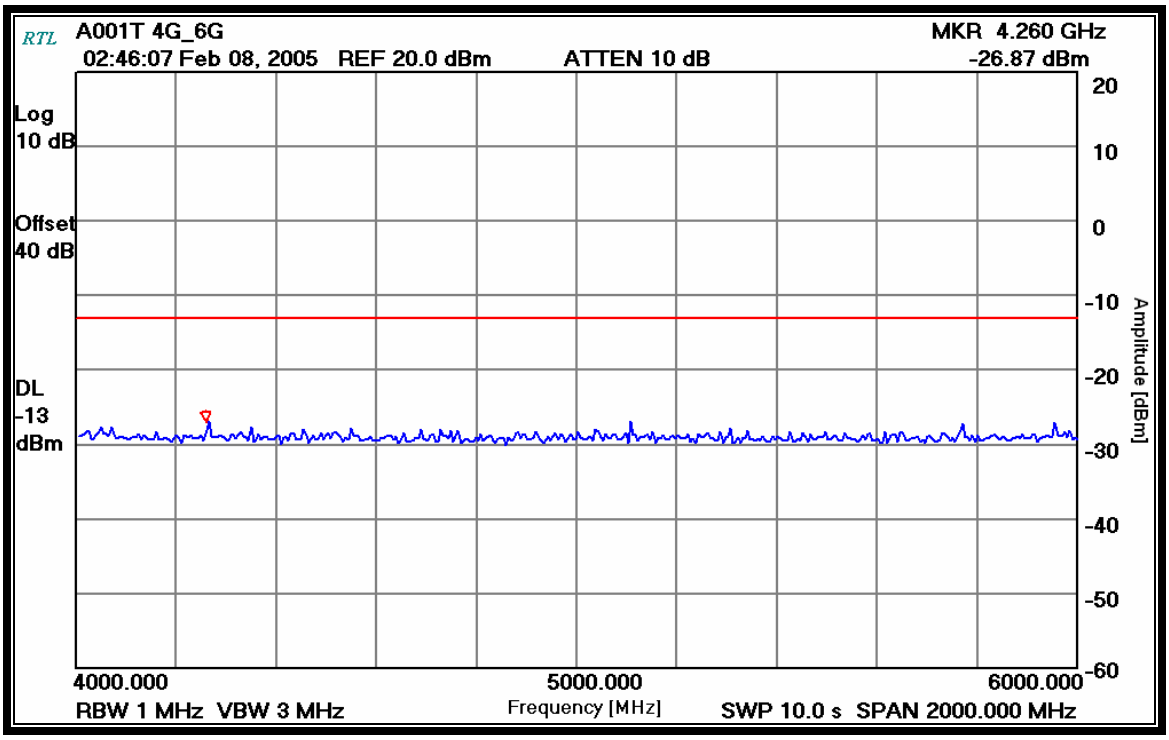
PLOT 6-18: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (30 MHZ – 1 GHZ)



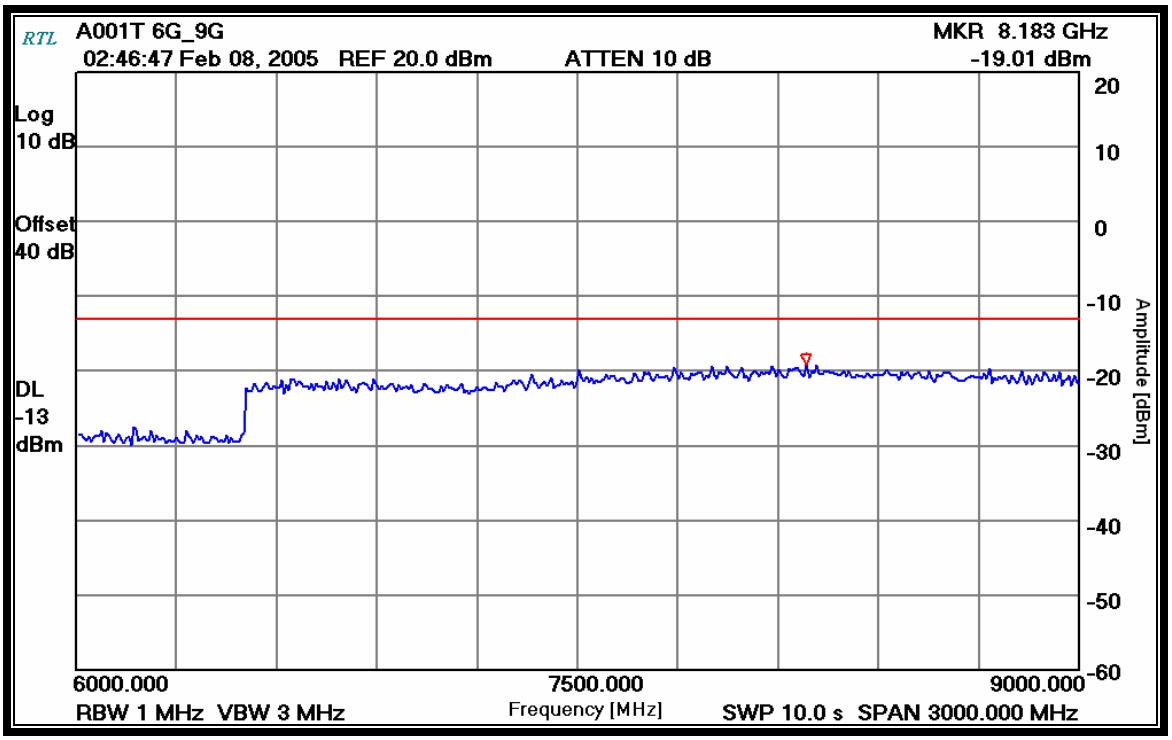
PLOT 6-19: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (1 GHZ – 4 GHZ)



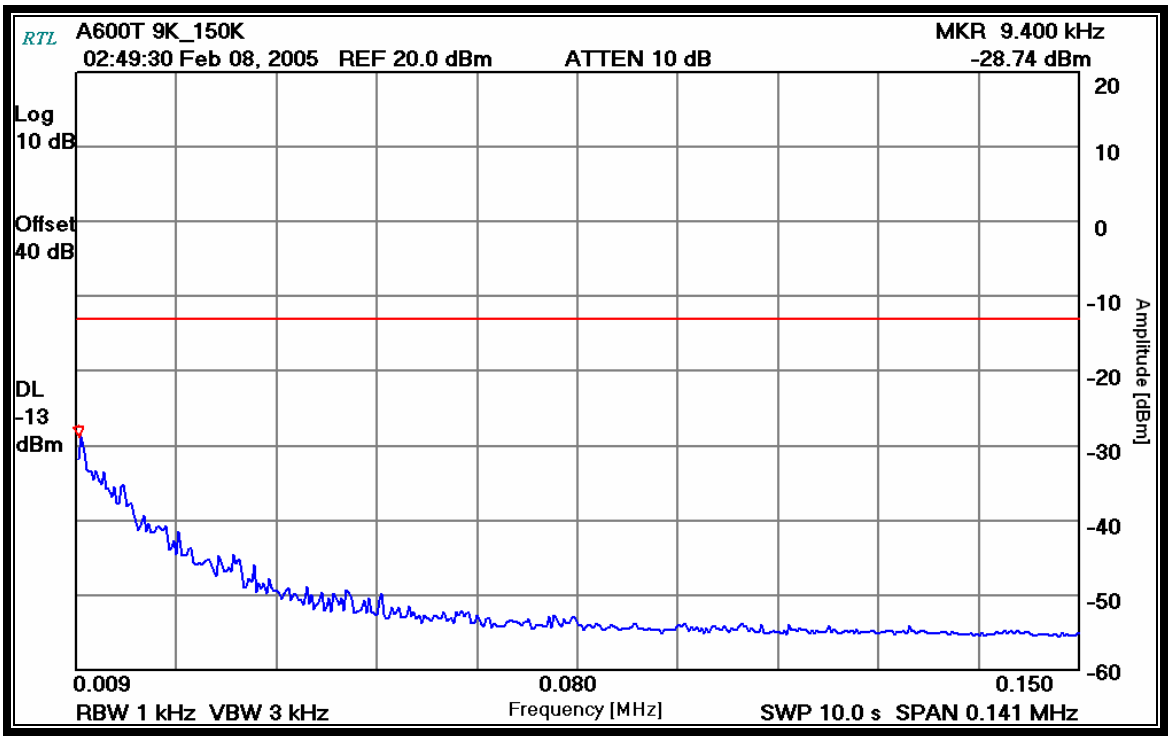
PLOT 6-20: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (4 GHZ – 6 GHZ)



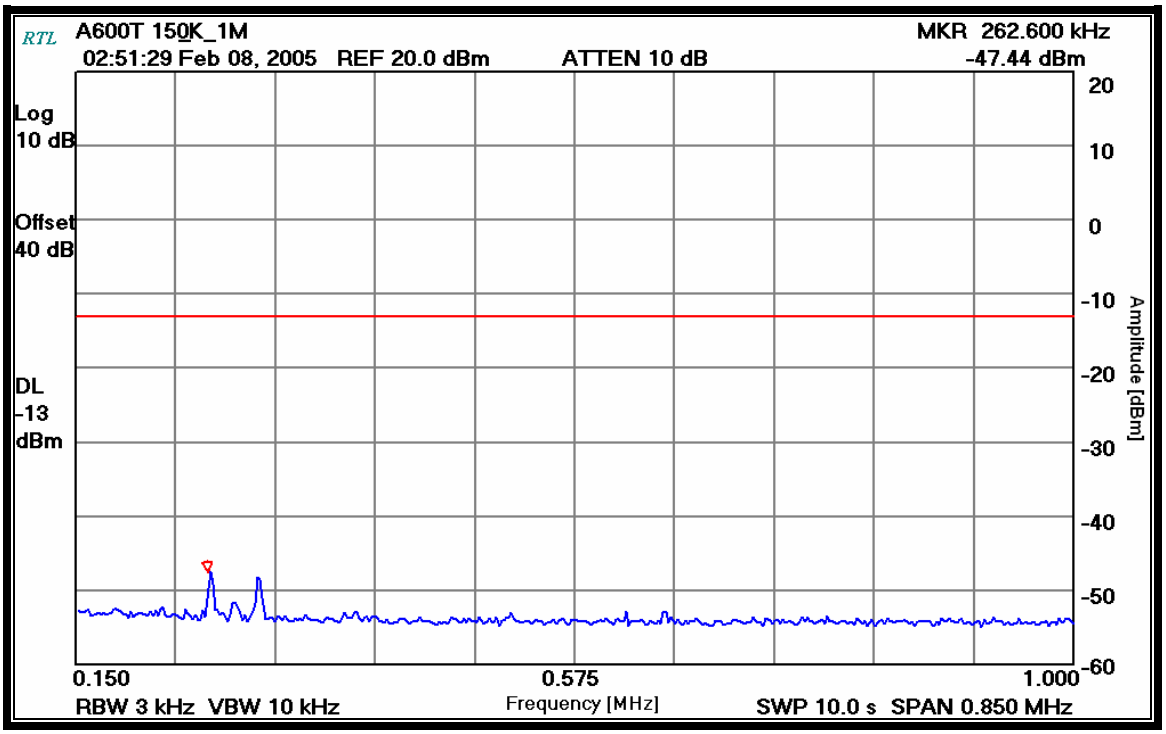
PLOT 6-21: CONDUCTED SPURIOUS EMISSIONS CHANNEL A001T – 851.0125 MHZ (6 GHZ – 9 GHZ)



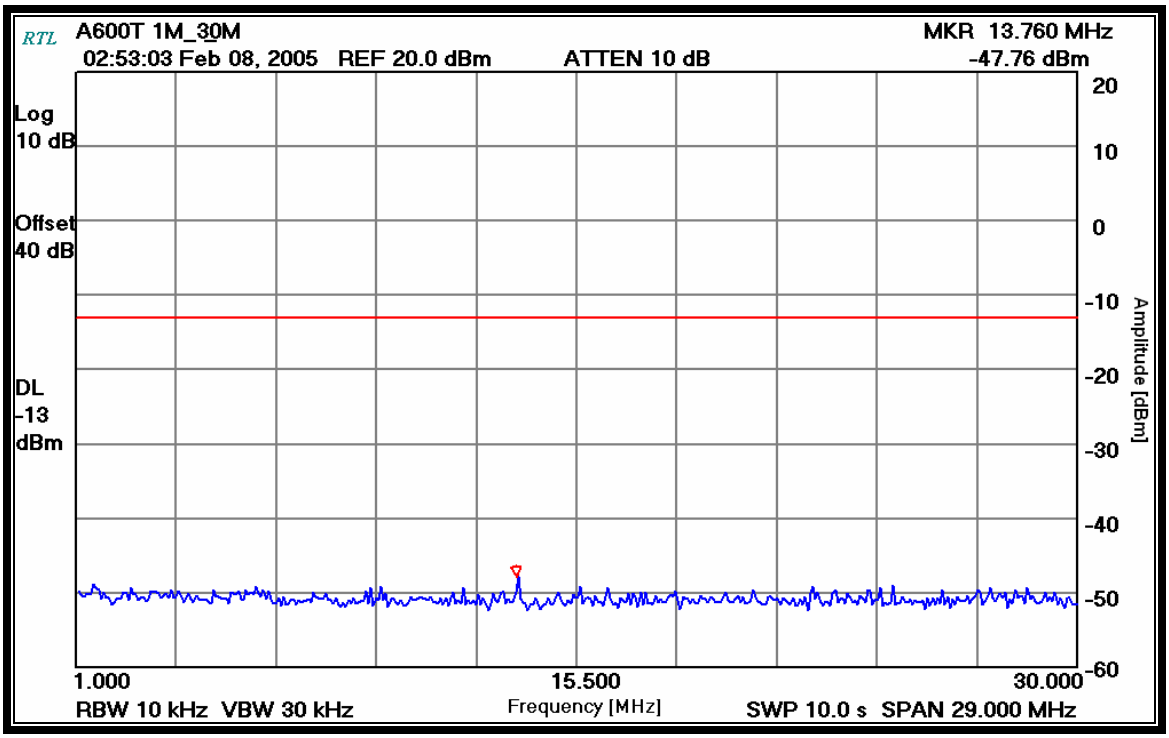
PLOT 6-22: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (9 KHZ – 150 KHZ)



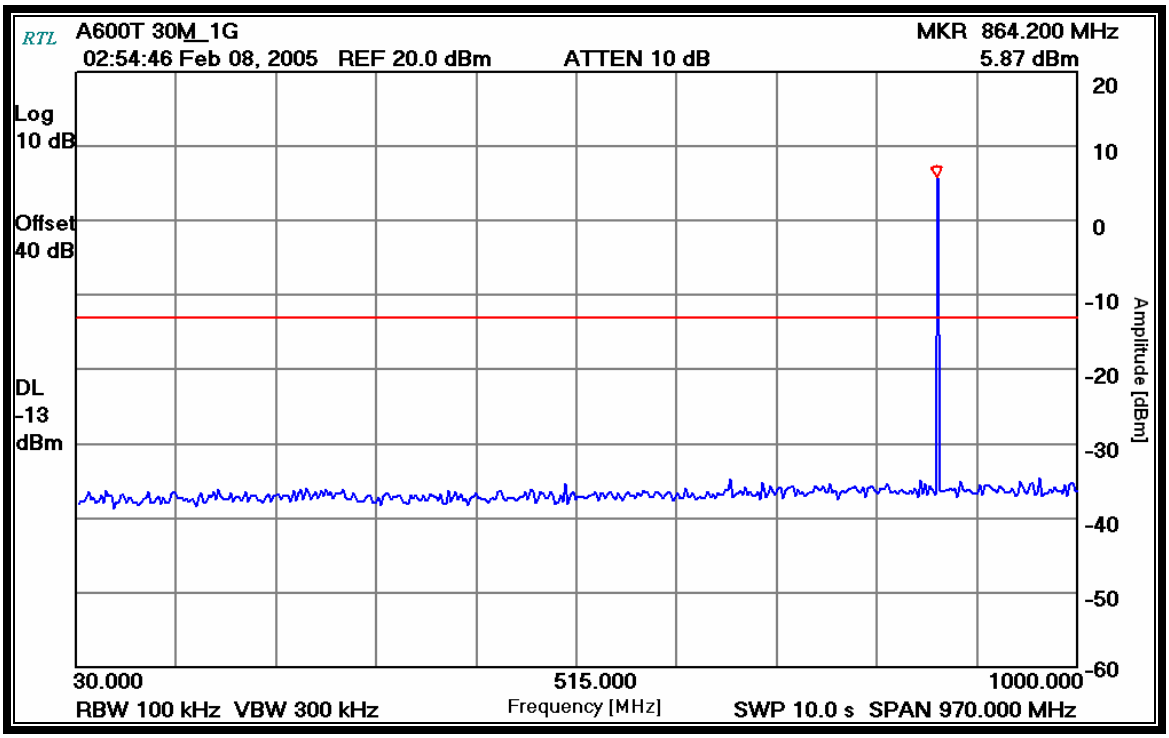
PLOT 6-23: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (150 KHZ – 1 MHZ)



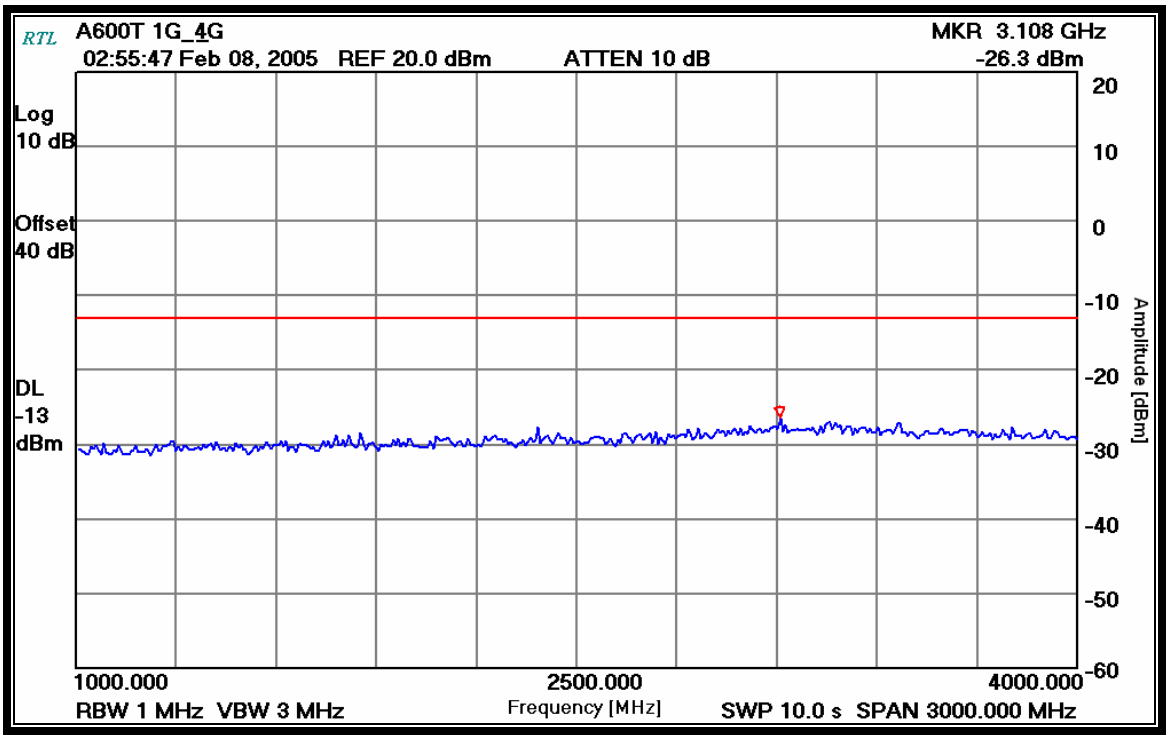
PLOT 6-24: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (1 MHZ – 30 MHZ)



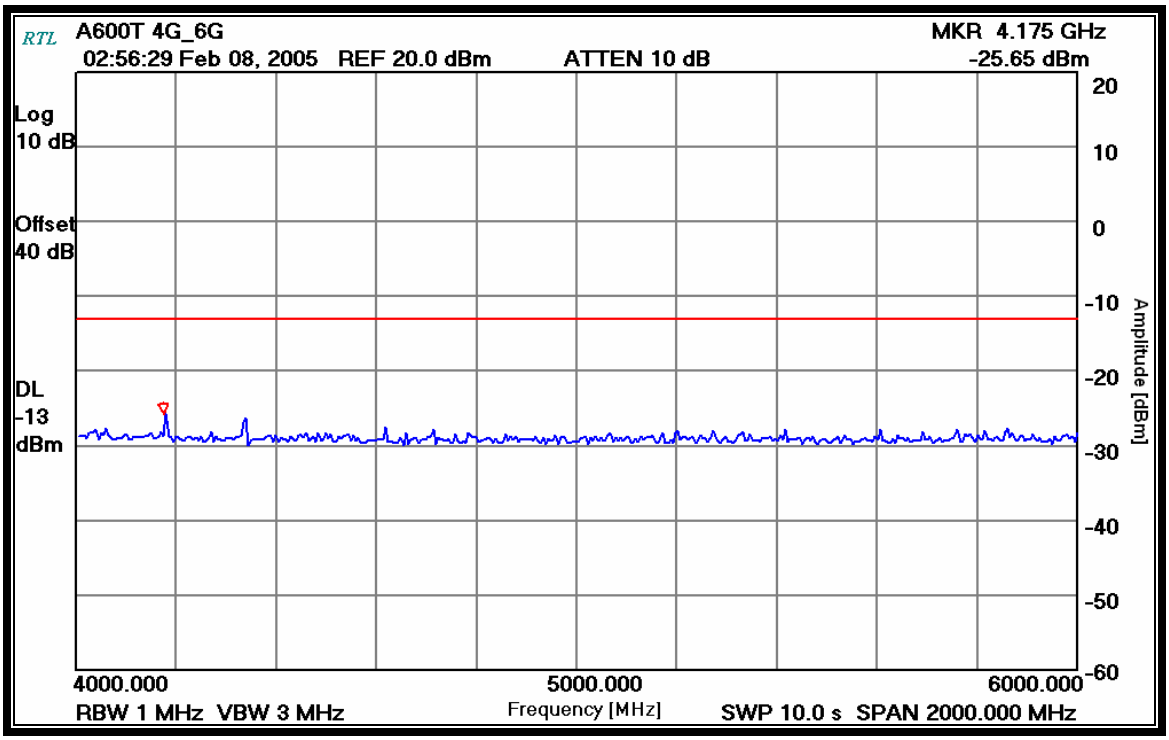
PLOT 6-25: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (30 MHZ – 1 GHZ)



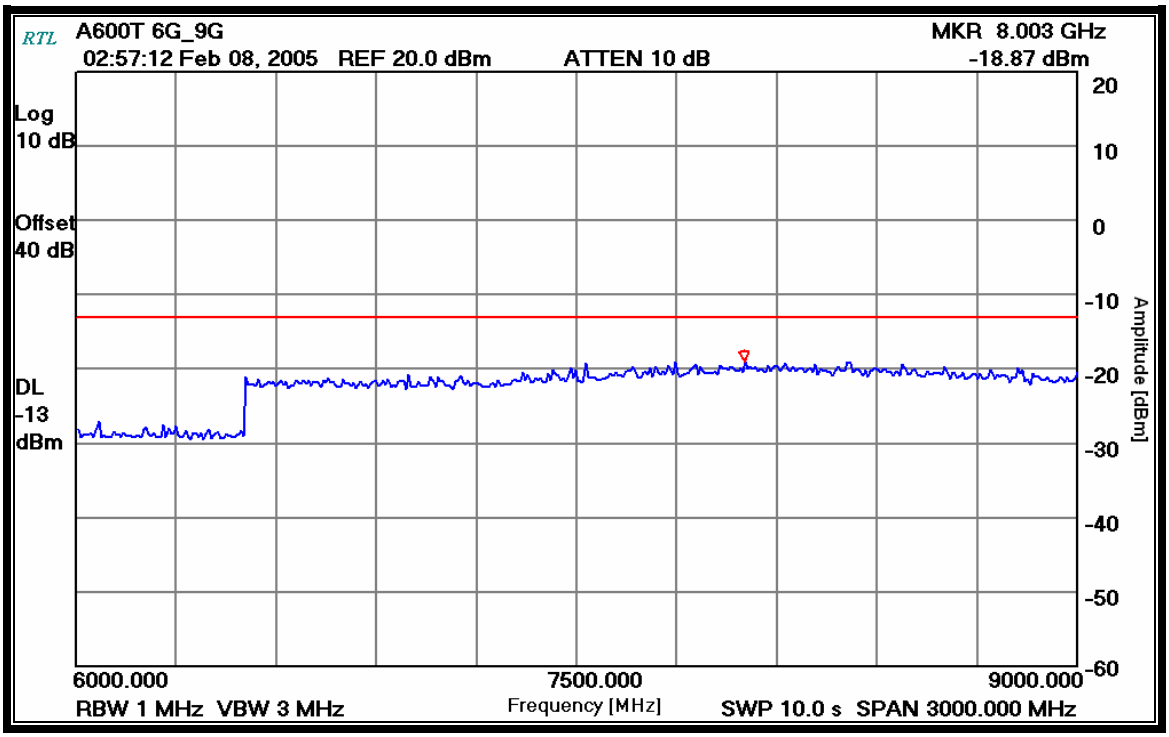
PLOT 6-26: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (1 GHZ – 4 GHZ)



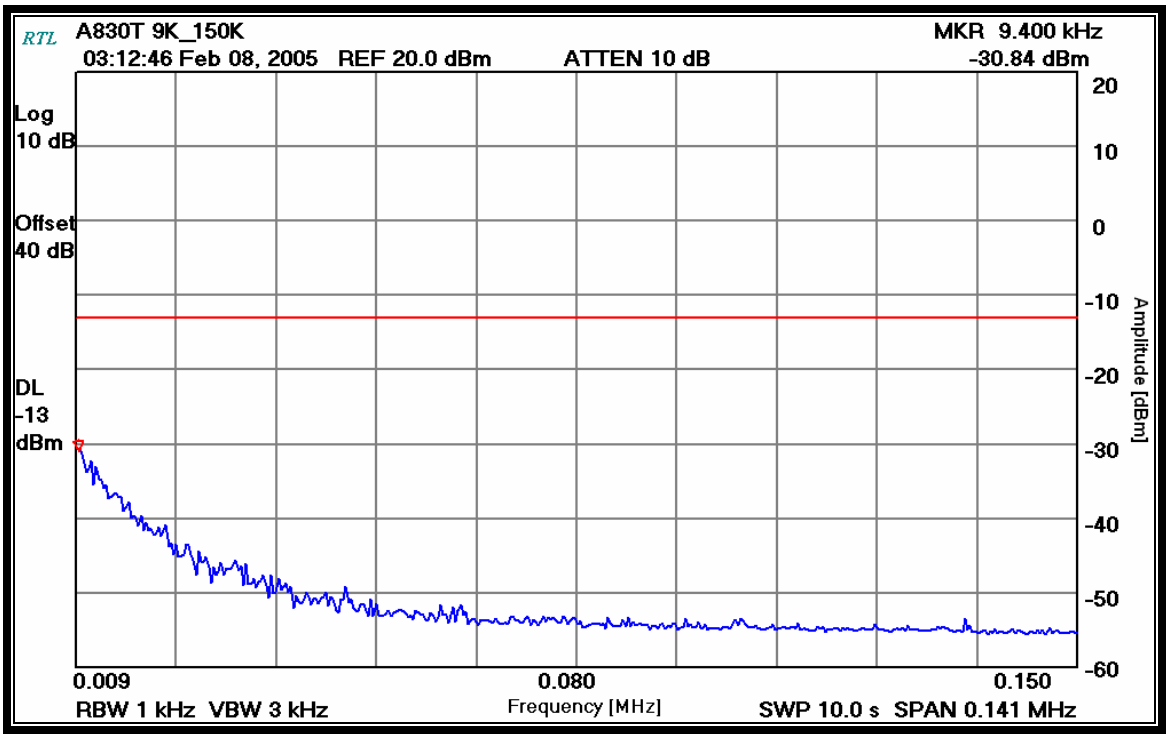
PLOT 6-27: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (4 GHZ – 6 GHZ)



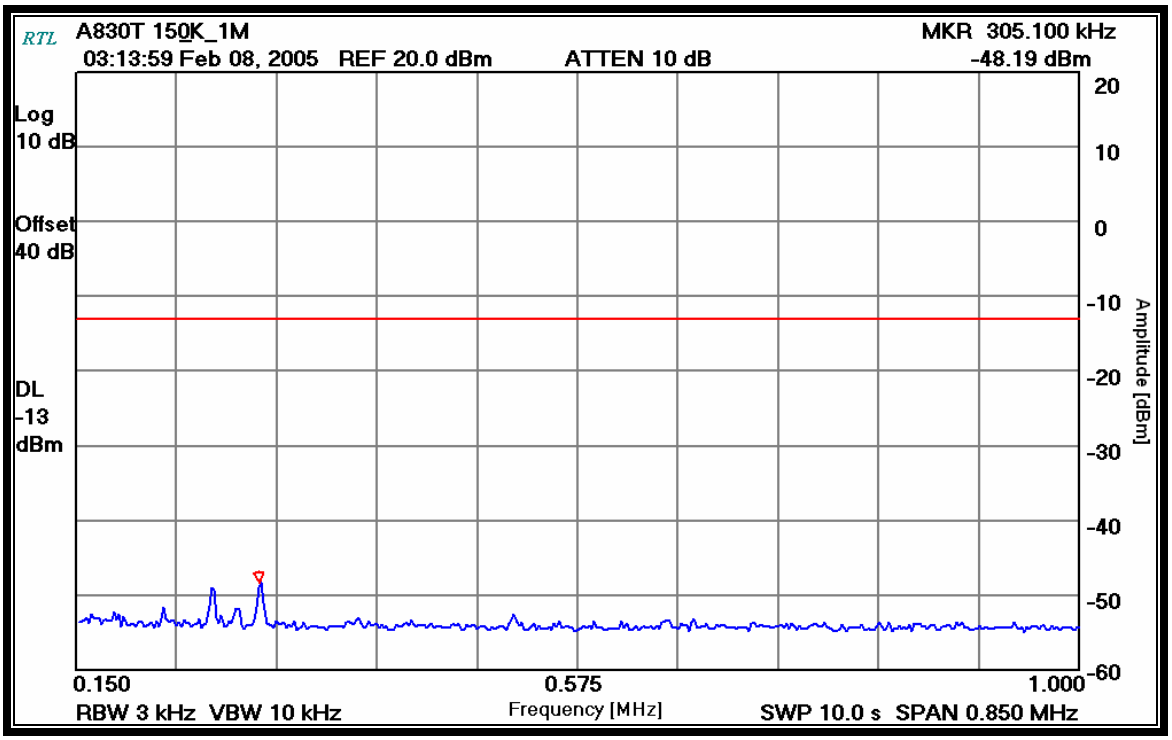
PLOT 6-28: CONDUCTED SPURIOUS EMISSIONS CHANNEL A600T – 865.9875 MHZ (6 GHZ – 9 GHZ)



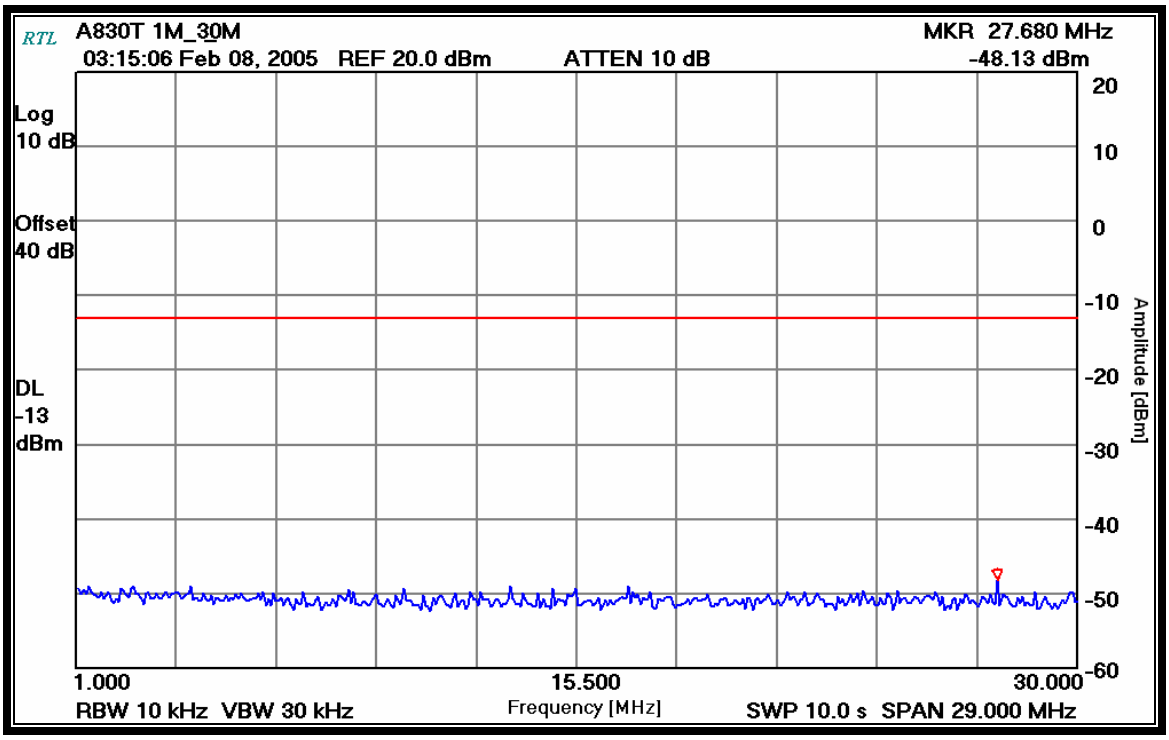
PLOT 6-29: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (9 KHZ – 150 KHZ)



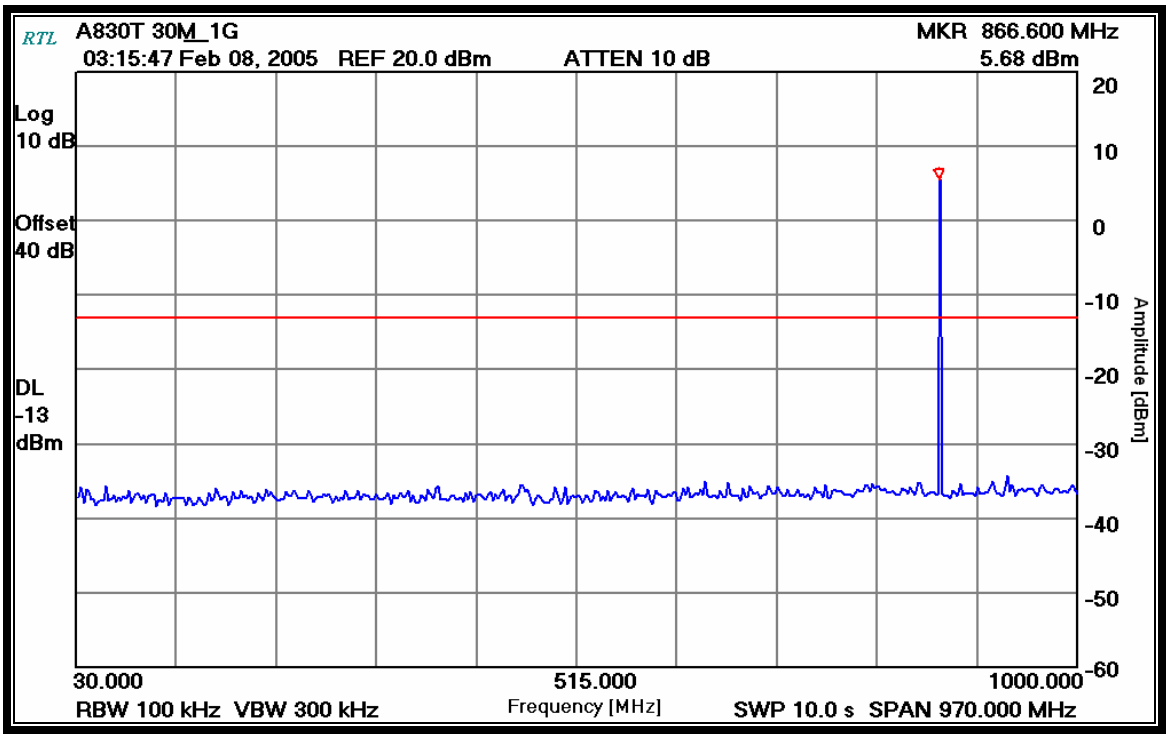
PLOT 6-30: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (150 KHZ – 1 MHZ)



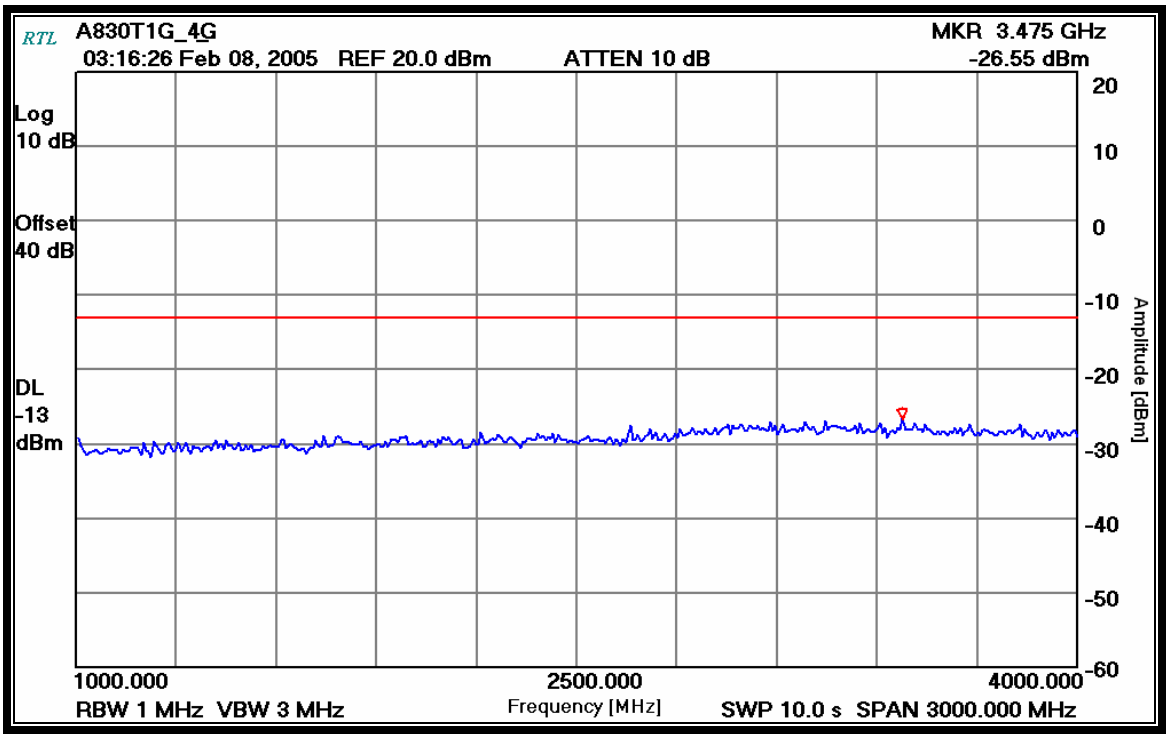
PLOT 6-31: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (1 MHZ – 30 MHZ)



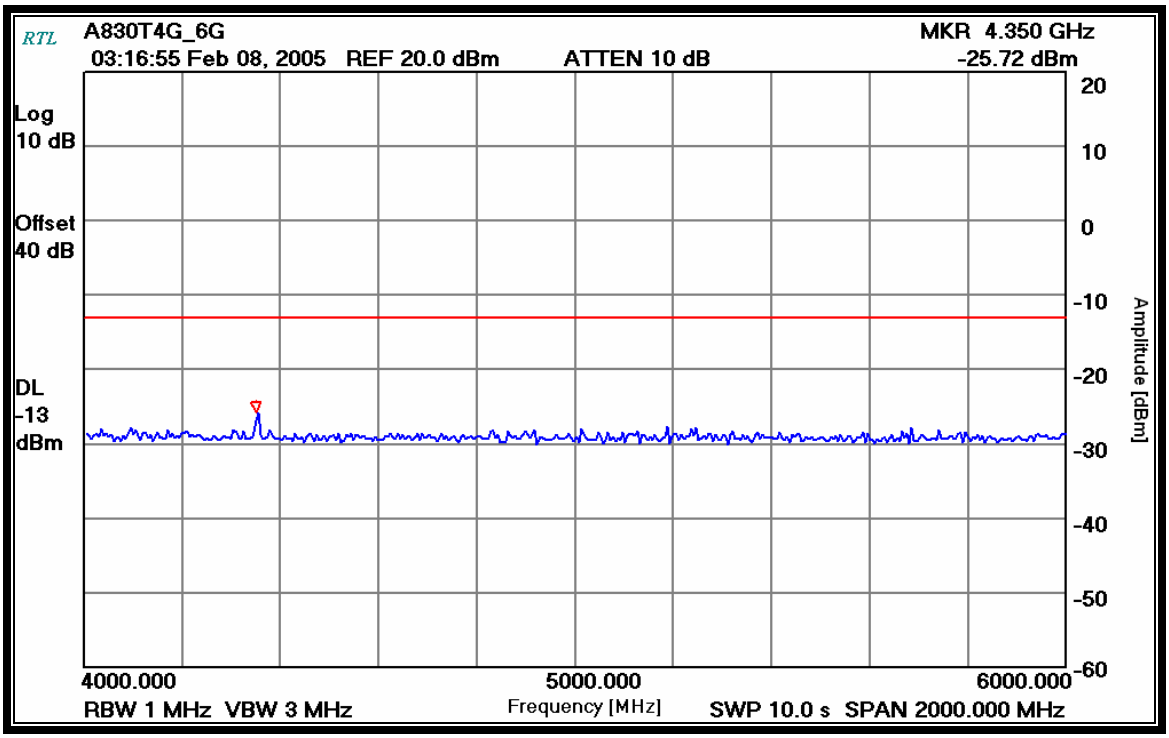
PLOT 6-32: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (30 MHZ – 1 GHZ)



PLOT 6-33: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (1 GHZ – 4 GHZ



PLOT 6-34: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (4 GHZ – 6 GHZ)



PLOT 6-35: CONDUCTED SPURIOUS EMISSIONS CHANNEL A830T – 868.9875 MHZ (6 GHZ – 9 GHZ)

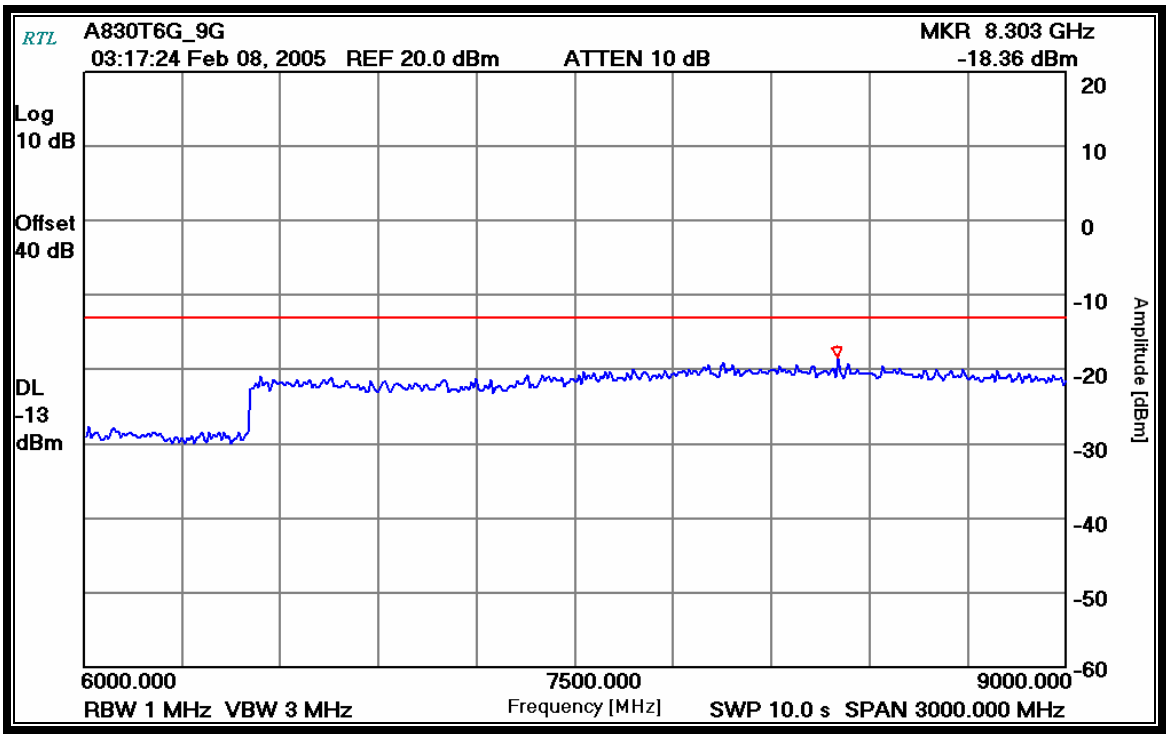


TABLE 6-1: TEST EQUIPMENT FOR TESTING CONDUCTED SPURIOUS EMISSIONS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

7 FCC RULES AND REGULATIONS PART 90 §90.543(C) AND PART 2 §2.1053(A): FIELD STRENGTH OF SPURIOUS RADIATION

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, Section 2.2.12.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

7.2 TEST DATA

7.2.1 CFR 47 PART 90.210 REQUIREMENTS

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 7-1: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL A300N – 813.4875 MHZ; SMR; HIGH POWER

Limit = 43 + 10 Log P = 57.08 dBc
Conducted Power = 44.09 dBm = 25.6 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1626.975	49.61	-35.5	1.1	4.84	75.8	-18.7
2440.4625	54.37	-35.3	0.3	5.04	74.7	-17.6
3253.95	58.53	-30.4	0.7	5.84	69.4	-12.3
4067.4375	48.41	-34.0	0.6	5.54	73.2	-16.1
4880.925	44.85	-39.4	0.6	7.24	76.9	-19.8
5694.4125	54.12	-31.0	0.6	6.64	69.1	-12.0
6507.9	51.33	-32.3	1.4	7.84	69.9	-12.8
7321.3875	47.48	-36.2	1.6	7.64	74.3	-17.2
8134.875	53.91	-26.5	2.0	8.44	64.2	-7.1

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

TABLE 7-2: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL A715N – 822.5125 MHZ; NPS; HIGH POWER

Limit = 43 + 10 Log P = 57.12 dBc
Conducted Power = 44.12 dBm = 25.82 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1645.025	50.29	-34.3	0.7	4.84	74.3	-17.2
2467.5375	54.20	-35.9	0.9	5.14	75.8	-18.7
3290.05	54.52	-35.3	1.2	5.84	74.8	-17.7
4112.5625	42.46	-40.8	1.0	5.84	80.0	-22.9
4935.075	52.49	-32.2	1.5	7.14	70.7	-13.6
5757.5875	45.10	-39.6	1.5	6.64	78.6	-21.5
6580.1	48.46	-34.9	1.9	7.84	73.1	-16.0
7402.6125	46.84	-37.3	1.7	7.54	75.6	-18.5
8225.125	56.22	-22.8	2.6	8.44	61.1	-4.0

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

TABLE 7-3: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL A300T – 858.4875 MHZ; SMR; HIGH POWER

Limit = 43 + 10 Log P = 56.7 dBc
Conducted Power = 43.7 dBm = 23.44 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1716.975	46.37	-38.7	0.8	4.84	78.4	-21.7
2575.4625	49.87	-39.7	0.8	5.34	78.8	-22.1
3433.95	60.24	-30.0	1.2	5.84	69.0	-12.3
4292.4375	47.00	-37.5	1.1	6.94	75.4	-18.7
5150.925	60.53	-23.3	1.4	6.84	61.5	-4.8
6009.4125	60.53	-24.2	1.4	6.64	62.6	-5.9
6867.9	50.63	-32.0	1.7	7.94	69.5	-12.8
7726.3875	47.43	-35.1	2.1	7.84	73.1	-16.4
8584.875	48.60	-31.8	2.6	8.44	69.6	-12.9

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

TABLE 7-4: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL A715T – 867.5125 MHZ; NPS; HIGH POWER

Limit = 43 + 10 Log P = 56.2 dBc
Conducted Power = 43.2 dBm = 20.89 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1735.025	44.54	-40.7	1.0	4.84	80.0	-23.8
2602.5375	57.51	-32.6	0.9	5.34	71.3	-15.1
3470.05	56.70	-33.5	1.2	5.74	72.1	-15.9
4337.5625	44.30	-40.3	1.0	6.34	78.2	-22.0
5205.075	62.20	-21.8	1.3	6.94	59.3	-3.1
6072.5875	57.70	-27.2	1.7	6.84	65.3	-9.1
6940.1	45.80	-38.1	2.2	7.84	75.6	-19.4
7807.6125	47.76	-35.6	1.6	7.84	72.5	-16.3
8675.125	45.00	-35.4	2.2	7.84	72.9	-16.7

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

TABLE 7-5: TEST EQUIPMENT FOR TESTING FIELD STRENGTH OF SPURIOUS RADIATION

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	09/20/05
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridge Guide Antenna (1 - 18 GHz)	2310	2/17/06
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	N/A
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 - 20 GHz)	3610A00866	09/05/05

TEST PERSONNEL:

Daniel Biggs		February 15, 2005
Test Technician/Engineer	Signature	Date Of Test

8 FCC RULES AND REGULATIONS PART 90 §90.210(B, G, H): EMISSIONS MASKS AND PART 2 §2.1049(C)(1): OCCUPIED BANDWIDTH

Occupied Bandwidth: Provided that the ACCP requirements are met, the applicants may request any authorized bandwidth that does not exceed the channel size.

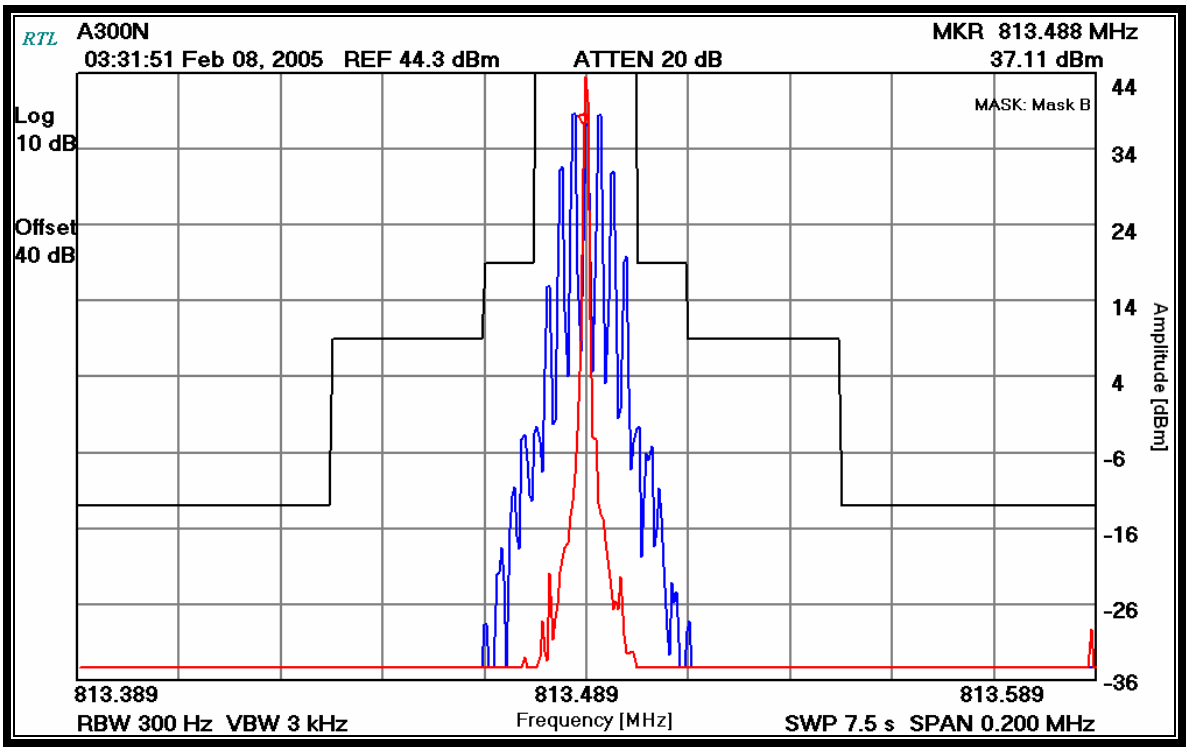
8.1 TEST PROCEDURE

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

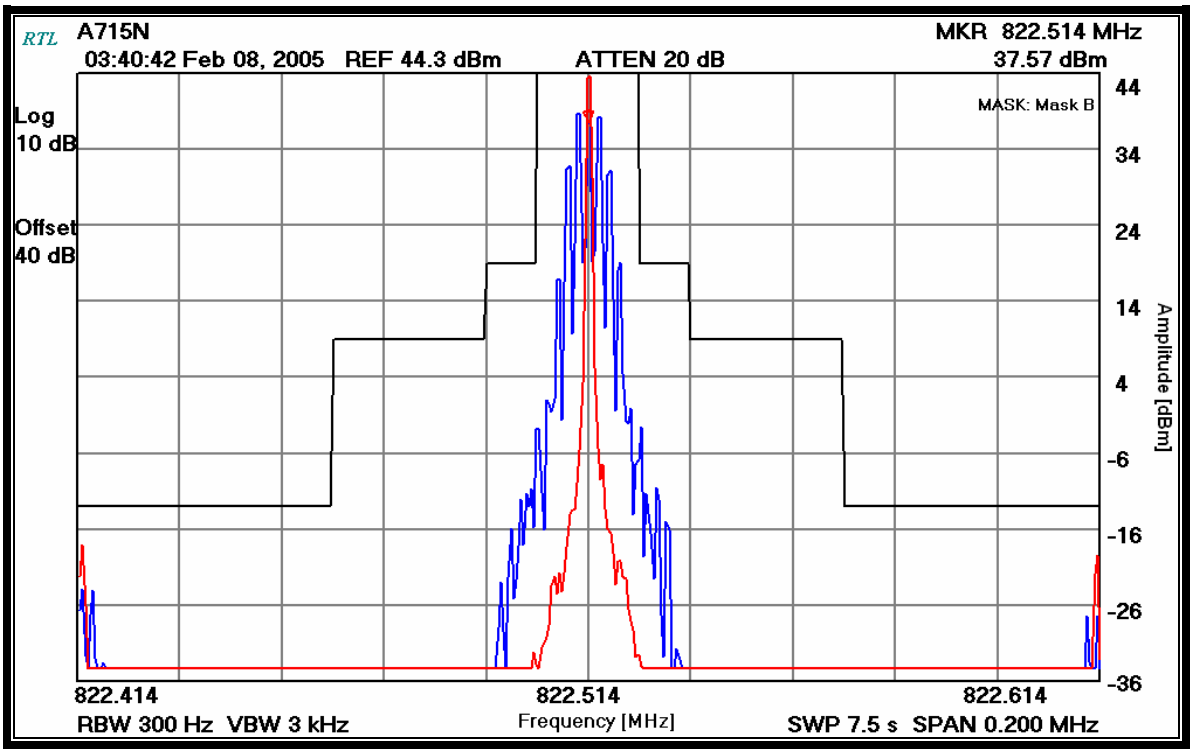
ANSI/TIA/EIA-603-2002, Section 2.2.11.

8.2 TEST DATA

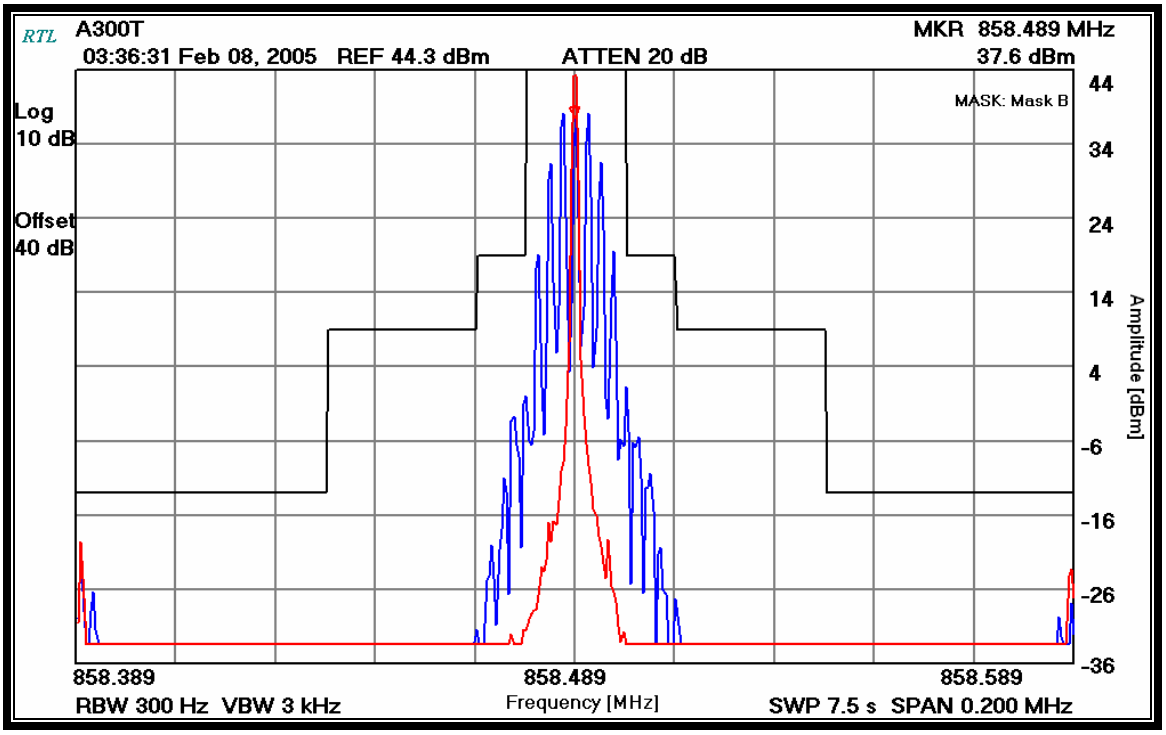
PLOT 8-1: OCCUPIED BANDWIDTH; SMR; CHANNEL A300N



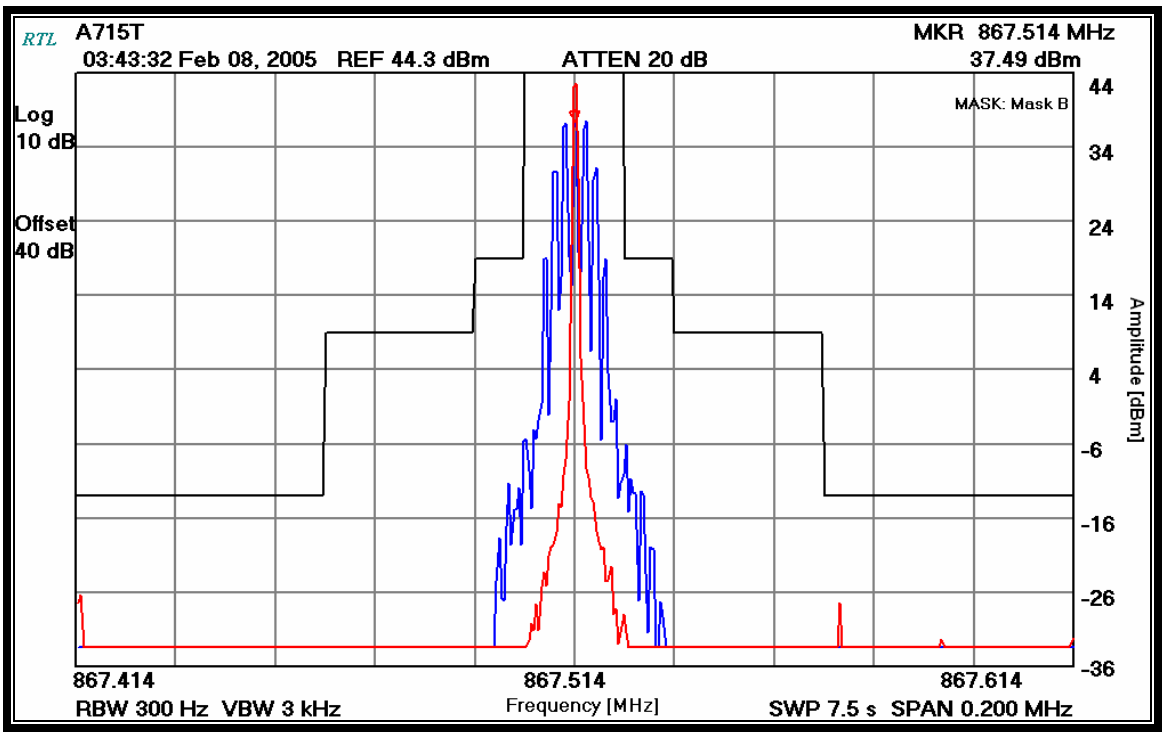
PLOT 8-2: OCCUPIED BANDWIDTH; NPS; CHANNEL A715N



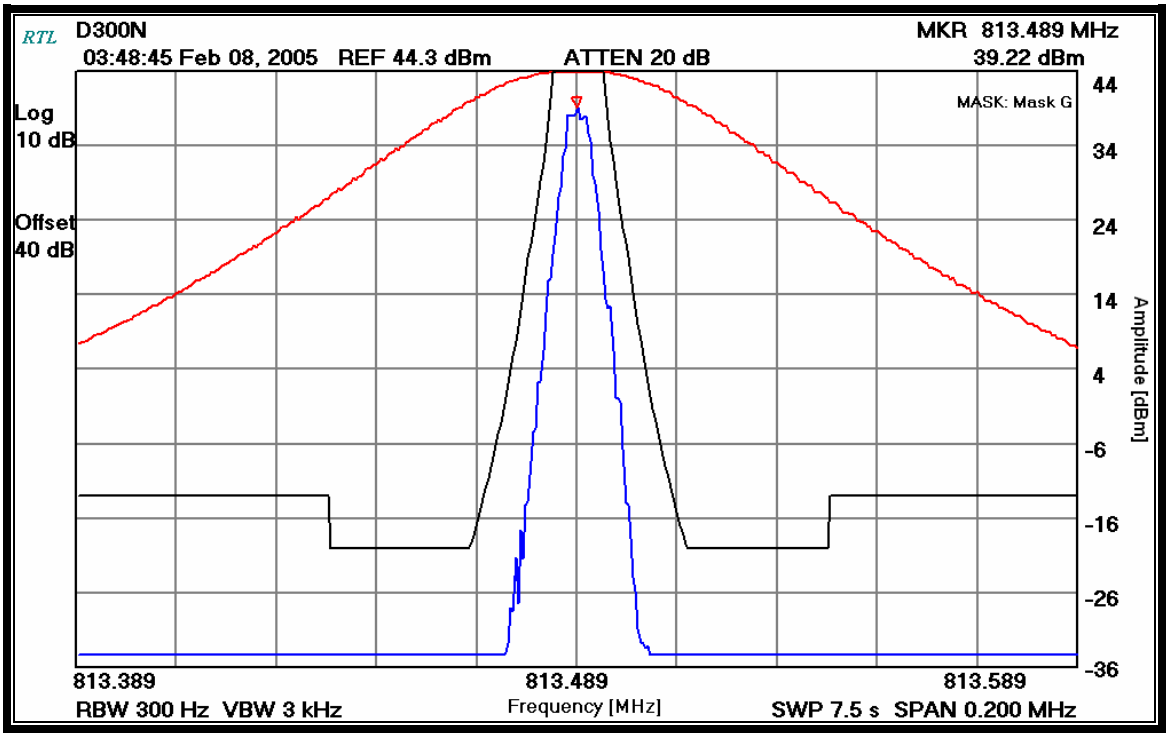
PLOT 8-3: OCCUPIED BANDWIDTH; SMR; CHANNEL A300T



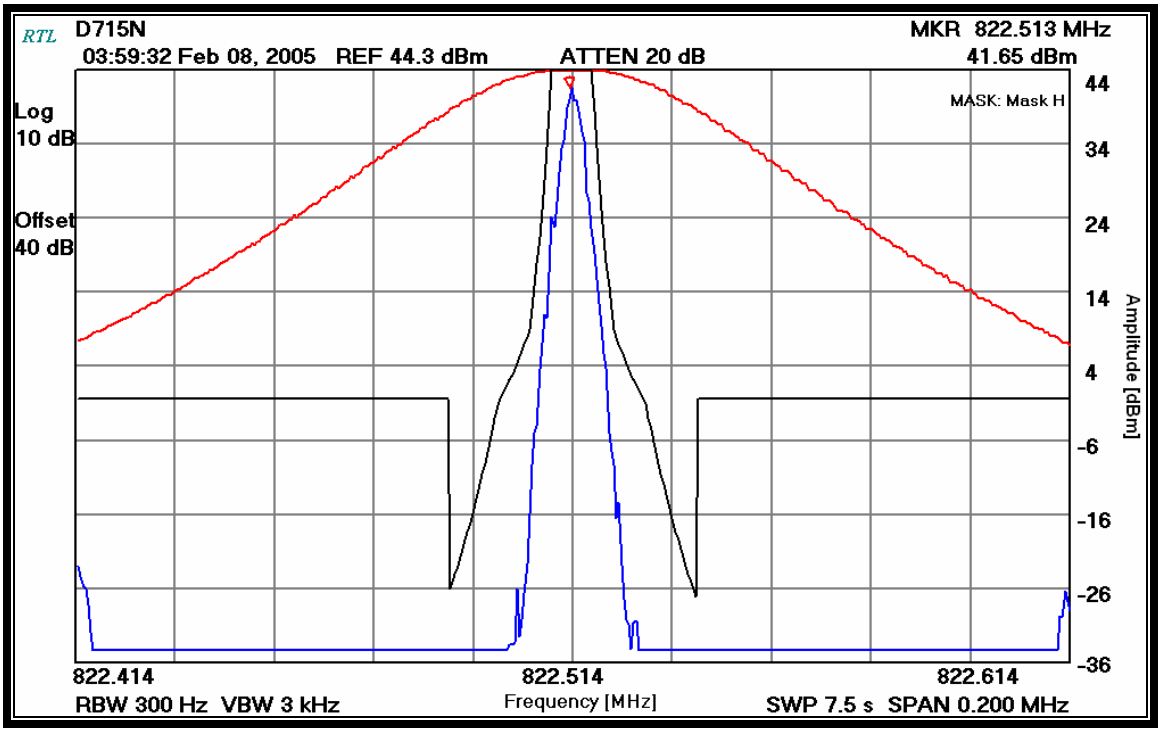
PLOT 8-4: OCCUPIED BANDWIDTH; NPS; CHANNEL A715T



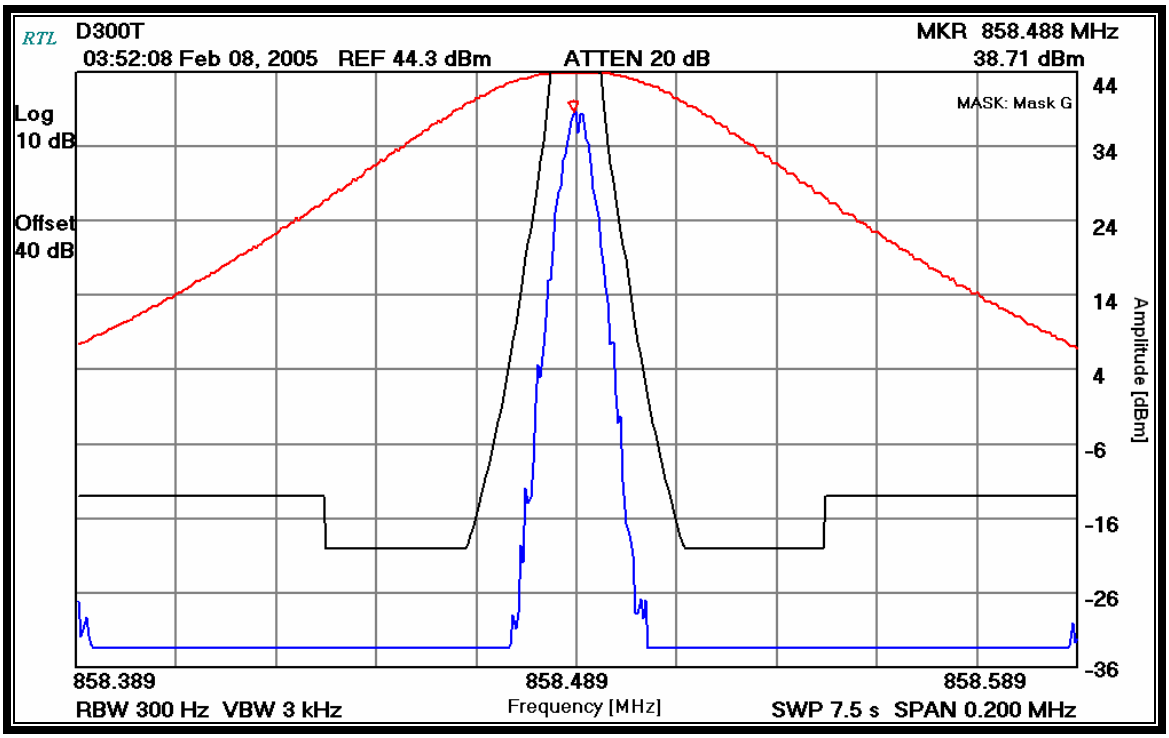
PLOT 8-5: OCCUPIED BANDWIDTH; SMR; CHANNEL D300N



PLOT 8-6: OCCUPIED BANDWIDTH; NPS; CHANNEL D715N



PLOT 8-7: OCCUPIED BANDWIDTH; SMR; CHANNEL D300T



PLOT 8-8: OCCUPIED BANDWIDTH; NPS; CHANNEL D715T

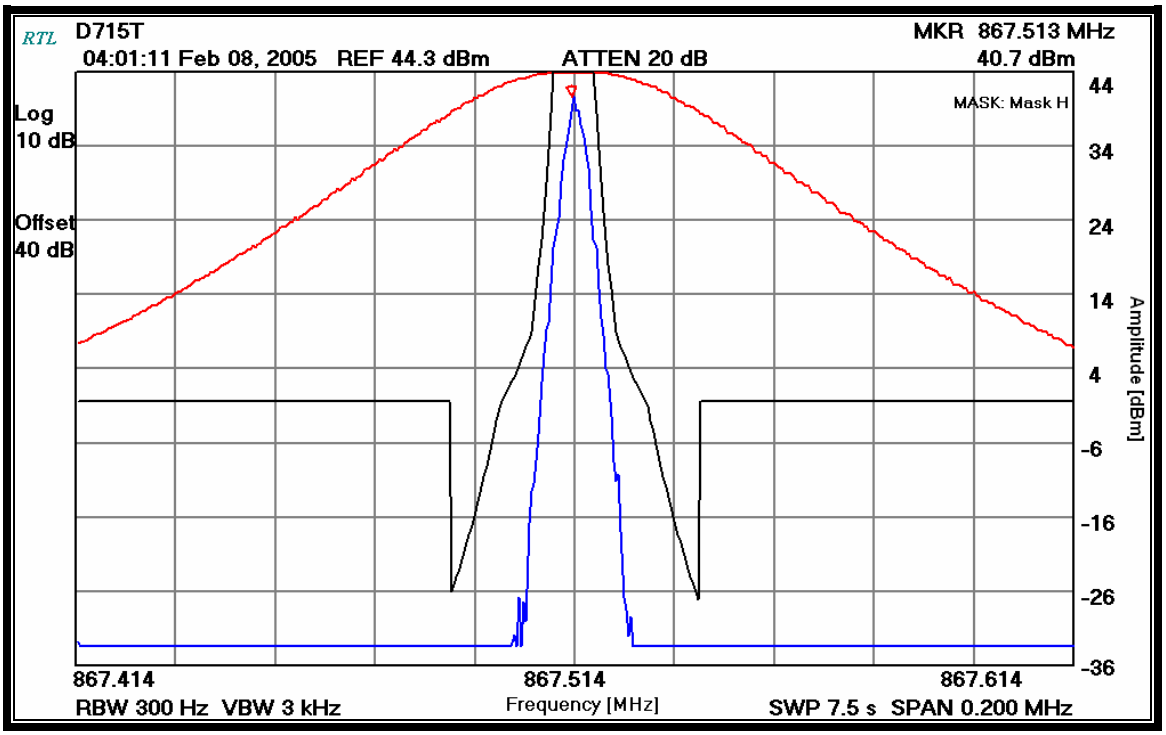
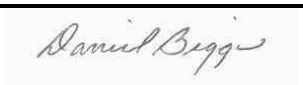


TABLE 8-1: TEST EQUIPMENT FOR TESTING OCCUPIED BANDWIDTH

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	09/08/05

TEST PERSONNEL:

Daniel Biggs		February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

9 FCC PART 2 §2.1047(A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.6

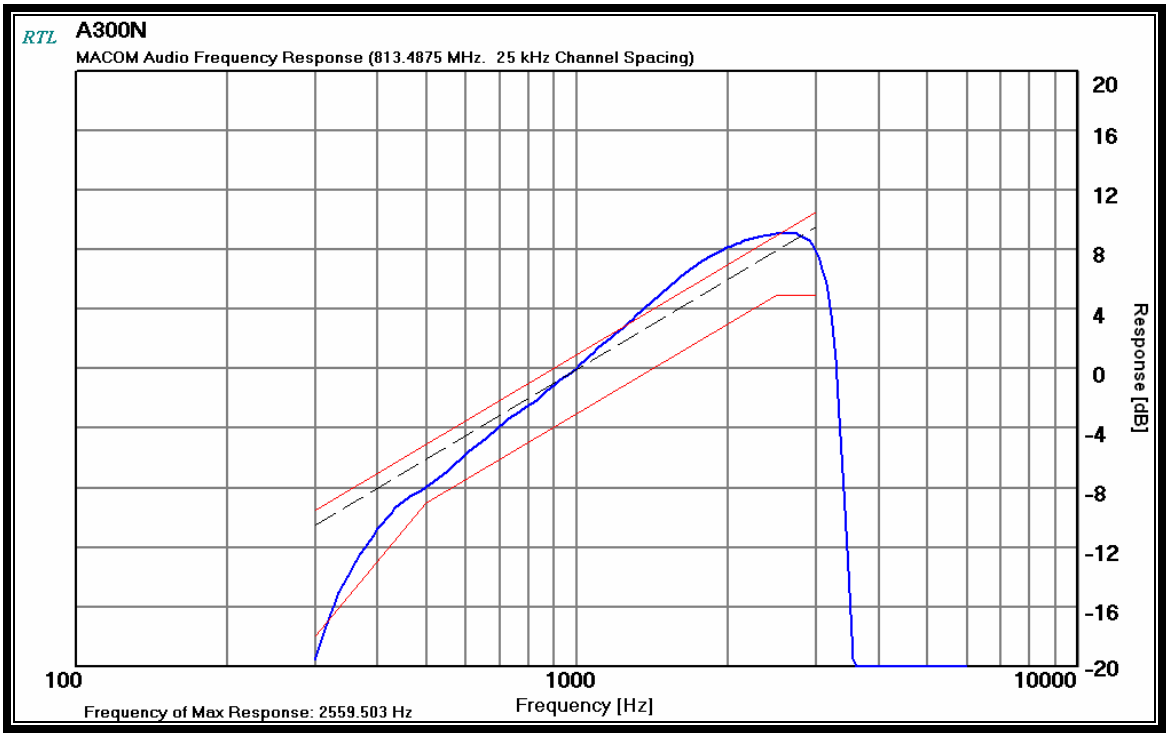
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref. The audio signal generator was varied from 100 Hz to 5 kHz with the input level held constant. The deviation in kHz was recorded using a modulation analyzer as DEVfreq. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

9.2 TEST DATA

PLOT 9-1: MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE; CHANNEL A300N, SMR



PLOT 9-2: MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE; CHANNEL A715N; NPS

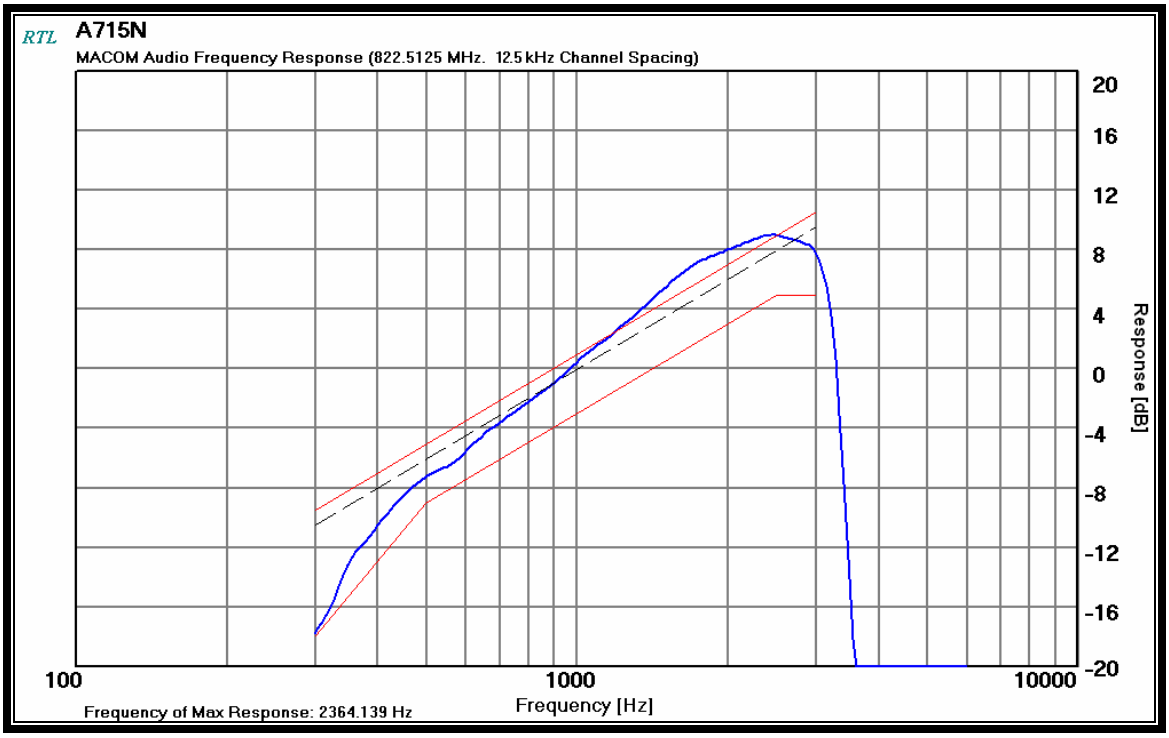


TABLE 9-1: TEST EQUIPMENT FOR TESTING AUDIO FREQUENCY RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/07/05
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

10 FCC PART 2 §2.1047(A): MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER

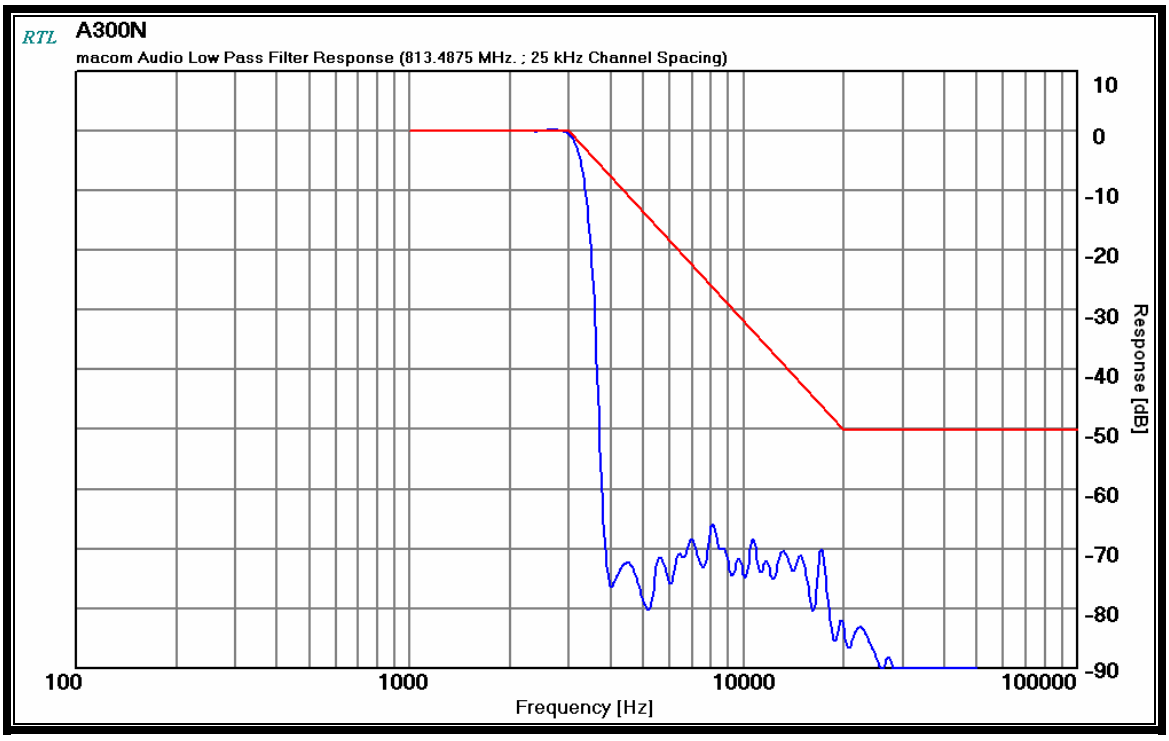
10.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

10.2 TEST DATA

PLOT 10-1: MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER; CHANNEL A300N, SMR



PLOT 10-2: MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER; CHANNEL A715N; NPS

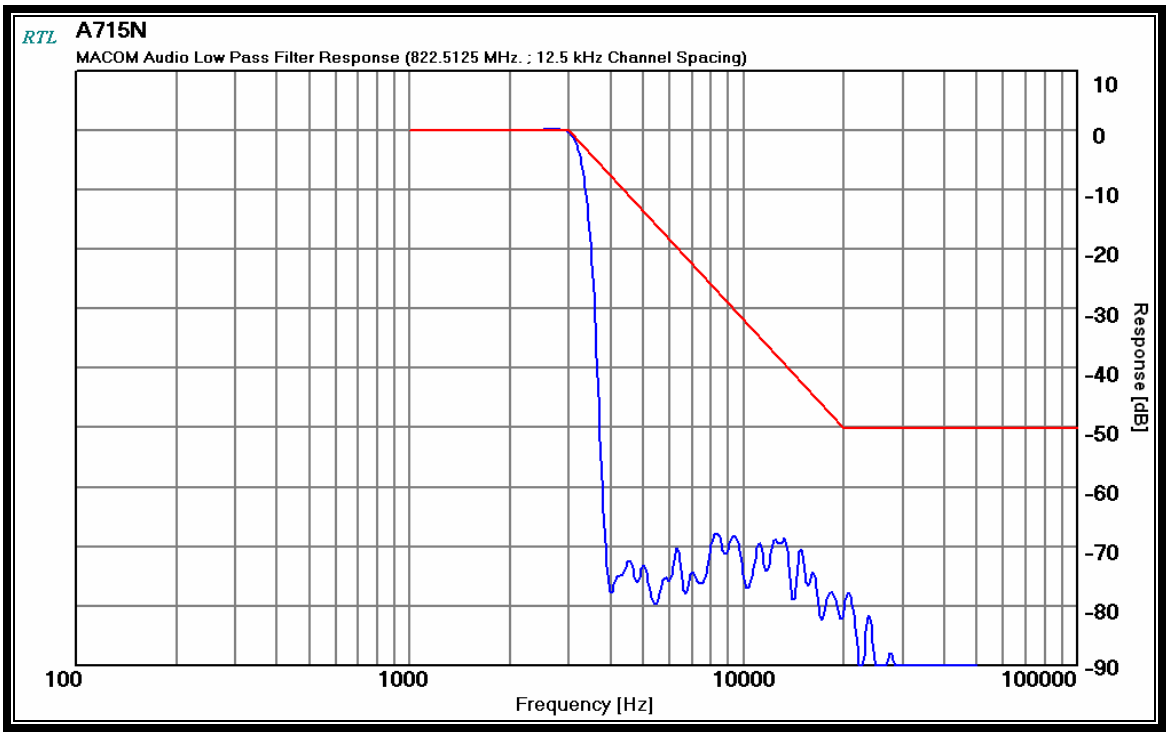


TABLE 10-1: TEST EQUIPMENT FOR TESTING AUDIO LOW PASS FILTER RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/07/05
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

11 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

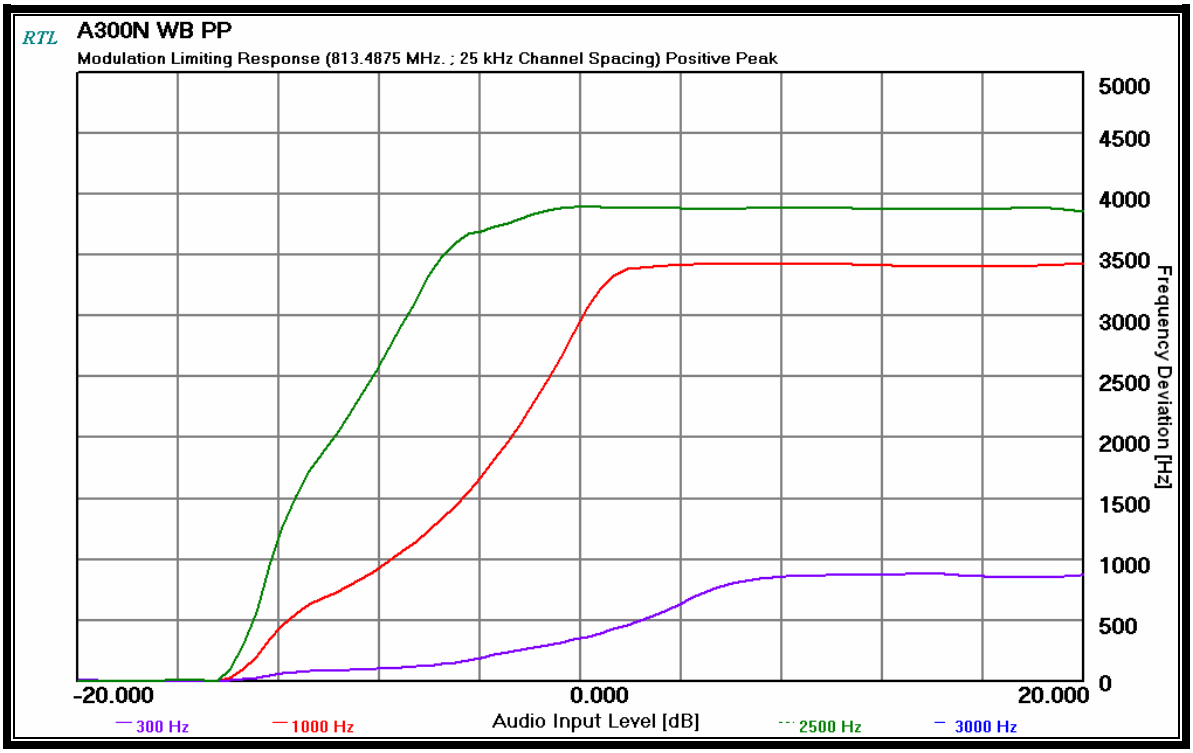
11.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.3

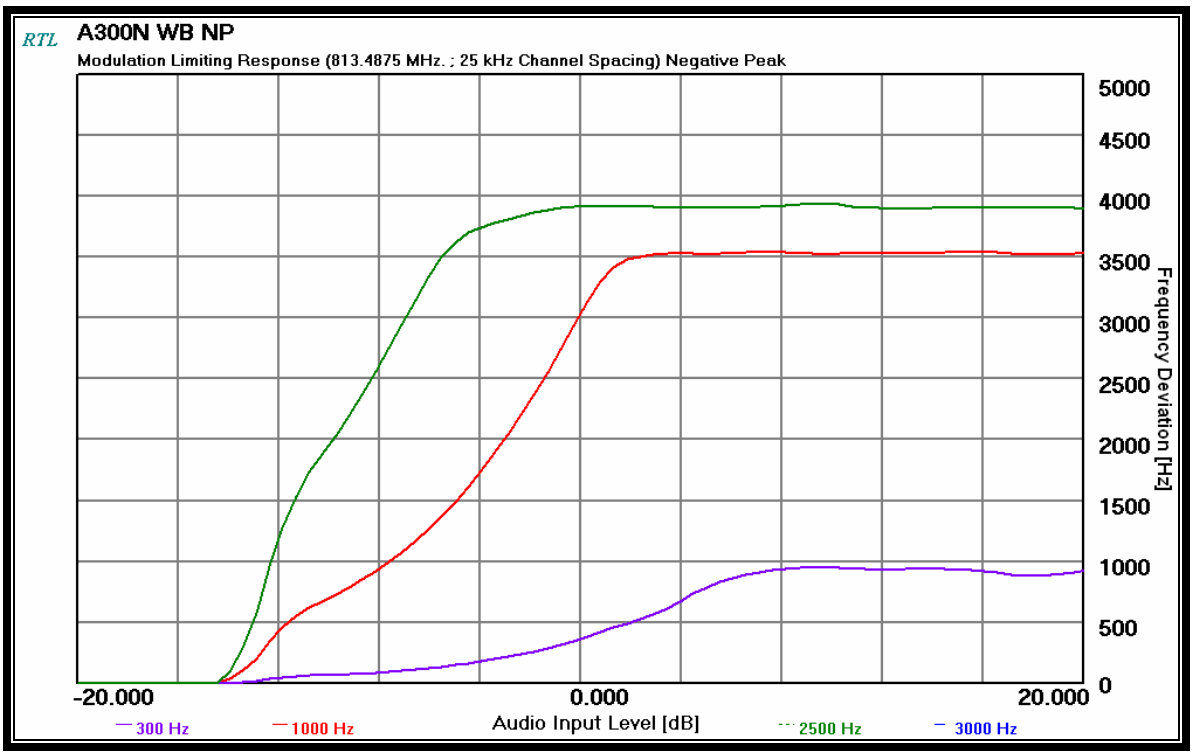
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB) the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

11.2 TEST DATA

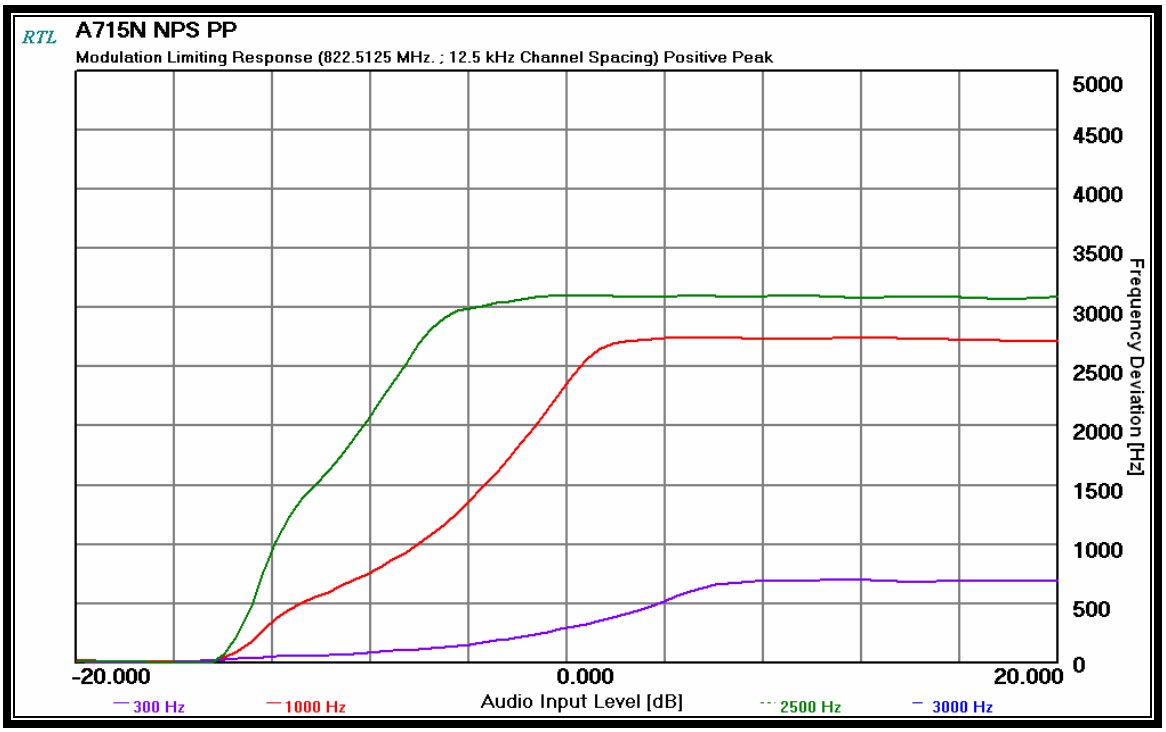
PLOT 11-1: MODULATION CHARACTERISTICS – MODULATION LIMITING: CHANNEL A300N; SMR POSITIVE PEAK



PLOT 11-2: MODULATION CHARACTERISTICS – MODULATION LIMITING: CHANNEL A300N; SMR; NEGATIVE PEAK



PLOT 11-3: MODULATION CHARACTERISTICS – MODULATION LIMITING: CHANNEL A715N; NPS; POSITIVE PEAK



PLOT 11-4: MODULATION CHARACTERISTICS – MODULATION LIMITING: CHANNEL A715N; NPS; NEGATIVE PEAK

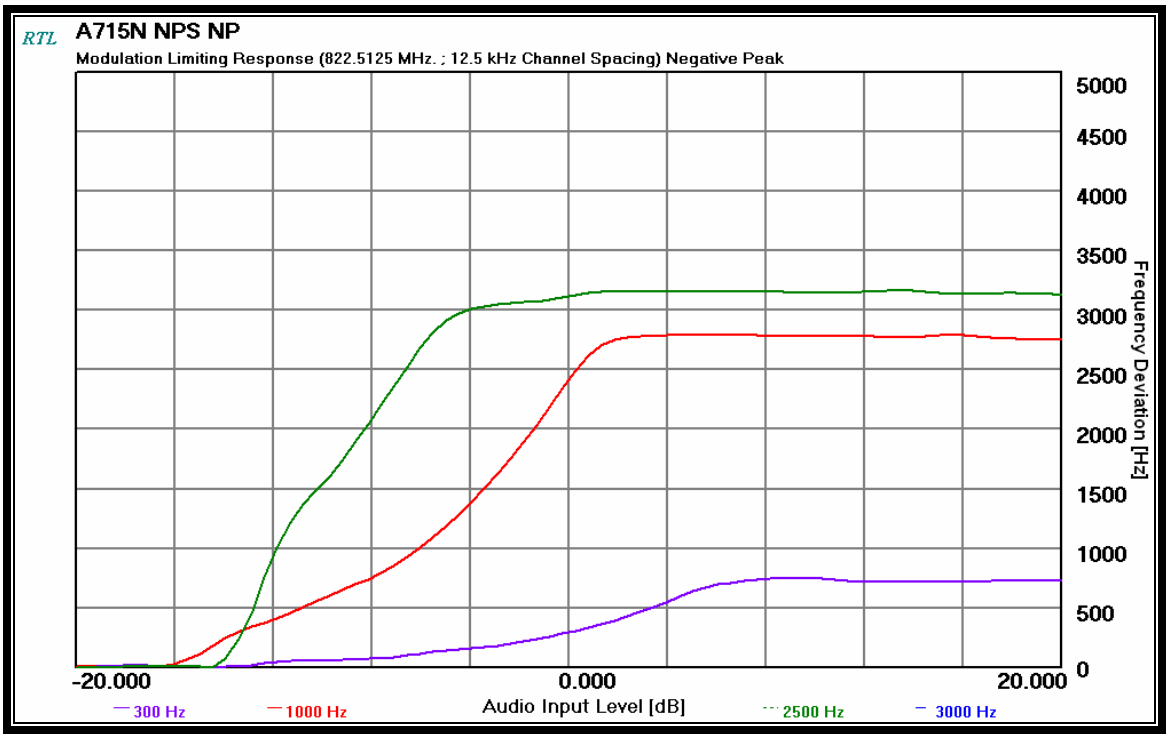


TABLE 11-1: TEST EQUIPMENT FOR TESTING MODULATION LIMITING

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/07/05
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	February 8, 2005
Test Technician/Engineer	Signature	Date Of Test

12 FCC RULES AND REGULATIONS PART 2 §2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: F3E

OCF SMR Voice – 25 kHz channel spacing - (806-821/861-866 MHz)

Calculation:
Max modulation(M) in kHz: 3.0
Max deviation (D) in kHz: 5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

OCF NPSPAC Voice – 12.5 kHz channel spacing - (821-824/866-869 MHz)

Calculation:
Max modulation(M) in kHz: 3.0
Max deviation (D) in kHz: 4
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 13.0 kHz
Emission designator: 13K0F3E

Type of Emission: F1D, F1E

P25 – SMR -9600 bps:
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = $[9600/\log_2(4) + 2 (1800) (1) = 8.400$ kHz
Emission designator: 8K4F1D, 8K4F1E

P25 – NPSPAC - 9600 bps:
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = $[9600/\log_2(4) + 2 (1800) (1) = 8.400$ kHz
Emission designator: 8K4F1D, 8K4F1E

13 FCC RULES AND REGULATIONS PART 15 §15.109: RADIATED EMISSIONS LIMITS

13.1 AMENDMENTS TO EMISSIONS TEST METHODOLOGY

13.1.1 DEVIATIONS FROM TEST METHODOLOGY

There was no deviation from, additions to, or exclusions from, ANSI C63.4: 2003.

13.2 RADIATED EMISSIONS MEASUREMENTS

13.2.1 SITE AND TEST DESCRIPTION

Before final radiated emissions measurements were made on the OATS, the EUT was scanned indoors at both one and three meter distances. This was done in order to determine its emission spectrum signal. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS, at each frequency, in order to ensure that maximum emission amplitudes were measured.

Final radiated emissions measurements were made on the OATS at a distance of 3 meters. The EUT was placed on a nonconductive turntable at a height of 1m.

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emissions maximum levels. Measurements were taken using both horizontal and vertical antenna polarization. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

FIELD STRENGTH CALCULATIONS

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dB\mu V/m) = SAR(dB\mu V) + SCF(dB/m)$$

FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB/m) = -PG(dB) + AF(dB/m) + CL(dB)$$

SCF = Site Correction Factor
PG = Pre-Amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\mu V/m) = 10^{FI(dB\mu V/m)/20}$$

For example, assume a signal frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is –11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3dB\mu V - 11.5dB/m = 37.8dB\mu V/m$$
$$10^{37.8/20} = 10^{1.89} = 77.6\mu V/m$$

13.2.2 MEASUREMENT UNCERTAINTY

Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

13.2.3 TEST LIMITS

FCC Class B Radiated Emissions	
Frequency (MHz)	**At 3m (dBµV/m)**
30-88	40.0
88-216	43.5
216-960	46.0
> 1000	54

13.2.4 RADIATED EMISSIONS DATA – MODE RX, LIMIT/DISTANCE FCC B/3M

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
40.005	Qp	H	0	2.0	47.2	-18.4	28.8	40.0	-11.2
60.007	Qp	H	180	2.0	46.6	-25.6	21.0	40.0	-19.0
80.010	Qp	V	0	1.0	43.1	-24.8	18.3	40.0	-21.7
160.021	Qp	H	300	2.0	42.5	-20.5	22.0	43.5	-21.5
180.015	Qp	H	45	1.5	50.4	-20.8	29.6	43.5	-13.9
210.016	Qp	H	45	1.0	54.3	-19.5	34.8	43.5	-8.7
240.019	Qp	H	270	1.0	55.0	-17.6	37.4	46.0	-8.6
240.031	Qp	H	270	1.0	50.3	-17.6	32.7	46.0	-13.3
250.033	Qp	H	90	1.0	41.6	-16.9	24.7	46.0	-21.3
280.037	Qp	H	90	1.0	40.9	-15.8	25.1	46.0	-20.9
290.038	Qp	H	270	1.0	48.9	-15.9	33.0	46.0	-13.0
323.771	Qp	H	270	1.0	53.0	-14.6	38.4	46.0	-7.6
400.052	Qp	H	270	1.0	44.0	-12.2	31.8	46.0	-14.2
420.055	Qp	H	190	2.0	42.2	-10.8	31.4	46.0	-14.6
440.058	Qp	H	290	1.0	41.1	-10.8	30.3	46.0	-15.7
447.516	Qp	H	300	2.0	41.7	-10.8	30.9	46.0	-15.1
500.066	Qp	H	320	1.5	53.9	-9.5	44.4	46.0	-1.6
540.042	Qp	H	30	1.5	43.4	-9.1	34.3	46.0	-11.7
599.513	Qp	H	180	1.2	43.4	-7.8	35.6	46.0	-10.4
600.078	Qp	H	180	1.0	44.8	-7.8	37.0	46.0	-9.0
699.526	Qp	H	0	1.0	44.2	-6.4	37.8	46.0	-8.2
700.091	Qp	H	0	1.0	47.3	-6.4	40.9	46.0	-5.1
800.105	Qp	H	270	1.0	30.7	-5.0	25.7	46.0	-20.3

TEST PERSONNEL:

Daniel Biggs		February 11, 2005
Test Technician/Engineer	Signature	Date Of Test

14 CONCLUSION

The data in this measurement report shows that the **M/A-COM, Inc**. Model **OpenSky M-803 Mobile Radio; FCC ID: BV8M803M,** complies with all the requirements of Parts 90, 15 and 2 of the FCC Rules.