

Certification Test Report

For a

Programmable Bi-Directional Booster Amplifier

Manufacturer:

Aero Comm, Inc.
19516 Amaranth Drive
Germantown, MD 20874

Testing Facility:

F-Squared Laboratories
10880 Moxley Road
Damascus, MD 20872

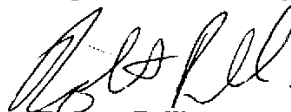
The Programmable Bi-Directional Booster Amplifier, Model 50289-RBA-800MHz has been tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47 Part 2.1041 and Part 90 for a Class B Private Land Mobile Radio Service Bi-directional Signal Booster. The results found in this test report relate only to the items tested. The product was received on August 13, 1999 and the testing was completed on August 19, 1999.

Evaluation Conducted By:



Santo Lavorata
EMC Technical Manager

Report Reviewed By:



Robert Pellizze
General Manager



success thru compliance

F-Squared Laboratories

9890A Main Street
Damascus, MD 20872
(301) 253 - 4500
Fax: (301) 253 - 5179

This report shall not be duplicated except in full without the written approval of F-Squared Laboratories

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Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
Issue Date: August 30, 1999

Exhibit I

Engineering Statements

This report has been prepared on behalf of Aero Comm, Inc. to certify a Class B Private Land Mobile Radio Service Bi-directional Signal Booster. The test was performed for above said device under Parts 2.1033 (c) and Part 90 of the FCC Rules and Regulations. The test results found in this test report relate only to the items tested.

EQUIPMENT UNDER TEST: Programmable Bi-Directional Signal Booster
Model: 02890-RBA-800MHz
Power Supply: Acopian Model# 12EB120

FCC ID: KJA504830225

APPLICABLE RULES: CFR 47 Part 2.1033 (c); 2.1046, 90.209, 90.219

EQUIPMENT CATEGORY: Repeater

MEASUREMENT LOCATION: F-Squared Laboratories in Damascus, MD. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

MEASUREMENT PROCEDURE: All measurements were performed according to the 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.

UNCERTAINTY BUDGET:

- Radiated Emission
Combined Uncertainty (+ or -) 2.24 dB
Expanded Uncertainty (+ or -) 4.48 dB
- Conducted Emission
Combined Uncertainty (+ or -) 1.13 dB
Expanded Uncertainty (+ or -) 2.26 dB

ENGINEERING STATEMENT#1:

I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Parts 2.1033 (c); 2.1046, 90.209, and 90.219 of the FCC Rules under normal use and maintenance.

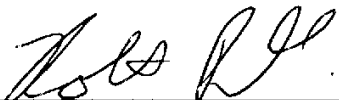
ENGINEERING STATEMENT#2:

Radio Frequency Radiation Exposure Declaration

The FCC Rule as noted in Part 2.1091 is not applicable for this fixed station device. Furthermore, the maximum power output available from the device of 17 dBmW (~0.0501 Watts) and not designed to drive any transmitting antenna when used according to the operation and instruction manual.

ENGINEERING STATEMENT#3:

EMI Countermeasures Statement by the Manufacturer as shown in the Authorization Letter Exhibit.

Certified by: 
Robert Pellizze, General Manager

Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
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Exhibit II

List of Measurement Instrumentation

Equipment Type	Manufacturer	Model #	Serial #	Cal. Due Date
Receiver Systems	Rohde & Schwarz	ESMI	DE23119	Feb. 2000
LISN #1	Solar	8012-50-R-24-BNC	910488	Jan. 2000
LISN #2	Solar	8012-50-R-24-BNC	933201	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B100	383	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B200	292	Jan. 2000
Biconical Antenna	Compliance Design Inc.	B300	318	Jan. 2000
Horn Antenna	Antenna Research Associates	DRG-118/A	1105	Feb. 2000
Antenna Mast	Compliance Design Inc.	M100	NA	NA
Turntable	F ² Laboratories	Site 1	NA	NA
Isolator #1*	UTE Microwave Inc.	CT-1059-OT	U6049	**
Isolator #2*	UTE Microwave Inc.	CT-1059-OT	U6050	**
Combiner*	Mini-Circuits	ZESC-2-11	15542	**
RF Signal Generator#1	Giga-Tronics	6061A	9637902	Jan. 2000
RF Signal Generator#2	HP	E4420B-1E5	US38220249	July 2000
Spectrum Analyzer	HP	8391A	3149A07546	Feb. 2000

* Note1: Customer Provided Equipment

**Note2: Calibrated with the Rohde & Schwarz receiver and the HP and Gigatronics Signal Generators

Exhibit III

Equipment Under Test Information and Data

TEST ITEM CONDITION:

The equipment to be tested was received in good condition. Electrical and mechanical drawings are included in the Operation and Instruction manual as supplied in Exhibit XIII.

TESTING ALGORITHM:

The EUT was driven with the highest input signal level permitted in both the forward and reverse signal path directions. The worst case emissions are recorded in the data tables.

CONDUCTED EMISSION TESTING:

The EUT was placed on a 0.8 meter high, 1 X 1.5 meter non-conductive table. Power was provided to the EUT through a LISN bonded to a 3 X 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver and emissions in the range 450kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak values, and the resolution bandwidth during testing was 9kHz. All data for conducted emissions is found in Exhibit VI.

RADIATED EMISSIONS: SPURIOUS EMISSIONS TESTING

The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Cable and peripheral positions were also varied to produce maximum emissions. Both horizontal and vertical field components were measured. The output of the antenna was connected to the input of the receiver and emissions were measured in the range 30MHz to 8.5 GHz. The measured values up to 1GHz with a resolution bandwidth of 120KHz are quasi-peak readings made at 3 meters. Emissions from 1 GHz to 8.5 GHz were measured with a resolution bandwidth of 1 MHz and placed in the average detector mode. All data for radiated spurious emissions is found in Exhibit VII.

RADIATED SPURIOUS EMISSION ANTENNA PORT TESTING:

The EUT was tested near the spectrum analyzer and source signal generators with the shortest available length cables to insure correct data collection. The Forward and Reverse outputs of the EUT were connected to the EMI receiver input port and the emissions were measured as shown in Exhibit VII. The test was then repeated with the receiver input connected first to the Forward Channel input port followed by measurements from the Reverse Channel input port.

INTERMODULATION DISTORTION AND EMISSIONS MASK TESTING:

The EUT was tested by the use of 2 signal generators, 1 combiner, and 2 isolators in line with each signal generator. The output of the EUT was connected to the receiver and the emissions were measured as shown in Exhibit VIII.

CALCULATION OF DATA #1:

RADIATED EMISSIONS - The antenna factors (including cable losses) of the biconical antennas were used along with the pre-amplifier gain, which were entered into the memory of the receiver. The receiver uses these values to correct the reading for amplitude automatically. The field strength reading taken directly from the receiver and compared to the FCC limits in dBuV/m. The following equation is used to convert to uV/m:

$$E_{uV/m} = \text{antilog}(E_{dBuV/m} / 20)$$

SAMPLE OF FIELD STRENGTH CALCULATION:

$$E_a = V_a + A_F + A_e + (-A_G)$$

Where E_a = Field Strength(dBuV/m)

V_a = 20 x log₁₀ (Measure RF voltage, uV)

A_e = Cable Loss Factor, dB

A_G = Amplifier Gain, dB

A_F = Antenna Factor dB(m-1)

i.e. If the reading is 57.0 dBuV, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, so the field strength will be:

$$\begin{aligned} E_a(\text{dBuV/m}) &= 57 + 8 + 1 + (-25) \\ &= 41 \text{ dBuV/m} \end{aligned}$$

or

$$\begin{aligned} E_a(\text{uV/m}) &= 10^{(41/20)} \\ &= 112.20 \text{ uV/m} \end{aligned}$$

CALCULATION OF DATA#2:

Emission Mask Limits – All of the calculations were based on the measured 1 dB compression output power level of the EUT and Emissions Mask H of section 90.210 (H). The EUT does not have an audio low-pass filter and the limits specified in sub sections 1 to 5 were applied. The mask was applied on the following three center frequencies: 821.1 (Channel 607), 823.05 (Channel 755) and 823.95 (Channel 825). An Excel spreadsheet was used with the various emission masks based on frequency to derive the limits. The limits are based on the following Mask (H) criteria's:

KHz offset from Center Frequency	DB of attenuation down from Center Frequency
0 - 4	0
4 - 8.5	$107 * \log((4 \text{ to } 8.5)/4)$
8.5 - 15	$40.5 * \log((8.5 \text{ to } 15)/1.16)$
15 - 25	$116 * \log((15 \text{ to } 25)/6.1)$
Beyond 25	$43 + \log(\text{Output Power in Watts})$

The required attenuation below and above the center frequency (CF) is shown for all three bands to reveal the low end, center, and high end performance of the EUT. The spreadsheet on the next page reveals all of the limit data points used for the test as shown in Exhibit VIII. The output power of the EUT was driven to 2 dB of the specified 1 dB gain compression output power (+15 dBmW). This output (+17dBmW) is 10 dB above the maximum available output based on the -20 dB maximum input level as specified and permitted by the client. The emissions mask level was also adjusted to the signal generator unmodulated output level to provide a comparison between the modulated generator output and the EUT output.

EMISSION Mask dBmW Limit Levels

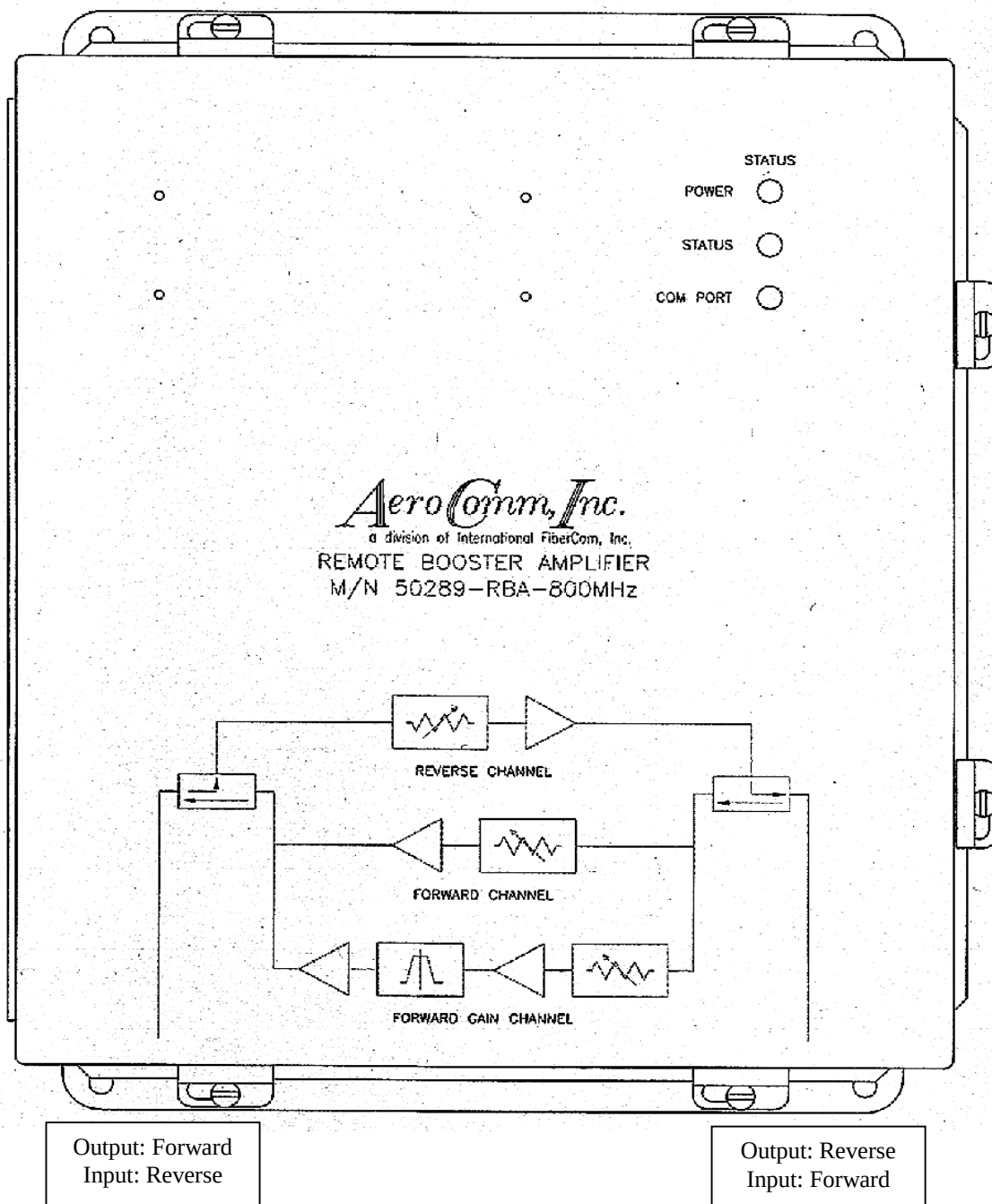
Channel 607			Channel 755			Channel 825		
FMHz	Gen.Out	EUT Out	FMHz	Gen.Out	EUT Out	FMHz	Gen.Out	EUT Out
821.0700	-35.7	-15.00	823.0200	-35.7	-15.00	823.9200	-35.7	-15.00
821.0750	-35.7	-15.00	823.0250	-35.7	-15.00	823.9250	-35.7	-15.00
821.0750	-76.8	-56.06	823.0250	-76.8	-56.06	823.9250	-76.8	-56.06
821.0760	-74.7	-54.01	823.0260	-74.7	-54.01	823.9260	-74.7	-54.01
821.0770	-72.6	-51.86	823.0270	-72.6	-51.86	823.9270	-72.6	-51.86
821.0780	-70.3	-49.62	823.0280	-70.3	-49.62	823.9280	-70.3	-49.62
821.0790	-68.0	-47.28	823.0290	-68.0	-47.28	823.9290	-68.0	-47.28
821.0800	-65.5	-44.82	823.0300	-65.5	-44.82	823.9300	-65.5	-44.82
821.0810	-62.9	-42.24	823.0310	-62.9	-42.24	823.9310	-62.9	-42.24
821.0820	-60.2	-39.51	823.0320	-60.2	-39.51	823.9320	-60.2	-39.51
821.0830	-57.3	-36.63	823.0330	-57.3	-36.63	823.9330	-57.3	-36.63
821.0840	-54.3	-33.58	823.0340	-54.3	-33.58	823.9340	-54.3	-33.58
821.0850	-51.0	-30.33	823.0350	-51.0	-30.33	823.9350	-51.0	-30.33
821.0860	-49.6	-28.92	823.0360	-49.6	-28.92	823.9360	-49.6	-28.92
821.0870	-48.3	-27.61	823.0370	-48.3	-27.61	823.9370	-48.3	-27.61
821.0880	-46.9	-26.20	823.0380	-46.9	-26.20	823.9380	-46.9	-26.20
821.0890	-45.4	-24.66	823.0390	-45.4	-24.66	823.9390	-45.4	-24.66
821.0900	-43.7	-22.98	823.0400	-43.7	-22.98	823.9400	-43.7	-22.98
821.0910	-41.8	-21.13	823.0410	-41.8	-21.13	823.9410	-41.8	-21.13
821.0915	-40.7	-20.03	823.0415	-40.7	-20.03	823.9415	-40.7	-20.03
821.0920	-37.9	-17.21	823.0420	-37.9	-17.21	823.9420	-37.9	-17.21
821.0930	-31.7	-11.01	823.0430	-31.7	-11.01	823.9430	-31.7	-11.01
821.0940	-24.5	-3.84	823.0440	-24.5	-3.84	823.9440	-24.5	-3.84
821.0950	-16.1	4.63	823.0450	-16.1	4.63	823.9450	-16.1	4.63
821.0960	-5.7	15.00	823.0460	-5.7	15.00	823.9460	-5.7	15.00
821.1000	-5.7	15.00	823.0500	-5.7	15.00	823.9500	-5.7	15.00
821.1040	-5.7	15.00	823.0540	-5.7	15.00	823.9540	-5.7	15.00
821.1050	-16.1	4.63	823.0550	-16.1	4.63	823.9550	-16.1	4.63
821.1060	-24.5	-3.84	823.0560	-24.5	-3.84	823.9560	-24.5	-3.84
821.1070	-31.7	-11.01	823.0570	-31.7	-11.01	823.9570	-31.7	-11.01
821.1080	-37.9	-17.21	823.0580	-37.9	-17.21	823.9580	-37.9	-17.21
821.1085	-40.7	-20.03	823.0585	-40.7	-20.03	823.9585	-40.7	-20.03
821.1090	-41.8	-21.13	823.0590	-41.8	-21.13	823.9590	-41.8	-21.13
821.1100	-43.7	-22.98	823.0600	-43.7	-22.98	823.9600	-43.7	-22.98
821.1110	-45.4	-24.66	823.0610	-45.4	-24.66	823.9610	-45.4	-24.66
821.1120	-46.9	-26.20	823.0620	-46.9	-26.20	823.9620	-46.9	-26.20
821.1130	-48.3	-27.61	823.0630	-48.3	-27.61	823.9630	-48.3	-27.61
821.1140	-49.6	-28.92	823.0640	-49.6	-28.92	823.9640	-49.6	-28.92
821.1150	-50.8	-30.13	823.0650	-50.8	-30.13	823.9650	-50.8	-30.13
821.1160	-54.3	-33.58	823.0660	-54.3	-33.58	823.9660	-54.3	-33.58
821.1170	-57.3	-36.63	823.0670	-57.3	-36.63	823.9670	-57.3	-36.63
821.1180	-60.2	-39.51	823.0680	-60.2	-39.51	823.9680	-60.2	-39.51
821.1190	-62.9	-42.24	823.0690	-62.9	-42.24	823.9690	-62.9	-42.24
821.1200	-65.5	-44.82	823.0700	-65.5	-44.82	823.9700	-65.5	-44.82
821.1210	-68.0	-47.28	823.0710	-68.0	-47.28	823.9710	-68.0	-47.28
821.1220	-70.3	-49.62	823.0720	-70.3	-49.62	823.9720	-70.3	-49.62
821.1230	-72.6	-51.86	823.0730	-72.6	-51.86	823.9730	-72.6	-51.86
821.1240	-74.7	-54.01	823.0740	-74.7	-54.01	823.9740	-74.7	-54.01
821.1250	-76.8	-56.06	823.0750	-76.8	-56.06	823.9750	-76.8	-56.06
821.1250	-35.7	-15.00	823.0750	-35.7	-15.00	823.9750	-35.7	-15.00
821.1300	-35.7	-15.00	823.0800	-35.7	-15.00	823.9800	-35.7	-15.00

Exhibit IV

Block Diagram

PROGRAMMABLE BI-DIRECTIONAL BOOSTER AMPLIFIER PBBA

MODEL 50289-RBA-800MHz
P/N 50483-02-25



Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
Issue Date: August 30, 1999

Exhibit V

EUT Configuration and Cables

EUT:

Device	Manufacturer	Model #	FCC ID
Programmable Remote Booster-Amplifier	Aero Comm, Inc.	502890-RBA-800MHz	KJA504830225

Peripherals:

Device	Manufacturer	Model # / Serial #	FCC ID
Computer	Toshiba	PA1240U VCD	DoC

Cable: All one meter or greater in length – bundled according to **ANSI C63.4 – 1992**

Computer: Power - shielded

RS-232 Port: Data - shielded

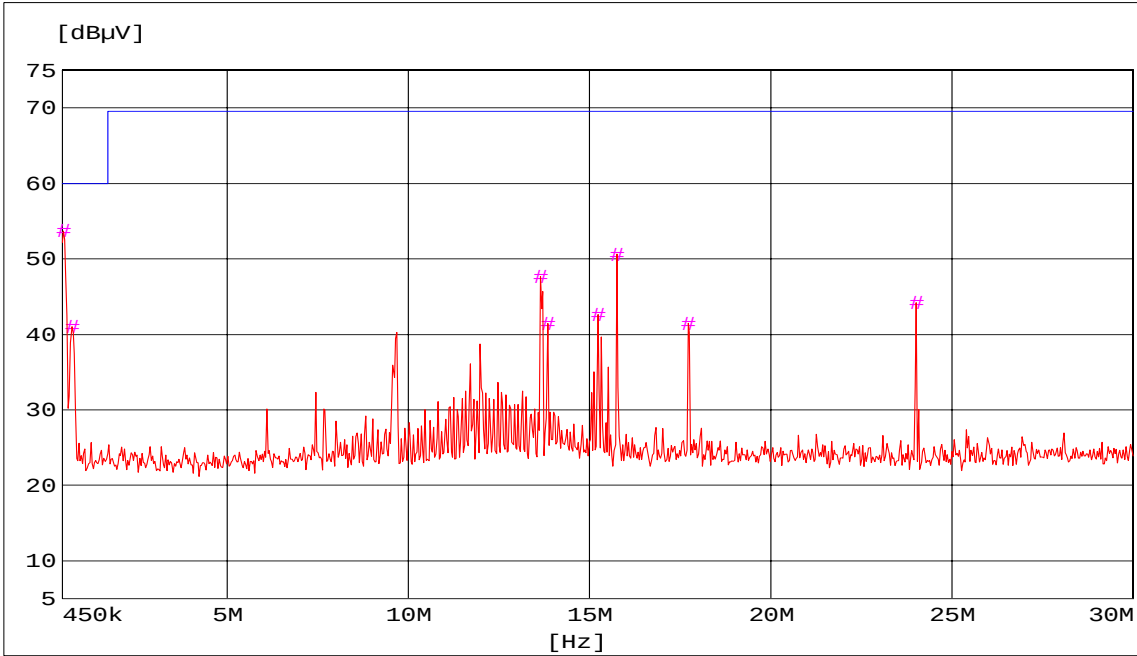
EUT: Power - unshielded

Internal Devices:

Device	Manufacturer	Model #	FCC ID
Attenuator Amp x 3	Aero Com	50483-02-26	NA
MMIC Amp#1	Aero Com	50483-02-27	NA
MMIC Amp#2	Aero Com	50483-02-30	NA
RBA BPF Module	Aero Com	50483-02-28	NA
Directional Coupler#1	Mini-Circuit	ZFDC-15-5	NA
Directional Coupler#2	Mini-Circuit	ZFDC-10-5	NA
Signal Combinor x 2	Mini-Circuit	ZESC-2-11	NA

Exhibit VI

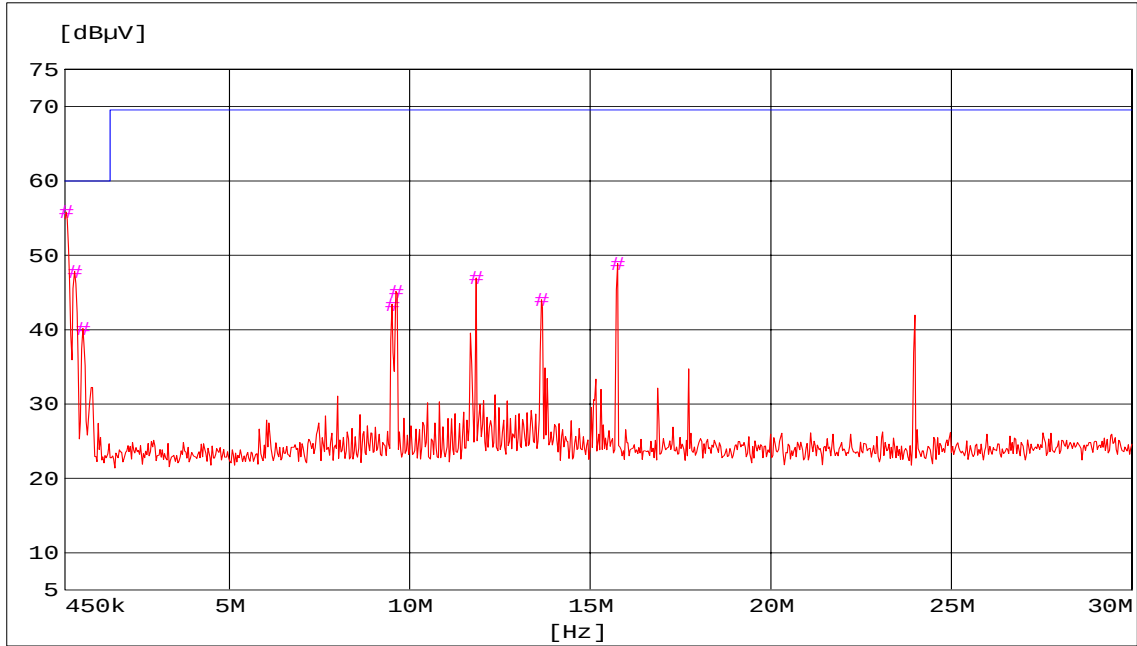
Conducted Data – Line



Frequency MHz	Level dBμV
0.482833	53.70
0.712667	41.02
13.649000	47.69
13.846000	41.46
15.225000	42.60
15.750333	50.63
17.720333	41.51
24.024333	44.17

Detector Used: Peak

Conducted Data – Neutral



Frequency MHz	Level dBμV
0.482833	55.81
0.712667	47.86
0.942500	40.14
9.512000	43.42
9.610500	45.14
11.843167	46.95
13.649000	44.00
15.750333	48.87

Detector Used: Peak

See next page for equipment setup configuration.

Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
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Conducted Emissions Test Setup Configuration:

Two Tone Conducted Emissions: Remote Booster JCN 9200-01

Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 30 kHz

Generator 1 output: 823.05 MHz, 0.6 dBmW for Amplifier set for 1 dB compression output

Generator 2 output: 823.95 MHz, 0.7 dBmW for Amplifier set for 1 dB compression output

Generator outputs adjusted for -13 dBmW output from each source with ~30 ft cable, isolators, and combiner in line with EUT input.

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

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Exhibit VII

RADIATED DATA (Per Section 2.1053 Field Strength of Spurious Enclosure Radiation)

Frequency (MHz)	Reading (dBuV/m)		Emission(uV/m)		*FCC Limits @ 3 Meters	
	Horizontal	Vertical	Horizontal	Vertical	(dBuV/m)	(uV/m)
107.70	<20.0	38.10	<10.0	80.35	53.90	495.45
176.20	39.44	<20.0	93.76	<10.0	53.90	495.45
392.50	39.42	<20.0	93.54	<10.0	53.90	495.45
394.30	<20.0	40.58	<10.0	106.91	53.90	495.45
951.33	43.24	<20.0	145.21	<10.0	53.90	495.45
938.00	<20.0	53.65	<10.0	481.39	53.90	495.45
1123.30	56.28	<20.0	651.63	<10.0	60.00	1000.00
8378.50	<20.0	51.95	<10.0	395.82	60.00	1000.00
8497.75	51.94	<20.0	395.37	<10.0	60.00	1000.00

*Class A converted for a 3 meter site measurement

CPU: Motorola MC68HC811E2CFN2

Clock: 8 MHz

Two Tone Radiated Spurious Enclosure Emissions: Remote Booster

Setup: Resolution Bandwidth: 120 KHz, Video Bandwidth: 1 MHz – 30 MHz – 1000 MHz
1 MHz, Video Bandwidth: 3 MHz – 1000 – 8500 MHz

Generator 1 output: 823.05 MHz, 0.6 dBmW for Amplifier set for 1 dB compression output

Generator 2 output: 823.95 MHz, 0.7 dBmW for Amplifier set for 1 dB compression output

Generator outputs adjusted for –13 dBmW output from each source with 30 ft cable, isolators,
and combiner in line with EUT input.

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band



PASS



FAIL

Signed by Testing Engineer:



Santo Lavorata, EMC Technical Manager

Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
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Exhibit VIII

Data for CFR 47 Part 2.1041

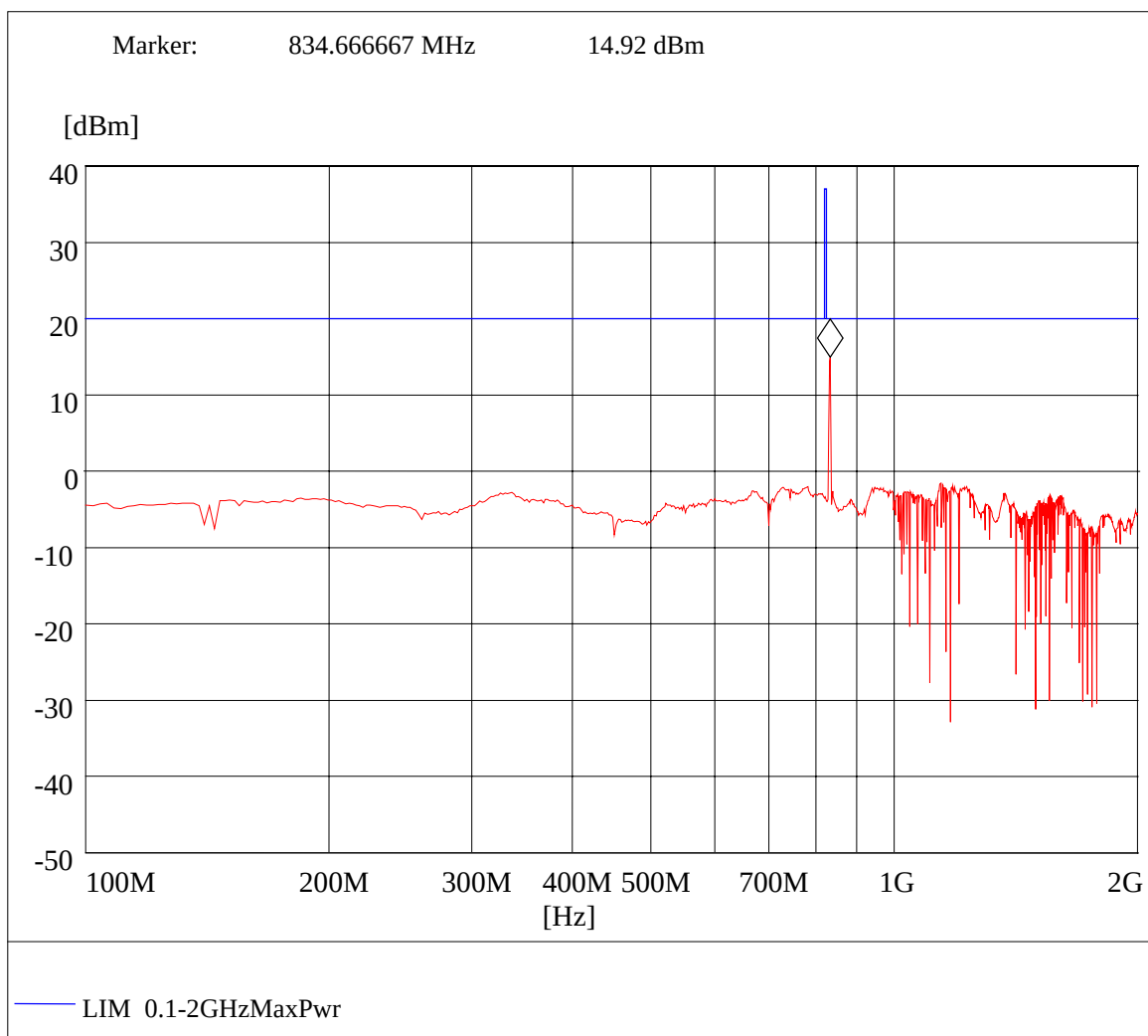
Section 2.1046 –RF Power Output

Section 2.1047 –Modulation Characteristics

Sections 2.1049 (i) and 90.219 (b & c) - Emissions Mask

Section 2.1051 – Spurious Emissions at Antenna Terminal

Section 2.1046 (a) – RF power output Forward Amplified Channel



Unmodulated Emissions Masks: Test Results Output Power Setup #1 of 2

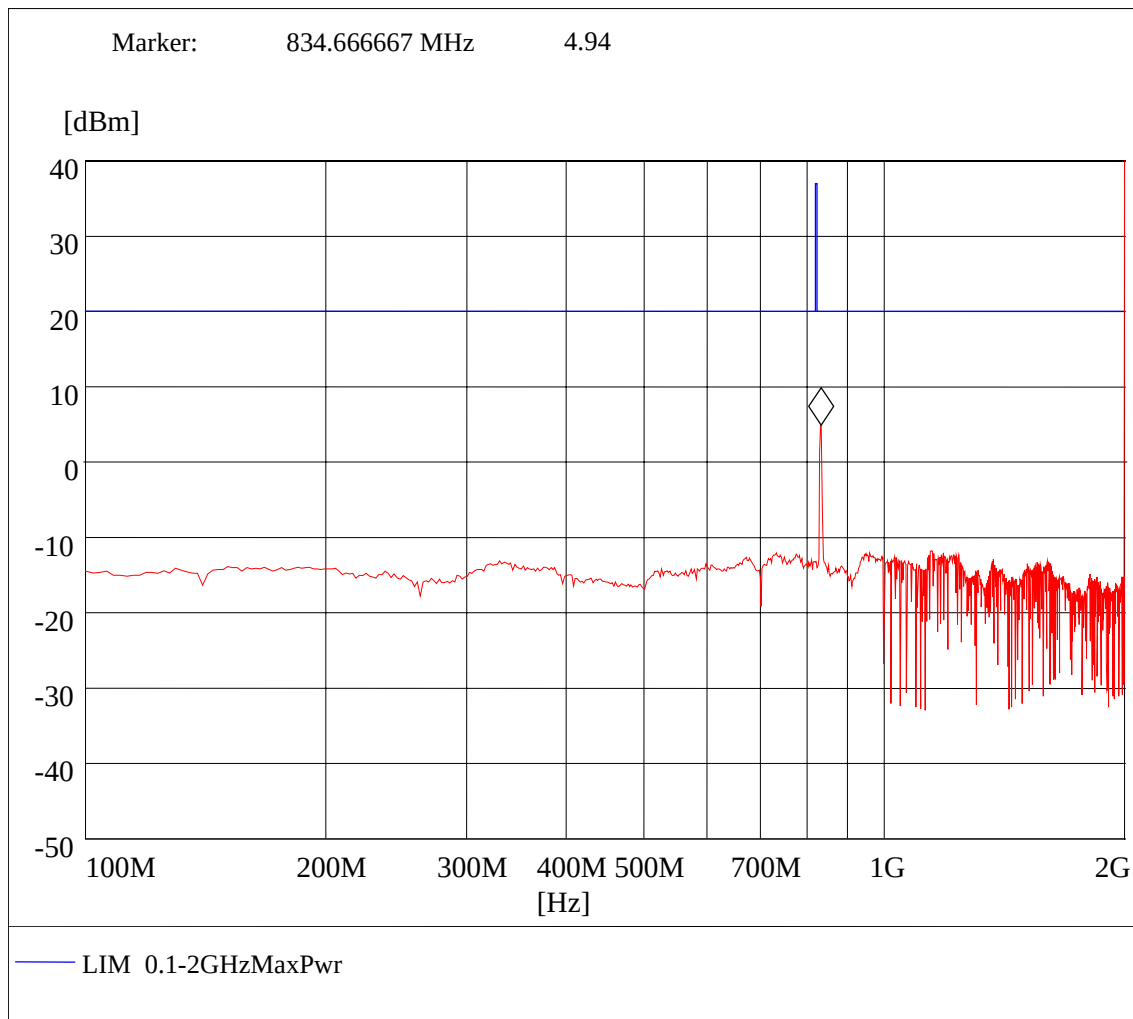
Setup: Resolution Bandwidth: 1 MHz, Video Bandwidth: 3 MHz

Generator output: 100 - 2000 MHz, -10.0 dBmW for 1 dB Gain compression Maximum Amplifier Output Power

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 24.92 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Unmodulated Emissions Masks: Test Results Output Power Setup #2 of 2

Setup: Resolution Bandwidth: 1 MHz, Video Bandwidth: 3 MHz

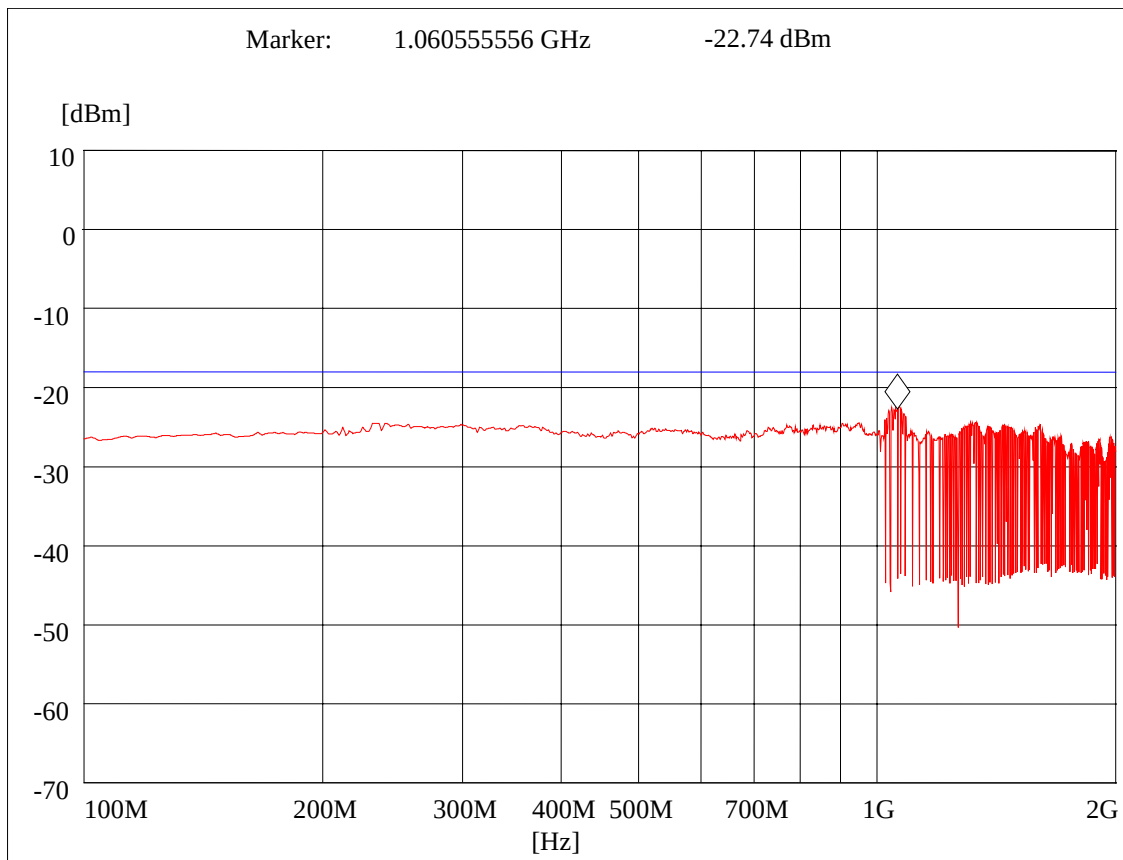
Generator output: 100 - 2000 MHz, -20.0 dBmW: Output Power Limited to Maximum Recommended input.

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 24.94 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer

Section 2.1046 (a) – RF power output Reverse Channel



Emissions Masks: Test Results Output Power Reverse Channel Setup

Setup: Resolution Bandwidth: 1 MHz, Video Bandwidth: 3 MHz

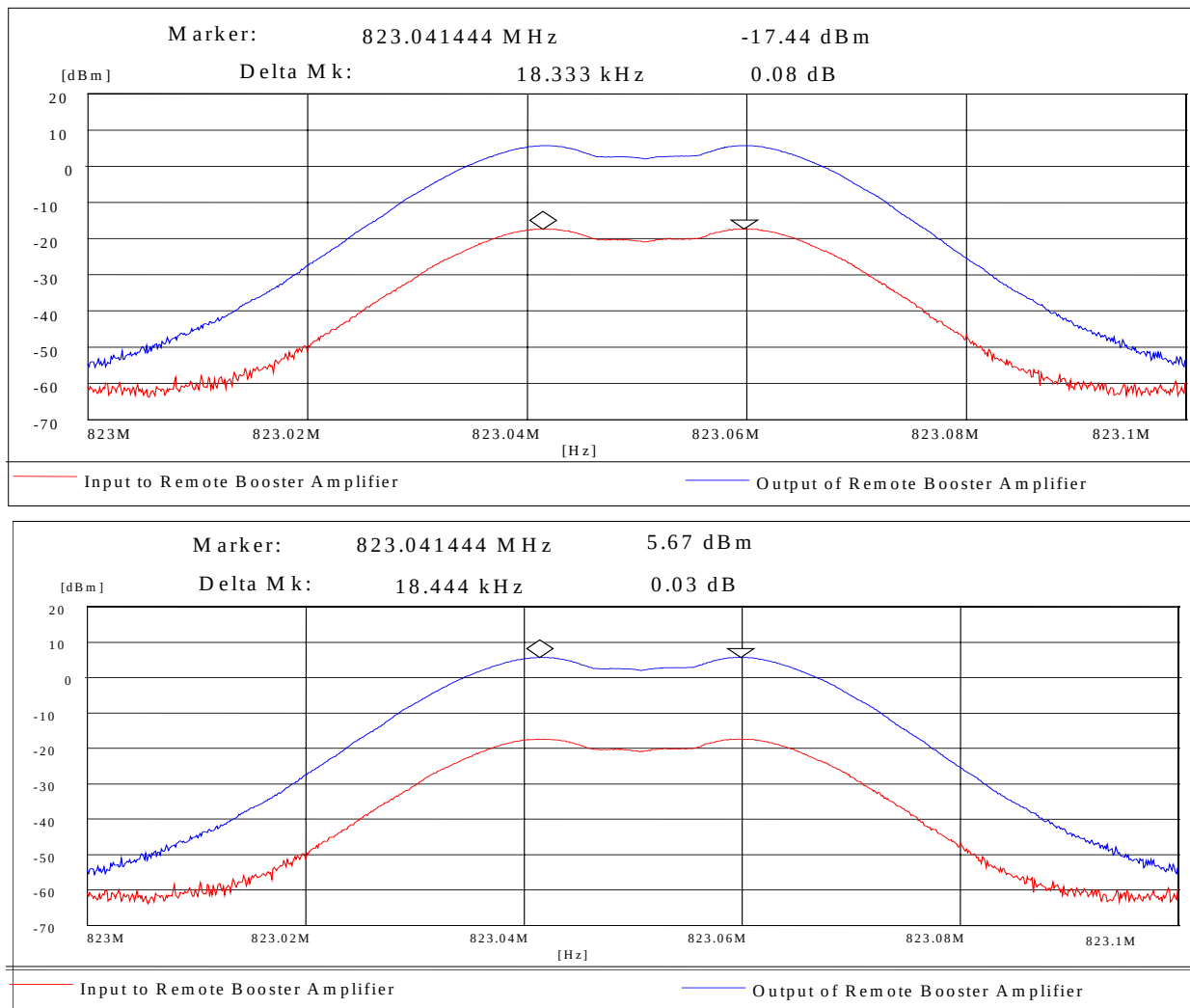
Generator output: 100 - 2000 MHz, -20.0 dBmW

Gain Setting on EUT: Forward 12 dB on In band, Forward -9 dB on Out band, Reverse 1 dB.

Measured Gain on Reverse Mode: -2.74 dB

Note: Signal Generator output Modulated: FM, 12.5 KHz deviation, 4 KHz rate

Section 2.1047 (a) – Modulation Characteristics
(Input to Output In-Band Comparison of Forward Amplified Band)



FM Modulated Emissions: Input and Output Power Comparison

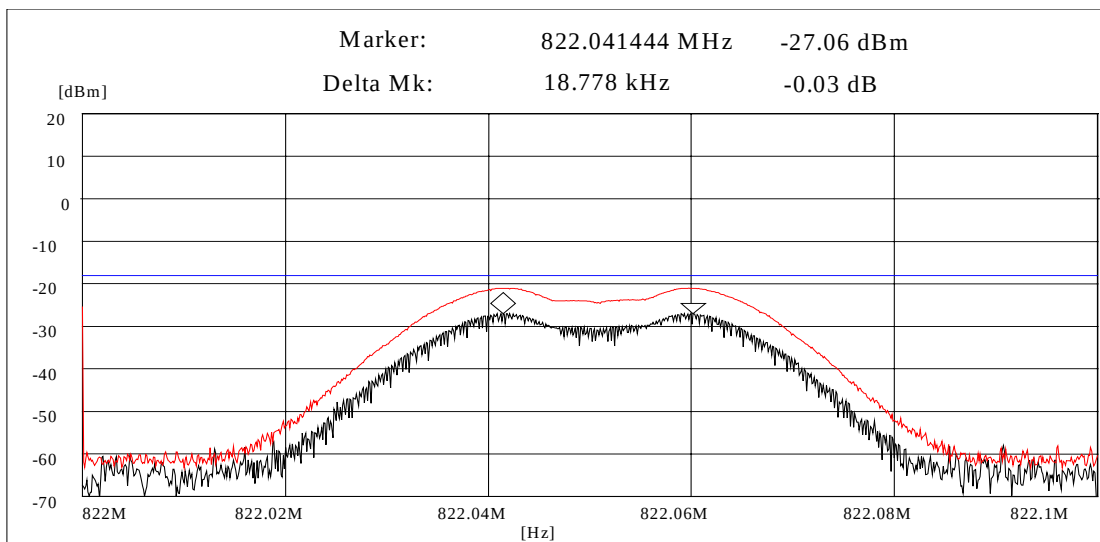
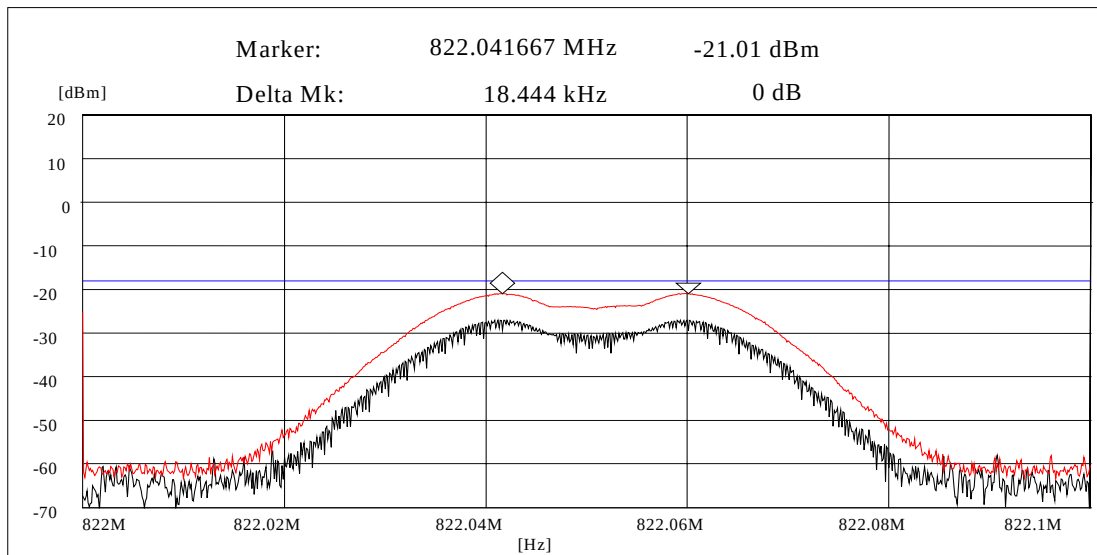
Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 0.1 MHz

Generator output: 823.05 MHz, -10.0 dBmW for 1 dB Gain compression Amplifier Output,
FM modulated with 4 KHz sine and 12.5 KHz deviation depth.

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 23.11 dB

Section 2.1047 (a) – Modulation Characteristics
(Input to Output Comparison of Reverse Band)

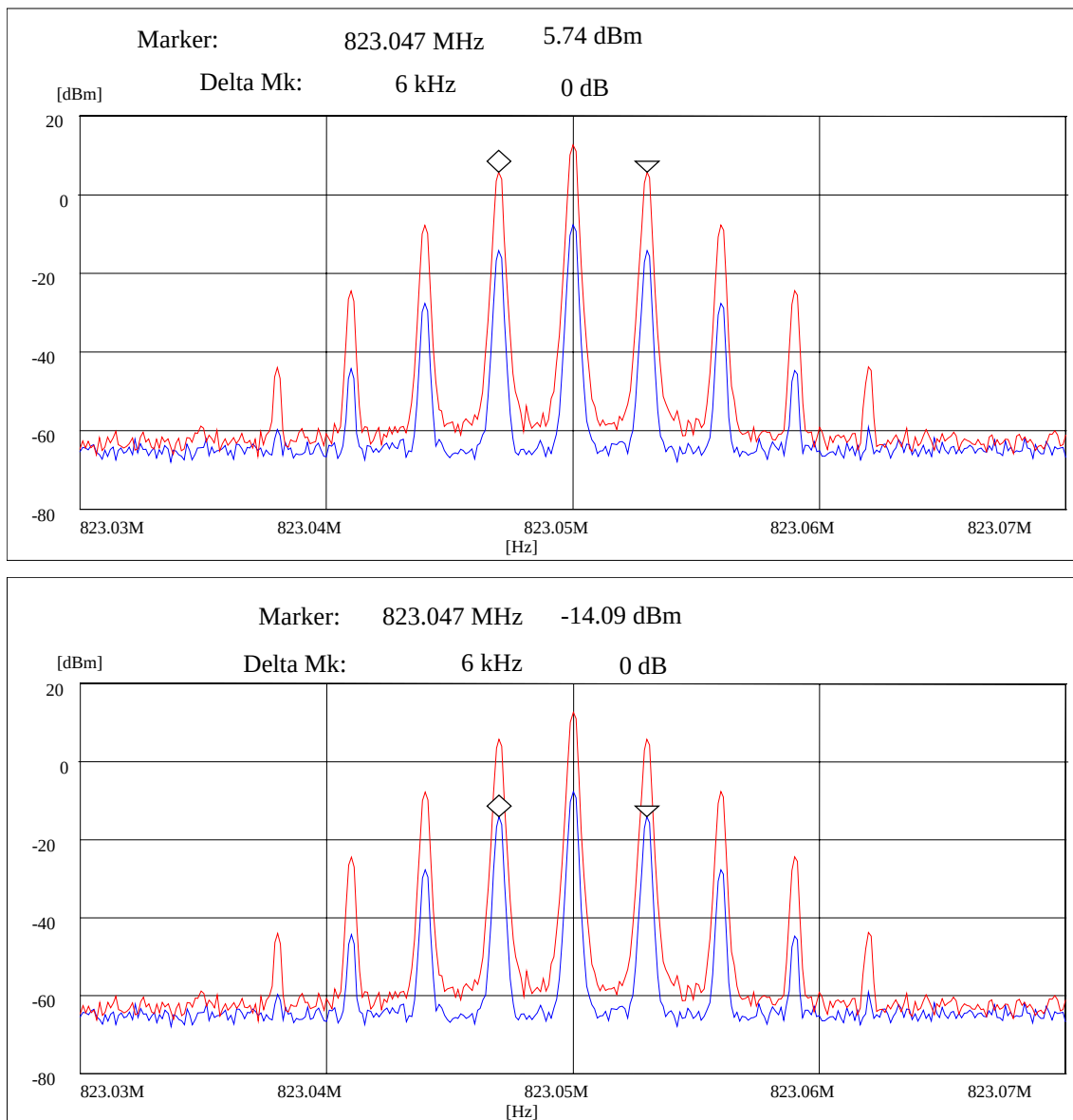


FM Modulated Emissions: Test Results Input and Output Power JCN 9200-01

Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 0.1 MHz

Generator output: 822.05 MHz, -20.0 dBmW for maximum rated input, FM modulated with 4 KHz sine and 12.5 KHz deviation depth.

Section 2.1047 (a) – Modulation Characteristics
(Input to Output In-Band Comparison of Forward Amplified Band @ 1 KHz Resolution Bandwidth)



FM Modulated Emissions: Test Results Input and Output Power

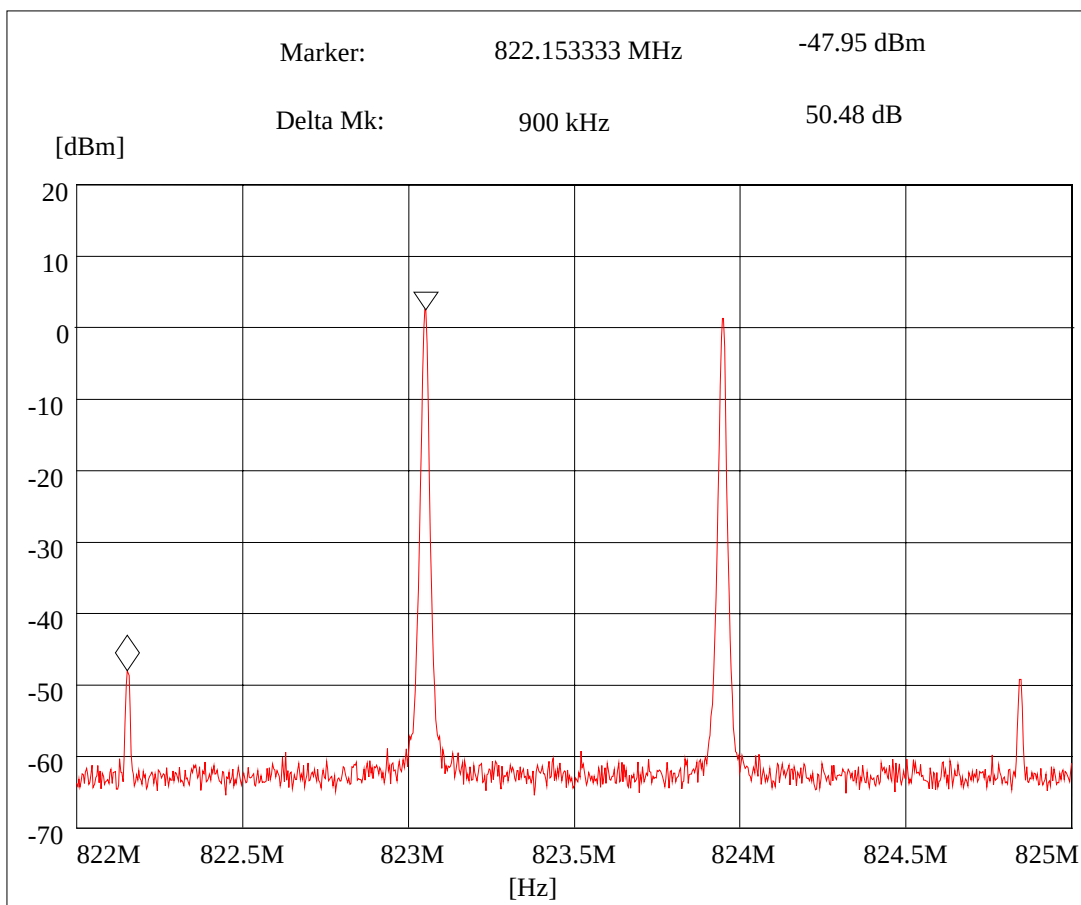
Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 1 KHz

Generator output: 823.05 MHz, -3.8 dBmW, FM modulated with 3 KHz sine and 2.5 KHz deviation depth.

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1 dB Reverse

Measured Gain on In Band: 19.83 dB

Section 2.1047 (a) – Modulation Characteristics
(Intermodulation Distortion of Amplified Forward Band)



Intermodulation Emissions: Remote Booster Output Power Forward Channel Setup

Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 0.1 MHz

Generator 1 output: 823.05 MHz, -15.2 dBmW for Amplifier Output with Maximum rated input

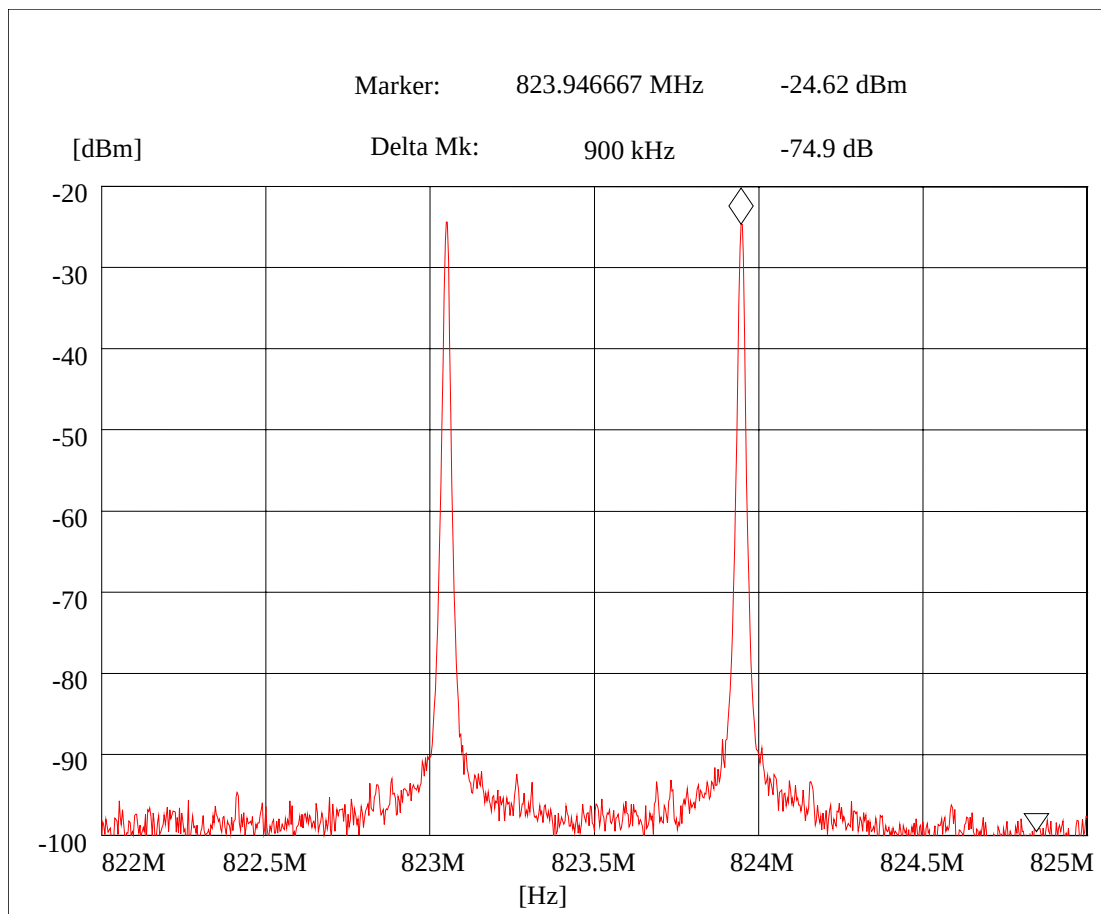
Generator 2 output: 823.95 MHz, -15.4 dBmW for Amplifier Output with Maximum rated input

Generator outputs adjusted for -20 dBmW output from each source after isolators and combiner

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Worst case intermodulation product: -50.48 dBc

Section 2.1047 (a) – Modulation Characteristics
(Intermodulation Distortion of Reverse Band)



Intermodulation Emissions: Signal Generator Output Reverse Channel Setup

Setup: Resolution Bandwidth: 9 KHz, Video Bandwidth: 0.1 MHz

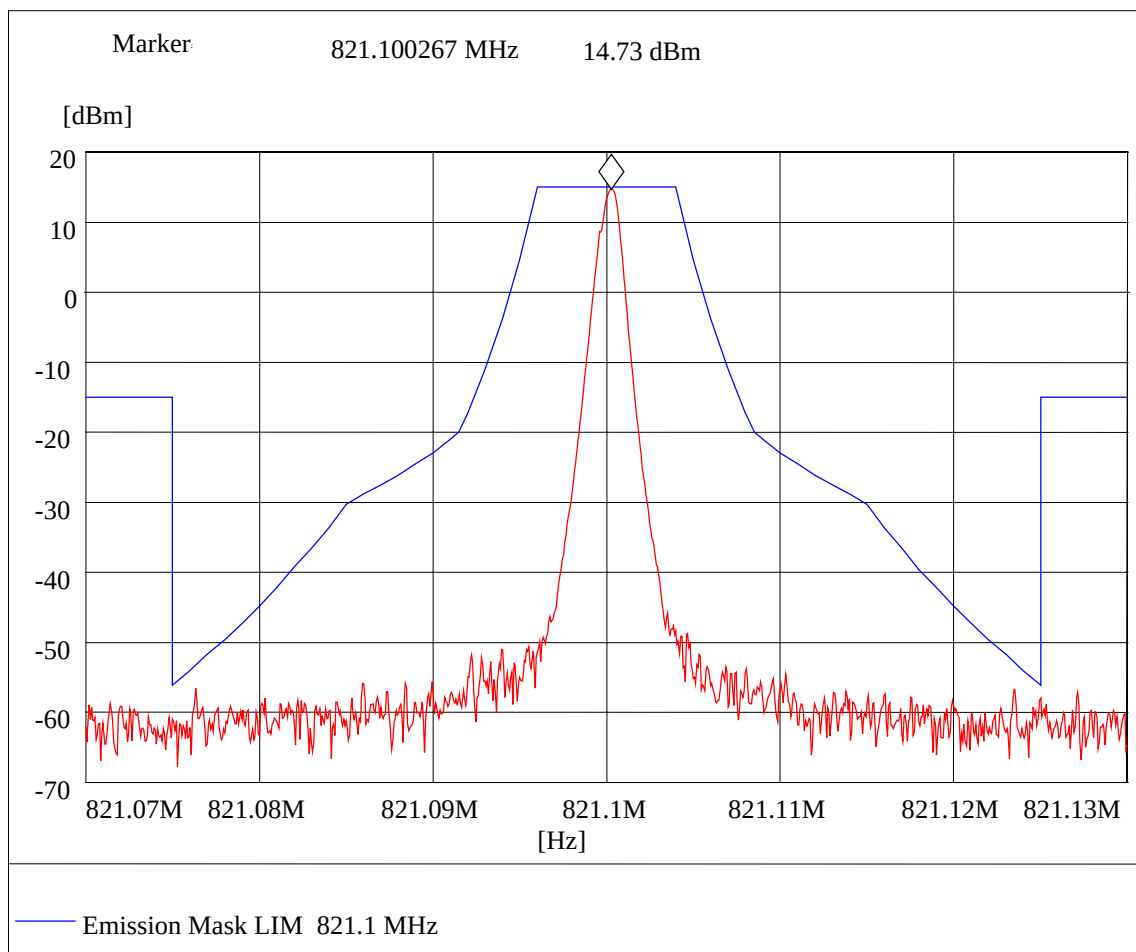
Generator 1 output: 823.05 MHz, -15.4 dBmW for Amplifier Output with Maximum input

Generator 2 output: 823.95 MHz, -15.5 dBmW for Amplifier Output with Maximum input

Generator outputs adjusted for -20 dBmW output from each source after isolators and combiner.

Gain Setting on EUT: Forward 12 dB on In band, Forward -9 dB on Out band, Reverse 1 dB.

Section 2.1049 (i) and 90.219 (b & c) – Occupied Bandwidth/Emissions Mask



Unmodulated Emissions Masks: Test Results Setup 1 of 14, Channel 607

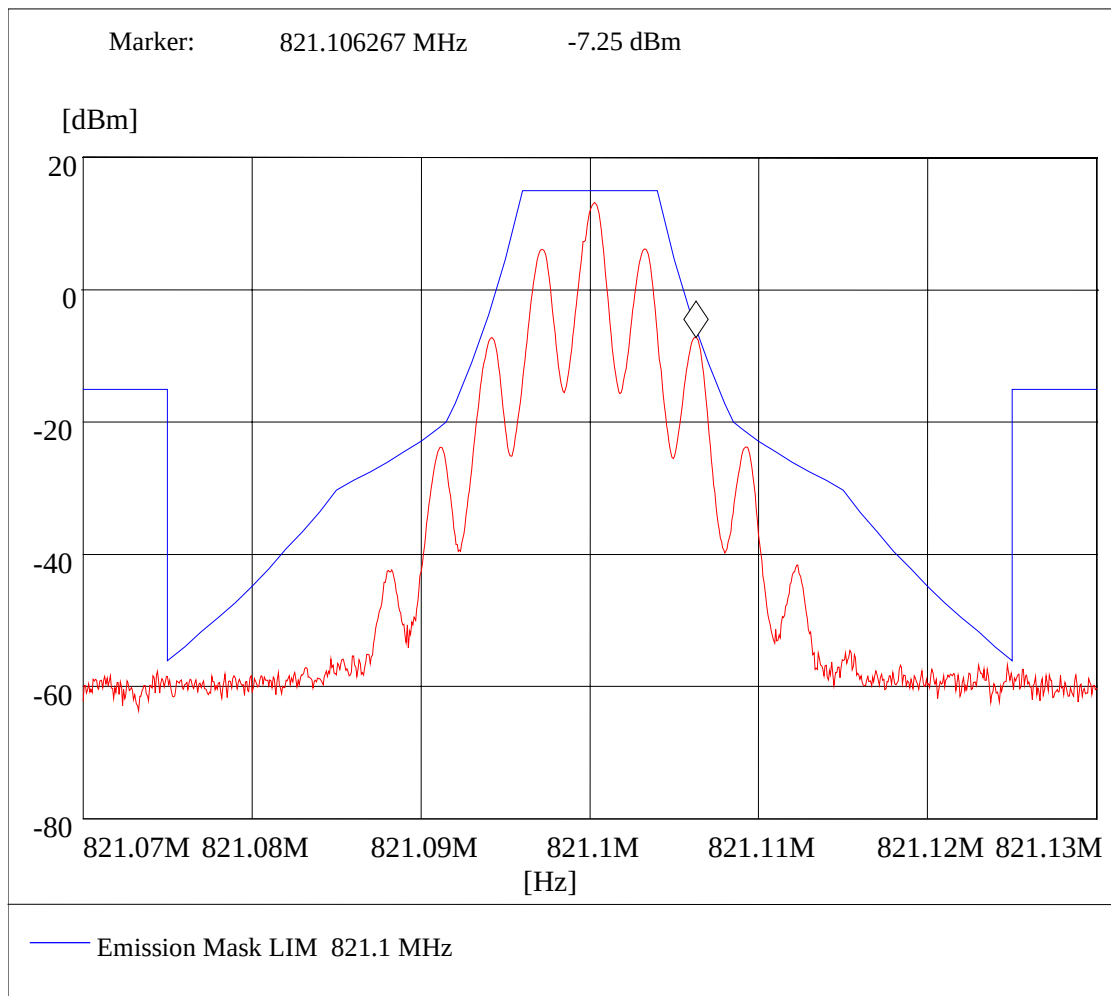
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 821.1 MHz, -5 dBmW

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 19.73 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: Test Results Setup 2 of 14, Channel 607

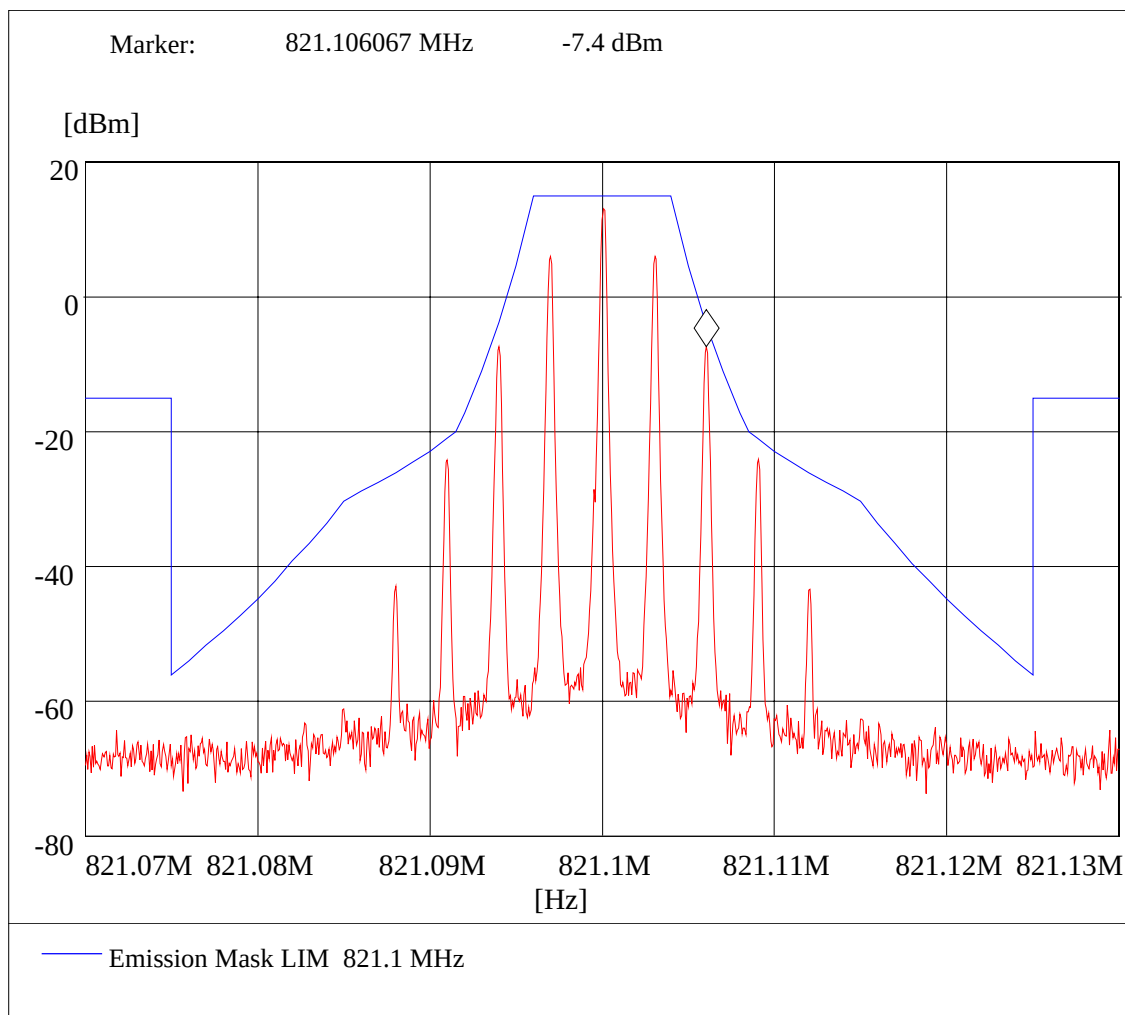
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 821.1 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: Test Results Setup 3 of 14, Channel 607

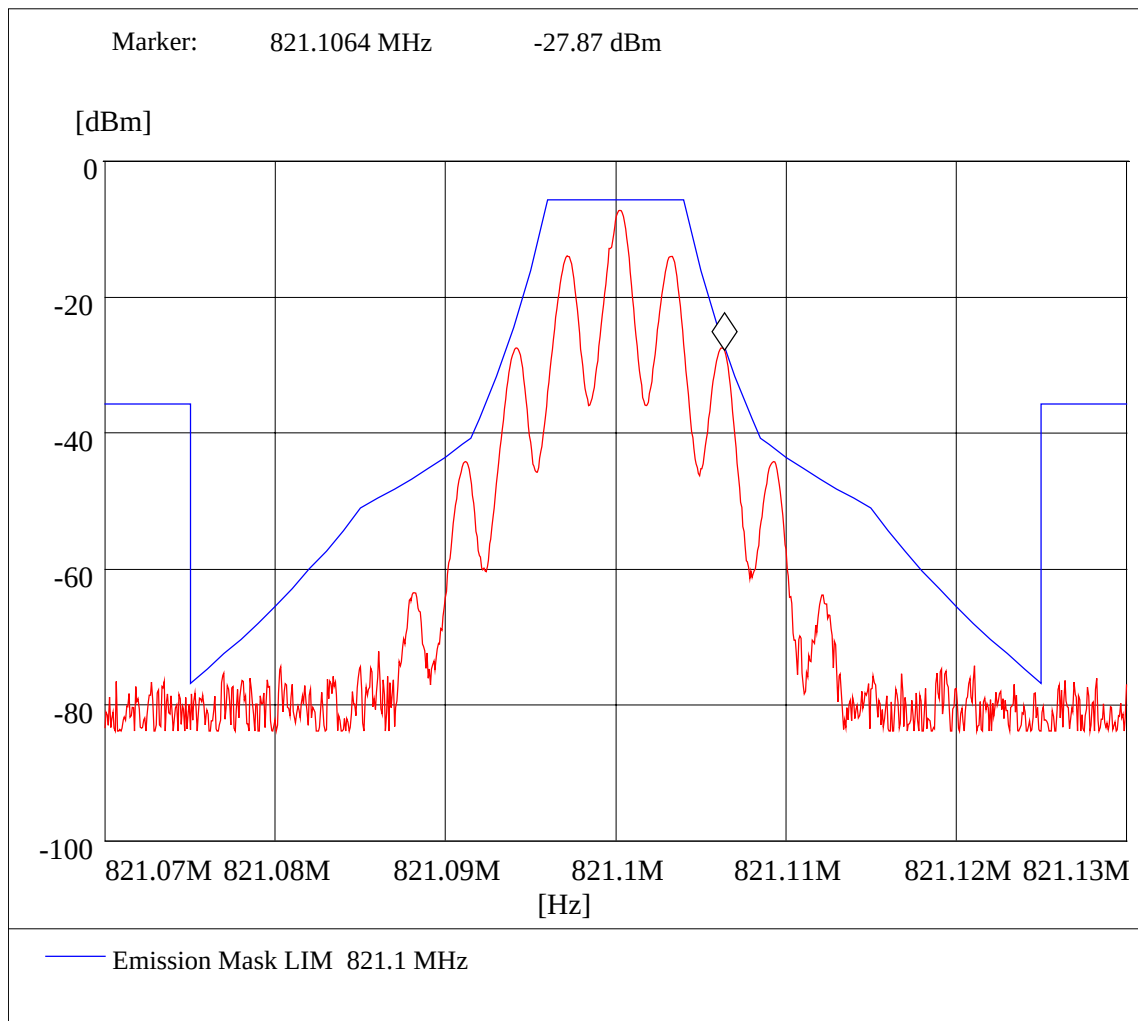
Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 3 KHz

Generator output: 821.1 MHz, -5.7 dBmW, FM modulated with 2.5 KHz Deviation, @ 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



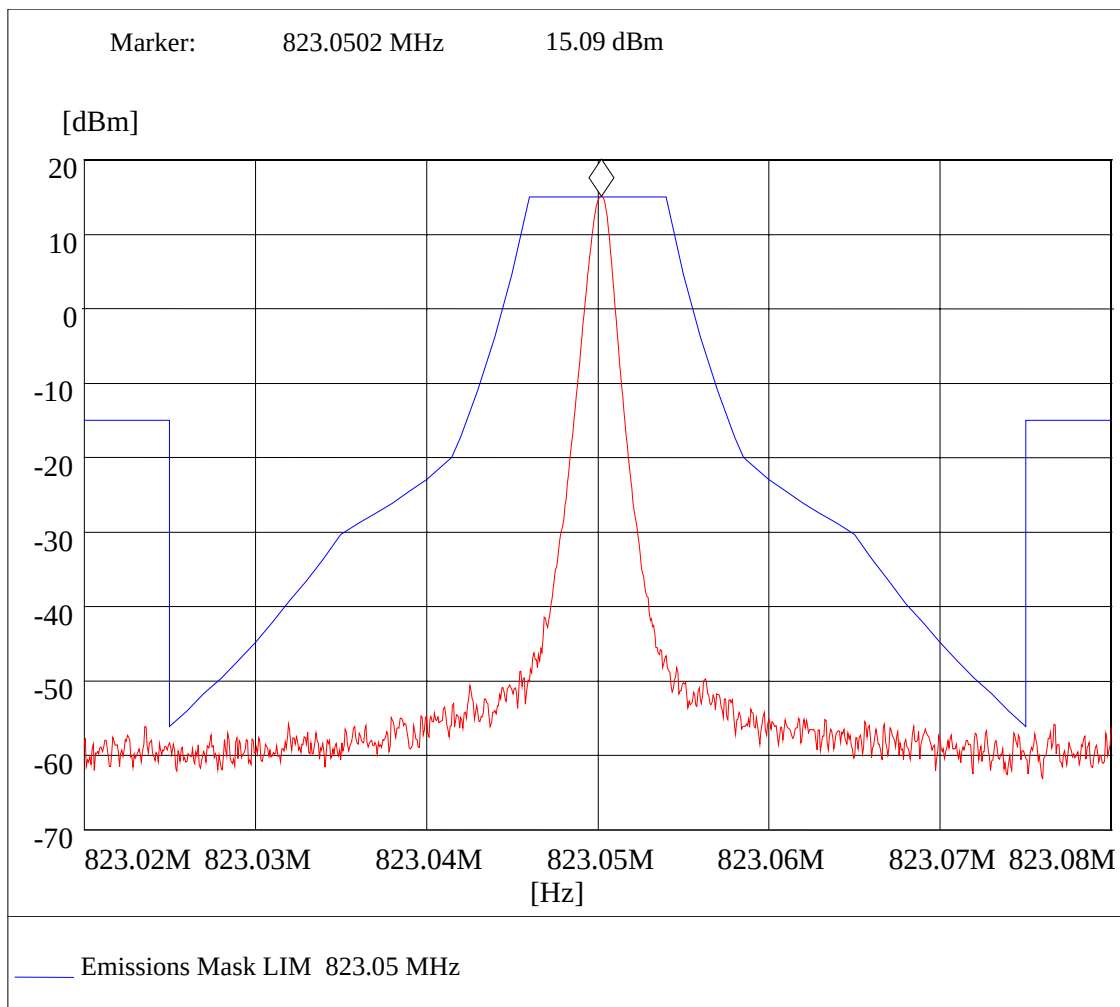
Modulated Emissions Masks: Generator Output Test Results, Setup 4 of 14, Channel 607

Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 3 KHz

Generator output: 821.1 MHz, -5.7 dBmW, FM modulated with 2.5 KHz Deviation, @ 3 KHz Rate

Emissions Mask Limit Adjusted for Generator Output Level

Note: 6 dB pad between output of EUT and Spectrum analyzer



Unmodulated Emissions Masks: Test Results Setup 5 of 14, Channel 755

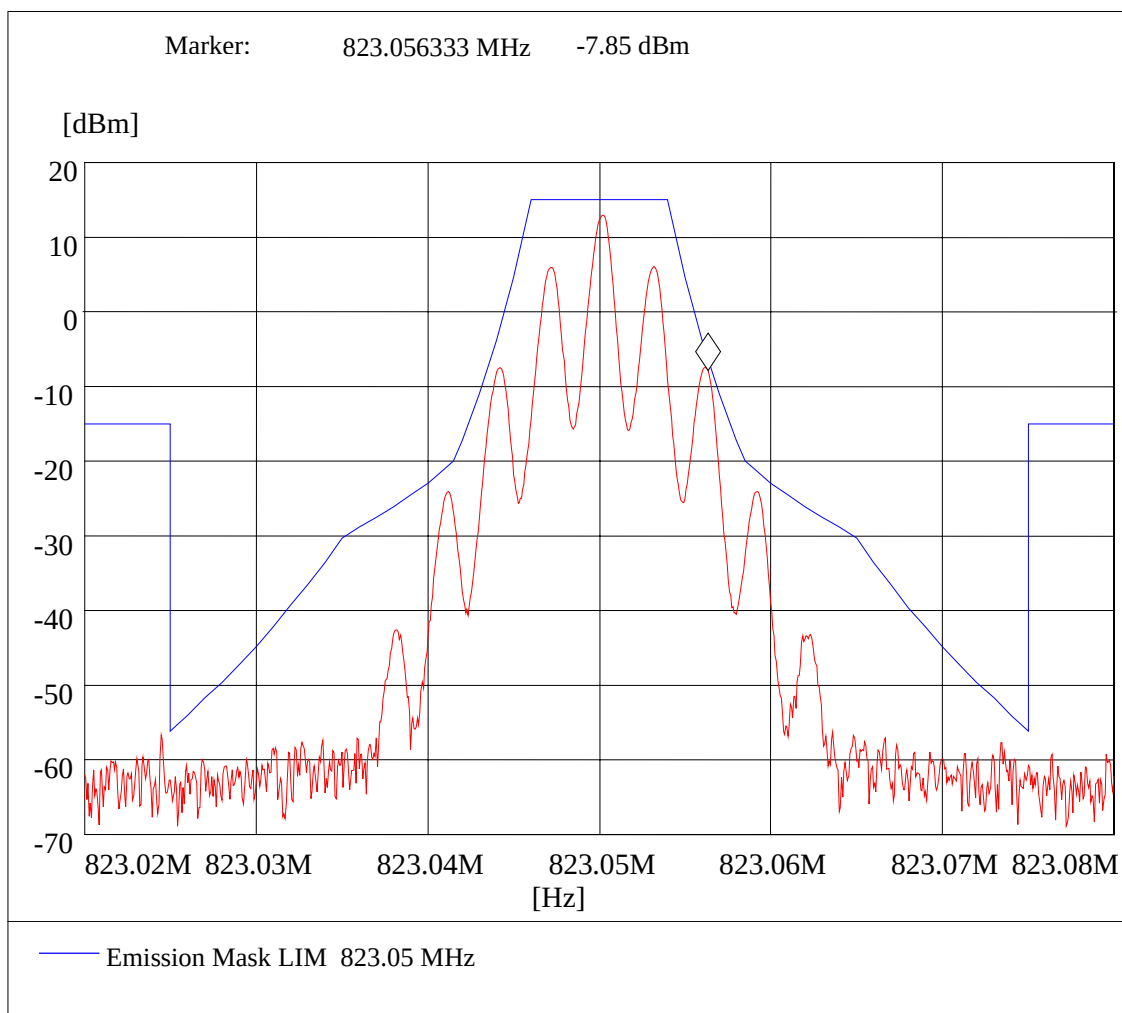
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.05 MHz, -8.2 dBmW

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 23.29 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: EUT Output Test Results, Setup 6 of 14, Channel 755

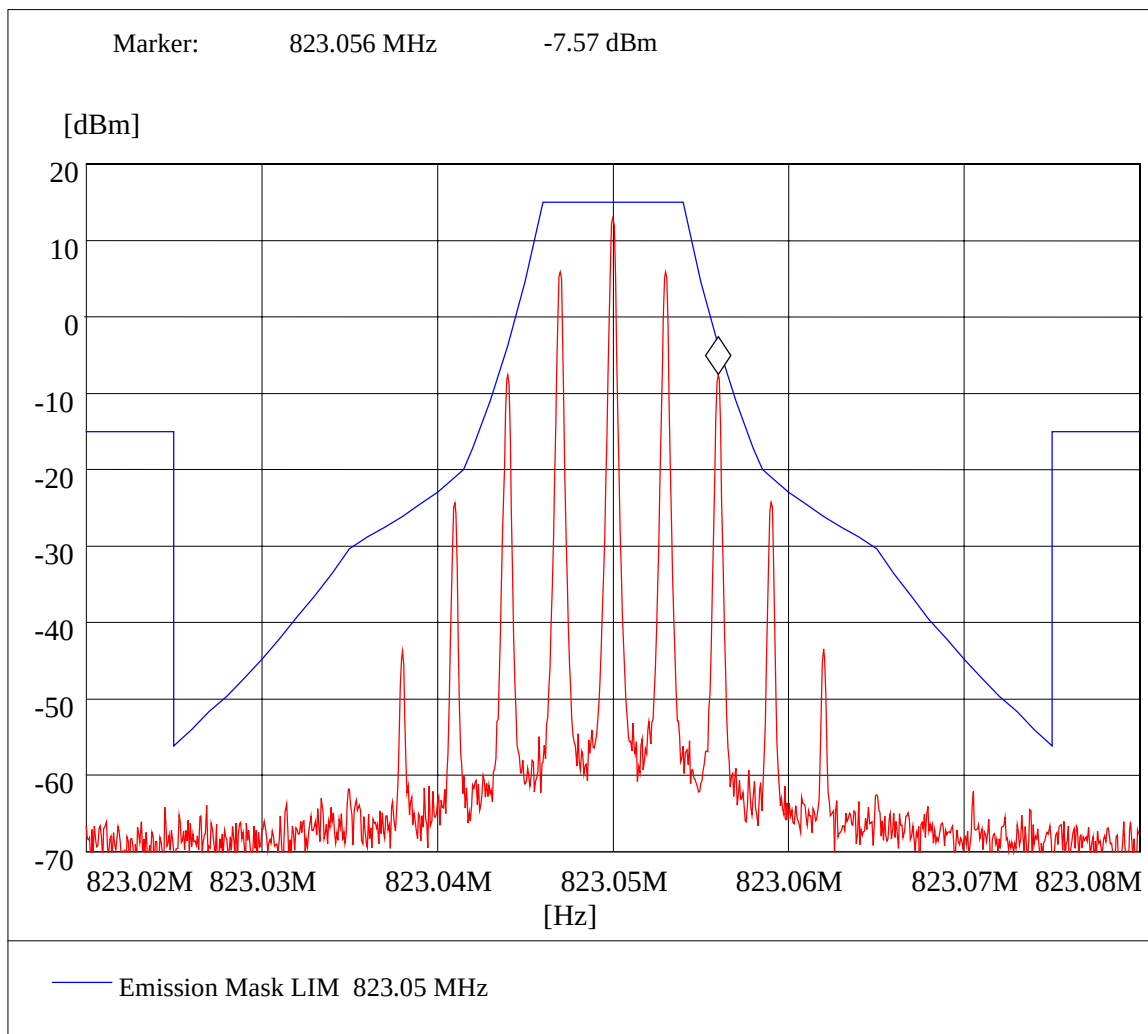
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.05 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: EUT Output Test Result, Setup 7 of 14, Channel 755

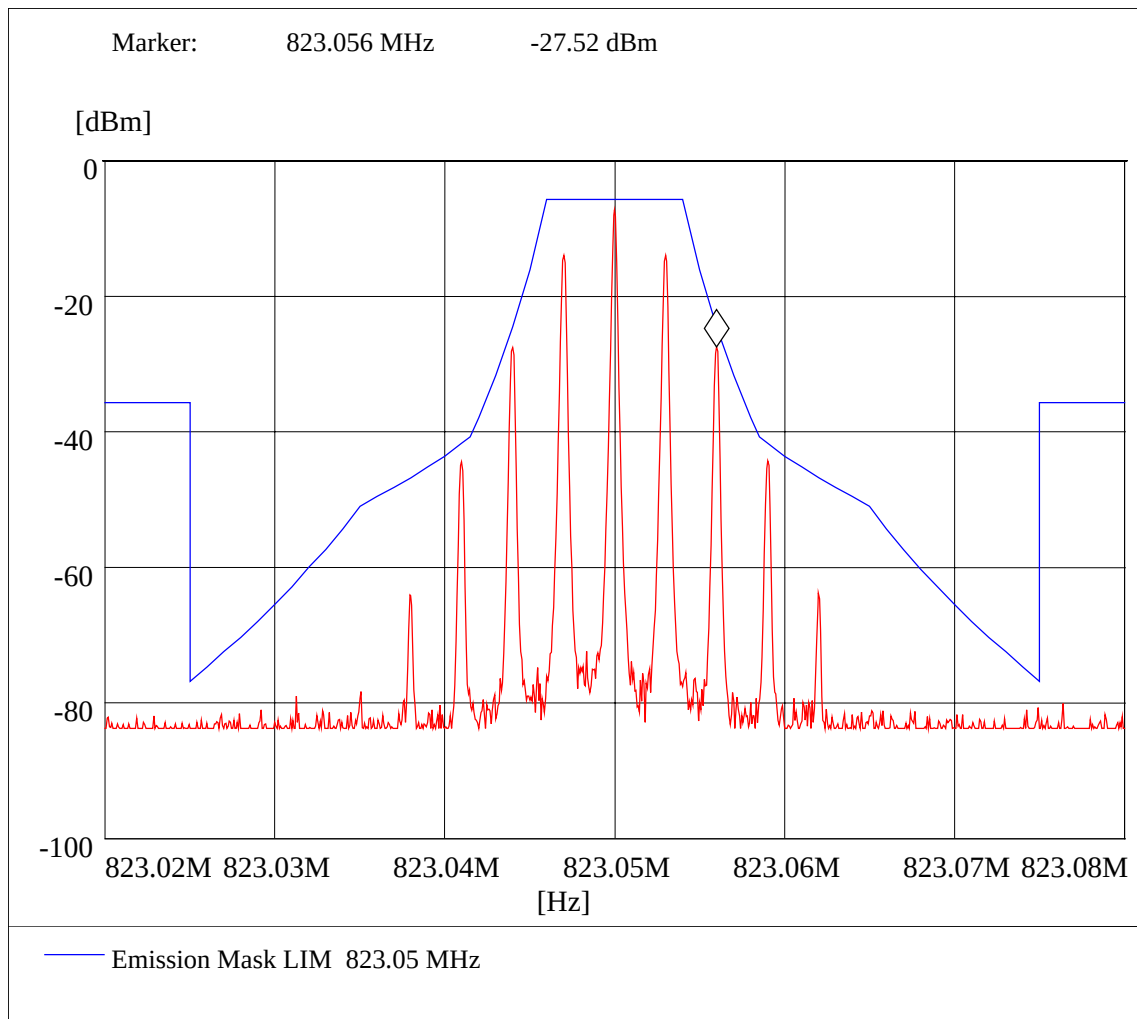
Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 3 KHz

Generator output: 823.05 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

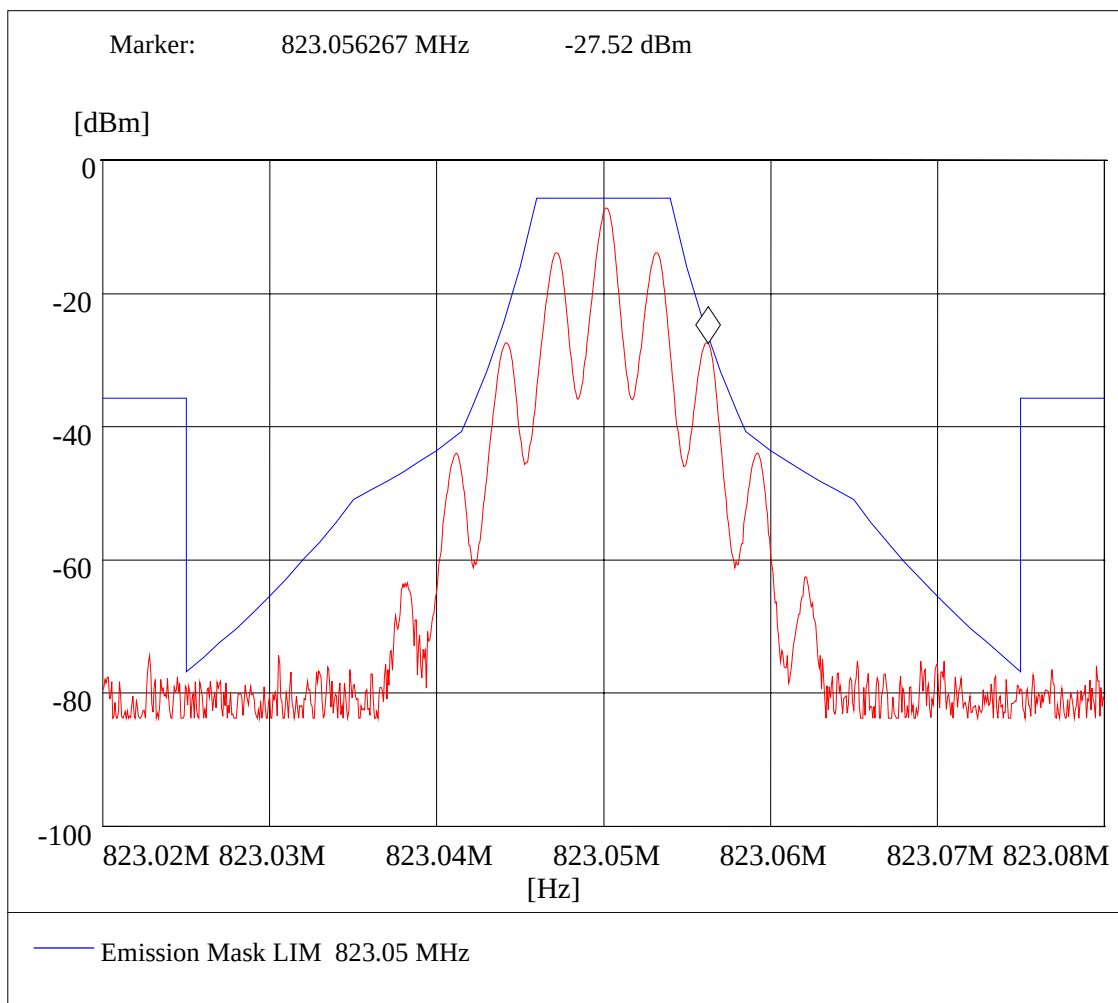
Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: Generator Output Test Results, Setup 8 of 14, Channel 755

Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 3 KHz

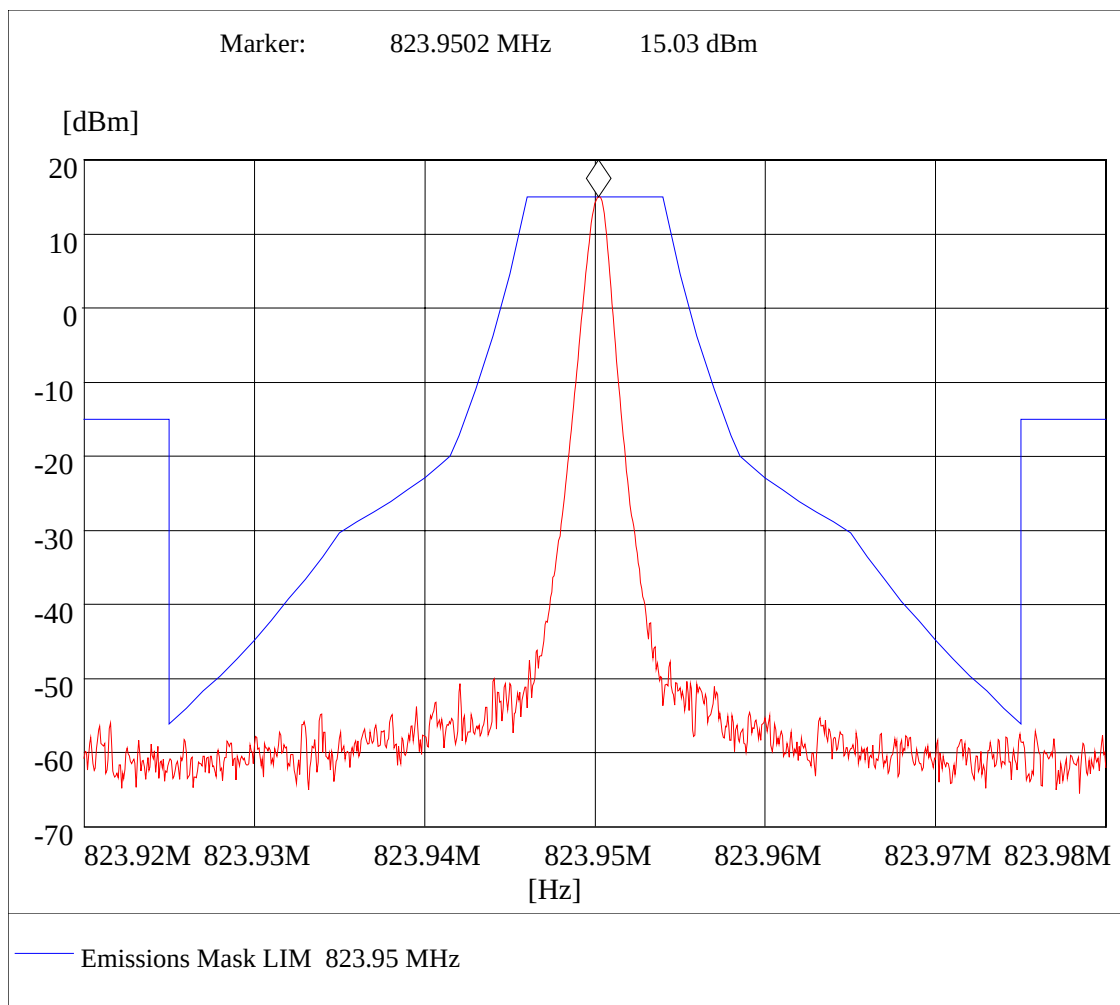
Generator output: 823.05 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate



Modulated Emissions Masks: Generator Output Test Results, Setup 9 of 14, Channel 755

Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.05 MHz, -3.8 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate



Unmodulated Emissions Masks: Test Results Setup 10 of 14, Channel 825

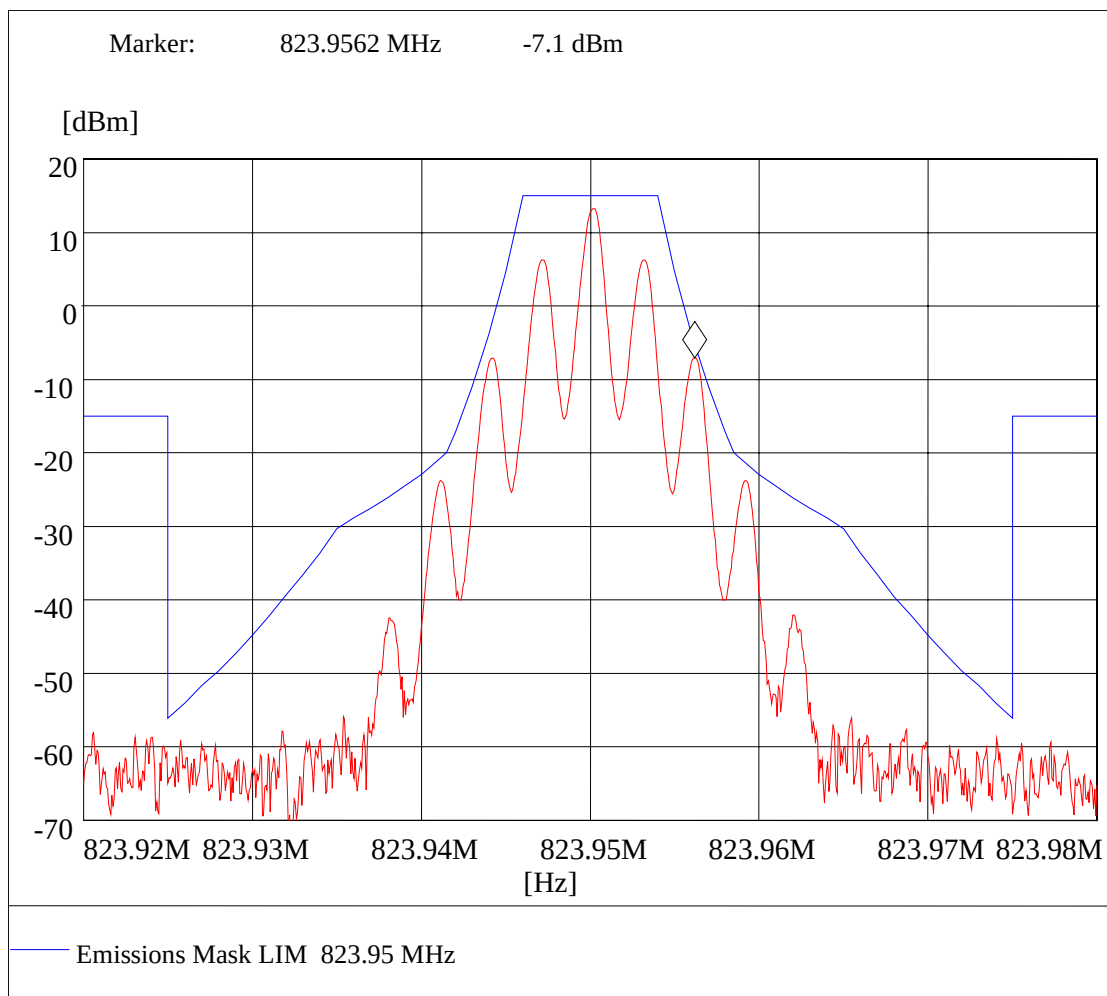
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.95 MHz, -8.0 dBmW

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 23.49 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: EUT Output Test Results, Setup 11 of 14, Channel 825

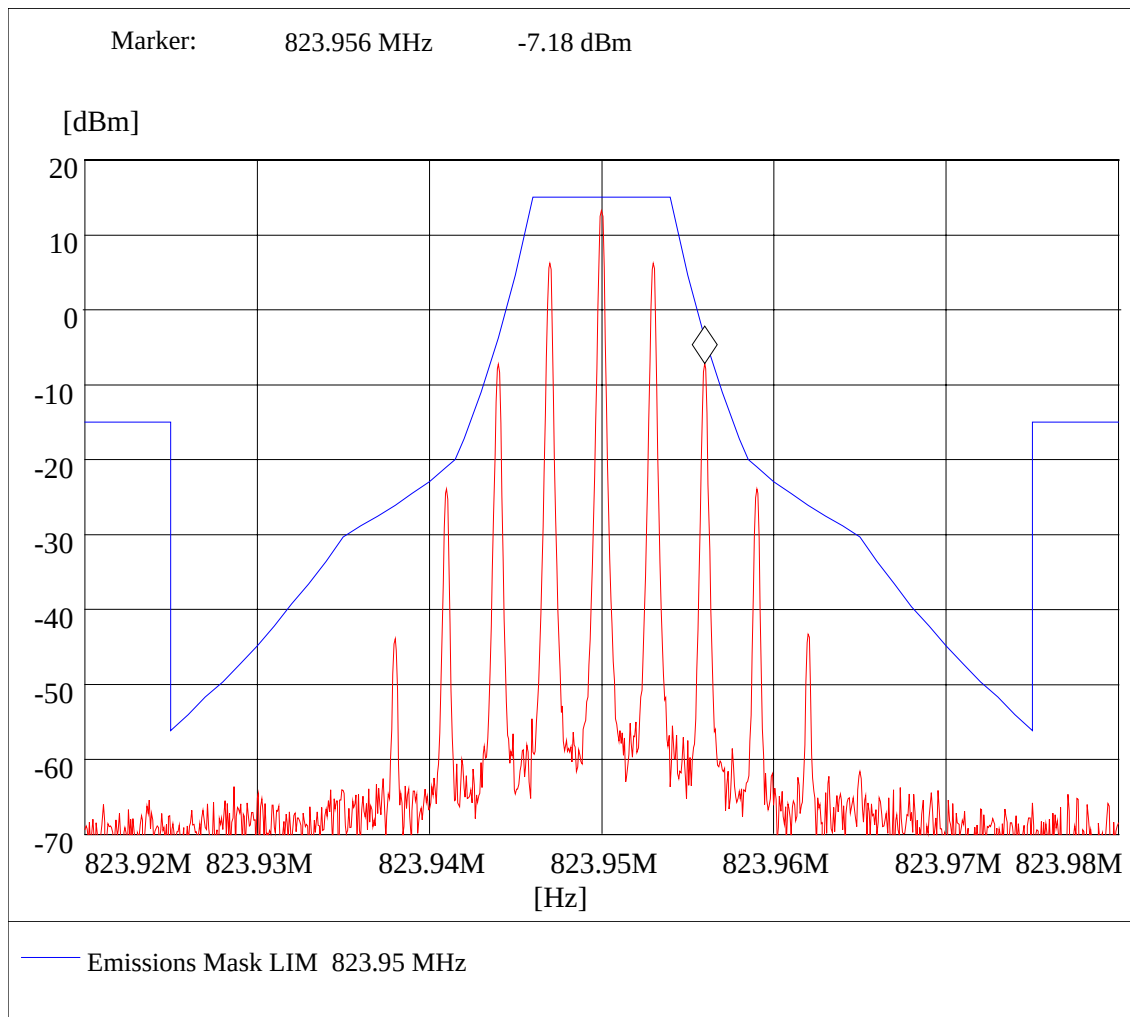
Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.95 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: EUT Output Test Results, Setup 12 of 14, Channel 825

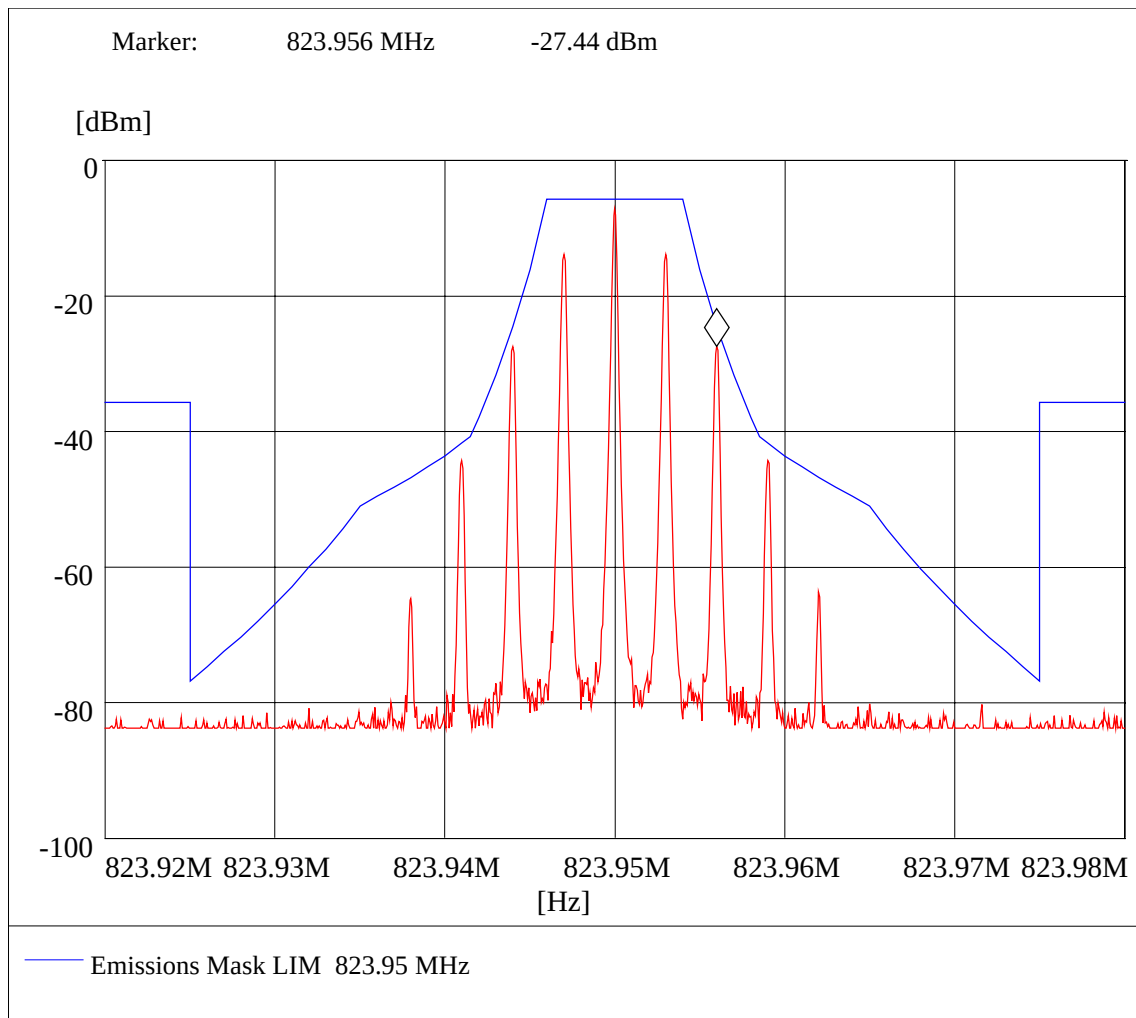
Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 3 KHz

Generator output: 823.95 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Gain Setting on EUT: Forward 27 dB on In band, Forward -9 dB on Out band, 1dB Reverse

Unmodulated Measured Gain on In Band: 20.4 dB

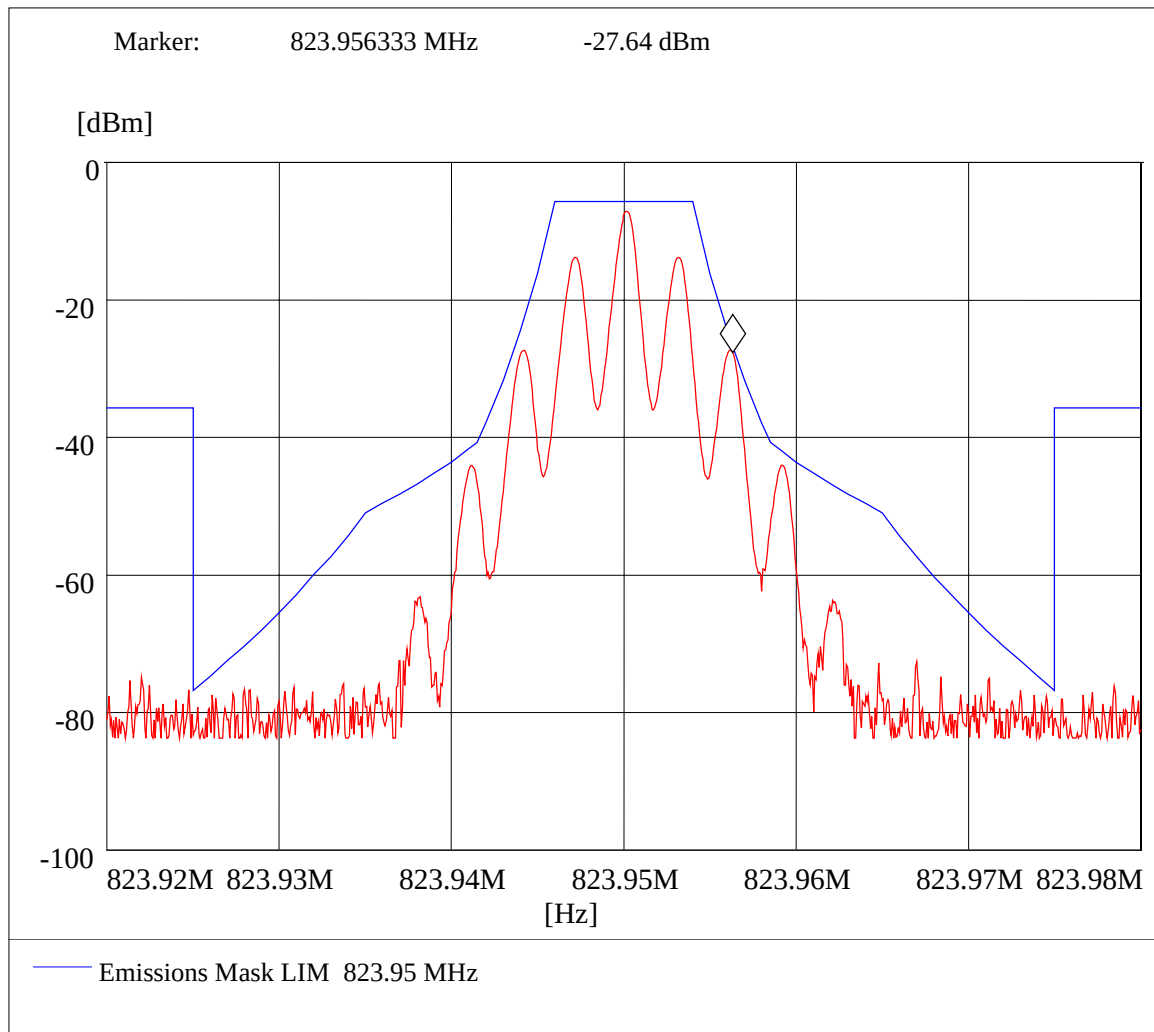
Note: 6 dB pad between output of EUT and Spectrum analyzer



Modulated Emissions Masks: Generator Output Test Results, Setup 13 of 14, Channel 825

Setup: Resolution Bandwidth: 200 Hz, Video Bandwidth: 3 KHz

Generator output: 823.95 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

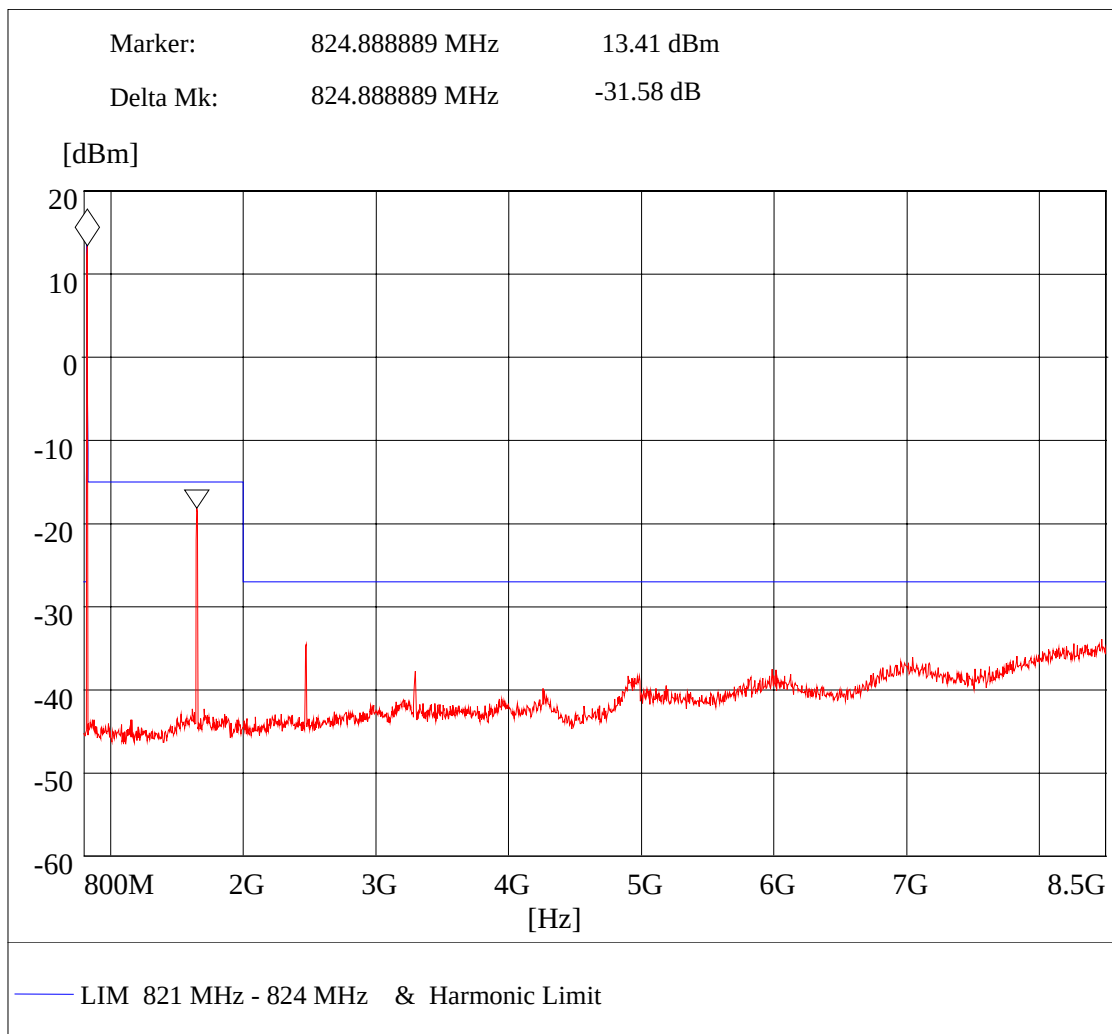


Modulated Emissions Masks: Generator Output Test Results, Setup 14 of 14, Channel 825

Setup: Resolution Bandwidth: 1 KHz, Video Bandwidth: 10 KHz

Generator output: 823.95 MHz, -5.7 dBmW, FM modulated 2.5 KHz Deviation, 3 KHz Rate

Section 2.1051 (a) – Spurious Emissions at Antenna Terminals



Unmodulated Spurious Emissions : Test Results Output Power & Harmonics from Forward Power

Setup: Resolution Bandwidth: 100 KHz, Video Bandwidth: 1 MHz

Generator output: 821 - 824 MHz, -10.0 dBmW for 1 dB Gain compression Amplifier Output

Gain Setting on EUT: Forward 27 dB on In band, Forward 6 dB on Out band

Measured Gain on In Band: 24.92 dB

Note: No pad used.

Client: Aero Comm, Inc.
FCC ID: KJA504830225
Model: 502890-RBA-800MHz

Report No.: 9200-01
Issue Date: August 30, 1999

Exhibit XI

Compliance Information

The following statement, or equivalent, is required to be in the user's manual:

FCC COMPLIANCE STATEMENT

The equipment described in this manual generates and uses radio frequency energy. If it is not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B Private Land Mobile Radio Service Bi-directional Signal Booster device pursuant to CFR 47 Part 2.1041 and Part 90 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference at the end use installation intended for this product. This device can only be operated with a station license issued by the FCC.

Warning to User:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.