UltraTech
Group of Labs

31040/SIT

C-1376

Canada
46390-2049

NVLAP
200093-0

00-034

SL2-IN-E-1119R

Aug. 22, 2003

TIMCO ENGINEERING INC.
P O BOX 370
849 N.W. STATE ROAD 45
NEWBERRY, FLORIDA
USA 32669

Subject: **Type Acceptance Application under FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-824 MHz and 851-869 MHz.**

Applicant: **Futurecom Systems Group Inc.**
Product: **Digital Channel Module**
Model: **CMD 800**
FCC ID: **L06-CMD800**

Dear Sir/Madam,

As appointed agent for **Futurecom Systems Group Inc.**, we would like to submit the application to FCC for certification of the above product. Please review all necessary files uploaded to TIMCO UPLOAD SITE site for detailed information.

If you have any queries, please do not hesitate to contact us by our TOLL FREE number:

OUR TELEPHONE NO.: 1-877-747-6381

Yours truly,

Tri Minh Luu, P. Eng.,
V.P., Engineering

TML/DH

Encl.

3000 Bristol Circle,
Oakville, Ontario,
Canada L6H 6G4

Tel.: (905) 829-1570
Fax.: (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

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BSMI
SL2-IN-E-1119R

Aug. 22, 2003

Futurecom Systems Group Inc.
3277 Langstaff Road
Concord, Ontario
Canada, L4K 5P8

Attn.: **Mr. Tony Bombera**

Subject: **Certification Testing in accordance with FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-824 MHz and 851-869 MHz .**

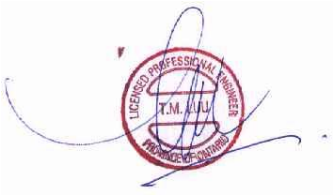
Product: **Digital Channel Module**
Model: **CMD 800**

Dear Mr. Bombera,

The product sample has been tested in accordance with **FCC 47 CFR, Parts 2 and 90 (Subpart I) - Non-Broadcast Radio Transceivers Operating in the frequency bands 806-824 MHz and 851-869 MHz ,** and the results and observation were recorded in the engineering report, Our File No.: FSG-035-F90

Enclosed you will find copy of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P.Eng
Vice President - Engineering

Encl.

3000 Bristol Circle,
Oakville, Ontario,
Canada L6H 6G4

Tel.: (905) 829-1570
Fax.: (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

ENGINEERING TEST REPORT

Digital Channel Module
Model No.: CMD 800

FCC ID: L06-CMD800

Applicant: **Futurecom Systems Group Inc.**
3277 Langstaff Road
Concord, Ontario
Canada, L4K 5P8

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, PARTS 2 and 90 (Subpart I)

UltraTech's File No.: FSG-035-F90

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Aug. 22, 2003	
Report Prepared by: William Truong	Tested by: Mr. Hung Trinh, RFI/EMI Technician
Issued Date: Aug. 22, 2003	Test Dates: August 7 - 21, 2003

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4
Tel.: (905) 829-1570 Fax.: (905) 829-8050
Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com

FC	VCCI	Canada	NVLAP	BSMI	IT	UL	entela
31040/SIT	C-1376	46390-2049	200093-0	SL2-IN-E-1119R	00-034		

TABLE OF CONTENTS

- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

EXHIBIT 1. SUBMITTAL CHECK LIST

Annex No.	Exhibit Type	Description of Contents	Quality Check (OK)
--	Test Report	Test Report	OK
1	Test Setup Photos	Photos # 1 to 2	OK
2	External Photos of EUT	Photos # 1 to 2	OK
3	Internal Photos of EUT	Photos of 1 to 16	OK
4	Cover Letters	• Letter from Ultratech for Certification Request • Letter from the Applicant to appoint Ultratech to act as an agent • Letter from the Applicant to request for Confidentiality Filing	
5	Attestation Statements	• NA	N/A
6	ID Label/Location Info	ID Label Location of ID Label	OK
7	Block Diagrams	Block Diagrams	OK
8	Schematic Diagrams	Schematic Diagrams	OK
9	Parts List/Tune Up Info	Parts List/Tune Up Info	OK
10	Operational Description	Operational Description	OK
11	RF Exposure Info	RF Exposure Info	OK
12	Users Manual	Users Manual	OK

EXHIBIT 2. INTRODUCTION

2.1. SCOPE

Reference:	FCC Parts 2 and 90
Title:	Telecommunication - Code of Federal Regulations, CFR 47, Parts 2 & 90
Purpose of Test:	To gain FCC Certification Authorization for Radio operating in the frequency bands 806-824 MHz and 851-869 MHz .
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.

2.2. RELATED SUBMITTAL(S)/GRANT(S)

None

2.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	2002	Code of Federal Regulations – Telecommunication
ANSI C63.4	1992	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
CISPR 22 & EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1	1999	Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 3. PERFORMANCE ASSESSMENT

3.1. CLIENT INFORMATION

APPLICANT	
Name:	Futurecom Systems Group Inc.
Address:	3277 Langstaff Road Concord, Ontario Canada, L4K 5P8
Contact Person:	Mr. Tony Bombera Phone #: (905) 660-5548. Ext: 225 Fax #: (905) 660-6858 Email Address: tonyb@futurecom.com

MANUFACTURER	
Name:	Futurecom Systems Group Inc.
Address:	3277 Langstaff Road Concord, Ontario Canada, L4K 5P8
Contact Person:	Mr. Tony Bombera Phone #: (905) 660-5548. Ext: 225 Fax #: (905) 660-6858 Email Address: tonyb@futurecom.com

3.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Futurecom Systems Group Inc.
Product Name:	Digital Channel Module
Model Name or Number:	CMD 800
Type of Equipment:	Non-broadcast Radio Communication Equipment
External Power Supply:	27.6 Vdc using external power supply
Transmitting/Receiving Antenna Type:	Non-integral

3.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	Commercial, Light Industry & Heavy Industry
Power Supply Requirement:	27.6 Vdc
RF Output Power Rating:	75 mili-Watts to 35 Watts
Operating Frequency Range:	806-824 MHz and 851-869 MHz Note: The radios are divided into 2 sub-bands as above
RF Output Impedance:	50 Ohms
Channel Spacing:	806-821/851-866: 25 kHz 821-824/866-869: 12.5 kHz
Occupied Bandwidth (99%):	
Emission Designation*:	806-821/851-866: 14K8F3E, 13K8F1D 821-824/866-869: 10K8F3E, 9K60F1D
Antenna Connector Type:	SMA female

* For an average case of commercial telephony, the Necessary Bandwidth is calculated as follows:

1. For FM Voice Modulation:

   Channel Spacing = 12.5 KHz, D = 2.4 KHz max., K = 1, M = 3 KHz
   B_n = 2M + 2DK = 2(3) + 2(2.4)(1) = **10.8 KHz**
   emission designation: 11K0F3E

   Channel Spacing = 25 KHz, D = 4.4 KHz max., K = 1, M = 3 KHz
   B_n = 2M + 2DK = 2(3) + 2(4.4)(1) = **14.8 KHz**
   emission designation: 16K0F3E

2. For FM Digital Modulation:

   Channel Spacing: 12.5 kHz, M = 9.6/2 kb/s, D=2.4 kHz, FM Level = 4
   B_n = 2M + 2DK = 2(9.6/4) + 2(2.4)(1) = **9.6 KHz**
   emission designation: 9K60F1D

   Channel Spacing: 25 kHz, M = 9.6/2 kb/s, D= 4.5 kHz, FM Level = 4
   B_n = 2M + 2DK = 2(9.6/4) + 2(4.5)(1) = **13.8 KHz**
   emission designation: 9K60F1D

3.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	Rx Port	1	SMA Female	Shielded coaxial
2	Tx Port	1	SMA Female	Shielded coaxial
3	I/O Port	1	DIN-8 Female	Shielded cable

3.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	Laptop computer
Brand name:	Hewlett Packard
Model Name or Number:	5500 CS
Serial Number:	TW63138246
Cable Length & Type:	Shielded
Connected to EUT's Port:	RS-232

3.6. BLOCK DIAGRAM OF TEST SETUP

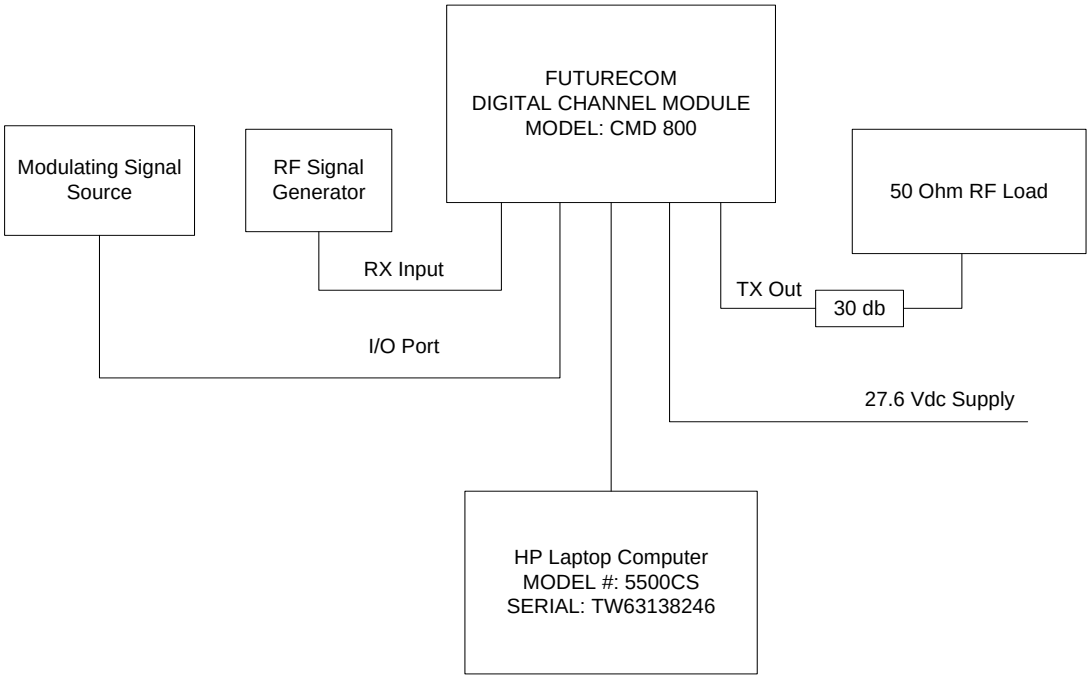


EXHIBIT 4. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

4.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	27.6 Vdc

4.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	Futurecom PC software is used to configure the EUT to operate in a required test mode per test requirements.
Special Hardware Used:	None
Transmitter Test Antenna:	The EUT is tested with the transmitter antenna port terminated to a 50 Ohms RF Load.

Transmitter Test Signals	
Frequency Band(s): ▪ 806-821 MHz ▪ 821-824 MHz ▪ 851-866 MHz ▪ 866-869 MHz	Near lowest, near middle & near highest frequencies in each frequency bands that the transmitter covers: ▪ 806, 813.5 & 821 MHz ▪ 821, 822.5 & 824 MHz ▪ 851, 858.5 $ 866 MHz ▪ 866, 867.5 & 869 MHz
Transmitter Wanted Output Test Signals: ▪ RF Power Output (measured maximum output power): ▪ Normal Test Modulation ▪ Modulating signal source:	 ▪ 77.6 mili-Watts to 35.5 Watts ▪ FM Voice & Data ▪ external

EXHIBIT 5. SUMMARY OF TEST RESULTS

5.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

- Radiated Emissions were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

  The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Aug. 10, 2002.

5.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	APPLICABILITY (YES/NO)
90.205 & 2.1046	RF Power Output	Yes
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	N/A for fixed base station
90.213 & 2.1055	Frequency Stability	Yes
90.242(b)(8) & 2.1047(a)	Audio Frequency Response	Yes
90.210 & 2.1047(b)	Modulation Limiting	Yes
90.210 & 2.1049	Emission Limitation & Emission Mask	Yes
90.210, 2.1057 & 2.1051	Emission Limits - Spurious Emissions at Antenna Terminal	Yes
90.210, 2.1057 & 2.1053	Emission Limits - Field Strength of Spurious Emissions	Yes
Digital Channel Module, **Model No.: CMD 800**, by **Futurecom Systems Group Inc.** has also been tested and found to comply with **FCC Part 15, Subpart B - Radio Receivers and Class A Digital Devices**. The engineering test report has been documented and kept in file and it is available anytime upon FCC request.		

5.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

5.4. DEVIATION OF STANDARD TEST PROCEDURES

None

EXHIBIT 6. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

6.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Exhibit 8 of this report

6.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 7 for Measurement Uncertainties.

6.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4:1992 and CISPR 16-1.

6.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER:

The essential function of the EUT is to correctly communicate data to and from radios over RF link.

6.5. RF POWER OUTPUT @ FCC 2.1046 & 90.205

6.5.1. Limits @ FCC 90.205

Please refer to FCC CFR 47, Part 90, Subpart I, Para. 90.205 for specification details.

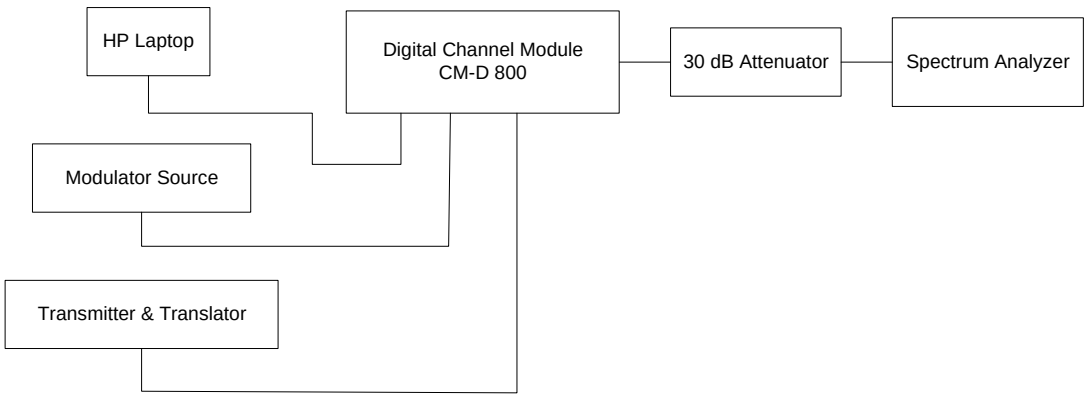
6.5.2. Method of Measurements

Refer to Exhibit 8, § 8.1 (Conducted) and 8.2 (Radiated) of this report for measurement details

6.5.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Attenuator(s)	Weinschel Corp	48-30-34	BM5354	Dc –18Ghz
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	…	9 kHz – 26 Ghz
Audio: SRS Function Generator	Stanford Research Systems	DS345	34591	1 kHz – 30.2 MHz
Voice Guard	General Electric	DS345	9614517	9600 b/s
Signal Generator	Gigatronics	6061A	5130408	10 kHz – 1050 Mhz

6.5.4. Test Arrangement



6.5.5. Test Data

Fundamental Frequency (MHz)	Measured (Average) Power				Power Rating	
	High		Low		High	Low
	dBm	Watt	dBm	mWatt	(Watts)	(mWatts)
806.0	45.3	33.9	14.6	28.8	35.0	75.0
813.5	45.5	35.5	14.9	30.9	35.0	75.0
821.0	45.5	35.5	15.3	33.9	35.0	75.0
822.5	45.5	35.5	15.4	34.7	35.0	75.0
824.0	45.5	35.5	15.6	36.3	35.0	75.0
851.0	45.4	34.7	18.2	66.1	35.0	75.0
858.5	45.3	33.9	18.3	67.6	35.0	75.0
866.0	45.3	33.9	18.7	74.1	35.0	75.0
867.5	45.3	33.9	18.8	75.9	35.0	75.0
869.0	45.3	33.9	18.9	77.6	35.0	75.0

Remarks: The power measurements are the same with all different modulations (voice, data or unmodulated)
.

6.6. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

Remark: Not applicable for fixed base station with the antenna located outdoor.

6.7. FREQUENCY STABILITY @ FCC 2.1055 & 90.213

6.7.1. Limits @ FCC 90.213

Please refer to FCC CFR 47, Part 90, Subpart I, Para. 90.213 for specification details.

FREQUENCY RANGE (MHz)	FIXED & BASE STATIONS (ppm)
806-821	1.5
821-824	1.0
851-866	1.5
866-869	1.0

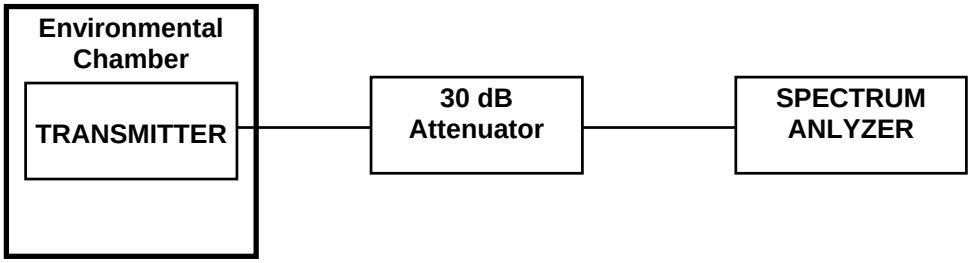
6.7.2. Method of Measurements

Refer to Exhibit 8, § 8.3 of this report for measurement details

6.7.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Temperature & Humidity Chamber	Tenney	T5	9723B	-40° to +60 ° C range

6.7.4. Test Arrangement



6.7.5. Test Data

Remark: The Radio transmitter is divided into 2 sub-bands 806-824 MHz and 851-869 MHx. Therefore, tests are conducted for each sub-band, the worst limit of 1.ppm was applied for compliance.

6.7.5.1. Frequency Stability for 806-824 MHz Sub-band

Product Name: **Model No.:**	**Digital Channel Module** **CMD 800**
Center Frequency:	806 MHz
Full Power Level:	35.5 Watts
Frequency Tolerance Limit:	±1 ppm
Max. Frequency Tolerance Measured:	+510 Hz or +0.632 ppm
Input Voltage Rating:	27.6 Vdc

CENTER FREQUENCY & RF POWER OUTPUT VARIATION			
Ambient Temperature (^{o}C)	**Supply Voltage (Nominal) 27.6 Volts dc**	**Supply Voltage (85% of Nominal) 23.5 Volts dc**	**Supply Voltage (115% of Nominal) 31.7 Volts dc**
	Hz	**Hz**	**Hz**
-30	+510	N/A	N/A
-20	-174	N/A	N/A
-10	+67	N/A	N/A
0	+194	N/A	N/A
+10	+126	N/A	N/A
+20	-3	+17	+24
+30	+136	N/A	N/A
+40	-68	N/A	N/A
+50	-37	N/A	N/A

6.7.5.2. Frequency Stability for 851-869 MHz Sub-band

Product Name: **Model No.:**	**Digital Channel Module** **CMD 800**
Center Frequency:	851 MHz
Full Power Level:	35.5 Watts
Frequency Tolerance Limit:	±1 ppm
Max. Frequency Tolerance Measured:	-372 Hz or 0.437 ppm
Input Voltage Rating:	27.6 Vdc

CENTER FREQUENCY & RF POWER OUTPUT VARIATION			
Ambient Temperature	**Supply Voltage (Nominal) 27.6 Volts dc**	**Supply Voltage (85% of Nominal) 23.5 Volts dc**	**Supply Voltage (115% of Nominal) 31.7 Volts dc**
(°C)	**Hz**	**Hz**	**Hz**
-30	-372	N/A	N/A
-20	+345	N/A	N/A
-10	+335	N/A	N/A
0	+320	N/A	N/A
+10	+145	N/A	N/A
+20	+5	+25	+35
+30	+75	N/A	N/A
+40	+10	N/A	N/A
+50	+180	N/A	N/A

6.8. AUDIO FREQUENCY RESPONSE @ FCC 2.1047(A) & 90.242(B)(8)

6.8.1. Limits @ FCC 2.1047(a) and 90.242(b)(8)

Recommended audio filter attenuation characteristics are give below:

RF Band	Audio band	Minimum Attenuation Rel. to 1 kHz Attenuation
406.1 – 960 MHz	3 –20 kHz 20 -30 kHz	60 $\log_{10}$(f/3) dB where f is in kHz 50dB

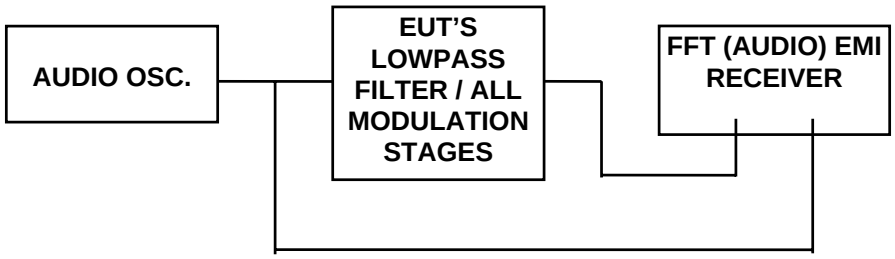
6.8.2. Method of Measurements

The rated audio input signal was applied to the input of the audio lowpass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT (Audio) EMI Receiver. Tests were repeated at different audio signal frequencies from 0 to 50 kHz.

6.8.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
FFT (audio) EMI Receiver	Advantest	R9211E	…	10 mHz – 100 kHz, 1 MHz Input Impedance
Audio Oscillator	Hewlett Packard	HP 204C	0989A08798	DC to 1.2 MHz

6.8.4. Test Arrangement



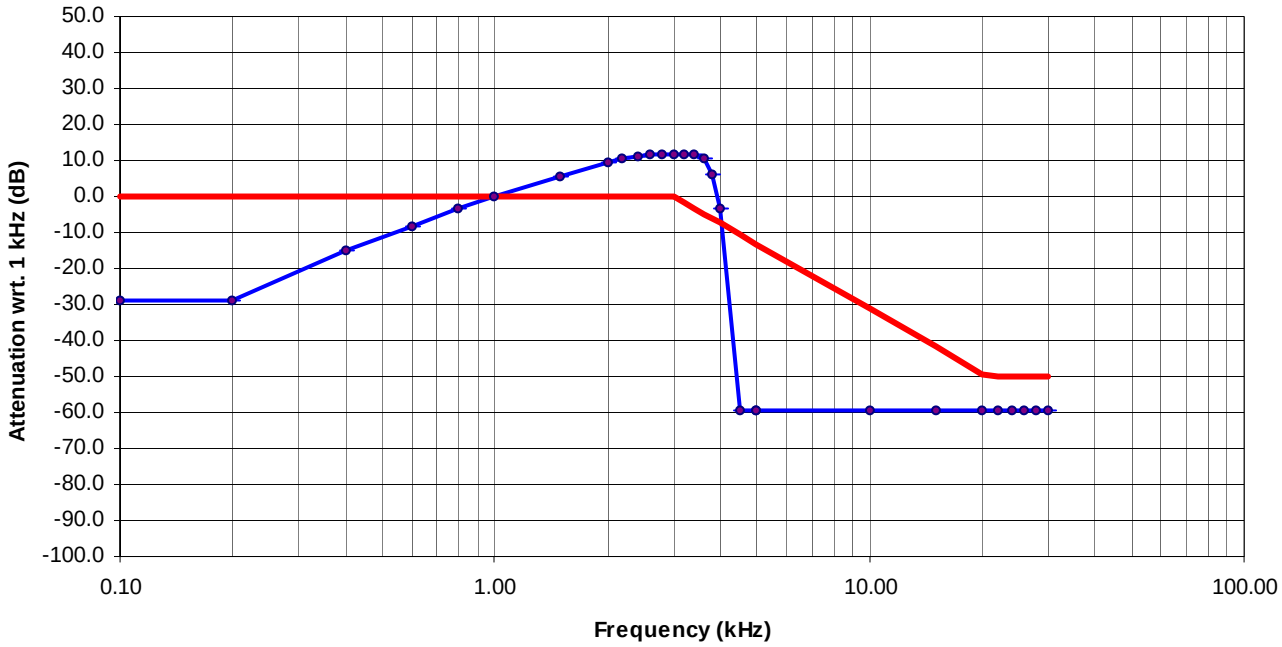
6.8.5. Test Data

*6.8.5.1. 12.5 kHz Channel Spacing, F3E, Frequency of All Modulation States**

FREQUENCY (kHz)	AUDIO IN (dBV)	AUDIO OUT (dBV)	ATTEN. (OUT - IN) (dB)	ATTEN. wrt. 1 kHz (dB)	FCC LIMIT @22.915D (dB)	PASS/ FAIL
0.10	-15.8	-59.8	-44.1	-29.1	--	PASS
0.20	-15.8	-59.8	-44.1	-29.1	--	PASS
0.40	-15.8	-45.6	-29.9	-14.9	--	PASS
0.60	-15.8	-39.1	-23.3	-8.4	--	PASS
0.80	-15.8	-34.3	-18.6	-3.6	--	PASS
1.00	-15.8	-30.7	-15.0	0.0	--	PASS
1.50	-15.8	-25.0	-9.2	5.8	--	PASS
2.00	-15.8	-21.3	-5.6	9.4	--	PASS
2.20	-15.8	-20.4	-4.6	10.4	--	PASS
2.40	-15.8	-19.5	-3.7	11.3	--	PASS
2.60	-15.8	-19.1	-3.3	11.7	--	PASS
2.80	-15.8	-18.9	-3.1	11.9	--	PASS
3.00	-15.8	-18.9	-3.2	11.8	0.0	PASS
3.20	-15.8	-19.1	-3.3	11.7	-1.7	PASS
3.40	-15.8	-19.3	-3.5	11.5	-3.3	PASS
3.60	-15.8	-20.2	-4.5	10.5	-4.8	PASS
3.80	-15.8	-24.8	-9.0	6.0	-6.2	PASS
4.00	-15.8	-34.1	-18.4	-3.4	-7.5	PASS
4.50	-15.8	<-90.0	<-74.2	<-59.3	-10.6	PASS
5.00	-15.8	<-90.0	<-74.2	<-59.3	-13.3	PASS
5.00	-15.8	<-90.0	<-74.2	<-59.3	-13.3	PASS
10.00	-15.8	<-90.0	<-74.2	<-59.3	-31.4	PASS
15.00	-15.8	<-90.0	<-74.2	<-59.3	-41.9	PASS
20.00	-15.8	<-90.0	<-74.2	<-59.3	-49.4	PASS
22.00	-15.8	<-90.0	<-74.2	<-59.3	-50.0	PASS
24.00	-15.8	<-90.0	<-74.2	<-59.3	-50.0	PASS
26.00	-15.8	<-90.0	<-74.2	<-59.3	-50.0	PASS
28.00	-15.8	<-90.0	<-74.2	<-59.3	-50.0	PASS
30.00	-15.8	<-90.0	<-74.2	<-59.3	-50.0	PASS
40.00	-15.8	<-90.0	<-74.2	-59.2	-50.0	PASS
50.00	-15.8	<-90.0	<-74.2	-59.2	-50.0	PASS

Note: Because of the difficulty of measuring the Frequency Response of the internal lowpass filter, the Frequency Response of All Modulation States are performed to show the roll-off at 3 kHz in comparison with FCC Limit for audio lowpass filter.

AUDIO FREQUENCY REPSONSE OF ALL MODULATION STATES
FCC 2.987(a) & 90.242b(8)
Digital Channel Module, Model CMD 800

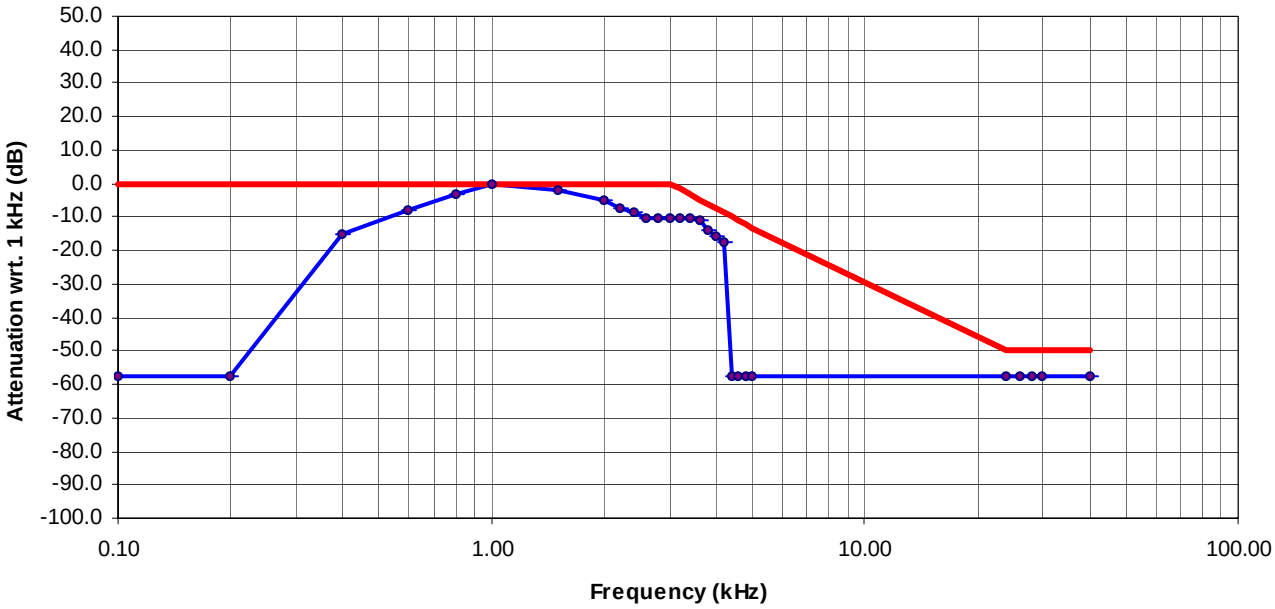


*6.8.5.2. 25 kHz Channel Spacing, F3E, Frequency of All Modulation States**

FREQUENCY (kHz)	AUDIO IN (dBV)	AUDIO OUT (dBV)	ATTEN. (OUT - IN) (dB)	ATTEN. wrt. 1 kHz (dB)	FCC LIMIT @22.915D (dB)	PASS/ FAIL
0.10	-13.4	<-90.0	<-76.7	<-67.8	--	PASS
0.20	-13.4	<-90.0	<-76.7	<-67.8	--	PASS
0.40	-13.4	-37.2	-23.8	-14.9	--	PASS
0.60	-13.4	-30.5	-17.1	-8.2	--	PASS
0.80	-13.4	-25.7	-12.4	-3.5	--	PASS
1.00	-13.4	-22.3	-8.9	0.0	--	PASS
1.50	-13.4	-24.6	-11.3	-2.4	--	PASS
2.00	-13.4	-27.4	-14.1	-5.2	--	PASS
2.20	-13.4	-30.0	-16.7	-7.8	--	PASS
2.40	-13.4	-31.0	-17.7	-8.8	--	PASS
2.60	-13.4	-32.5	-19.2	-10.3	--	PASS
2.80	-13.4	-32.5	-19.1	-10.2	--	PASS
3.00	-13.4	-32.8	-19.4	-10.5	0.0	PASS
3.20	-13.4	-32.8	-19.5	-10.6	-1.7	PASS
3.40	-13.4	-33.0	-19.6	-10.7	-3.3	PASS
3.60	-13.4	-33.6	-20.2	-11.3	-4.8	PASS
3.80	-13.4	-36.4	-23.0	-14.1	-6.2	PASS
4.00	-13.4	-38.0	-24.7	-15.8	-7.5	PASS
4.20	-13.4	-39.7	-26.3	-17.4	-8.8	PASS
4.40	-13.4	<-90.0	<-76.7	<-67.8	-10.0	PASS
4.60	-13.4	<-90.0	<-76.7	<-67.8	-11.1	PASS
4.80	-13.4	<-90.0	<-76.7	<-67.8	-12.2	PASS
5.00	-13.4	<-90.0	<-76.7	<-67.8	-13.3	PASS
10.00	-13.4	<-90.0	<-76.7	<-67.8	-31.4	PASS
15.00	-13.4	<-90.0	<-76.7	<-67.8	-41.9	PASS
20.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
24.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
26.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
28.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
30.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
40.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS
50.00	-13.4	<-90.0	<-76.7	<-67.8	-50.0	PASS

Note: Because of the difficulty of measuring the Frequency Response of the internal lowpass filter, the Frequency Response of All Modulation States are performed to show the roll-off at 3 kHz in comparison with FCC Limit for audio lowpass filter.

AUDIO FREQUENCY REPSONSE OF ALL MODULATION STATES
RSS-119, Sec. 6.6
Digital Channel Module, Model CMD 800
25 kHz Channel Spacing



6.9. MODULATION LIMITING @ FCC 2.1047(B) & 90.210

6.9.1. Limits @ FCC 2.1047(b) and 90.210

Recommended frequency deviation characteristics are give below:

- 1.25 kHz for 6.25 kHz Channel Spacing System
- 2.5 kHz for 12.5 kHz Channel Spacing
- 5 kHz for 25 kHz Channel Spacing System

6.9.2. Method of Measurements

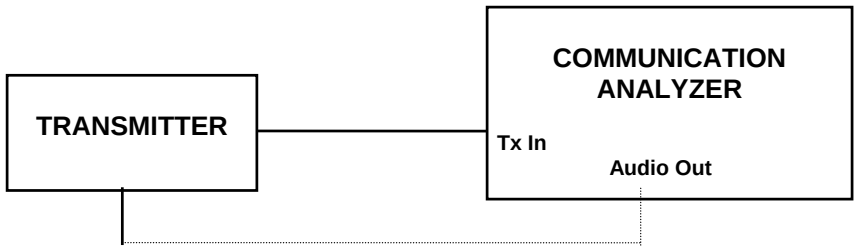
For Audio Transmitter:- The carrier frequency deviation was measured with the tone input signal level varied from 0 Vp to audio input rating level plus 16 dB at frequencies 0.1, 0.5, 1.0, 3.0 and 5.0 kHz. The maximum deviation was recorded at each test condition.

For Data Transmitter with Maximum Frequency Deviation set by Factory:- The EUT was set at maximum frequency deviation, and its peak frequency deviation was then measured using EUT's internal random data source.

6.9.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Communication Analyzer	Rohde & Schawrz	SMF02	879988/057	400 kHz - 1000 MHz including AF & RF Signal Generators, SINAD, DISTORTION, DEVIATION meters and etc

6.9.4. Test Arrangement



6.9.5. Test Data

6.9.5.1. Data Modulation Limiting: FM modulation with random data and Modulation Limiter set at a Maximum Frequency Deviation (Factory Setting).

12.5 kHz Channel Spacing

Data Baud Rate	Peak Deviation (kHz)	Maximum Limit (kHz)
9600	2.4	2.5

25 kHz Channel Spacing

Data Baud Rate	Peak Deviation (kHz)	Maximum Limit (kHz)
9600	4.5	5

6.9.5.2. Voice Modulation Limiting:

6.9.5.2.1. 12.5 kHz Channel Spacing

MODULATING SIGNAL LEVEL	PEAK FREQUENCY DEVIATION (kHz) at the following modulating frequency:					MAXIMUM LIMIT
(mVrms)	0.1 kHz	0.5 kHz	1.0 kHz	3.0 kHz	5.0 kHz	(kHz)
20	0.77	0.80	0.76	0.83	0.72	2.5
40	0.76	0.81	0.86	1.24	0.72	2.5
60	0.77	0.84	0.96	1.56	0.72	2.5
80	0.78	0.83	1.06	1.89	0.72	2.5
100	0.77	0.88	1.17	2.12	0.72	2.5
120	0.77	0.94	1.27	2.24	0.72	2.5
140	0.77	0.97	1.38	2.24	0.72	2.5
160	0.77	1.04	1.50	2.24	0.72	2.5
180	0.77	1.09	1.60	2.24	0.72	2.5
200	0.77	1.15	1.72	2.24	0.72	2.5
250	0.77	1.28	1.99	2.24	0.72	2.5
300	0.77	1.40	2.28	2.24	0.72	2.5
350	0.77	1.54	2.35	2.26	0.72	2.5
400	0.77	1.68	2.35	2.26	0.72	2.5
450	0.77	1.85	2.36	2.26	0.72	2.5
500	0.77	1.97	2.36	2.26	0.72	2.5
600	0.77	2.23	2.37	2.25	0.72	2.5
700	0.77	2.32	2.38	2.23	0.72	2.5
800	0.77	2.33	2.38	2.41	0.72	2.5
900	0.77	2.33	2.38	2.41	0.72	2.5
1000	0.77	2.34	2.38	2.34	0.72	2.5

Voice Signal Input Level = STD MOD Level + 16 dB = 44.0 dBVrms + 16 = **60.0 dBmV**

MODULATING FREQUENCY (KHz)	PEAK FREQUENCY DEVIATION (KHz)	MAXIMUM LIMIT (KHz)
0.1	0.71	2.5
0.2	0.72	2.5
0.4	2.34	2.5
0.6	2.34	2.5
0.8	2.35	2.5
1.0	2.36	2.5
1.2	2.37	2.5
1.4	2.38	2.5
1.6	2.39	2.5
1.8	2.37	2.5
2.0	2.38	2.5
2.5	2.41	2.5
3.0	2.42	2.5
3.5	2.21	2.5
4.0	1.81	2.5
4.5	0.73	2.5
5.0	0.73	2.5
6.0	0.73	2.5
7.0	0.72	2.5
8.0	0.72	2.5
9.0	0.72	2.5
10.0	0.71	2.5

6.9.5.2.2. 25 kHz Channel Spacing

MODULATING SIGNAL LEVEL	PEAK FREQUENCY DEVIATION (kHz) at the following modulating frequency:					MAXIMUM LIMIT
(mVrms)	0.1 kHz	0.5 kHz	1.0 kHz	3.0 kHz	5.0 kHz	(kHz)
20	0.73	0.80	0.8	1.24	0.76	5
40	0.73	0.86	1.01	1.87	0.76	5
60	0.73	0.95	1.26	2.51	0.76	5
80	0.73	1.05	1.50	3.17	0.76	5
100	0.73	1.16	1.72	3.81	0.76	5
120	0.73	1.27	1.95	4.22	0.76	5
140	0.73	1.37	2.15	4.21	0.76	5
160	0.73	1.48	2.40	4.20	0.76	5
180	0.73	1.61	2.61	4.23	0.76	5
200	0.73	1.72	2.86	4.23	0.76	5
250	0.73	1.98	3.32	4.21	0.76	5
300	0.73	2.26	4.15	4.27	0.76	5
350	0.73	2.55	4.31	4.28	0.76	5
400	0.73	2.84	4.32	4.29	0.76	5
450	0.73	3.12	4.32	4.24	0.76	5
500	0.73	3.39	4.32	4.25	0.76	5
600	0.73	3.94	4..29	4.26	0.76	5
700	0.73	4.26	4.34	4.25	0.76	5
800	0.73	4.26	4.34	4.26	0.76	5
900	0.73	4.28	4.31	4.26	0.76	5
1000	0.73	4.48	4.36	4.14	0.76	5

Voice Signal Input Level = STD MOD Level + 16 dB = 47 dBVrms + 16 = **63 dBmV**

MODULATING FREQUENCY (KHz)	PEAK FREQUENCY DEVIATION (KHz)	MAXIMUM LIMIT (KHz)
0.1	1.04	5
0.2	1.77	5
0.4	4.24	5
0.6	4.32	5
0.8	4.32	5
1.0	4.36	5
1.2	4.38	5
1.4	4.34	5
1.6	4.39	5
1.8	4.34	5
2.0	4.34	5
2.5	4.34	5
3.0	4.15	5
3.5	4.10	5
4.0	3.10	5
4.5	1.42	5
5.0	0.76	5
6.0	0.98	5
7.0	1.22	5
8.0	1.81	5
9.0	1.34	5
10.0	0.74	5

6.10. EMISSION MASK @ FCC 2.1049, 90.208 & 90.210

6.10.1. Limits @ FCC 90.209 & 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FREQUENCY RANGE (MHz)	Maximum Authorized BW (KHz)	CHANNEL SPACING (KHz)	Recommended Max. FREQ. DEVIATION (KHz)	FCC APPLICABLE MASK @ FCC 90.210
806-821/ 851-866	20	25	5	MASK B (Voice) & MASK G (Data)
821-824/866-869	11.25	12.5	2.5	MASK B (Voice) & MASK H (Data)

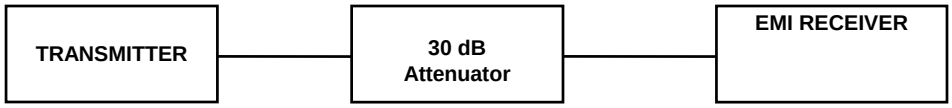
6.10.2. Method of Measurements

Refer to Exhibit 8, § 8.4 of this report for measurement details

6.10.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Audio Oscillator	Hewlett Packard	HP 204C	0989A08798	DC to 1.2 MHz

6.10.4. Test Arrangement



6.10.5. Test Data

6.10.5.1. 99% Occupied Bandwidth – 12.5 kHz Channel Spacing 821-824 MHz

Frequency (MHz)	Emission Designation	Measured 99% OBW (kHz)	Recommended Max. 99% OBW (kHz)	Refer to Plot Number
821.0	10K8F3E	10.0	11.25	1
822.5	10K8F3E	10.0	11.25	2
824.0	10K8F3E	10.0	11.25	3
821.0	9K60F1D	8.9	11.25	4
822.5	9K60F1D	8.9	11.25	5
824.0	9K60F1D	8.9	11.25	6

6.10.5.2. 99% Occupied Bandwidth – 12.5 kHz Channel Spacing 866-869 MHz

Frequency (MHz)	Emission Designation	Measured 99% OBW (kHz)	Recommended Max. 99% OBW (kHz)	Refer to Plot Number
866.0	10K8F3E	10.3	11.25	7
867.5	10K8F3E	10.3	11.25	8
869.0	10K8F3E	10.4	11.25	9
866.0	9K60F1D	9.5	11.25	10
867.5	9K60F1D	9.5	11.25	11
869.0	9K60F1D	9.5	11.25	12

6.10.5.3. 99% Occupied Bandwidth – 25 kHz Channel Spacing 806-821 MHz

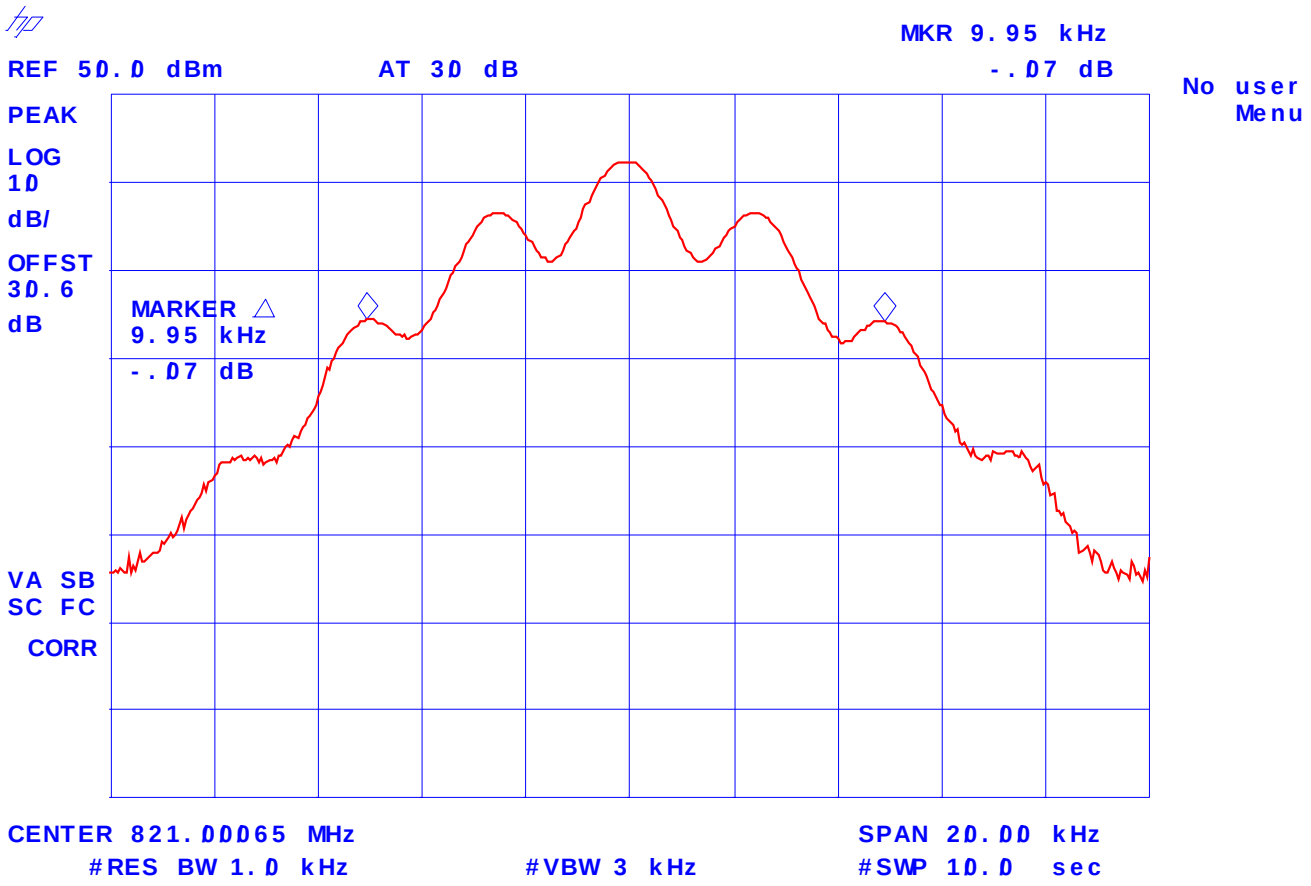
Frequency (MHz)	Emission Designation	Measured 99% OBW (kHz)	Recommended Max. 99% OBW (kHz)	Refer to Plot Number
806.0	14K8F3E	14.9	20.0	13
813.5	14K8F3E	15.1	20.0	14
821.0	14K8F3E	14.9	20.0	15
806.0	13K8F1D	13.3	20.0	16
813.5	13K8F1D	13.3	20.0	17
821.0	13K8F1D	13.3	20.0	18

6.10.5.4. 99% Occupied Bandwidth – 25 kHz Channel Spacing 851-866 MHz

Frequency (MHz)	Emission Designation	Measured 99% OBW (kHz)	Recommended Max. 99% OBW (kHz)	Refer to Plot Number
851.0	14K8F3E	15.6	20.0	19
858.5	14K8F3E	15.7	20.0	20
866.0	14K8F3E	15.5	20.0	21
851.0	13K8F1D	14.0	20.0	22
858.5	13K8F1D	14.1	20.0	23
866.0	13K8F1D	14.2	20.0	24

Plot # 1: 99% Occupied Bandwidth

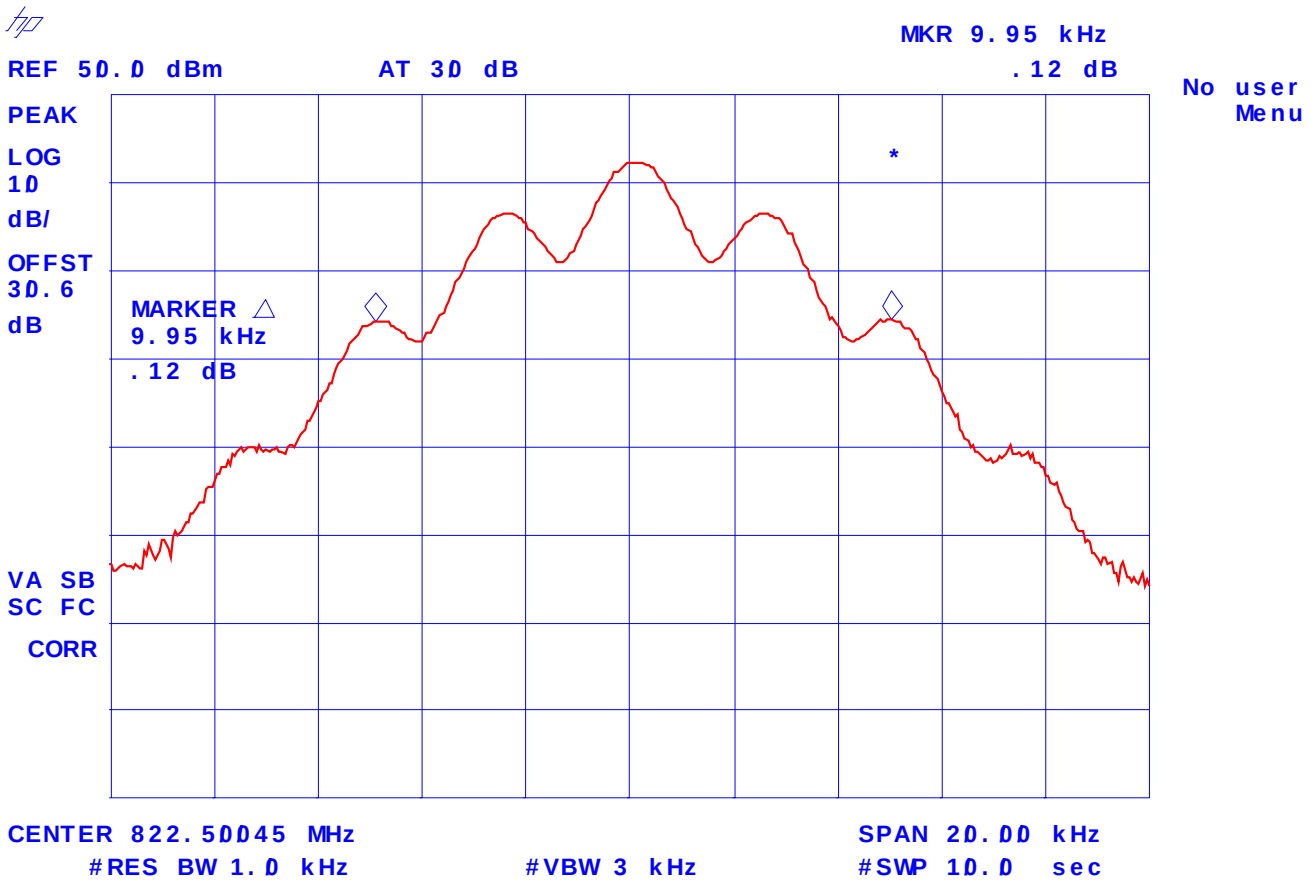
Frequency: 821 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 2: 99% Occupied Bandwidth

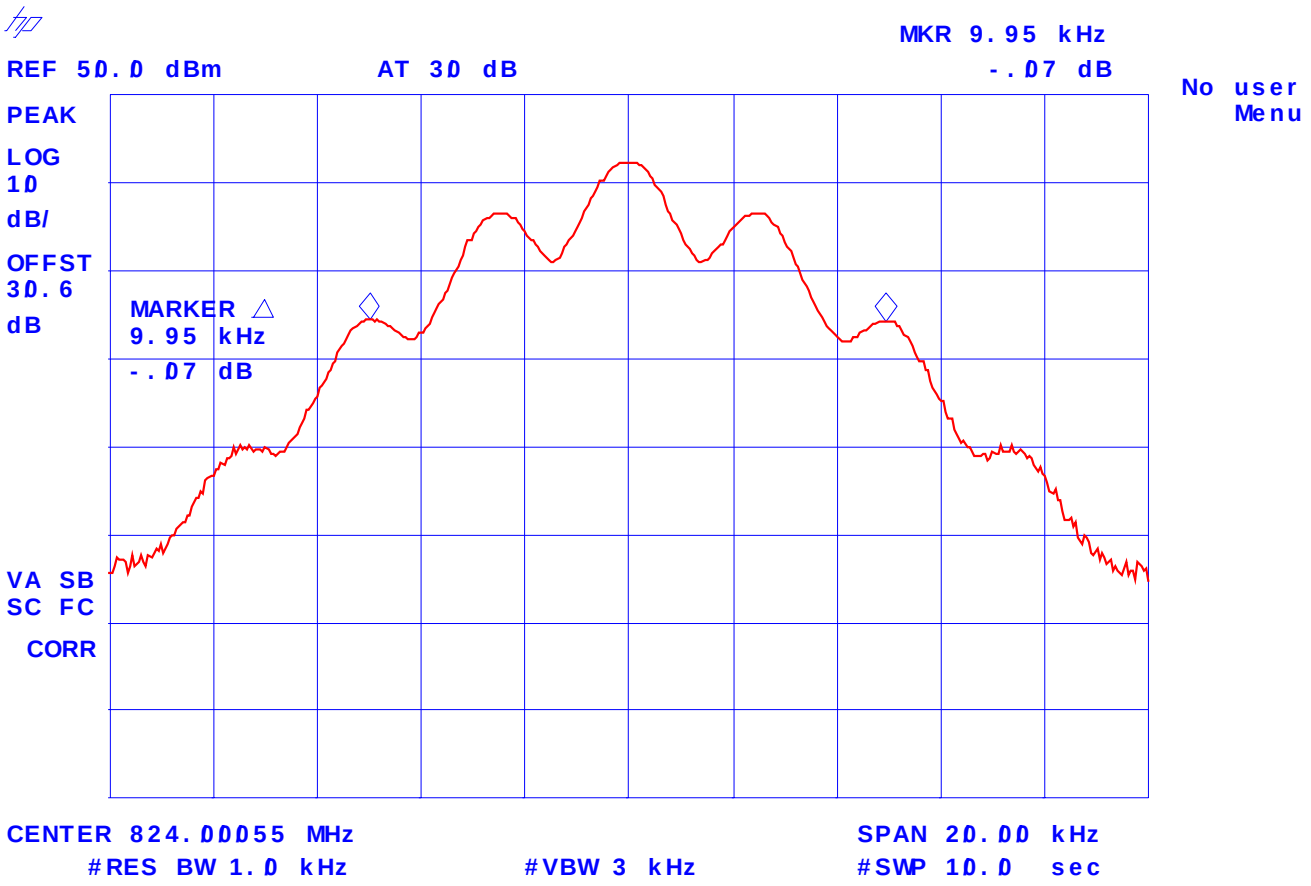
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 3: 99% Occupied Bandwidth

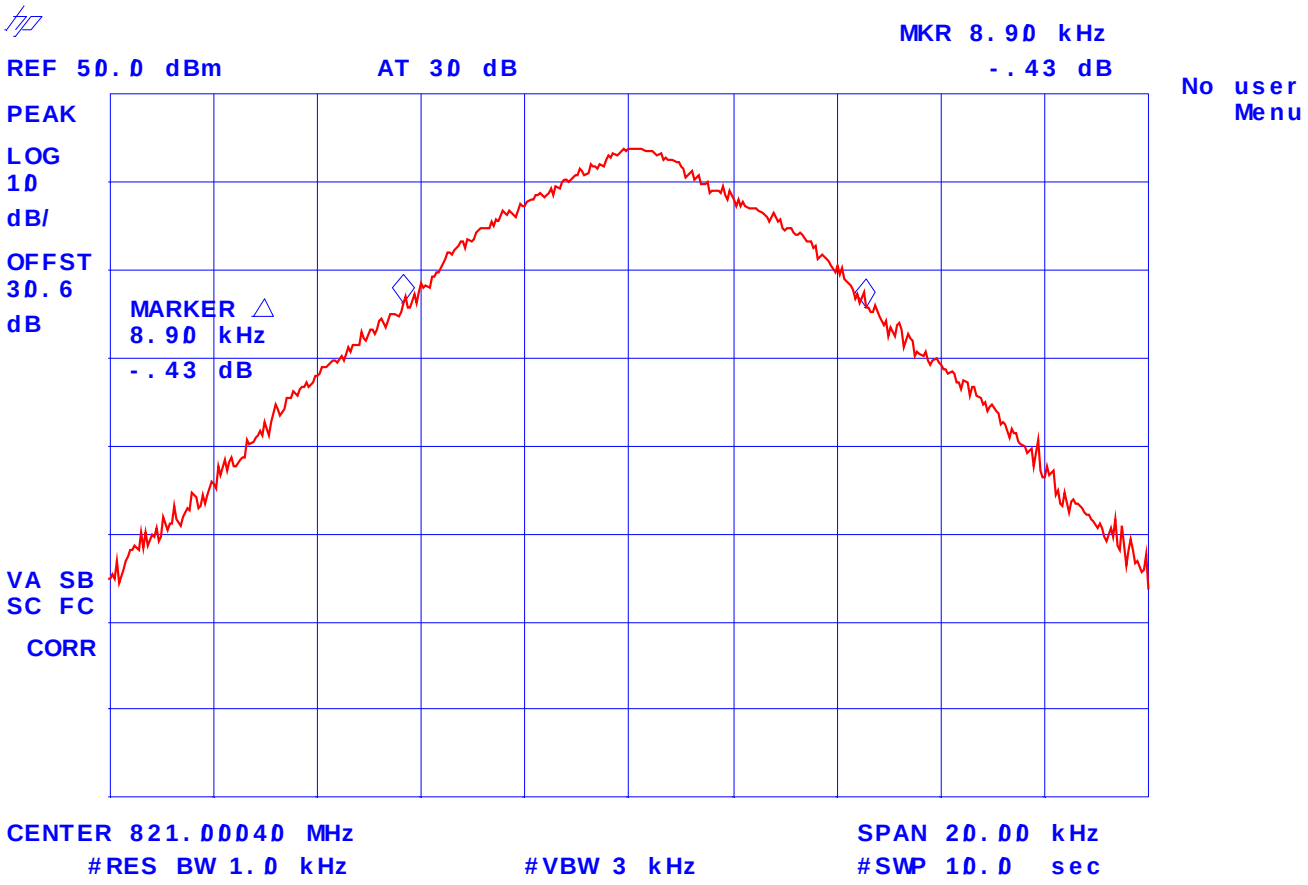
Frequency: 824 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

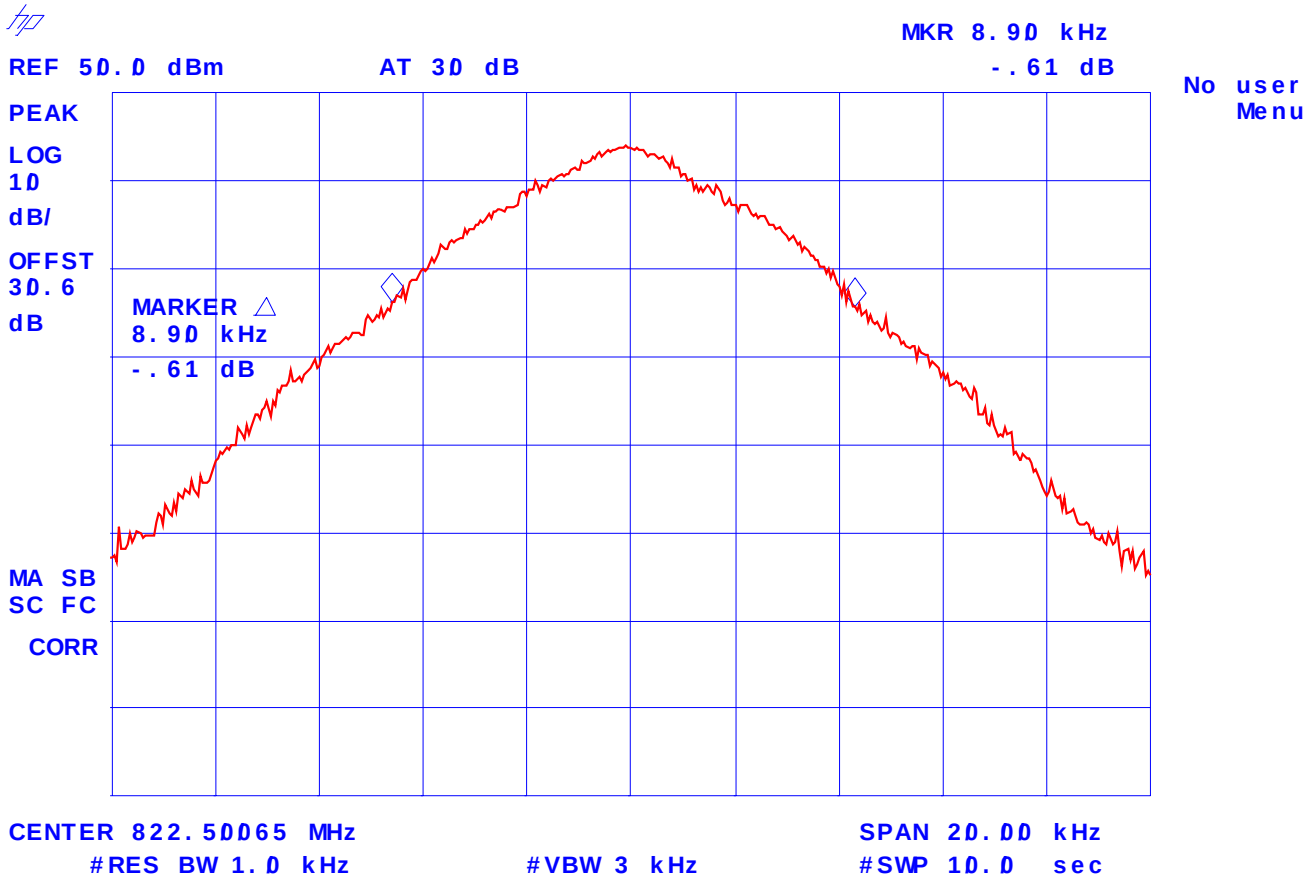
Plot # 4: 99% Occupied Bandwidth

Frequency: 821 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



Plot # 5: 99% Occupied Bandwidth

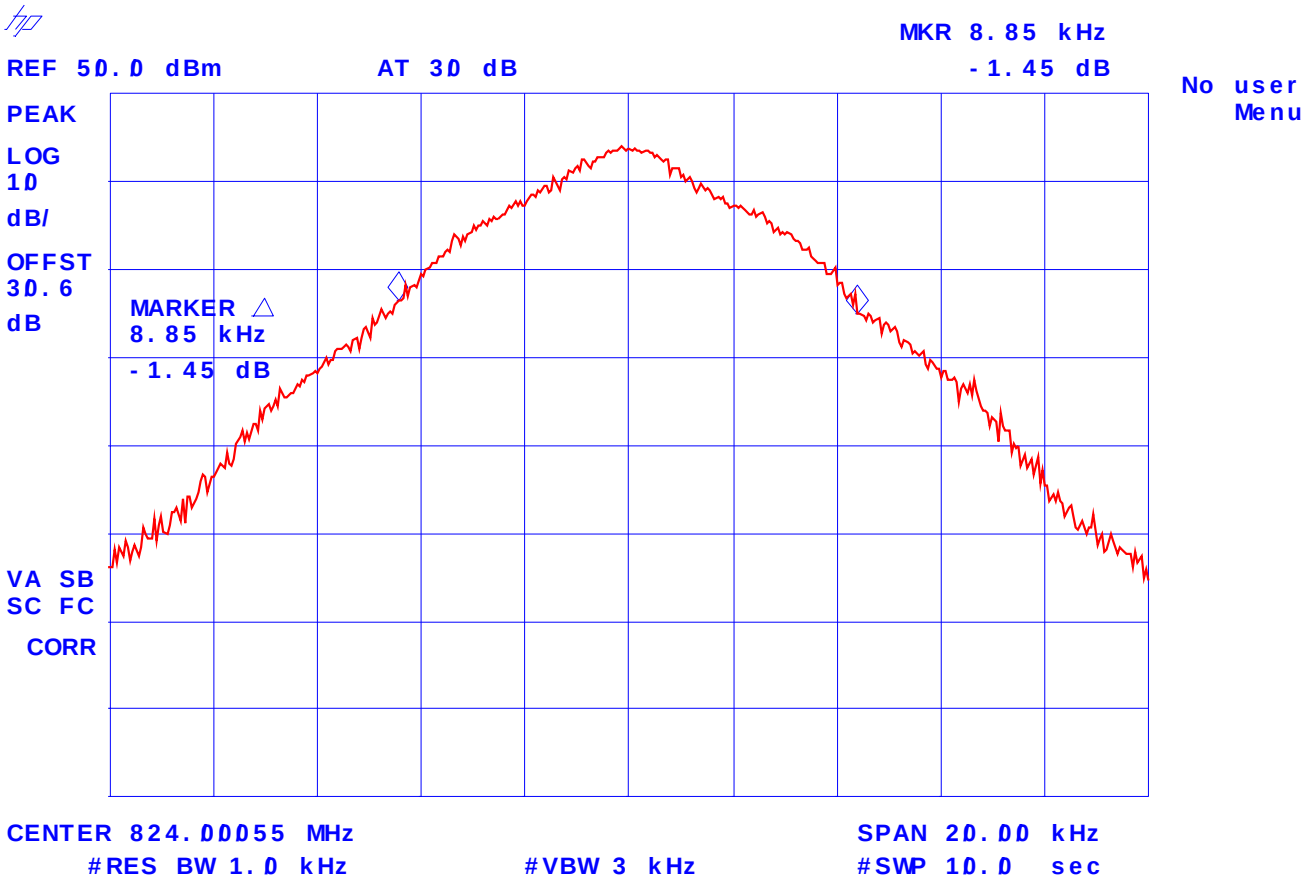
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 6: 99% Occupied Bandwidth

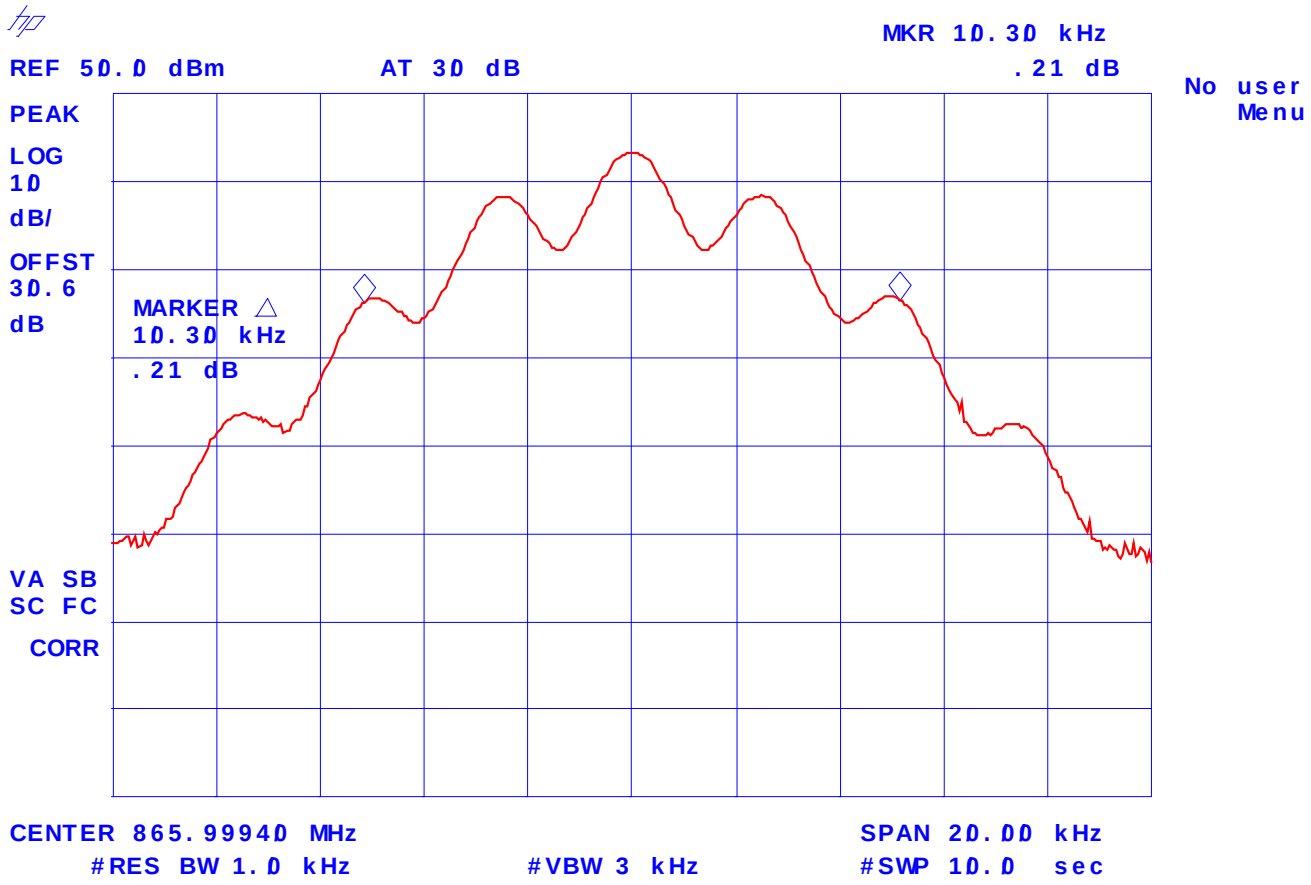
Frequency: 824 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 7: 99% Occupied Bandwidth

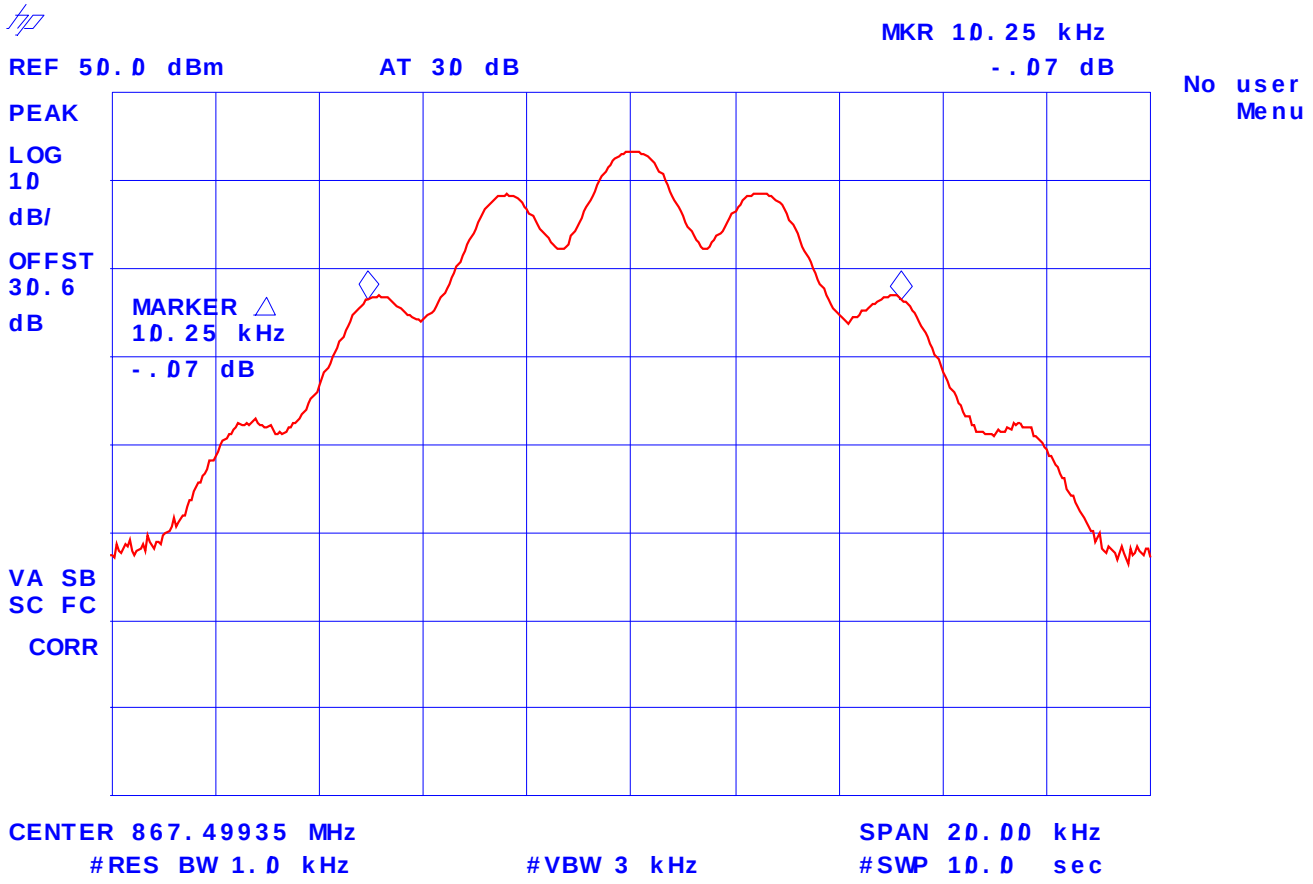
Frequency: 866 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

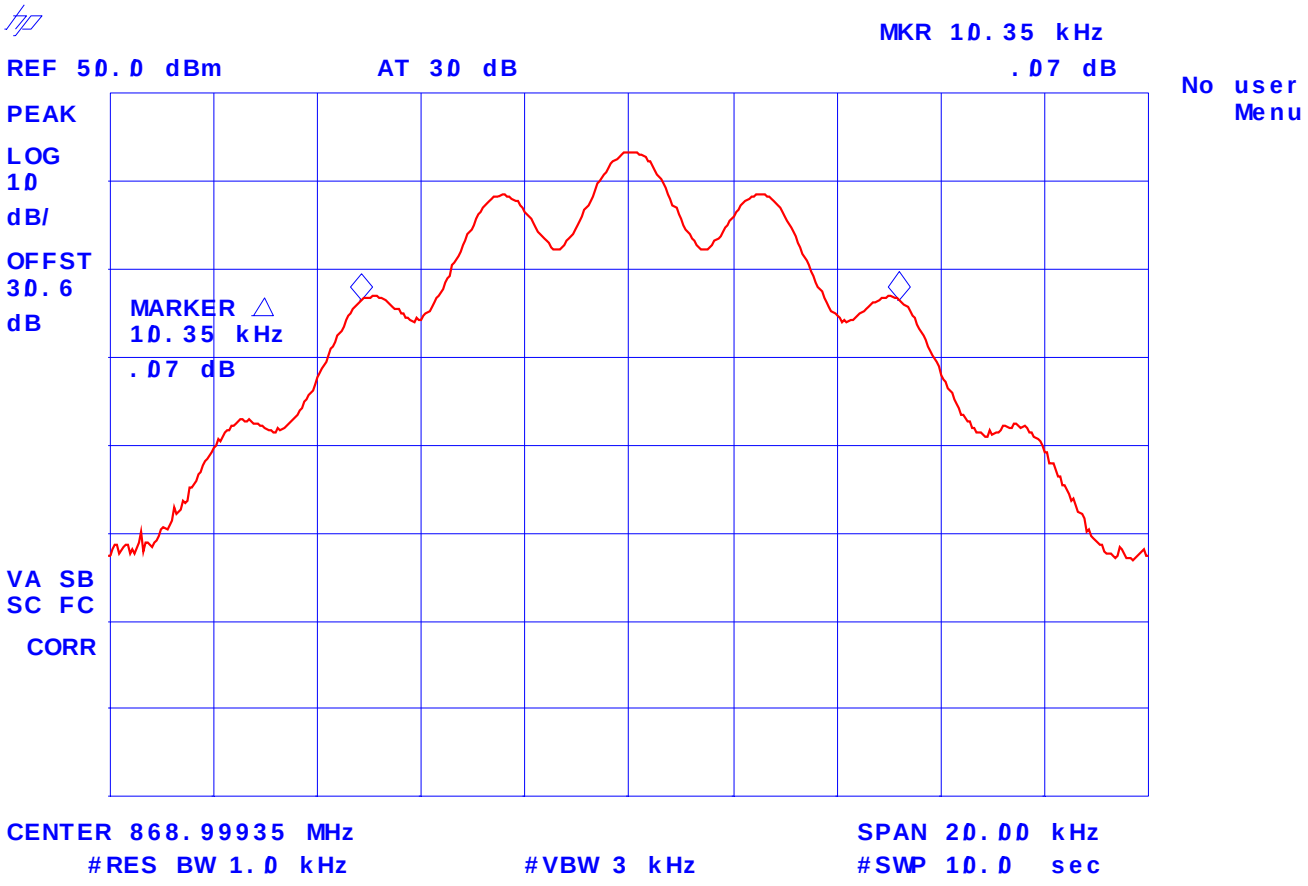
Plot # 8: 99% Occupied Bandwidth

Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



Plot # 9: 99% Occupied Bandwidth

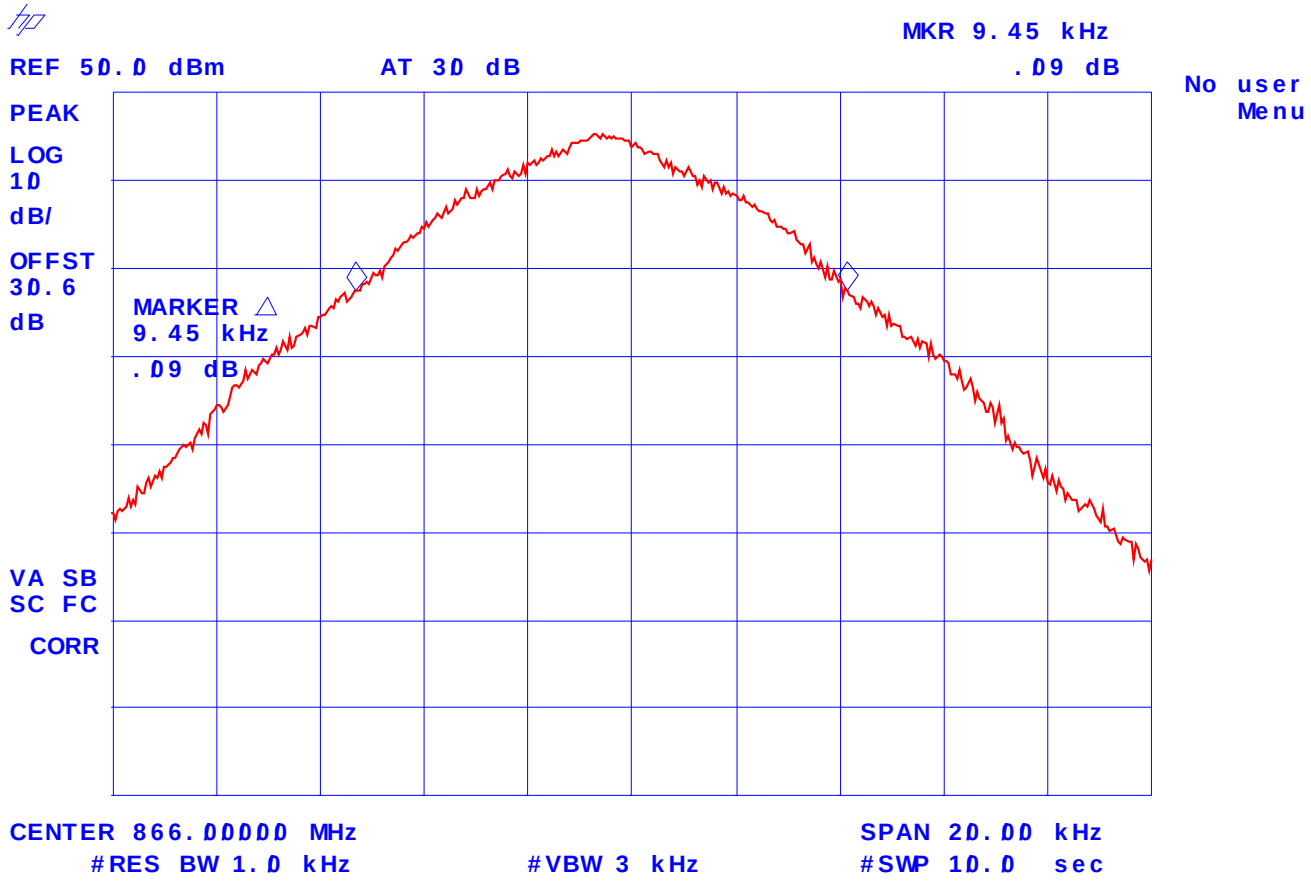
Frequency: 869 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

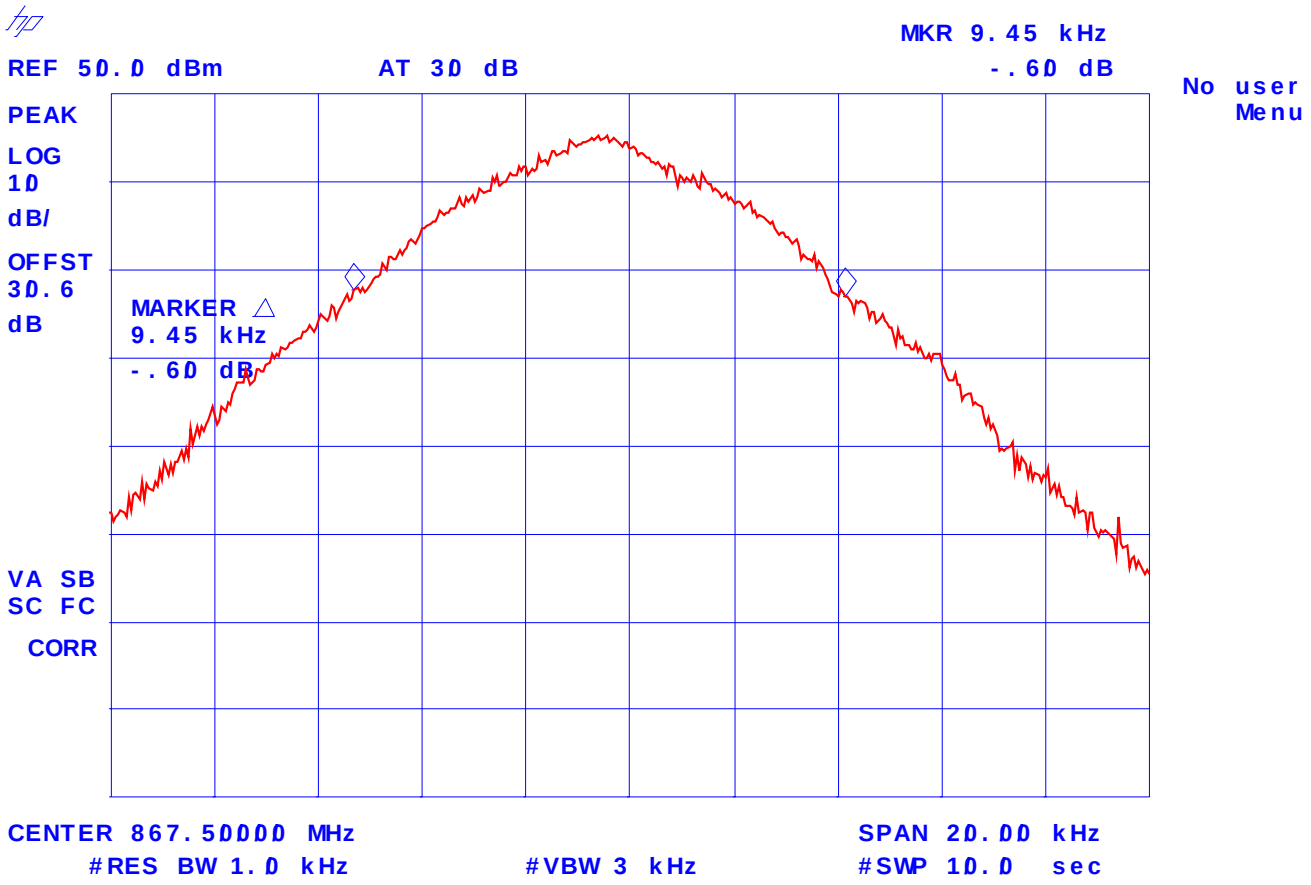
Plot # 10: 99% Occupied Bandwidth

Frequency: 866 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

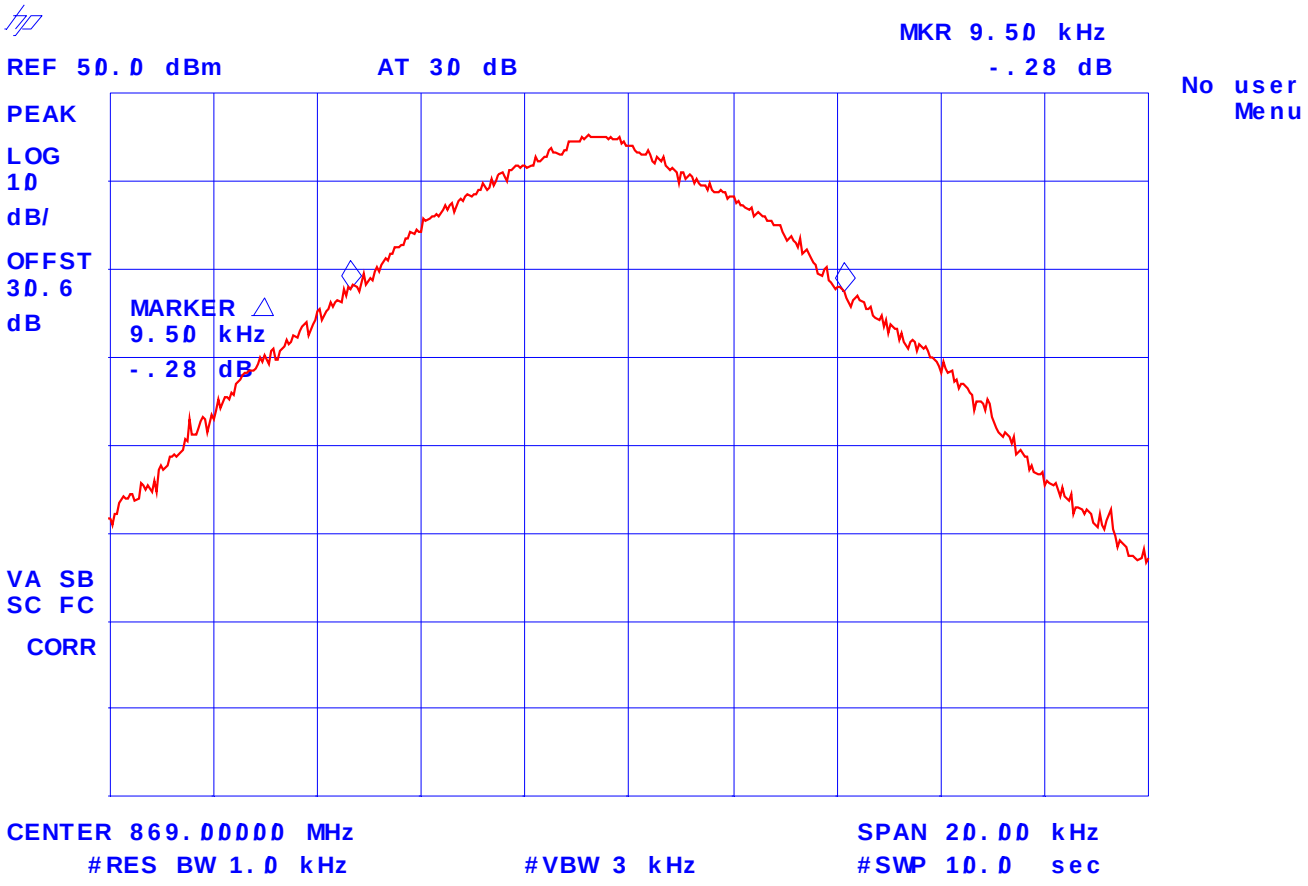
Plot # 11: 99% Occupied Bandwidth
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

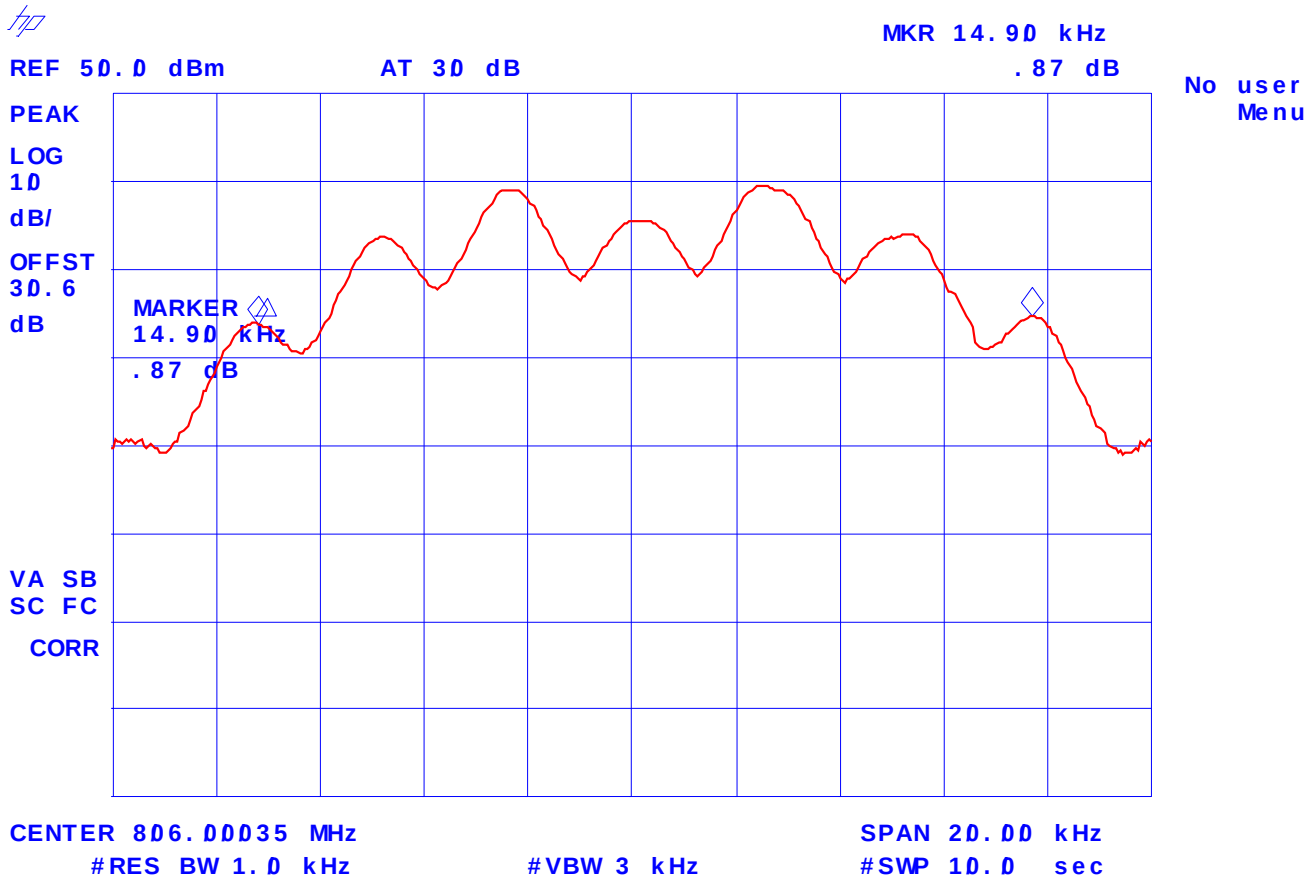
Plot # 12: 99% Occupied Bandwidth

Frequency: 869 MHz, 12.5 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



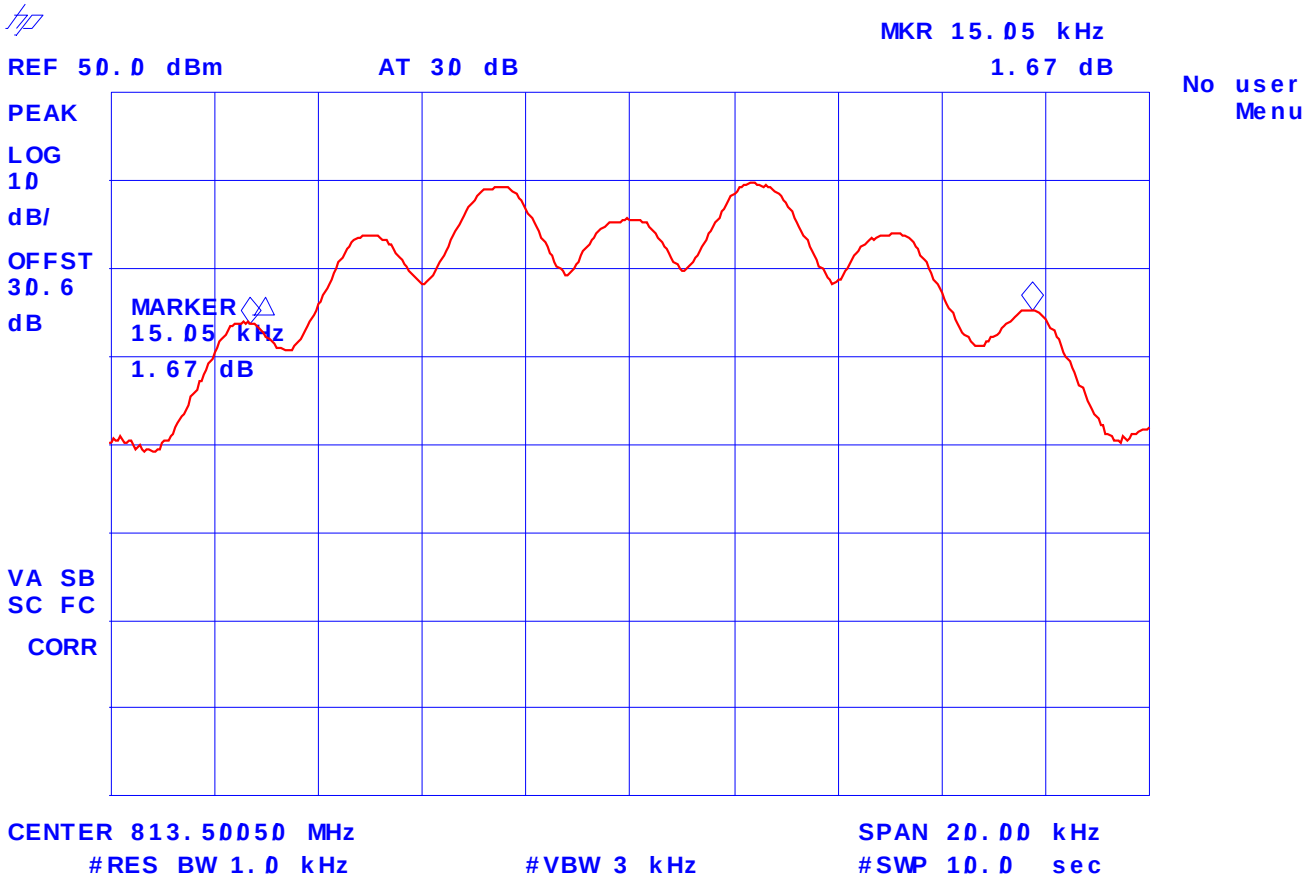
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 13: 99% Occupied Bandwidth
Frequency: 806 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



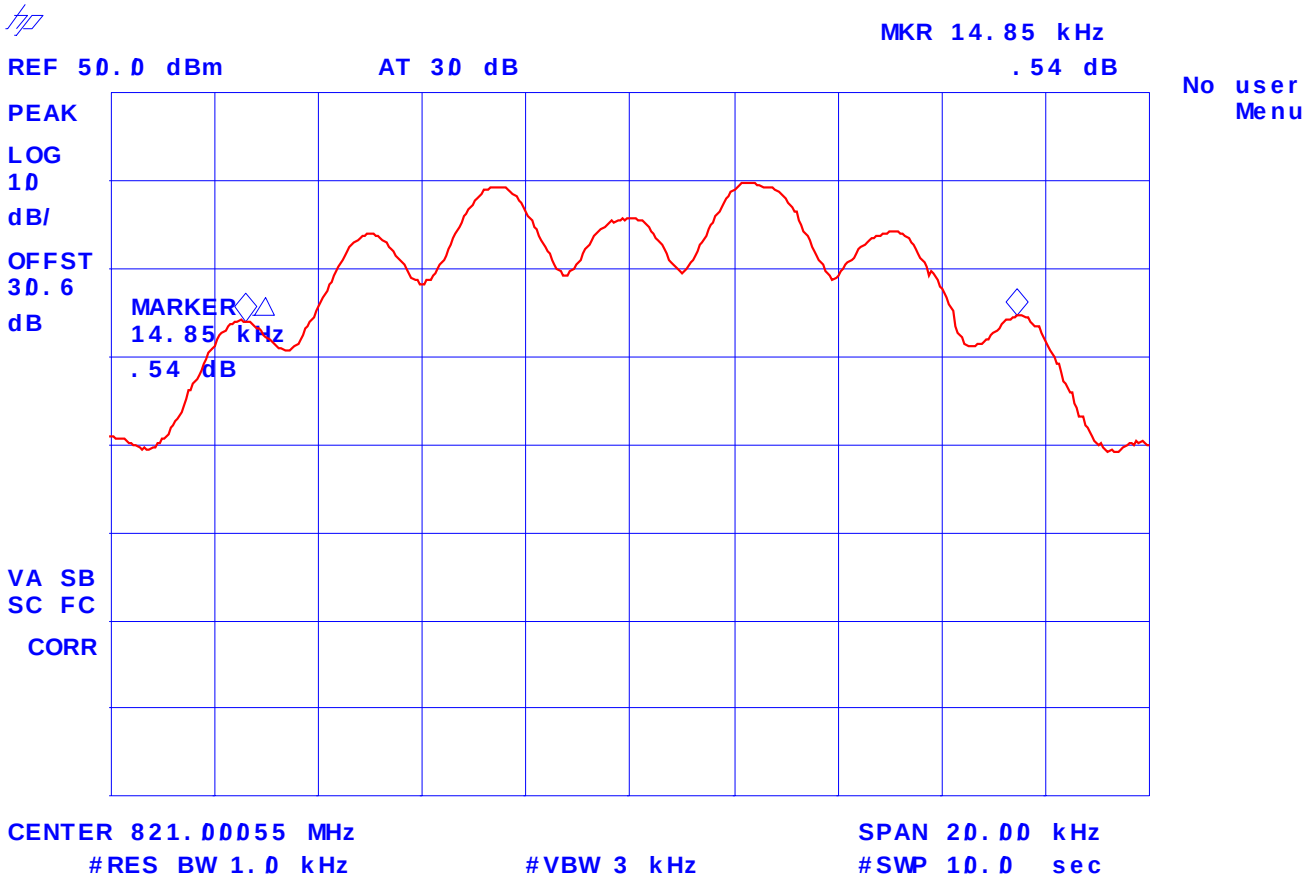
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 14: 99% Occupied Bandwidth
Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



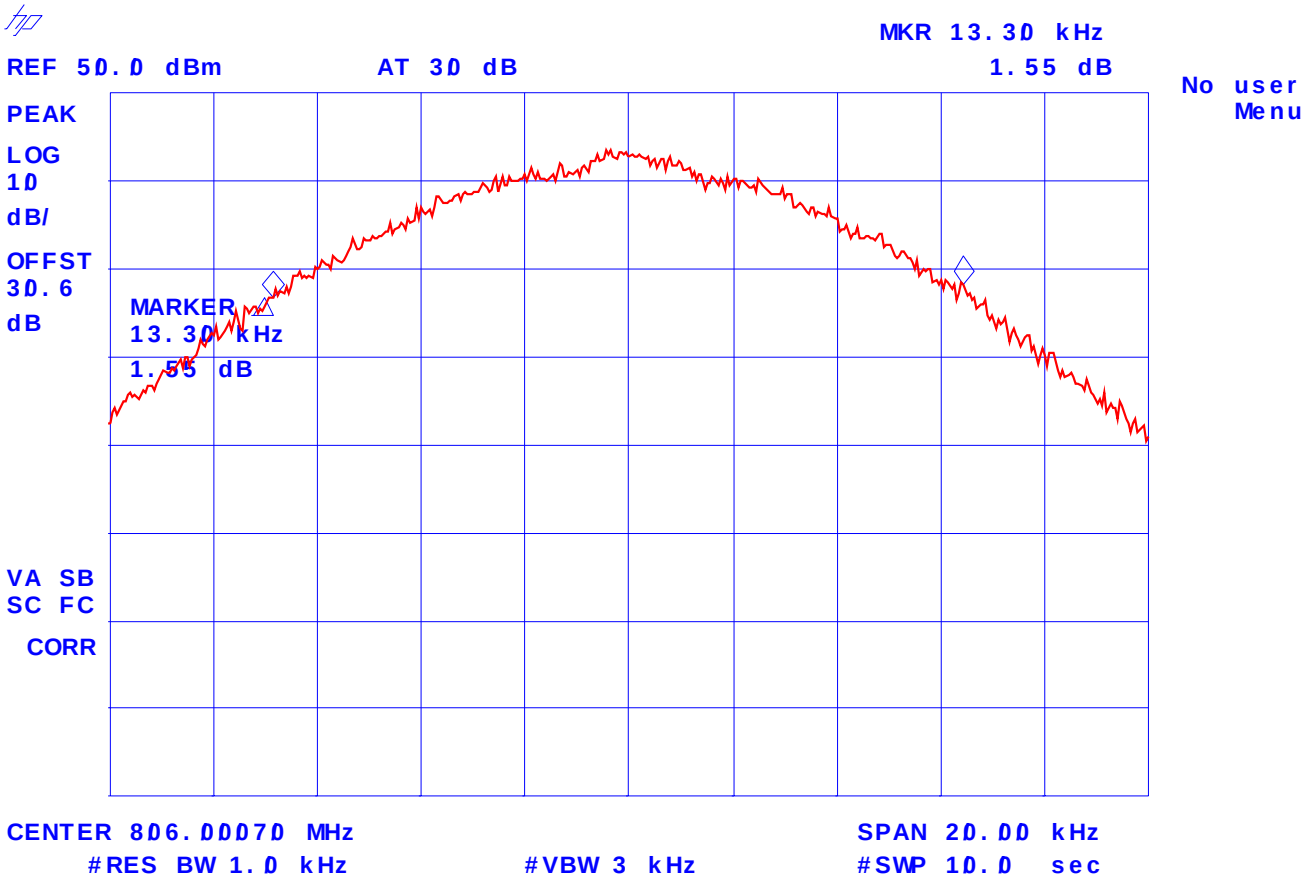
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 15: 99% Occupied Bandwidth
Frequency: 821 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



Plot # 16: 99% Occupied Bandwidth

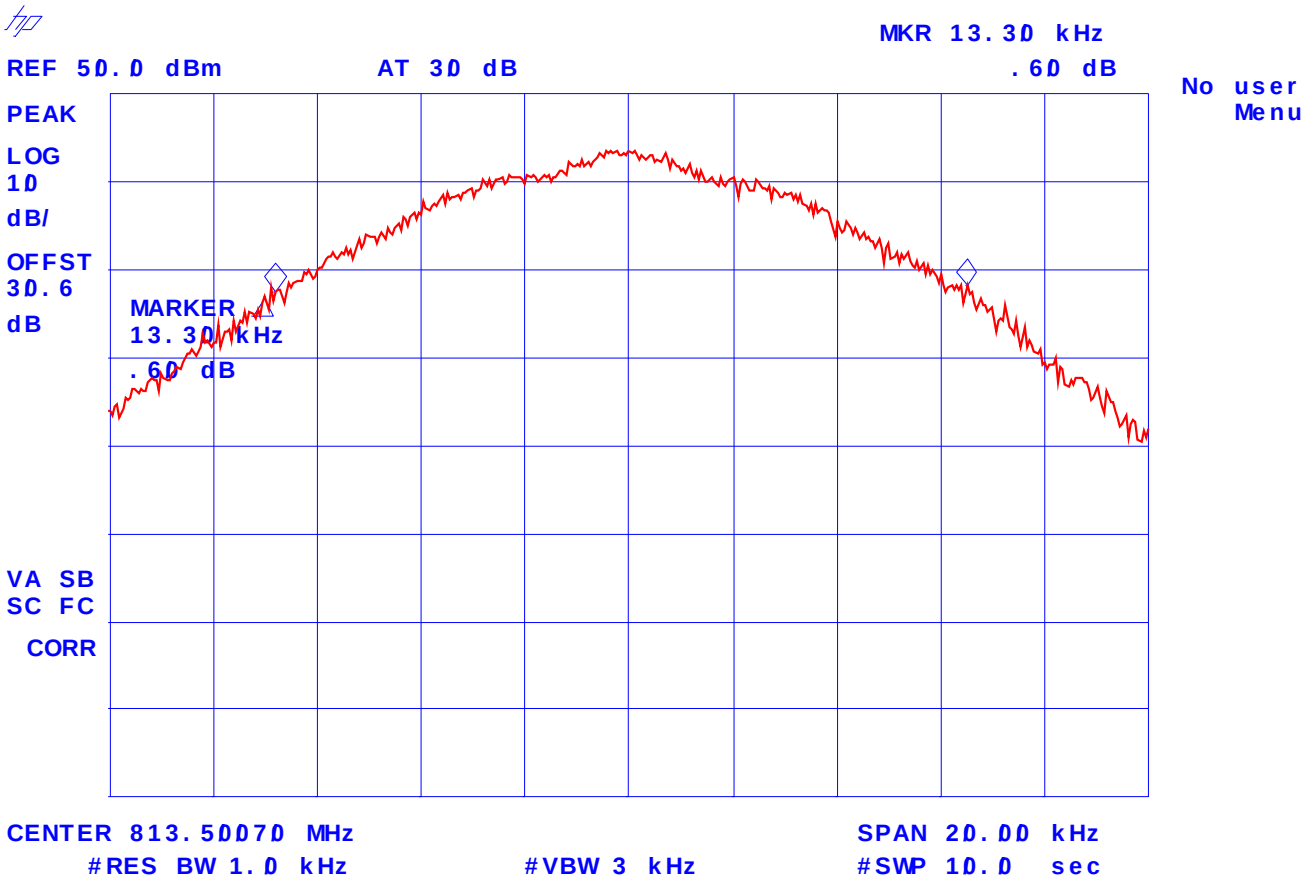
Frequency: 806 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

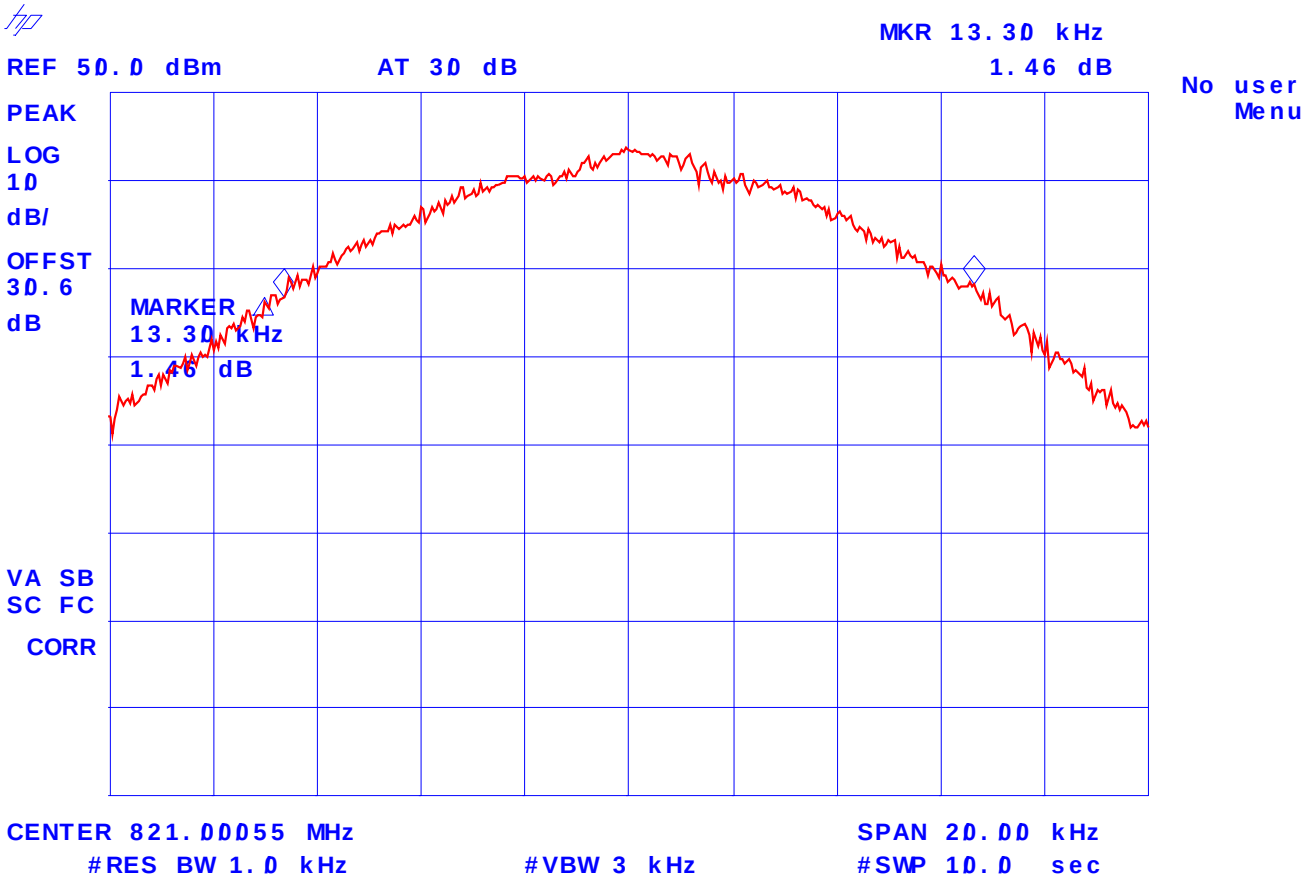
Plot # 17: 99% Occupied Bandwidth

Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



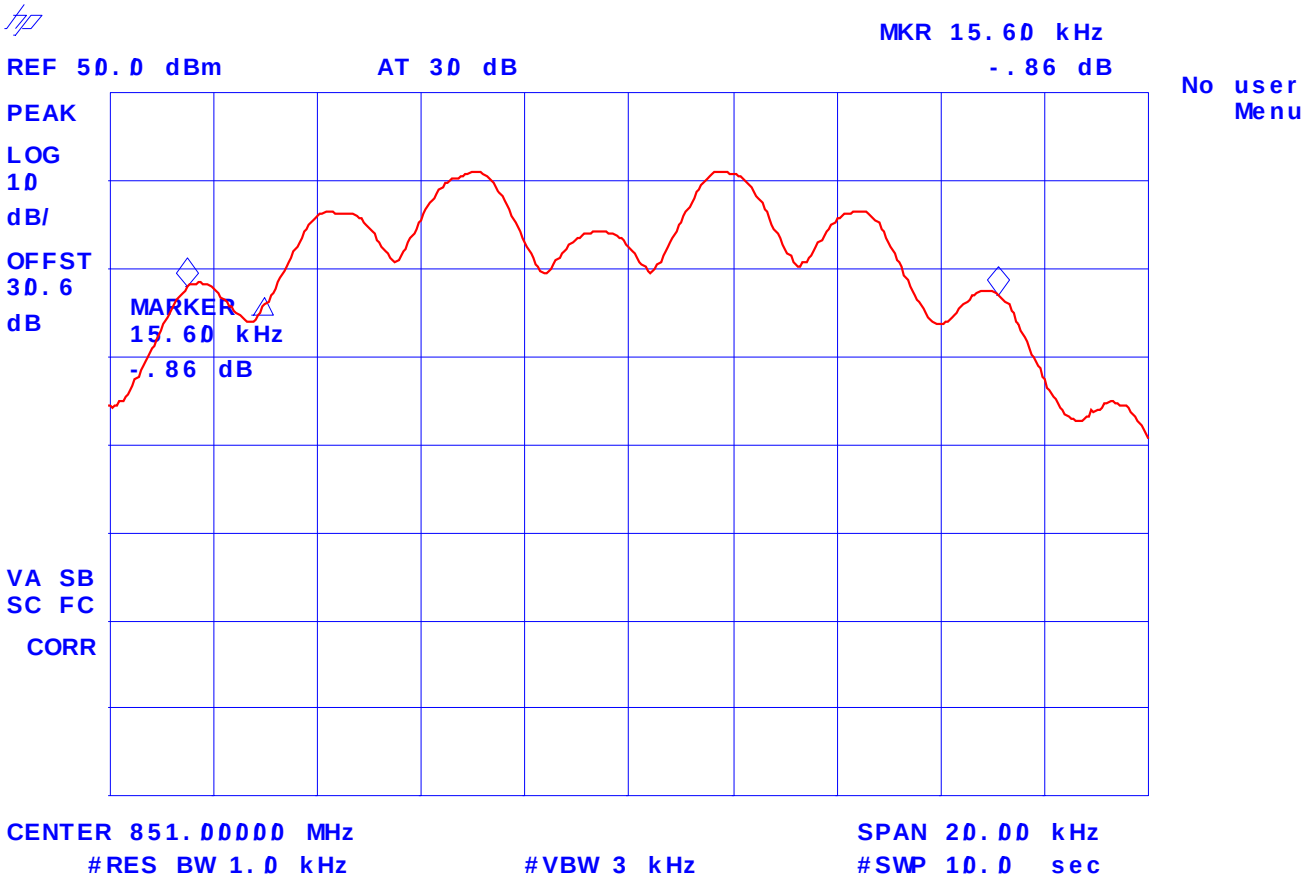
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 18: 99% Occupied Bandwidth
Frequency: 821 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



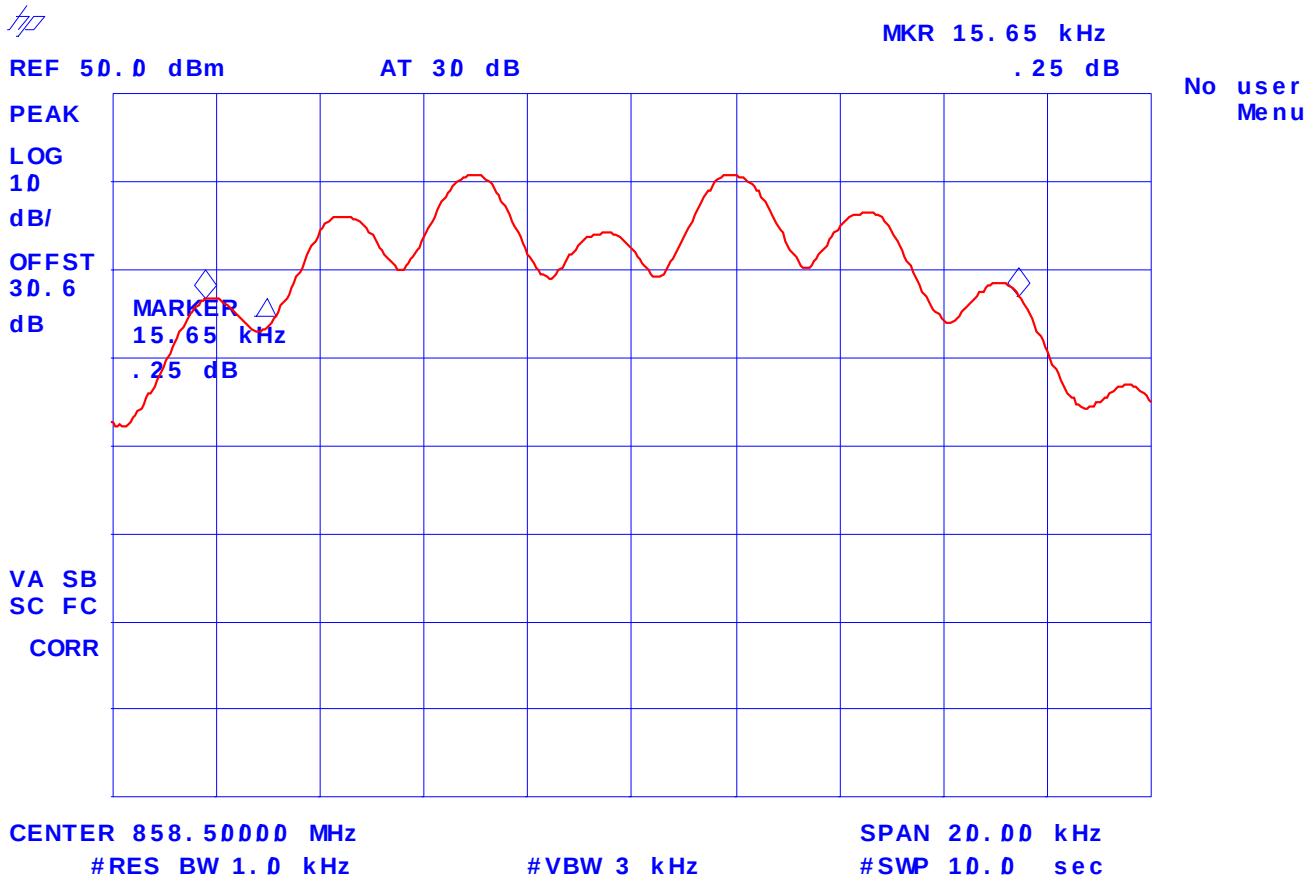
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 19: 99% Occupied Bandwidth
Frequency: 851 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



Plot # 20: 99% Occupied Bandwidth

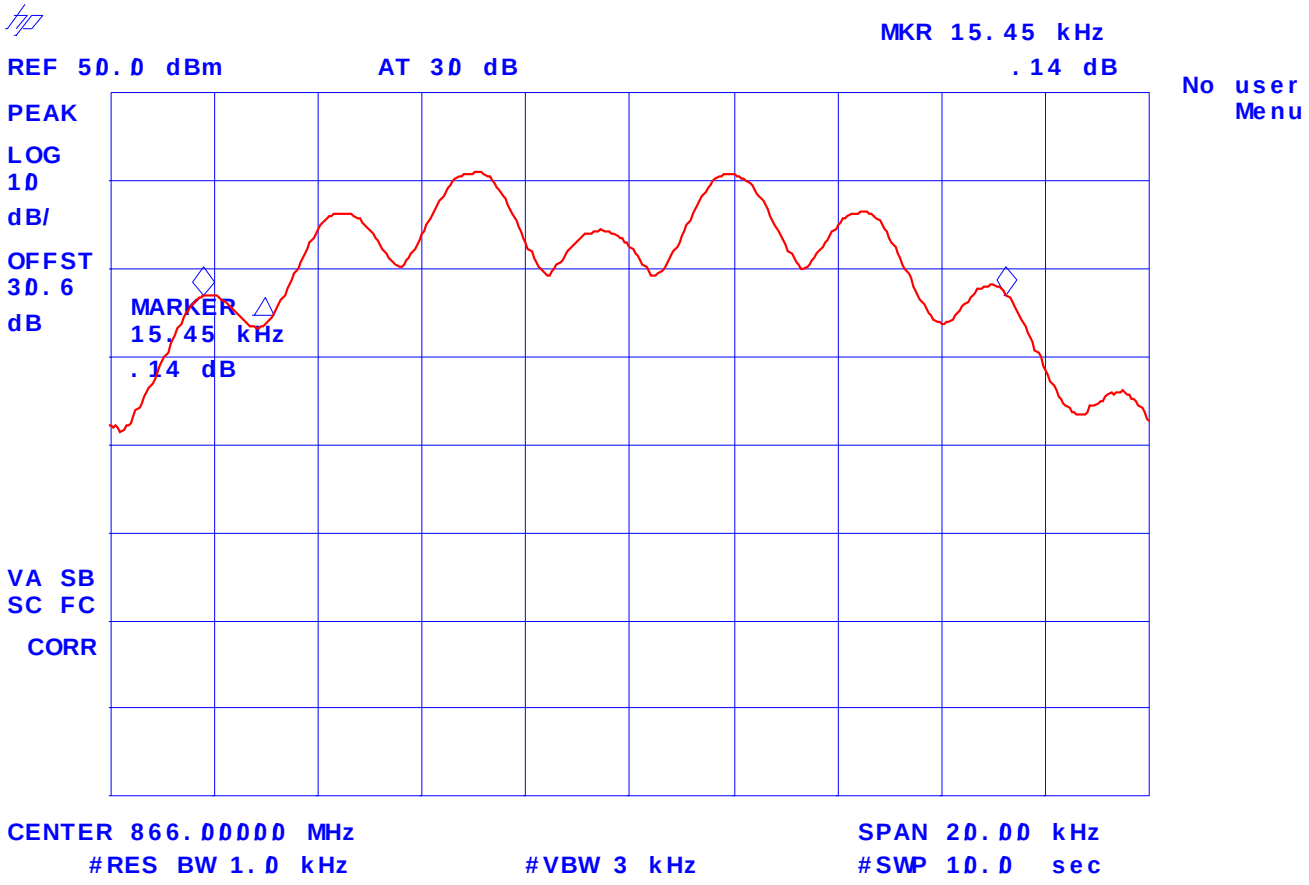
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 21: 99% Occupied Bandwidth

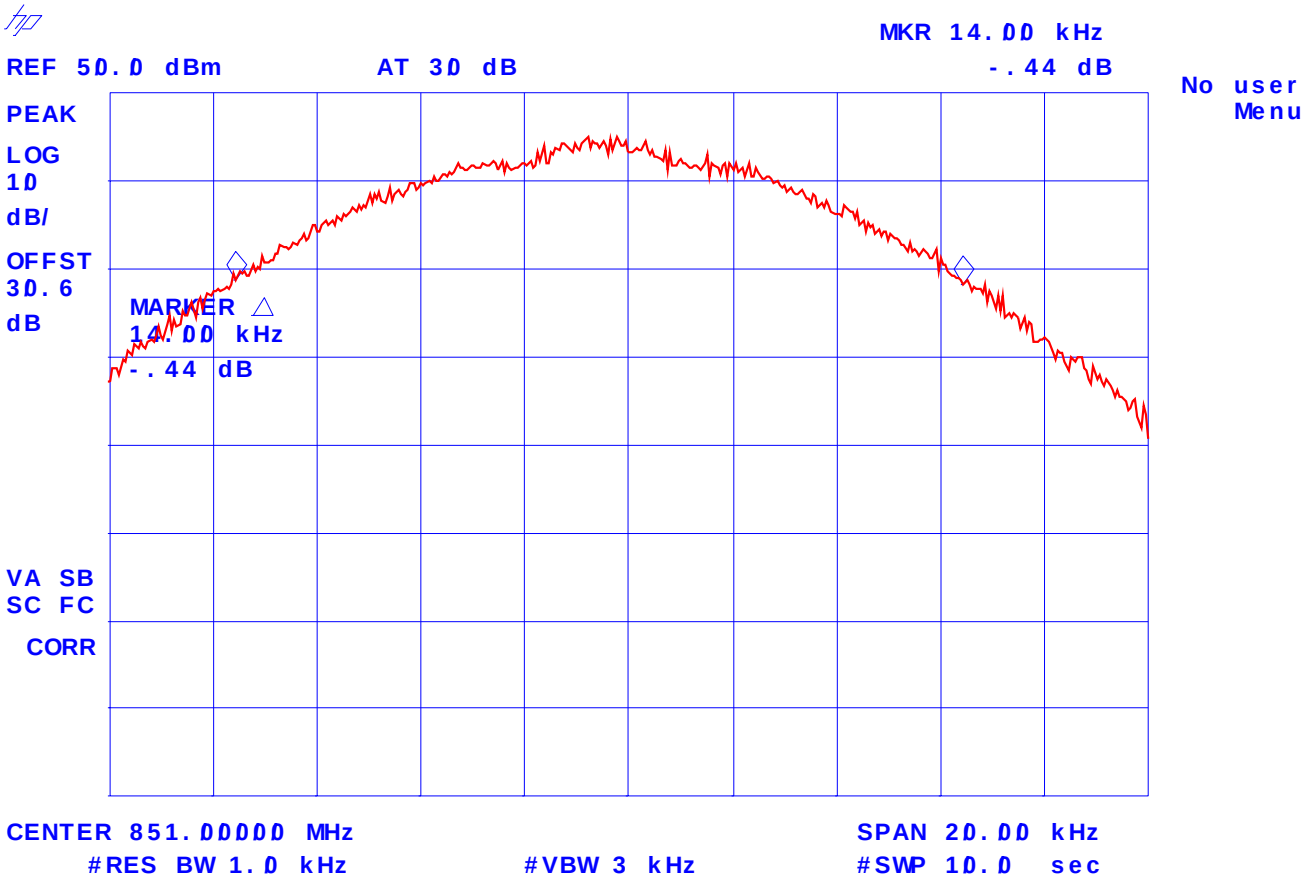
Frequency: 866 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 22: 99% Occupied Bandwidth

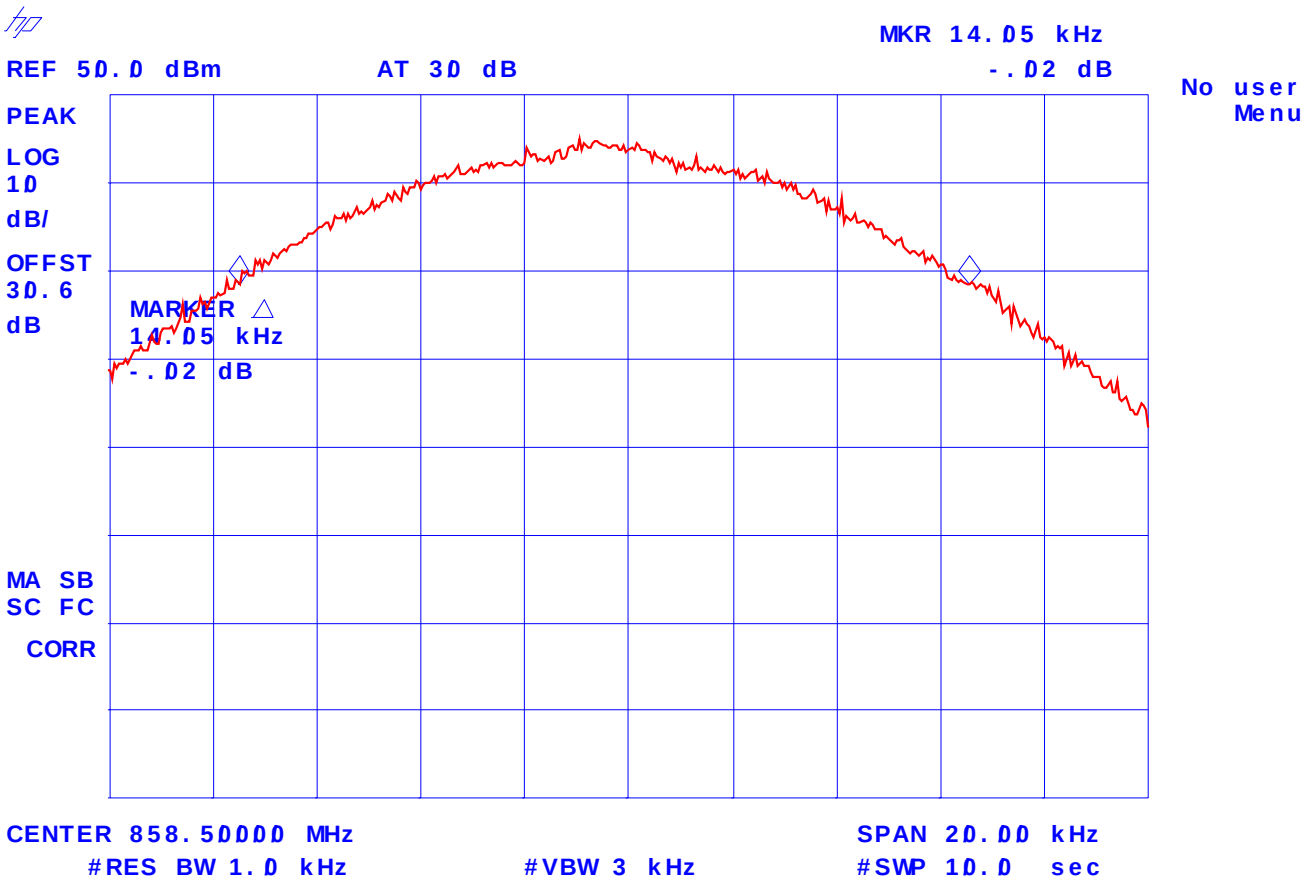
Frequency: 851 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 23: 99% Occupied Bandwidth

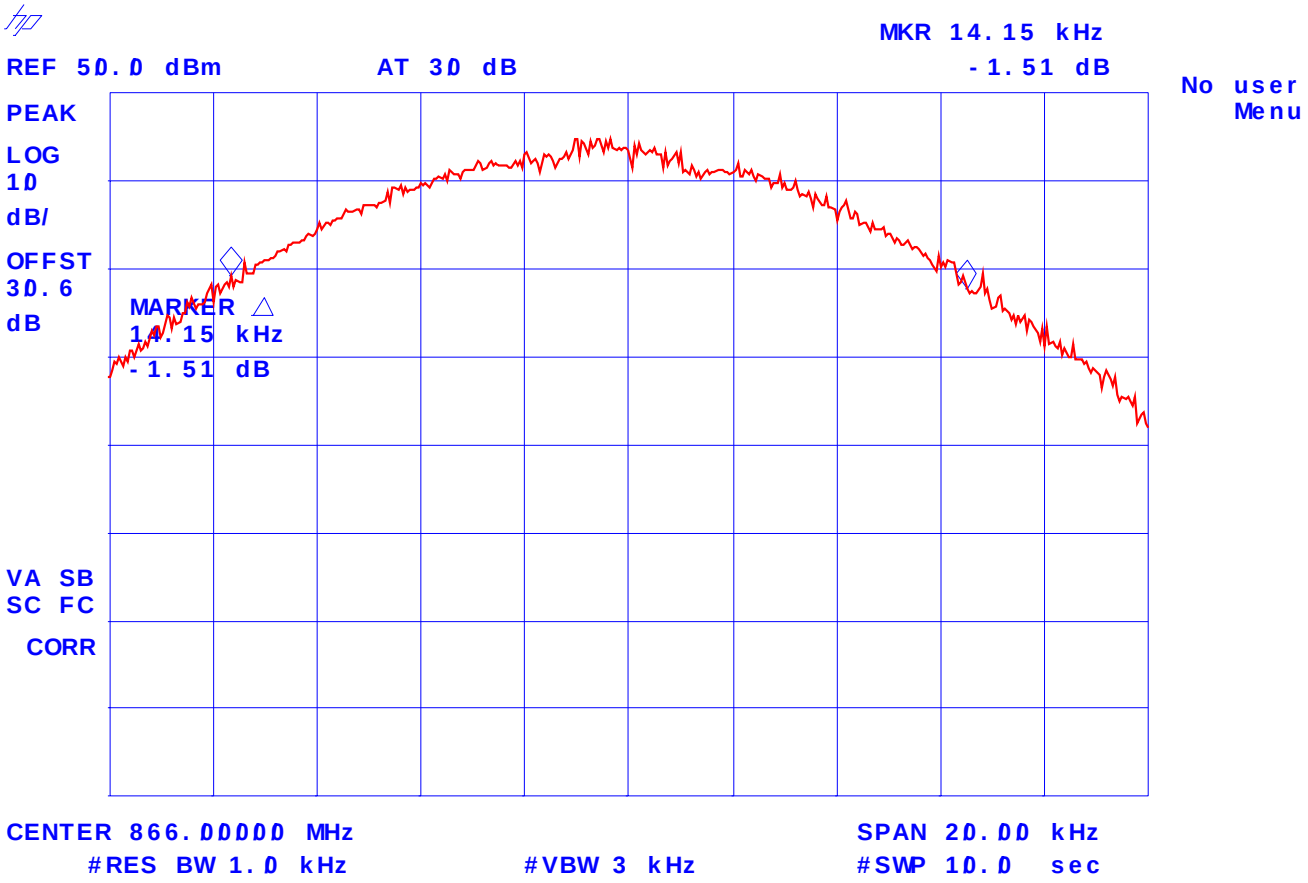
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 24: 99% Occupied Bandwidth

Frequency: 866 MHz, 25 kHz Channel Spacing. High Power
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

6.10.5.5. Emission Masks

Conform.

- Emission Mask B for FM Voice Modulation, Permitted Band 806-821 MHz, 25 kHz Channel Spacing, lowest power setting: refer to Plots # 25 to 28
- Emission Mask B for FM Voice Modulation, Permitted Band 806-821 MHz, 25 kHz Channel Spacing, highest power setting: refer to Plots # 29 to 32
- Emission Mask G for FM Data Modulation, Permitted Band 806-821 MHz, 25 kHz Channel Spacing, lowest power setting: refer to Plots # 33 to 36
- Emission Mask G for FM Data Modulation, Permitted Band 806-821 MHz, 25 kHz Channel Spacing, highest power setting: refer to Plots # 37to 40

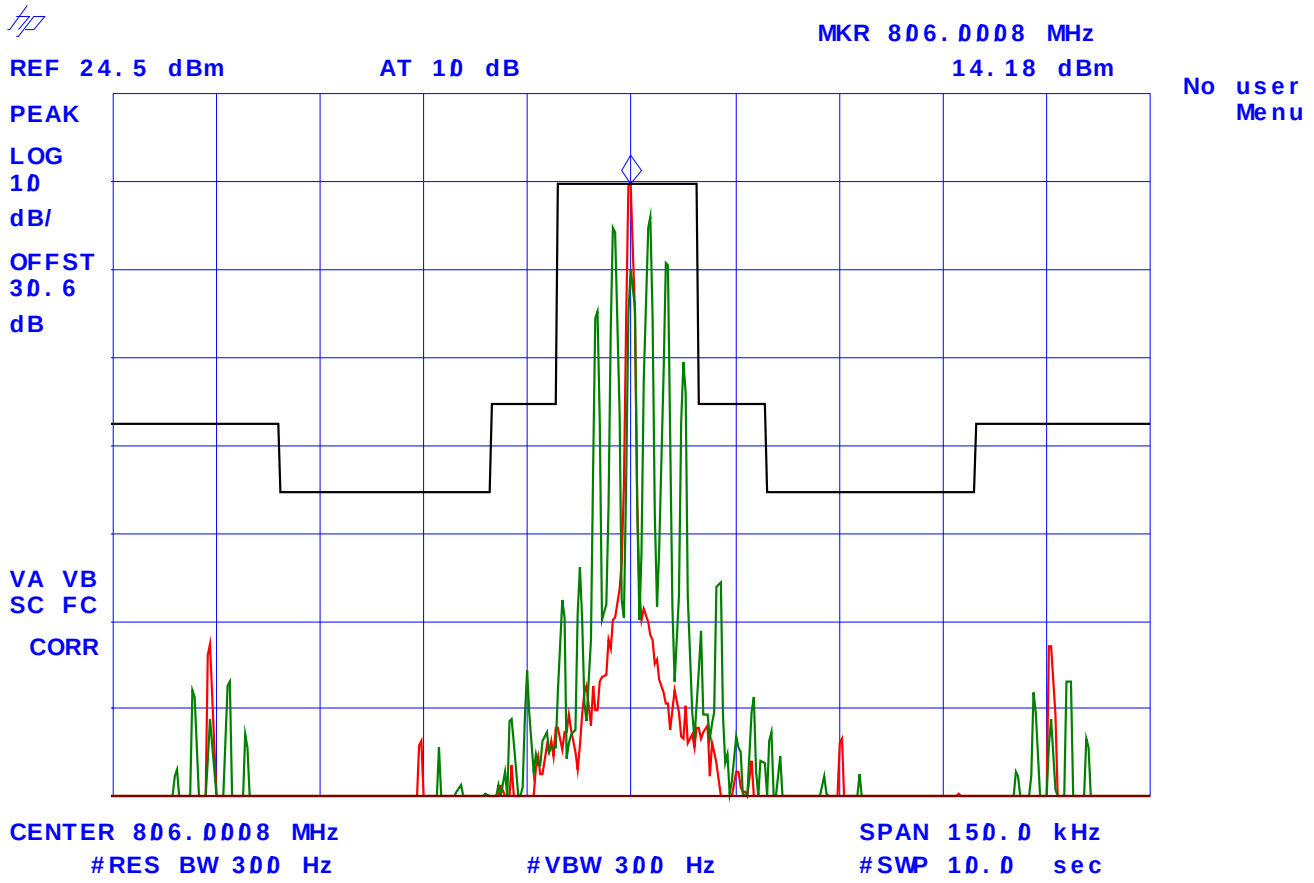
- Emission Mask B for FM Voice Modulation, Permitted Band 851-866 MHz, 25 kHz Channel Spacing, lowest power setting: refer to Plots # 41 to 44
- Emission Mask B for FM Voice Modulation, Permitted Band 851-866 MHz, 25 kHz Channel Spacing, highest power setting: refer to Plots # 45 to 48
- Emission Mask G for FM Data Modulation, Permitted Band 851-866 MHz, 25 kHz Channel Spacing, lowest power setting: refer to Plots # 49 to 52
- Emission Mask G for FM Data Modulation, Permitted Band 851-866 MHz, 25 kHz Channel Spacing, highest power setting: refer to Plots # 53 to 56

- Emission Mask B for FM Voice Modulation, Permitted Band 821-824 MHz, 12.5 kHz Channel Spacing, lowest power setting: refer to Plots # 57 to 60
- Emission Mask B for FM Voice Modulation, Permitted Band 821-824 MHz, 12.5 kHz Channel Spacing, highest power setting: refer to Plots # 61 to 64
- Emission Mask H for FM Data Modulation, Permitted Band 821-824 MHz, 12.5 kHz Channel Spacing, lowest power setting: refer to Plots # 65 to 68
- Emission Mask H for FM Data Modulation, Permitted Band 821-824 MHz, 12.5 kHz Channel Spacing, highest power setting: refer to Plots # 69 to 72

- Emission Mask B for FM Voice Modulation, Permitted Band 866-869 MHz, 12.5 kHz Channel Spacing, lowest power setting: refer to Plots # 73 to 76
- Emission Mask B for FM Voice Modulation, Permitted Band 866-869 MHz, 12.5 kHz Channel Spacing, highest power setting: refer to Plots # 77 to 80
- Emission Mask H for FM Data Modulation, Permitted Band 866-869 MHz, 12.5 kHz Channel Spacing, lowest power setting: refer to Plots # 81 to 84
- Emission Mask H for FM Data Modulation, Permitted Band 866-869 MHz, 12.5 kHz Channel Spacing, highest power setting: refer to Plots # 85 to 88

Plot # 25: Emissions Mask B

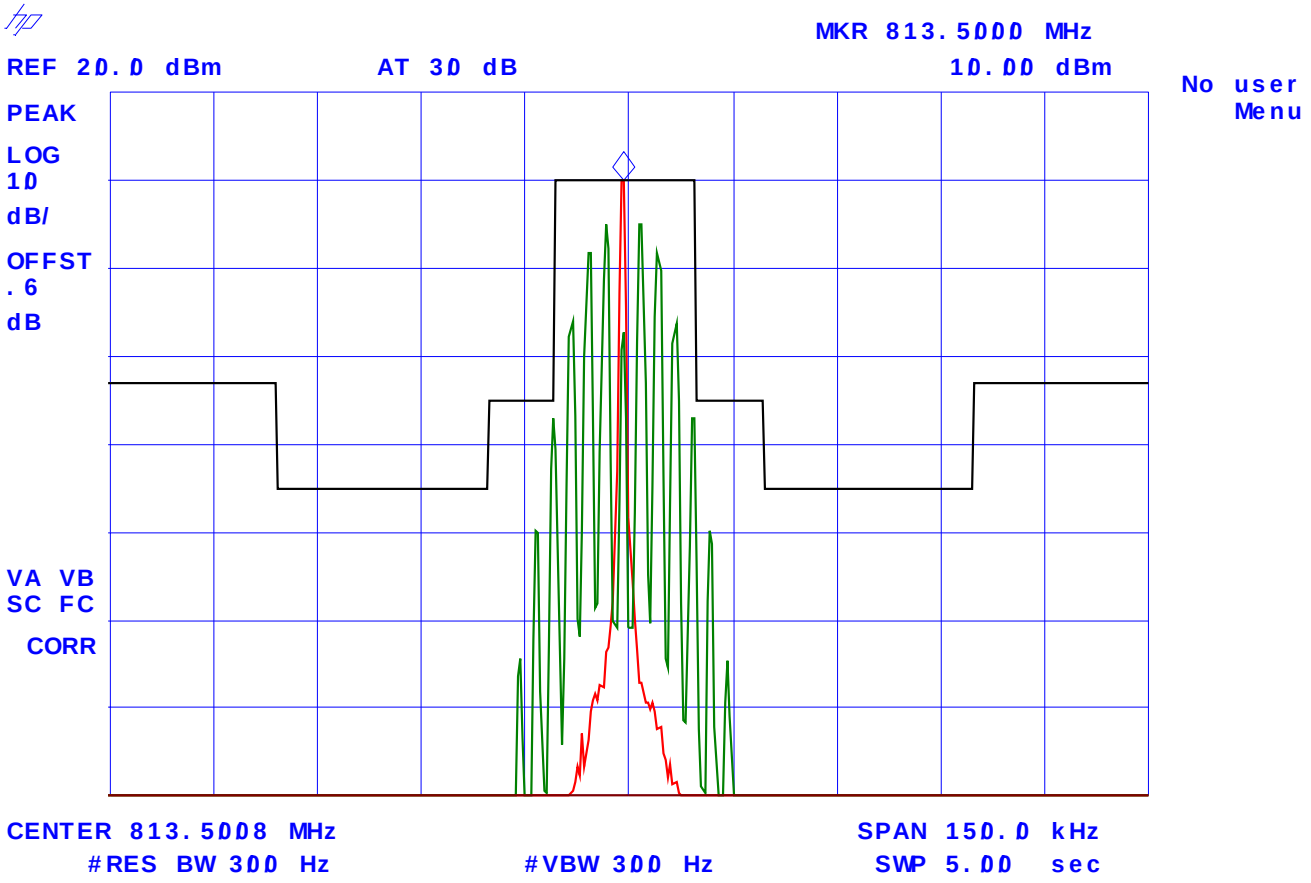
Frequency: 806 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 26: Emissions Mask B

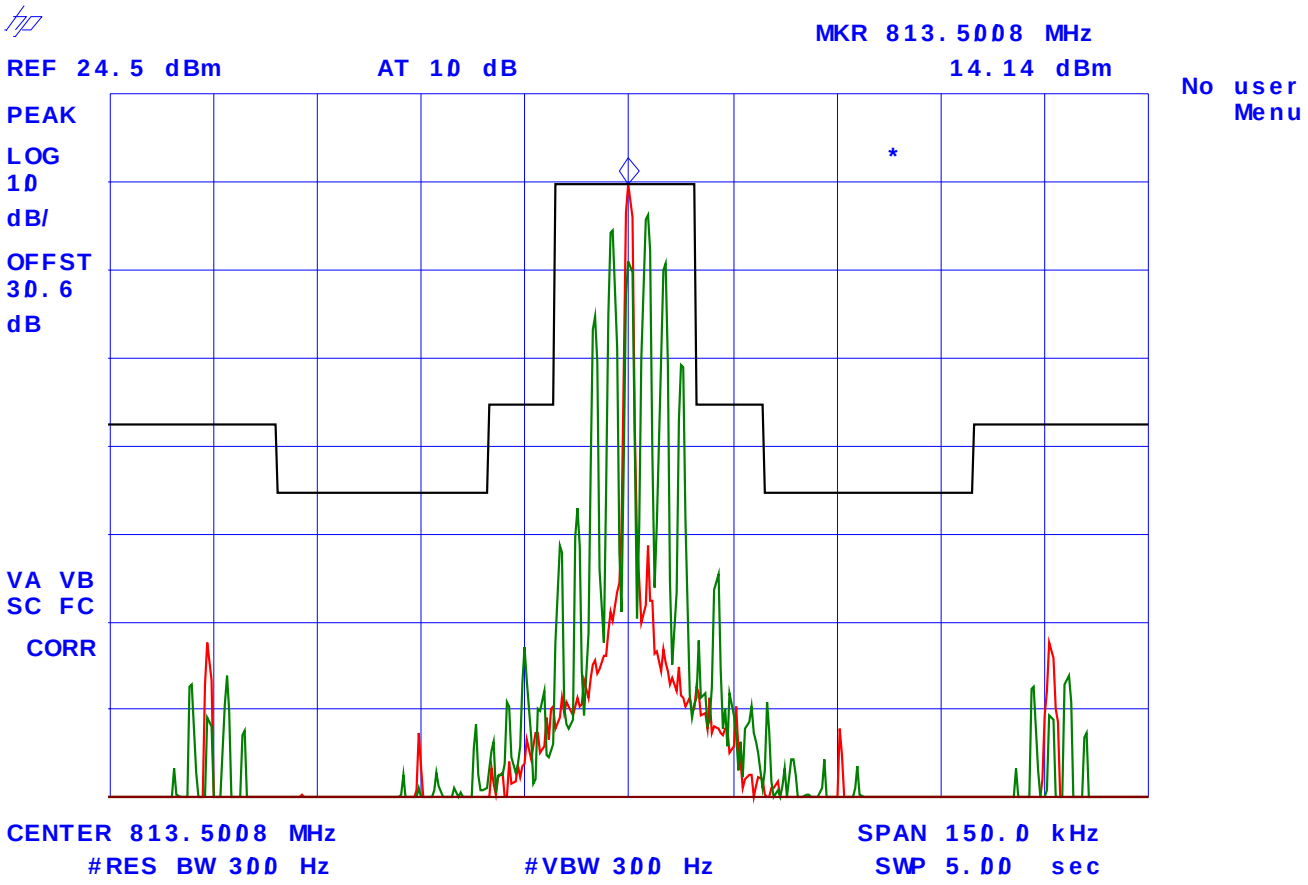
Frequency: 813.5 MHz, 25 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 27: Emissions Mask B

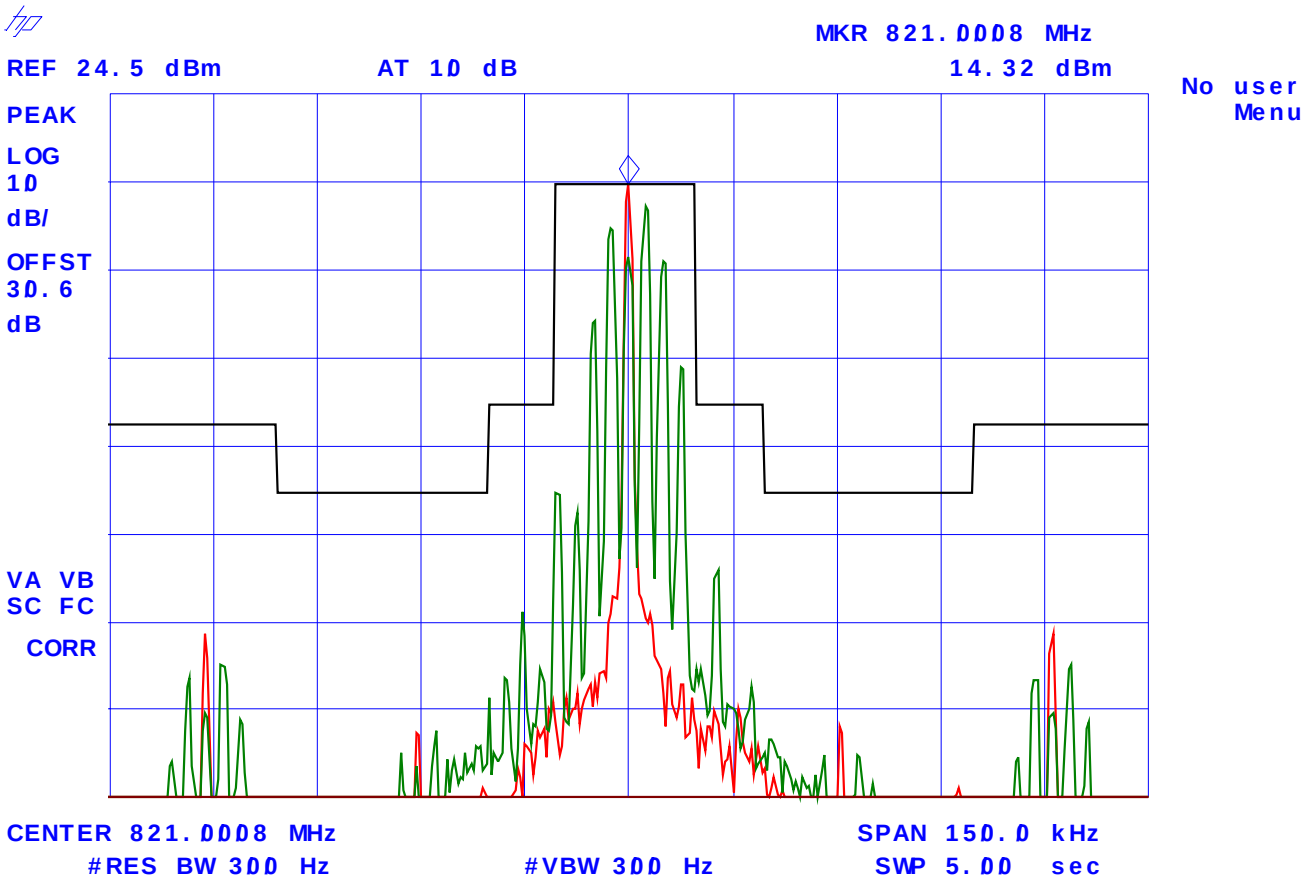
Frequency: 813.5 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 28: Emissions Mask B

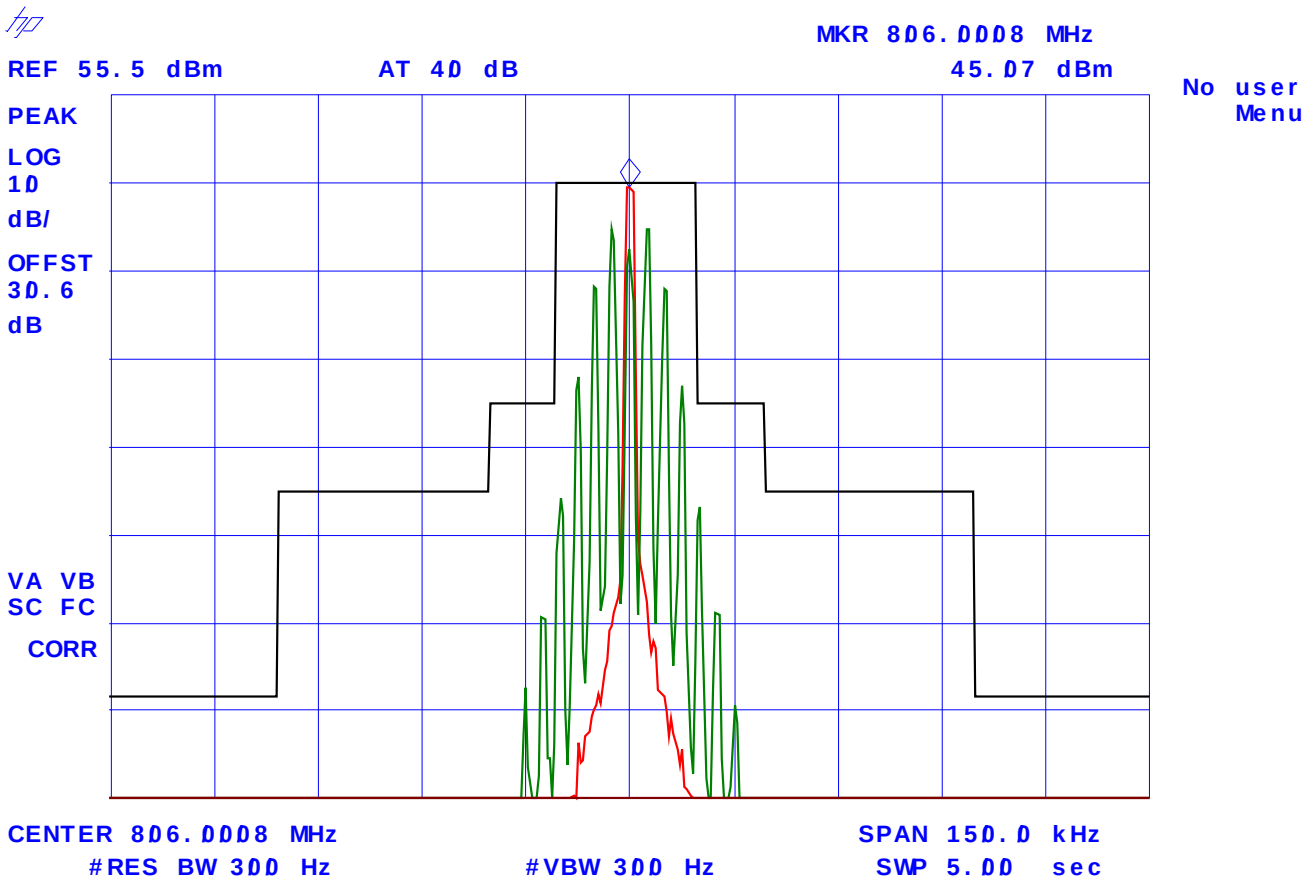
Frequency: 821 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 29: Emissions Mask B

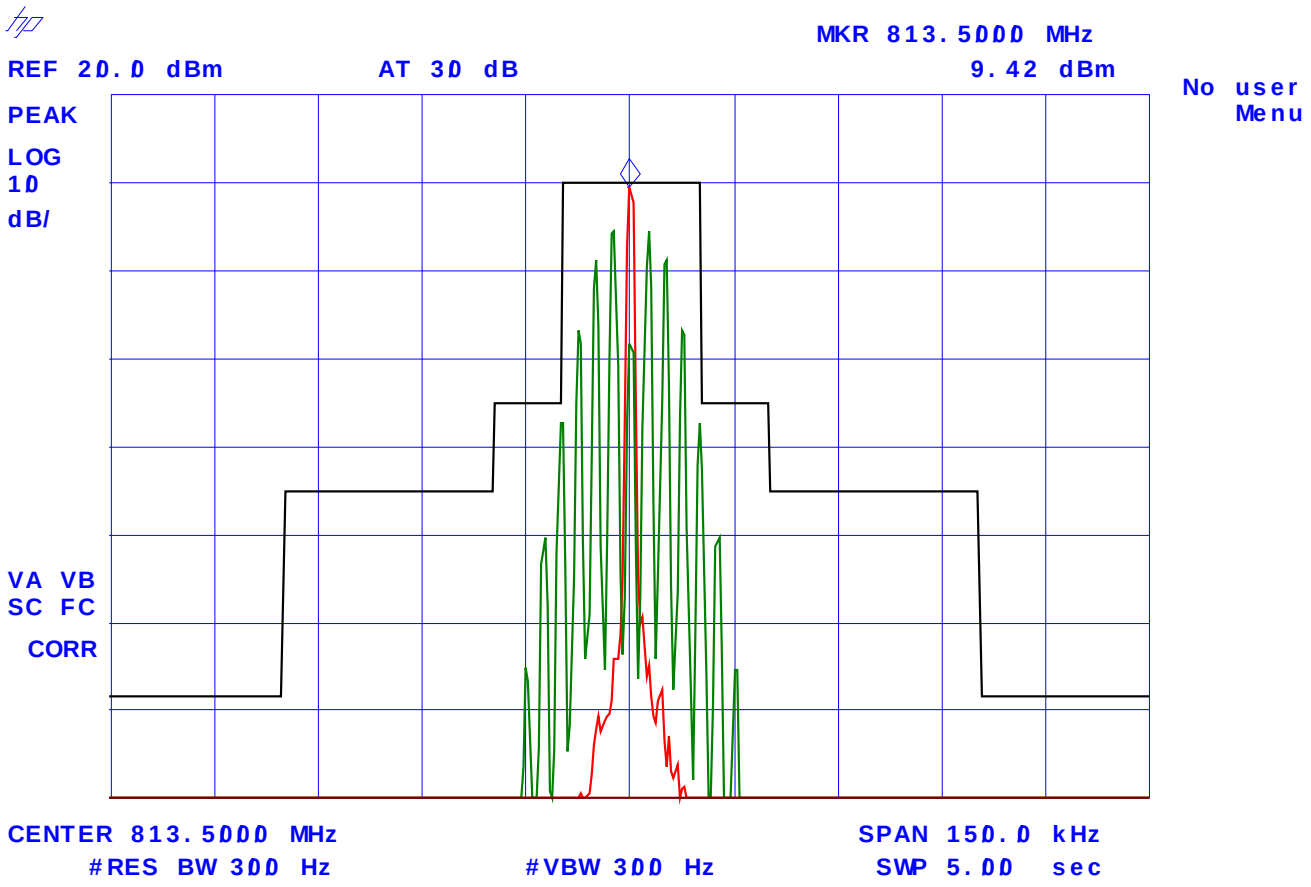
Frequency: 806 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 30: Emissions Mask B

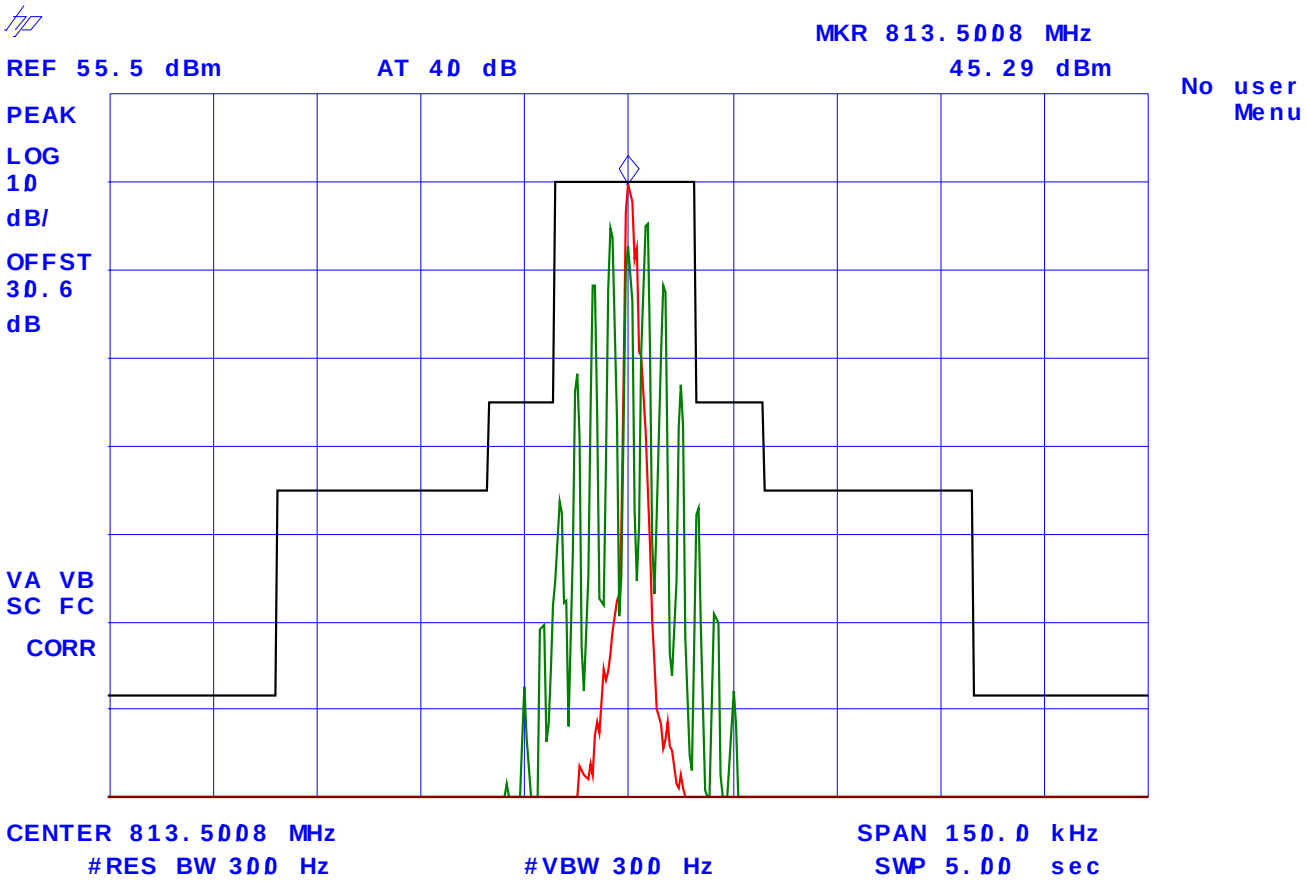
Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 31: Emissions Mask B

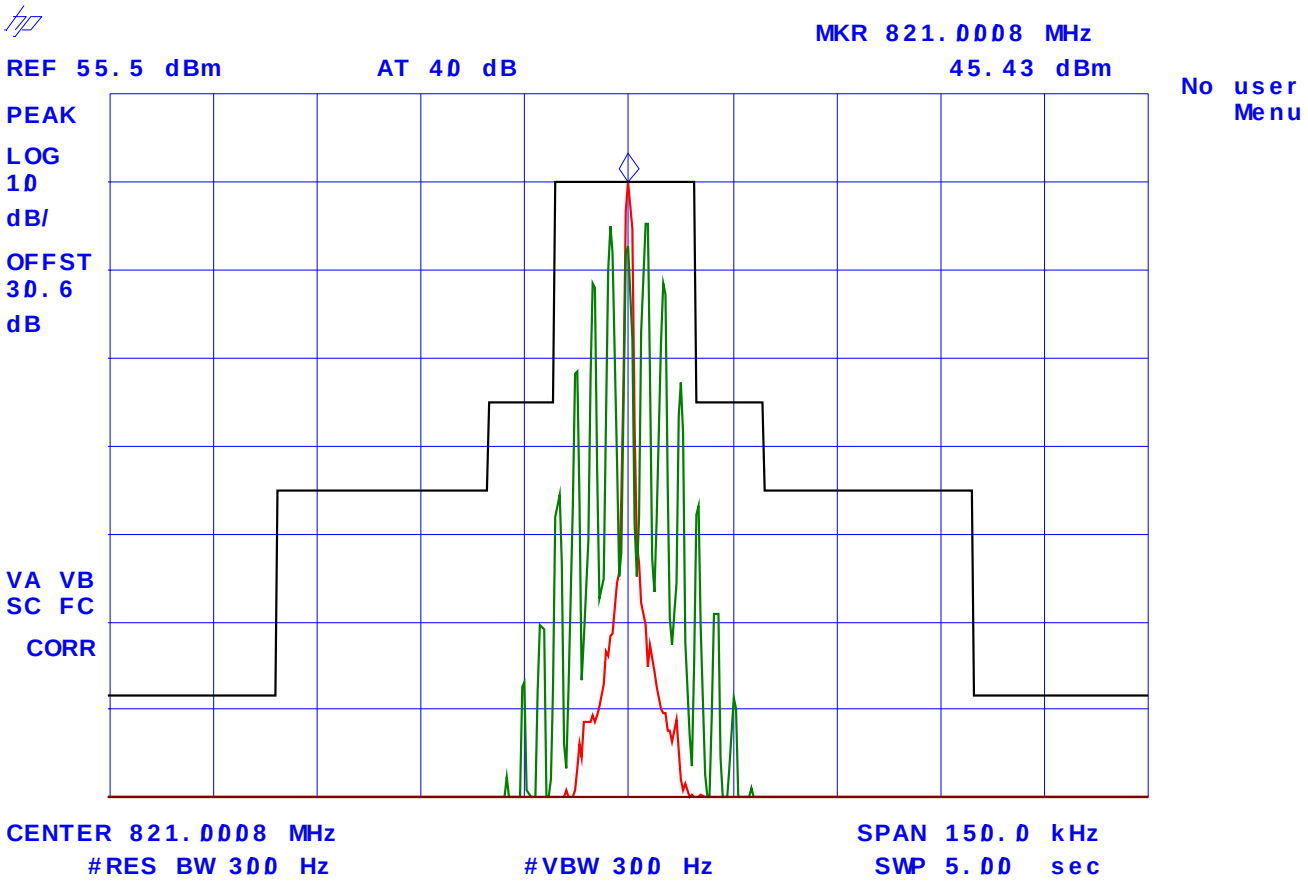
Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 32: Emissions Mask B

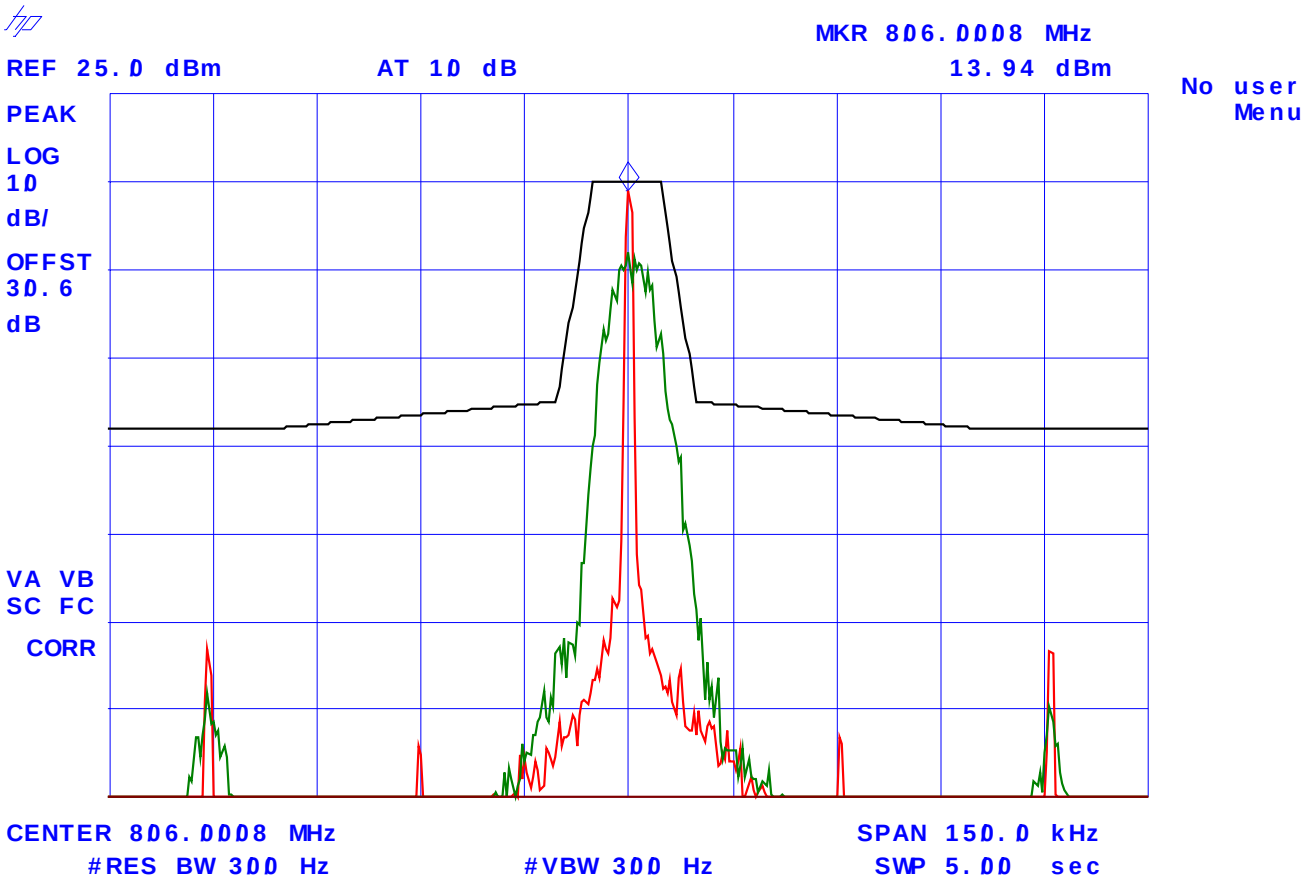
Frequency: 821 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 33: Emissions Mask G

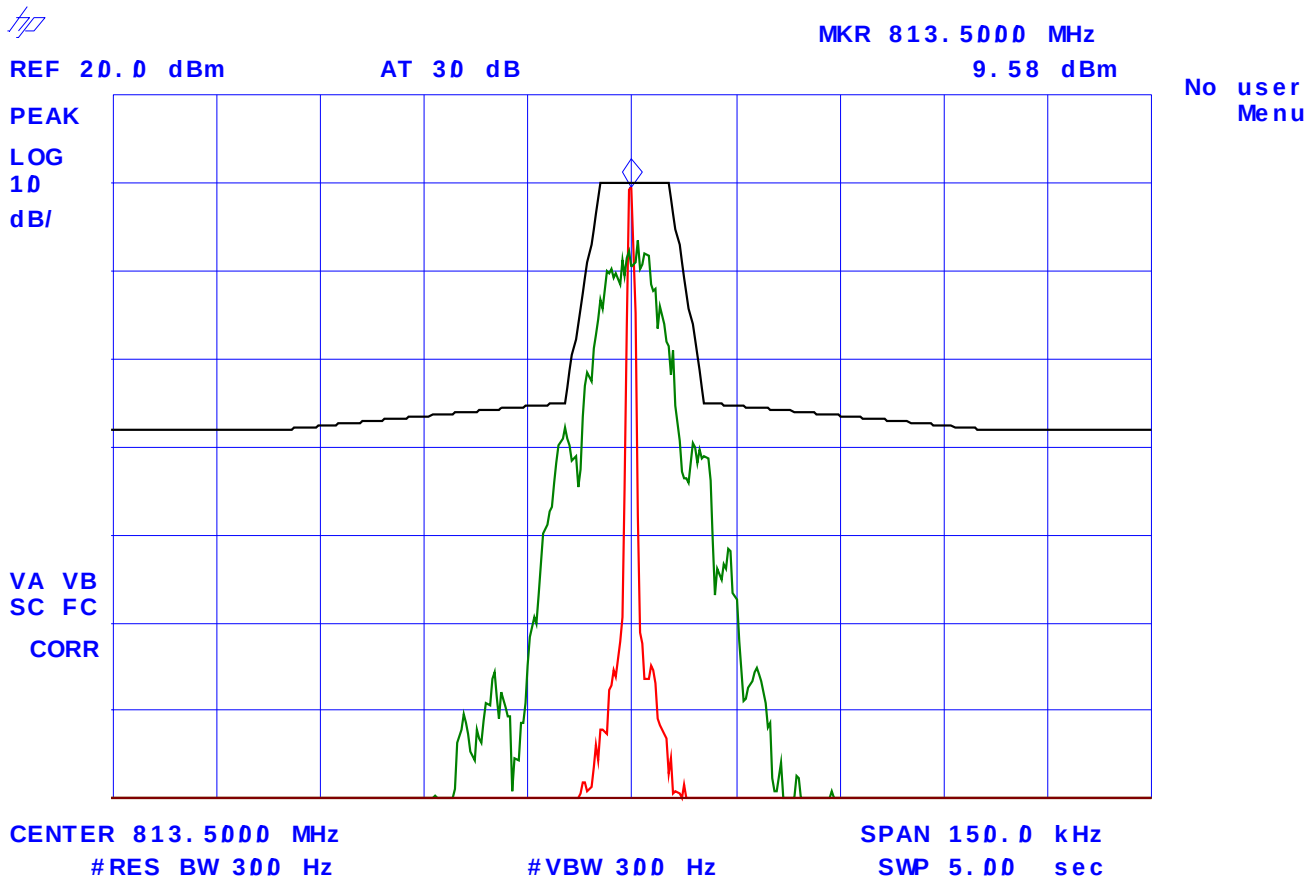
Frequency: 806 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 34: Emissions Mask G

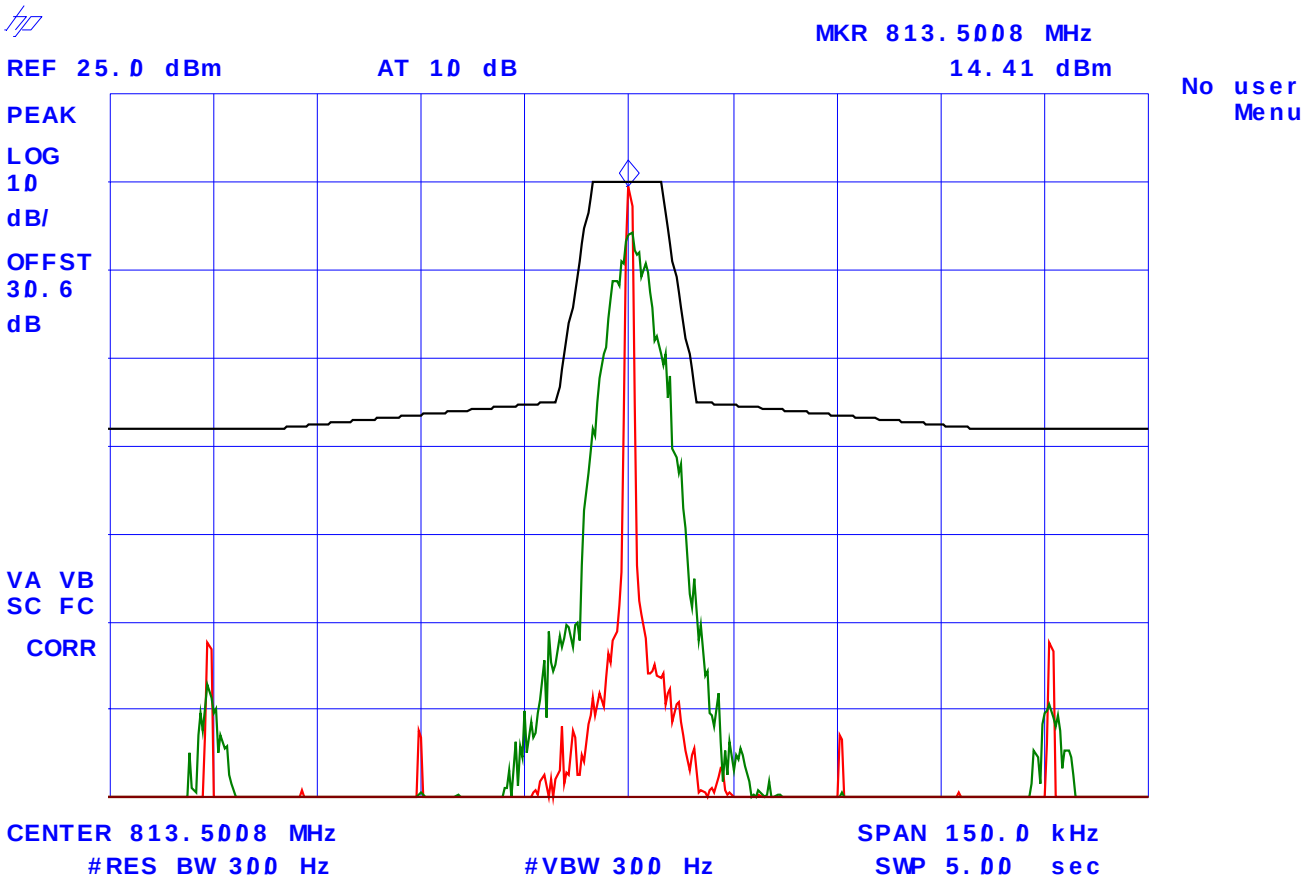
Frequency: 813.5 MHz, 25 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 35: Emissions Mask G

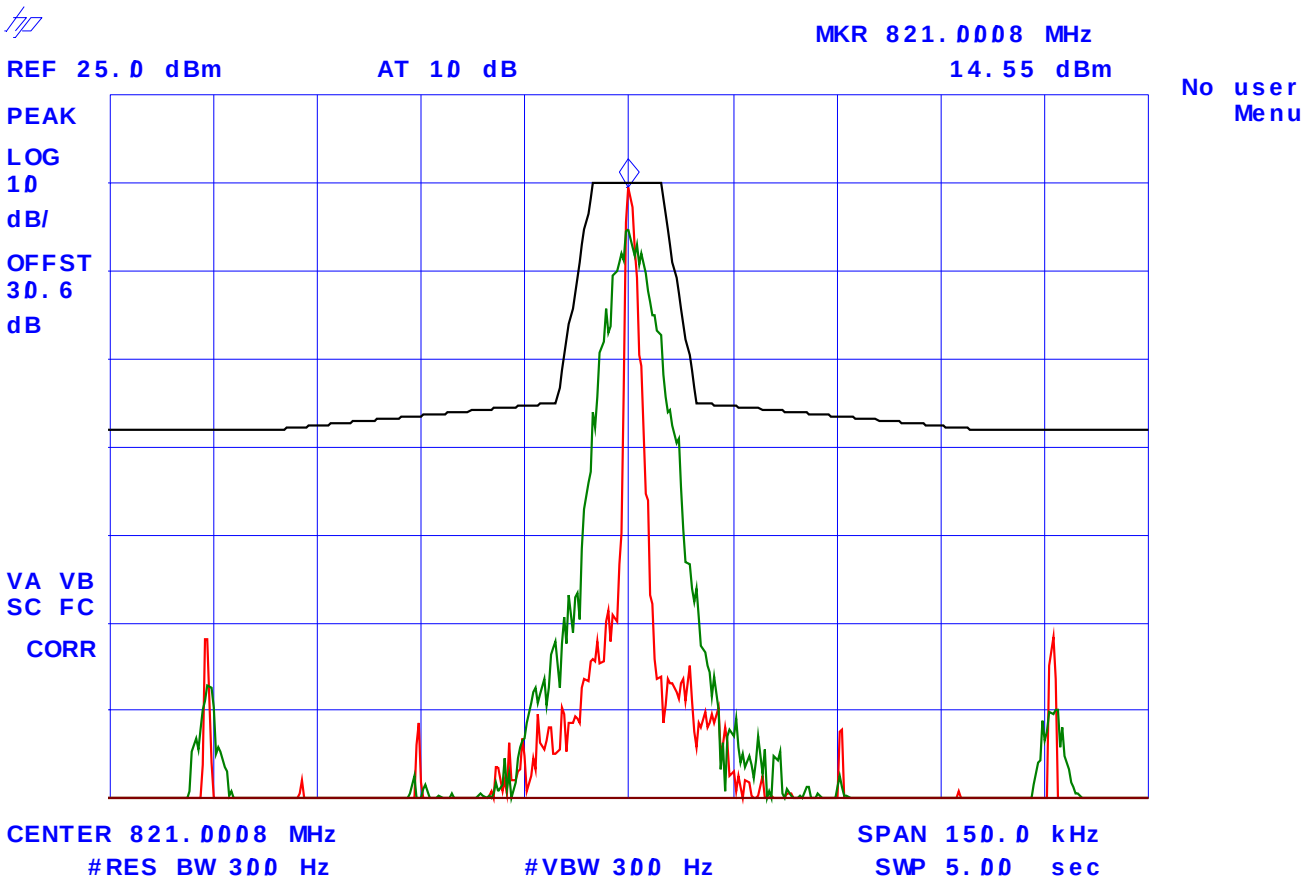
Frequency: 813.5 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 36: Emissions Mask G

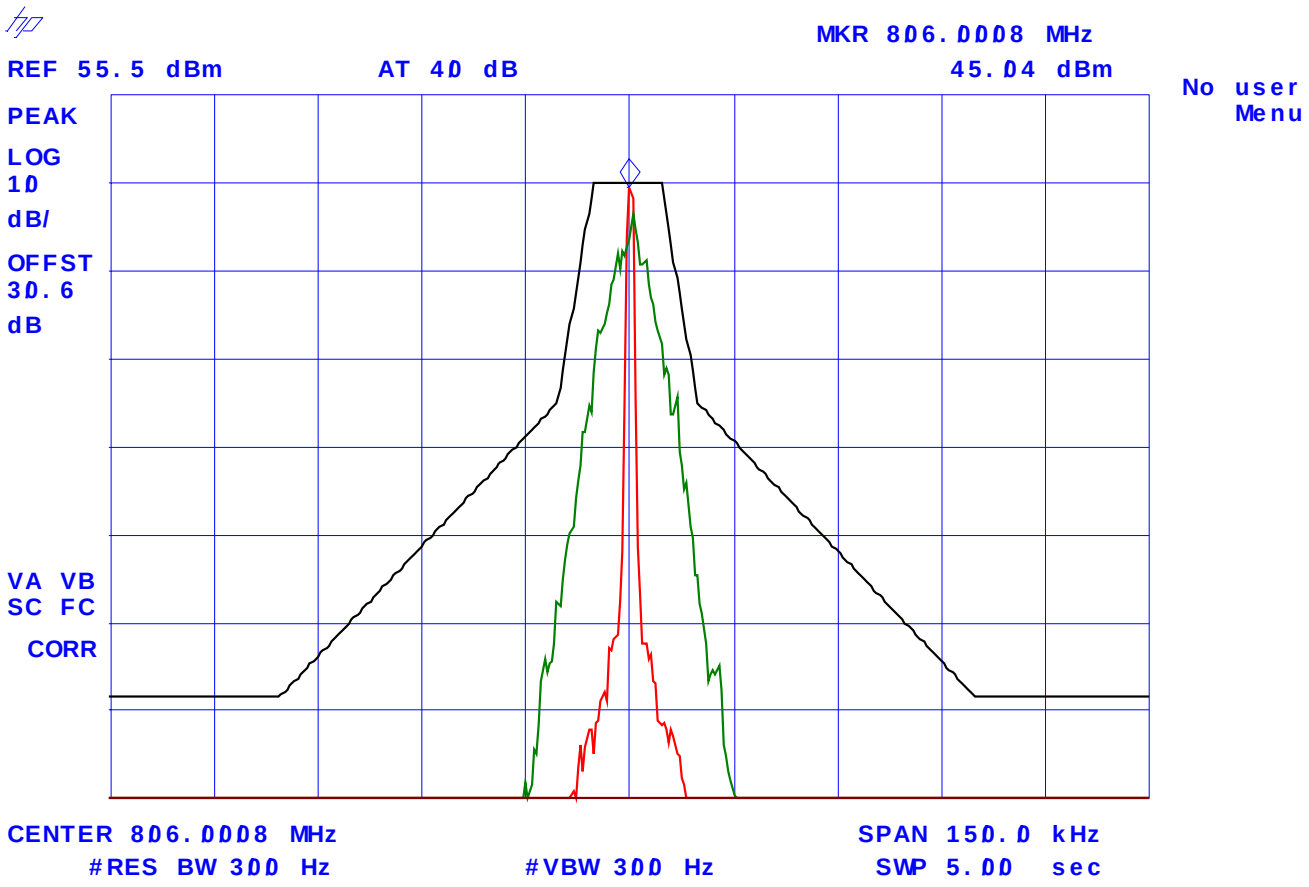
Frequency: 821 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 37: Emissions Mask G

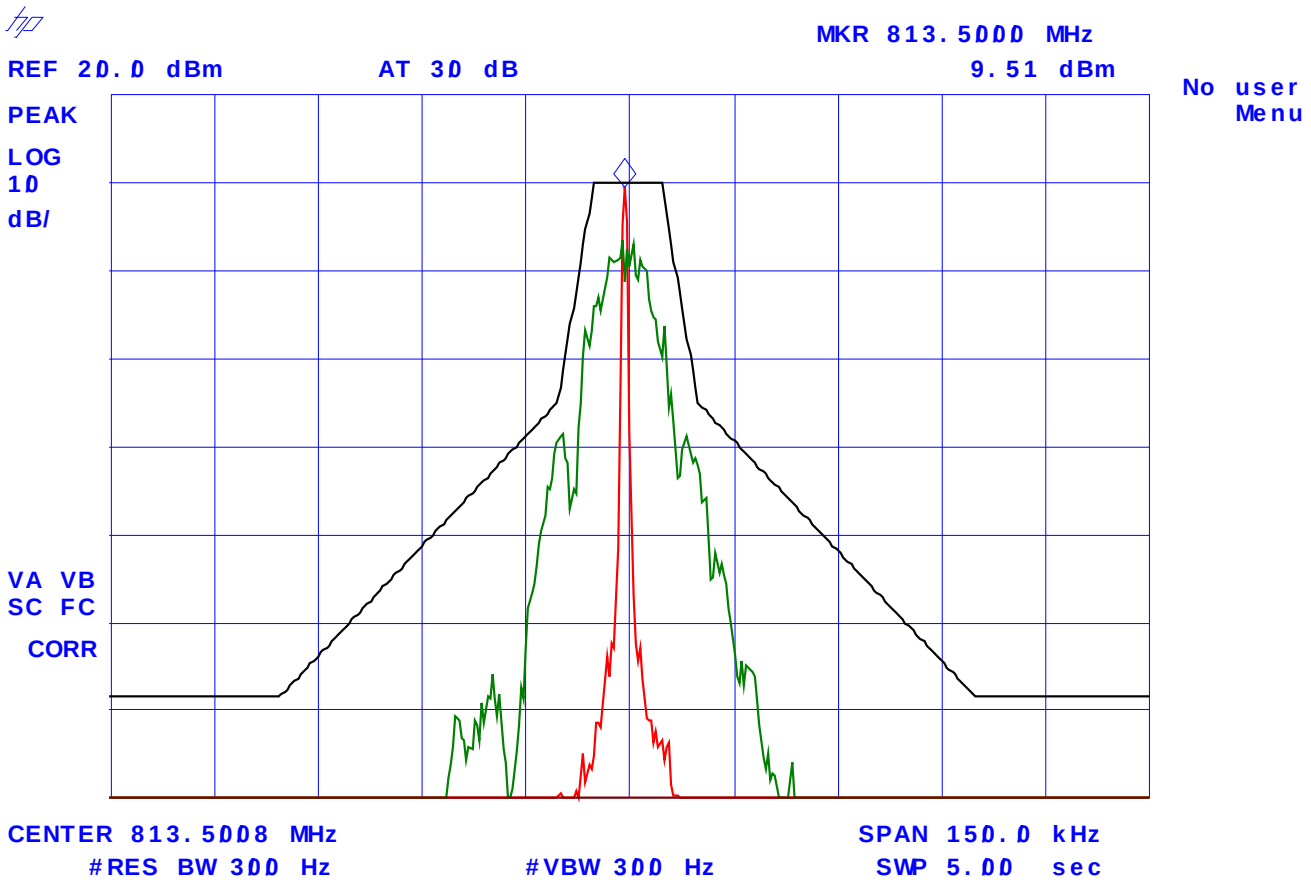
Frequency: 806 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 38: Emissions Mask G

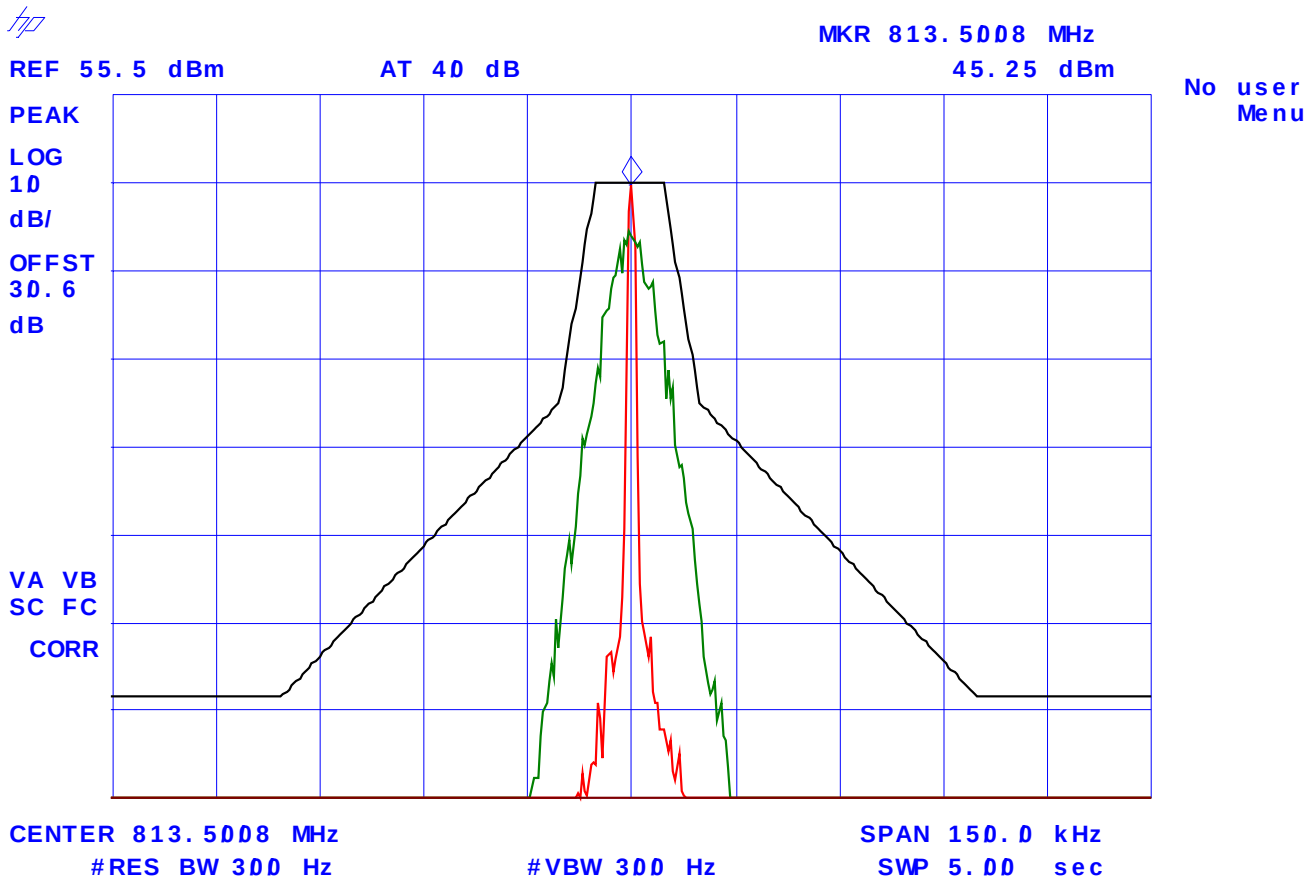
Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 39: Emissions Mask G

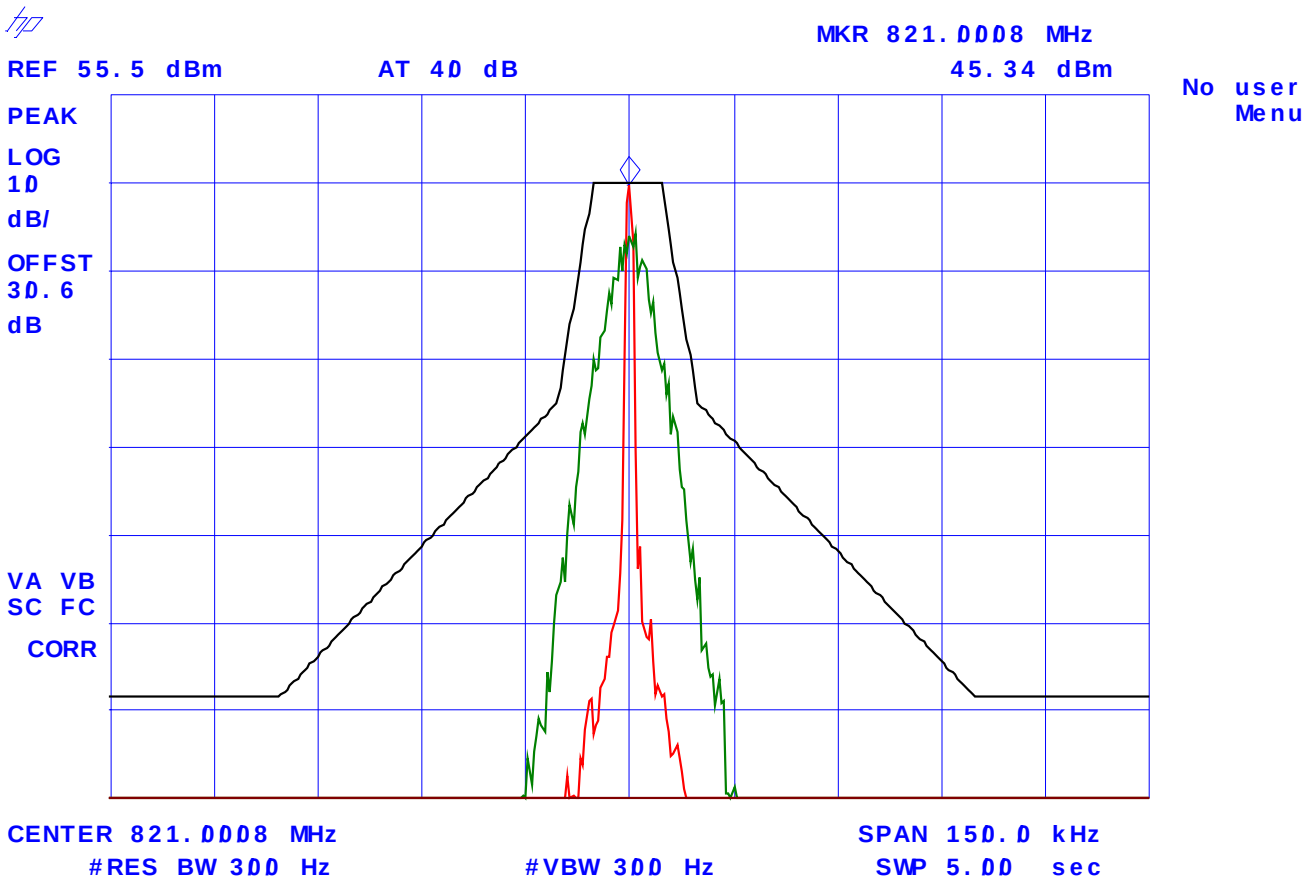
Frequency: 813.5 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 40: Emissions Mask G

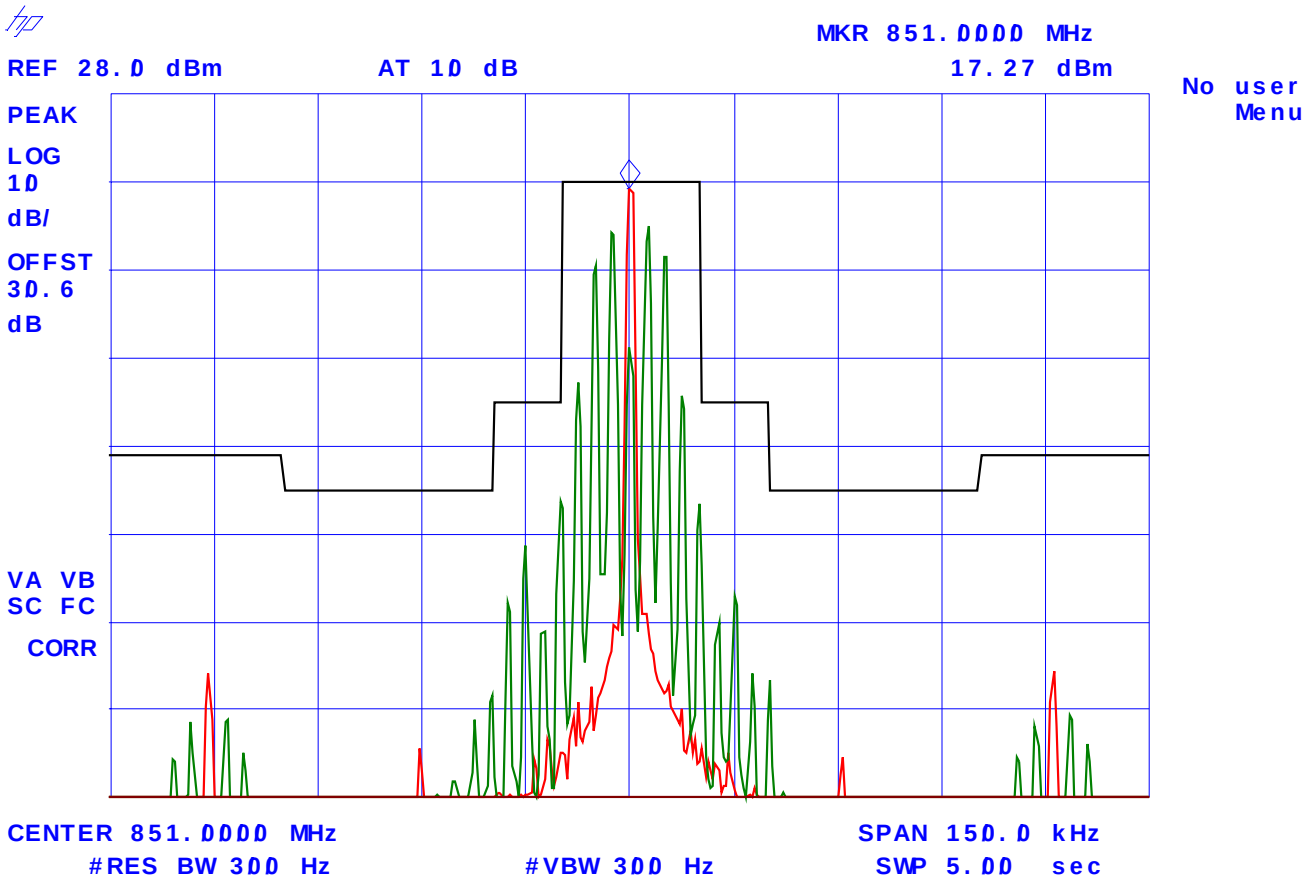
Frequency: 821 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 41: Emissions Mask B

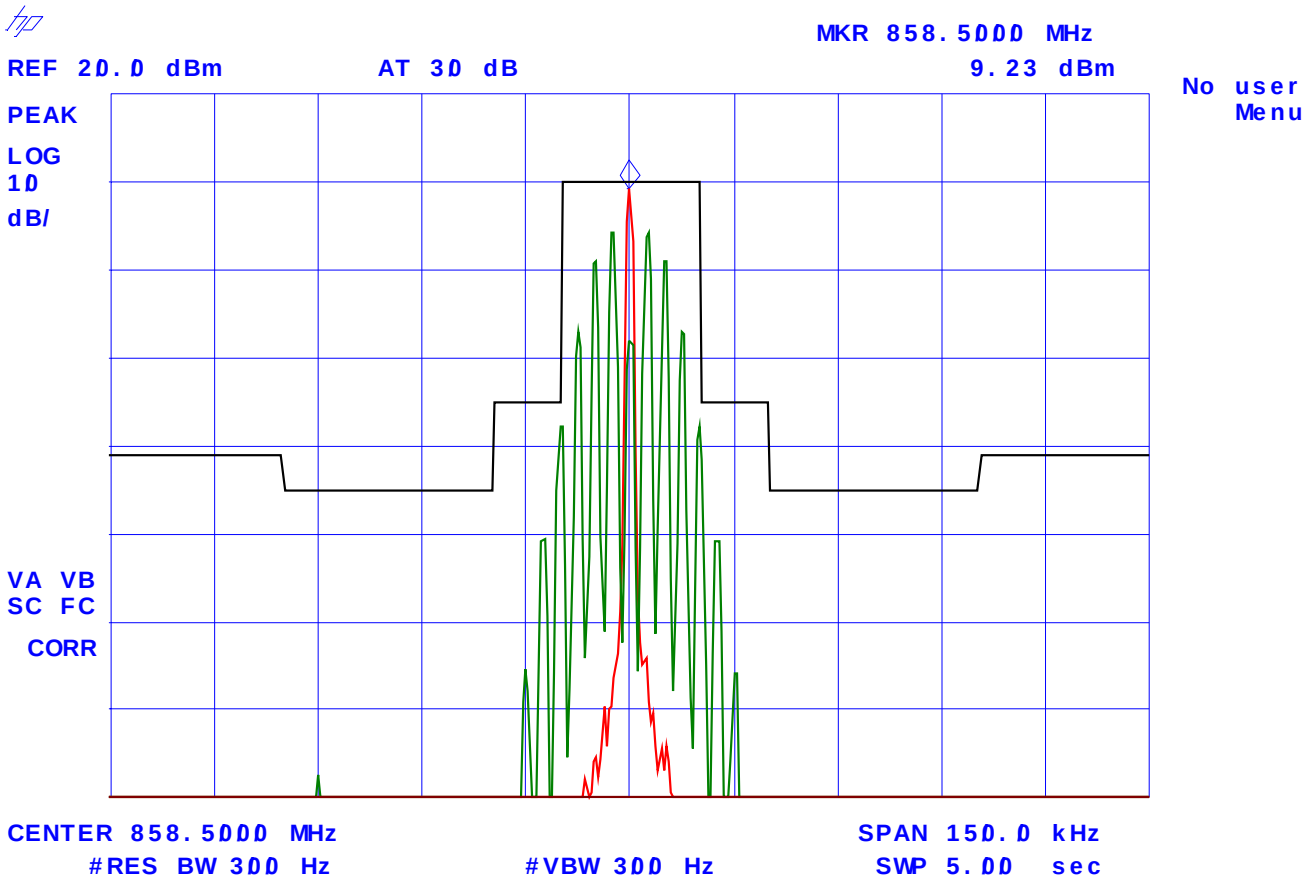
Frequency: 851 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 42: Emissions Mask B

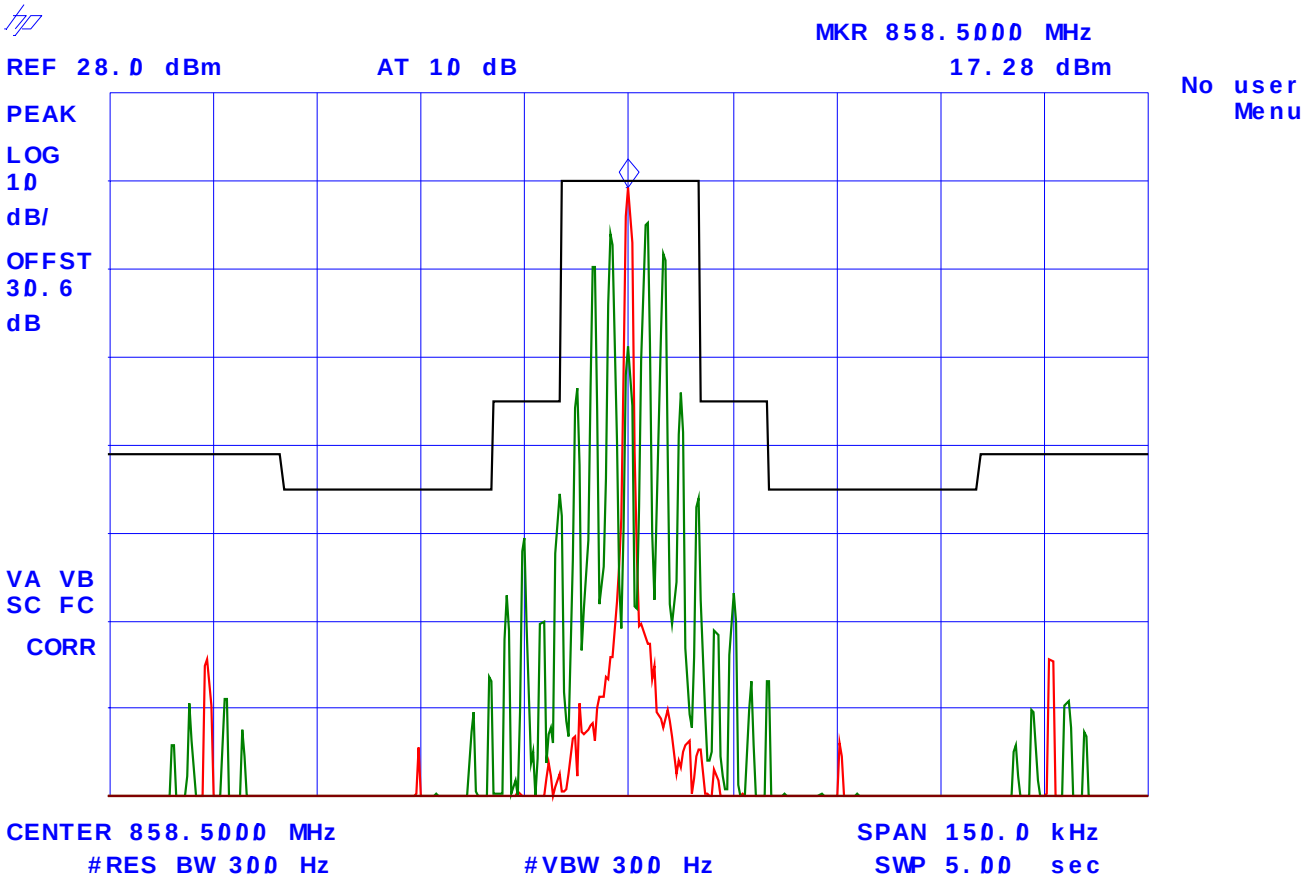
Frequency: 858.5 MHz, 25 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 43: Emissions Mask B

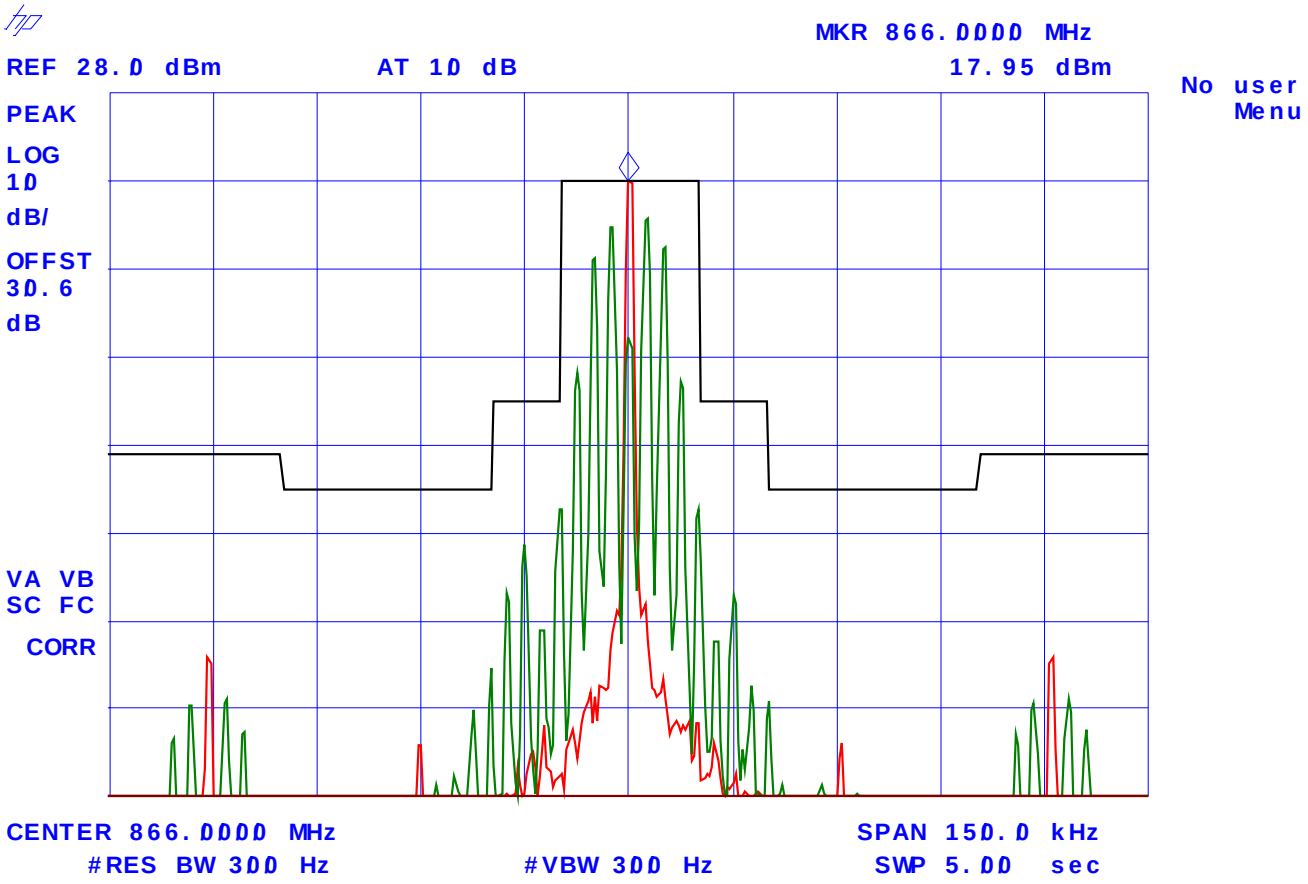
Frequency: 858.5 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 44: Emissions Mask B

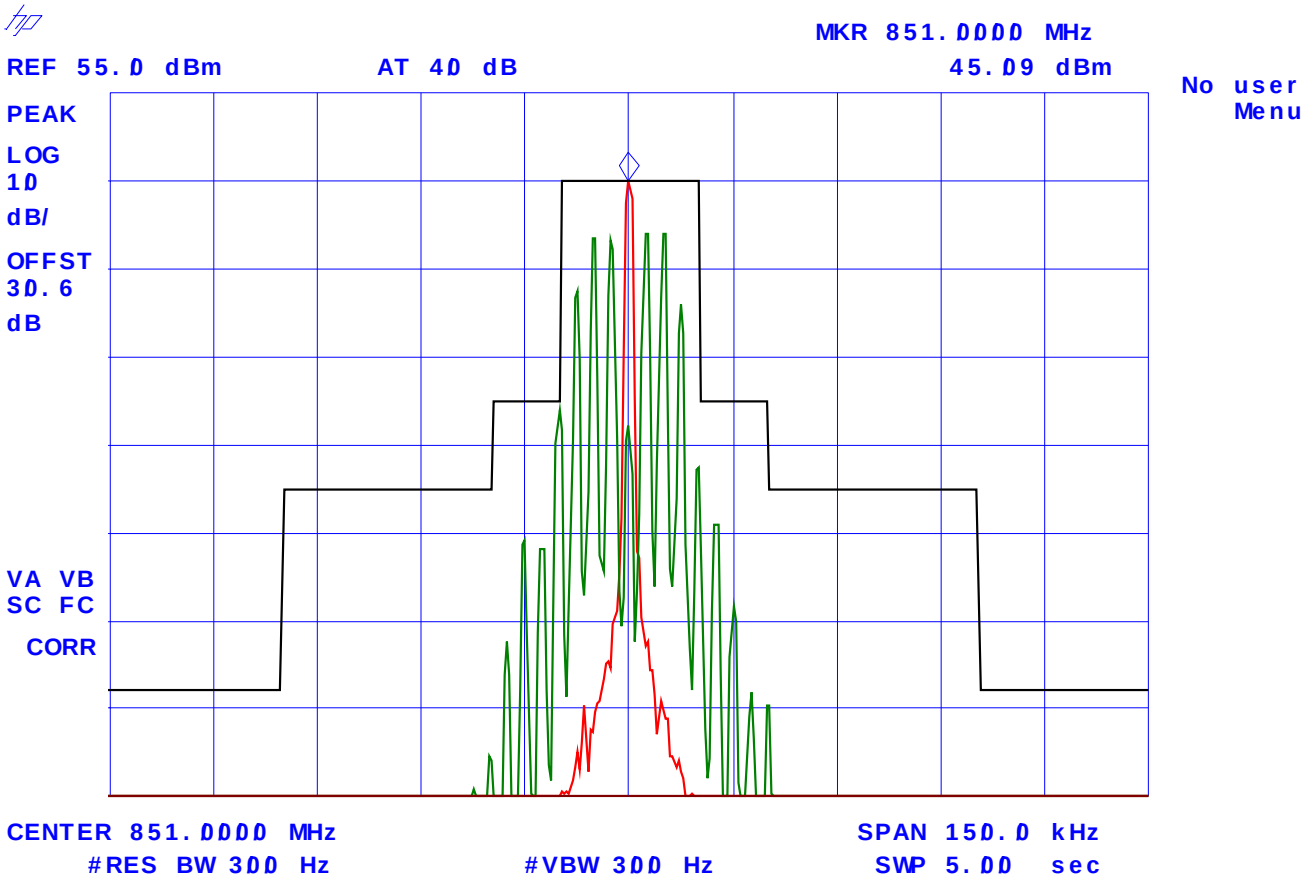
Frequency: 866 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 45: Emissions Mask B

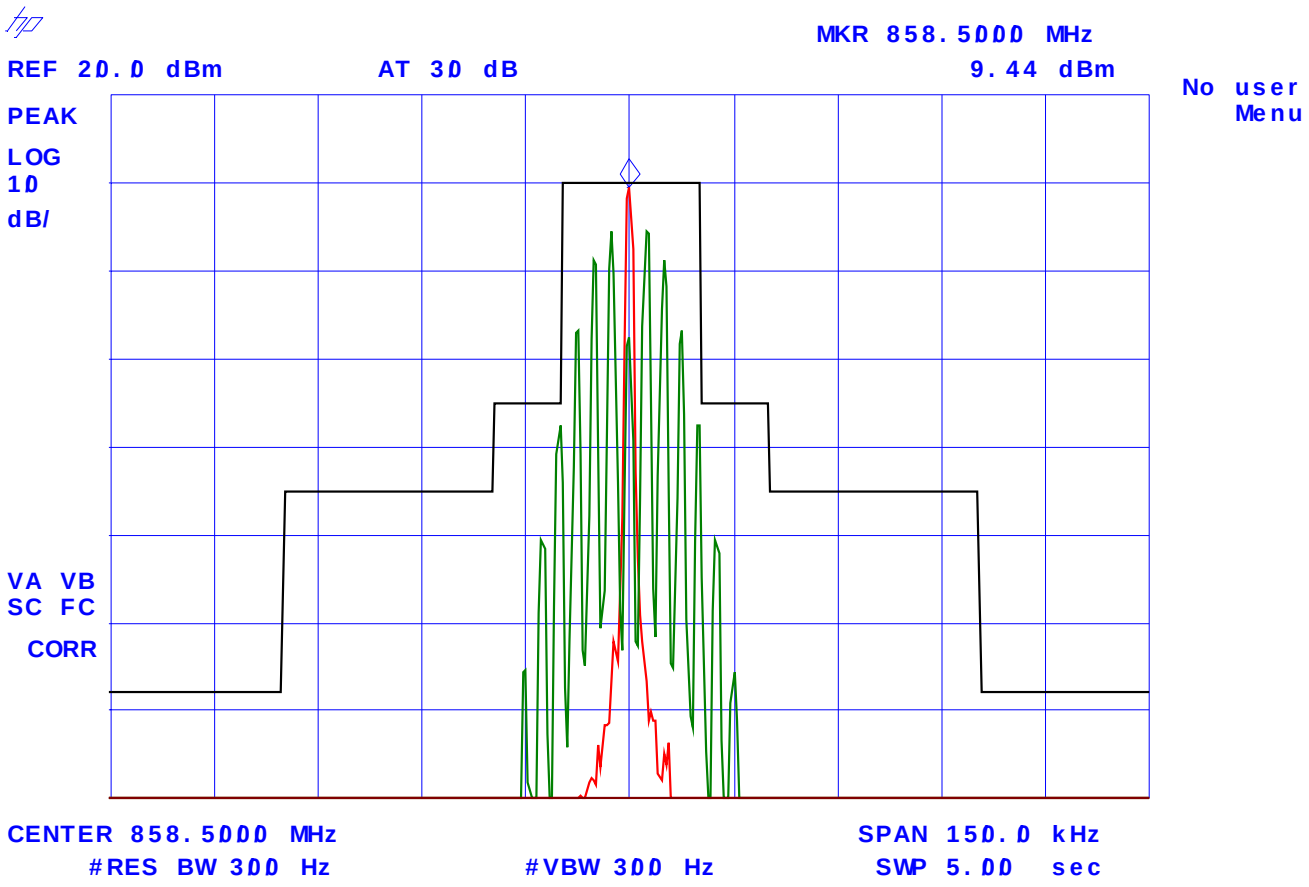
Frequency: 851 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 46: Emissions Mask B

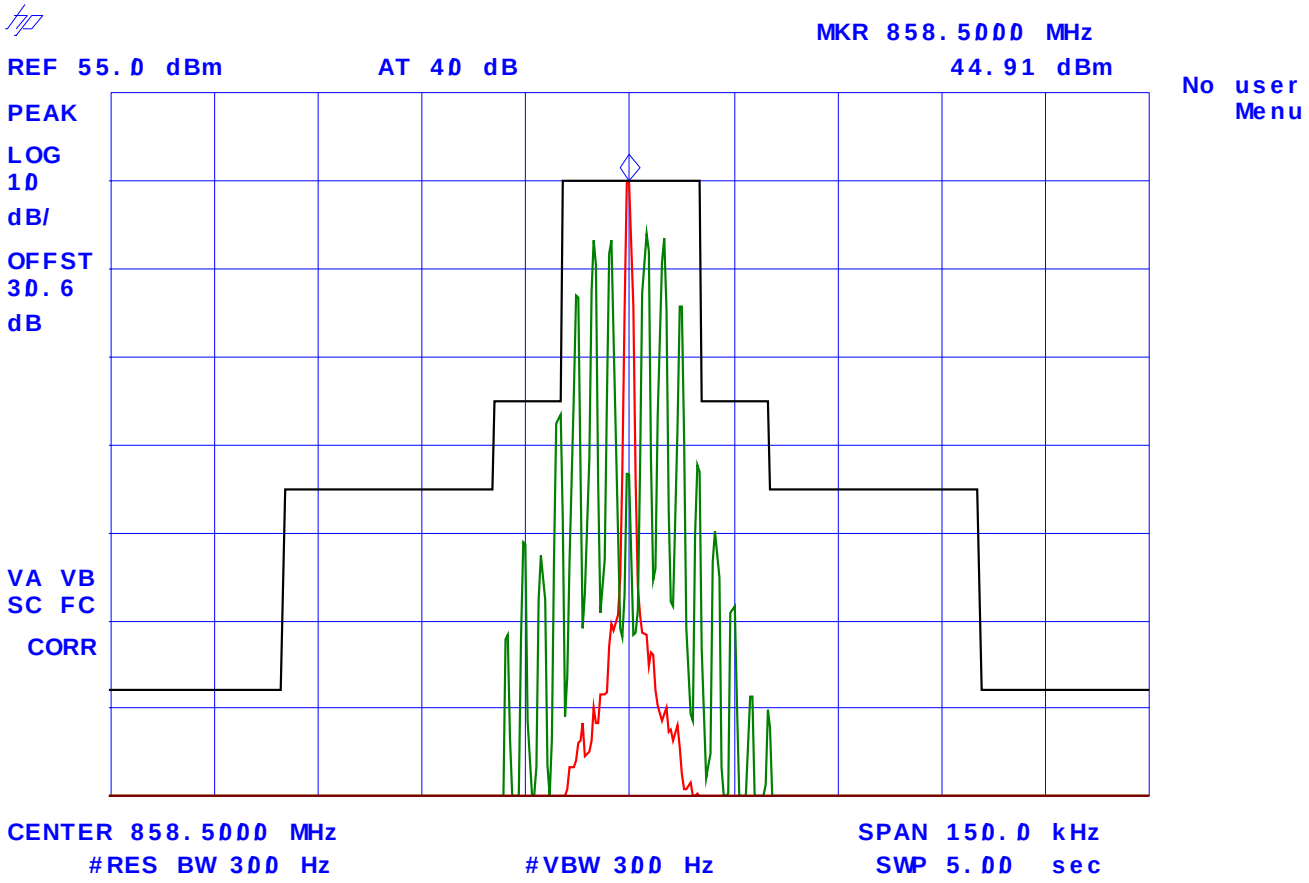
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 47: Emissions Mask B

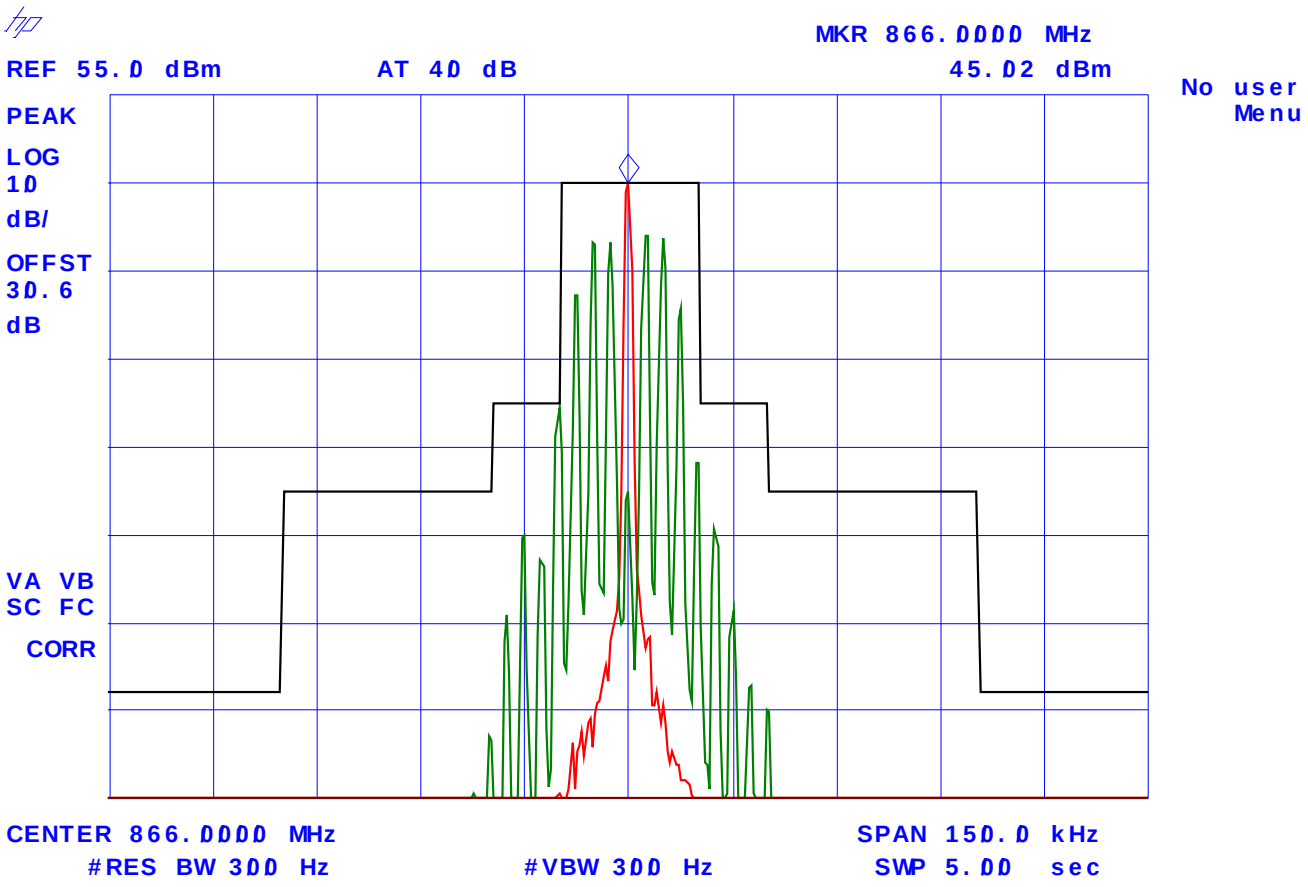
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 48: Emissions Mask B

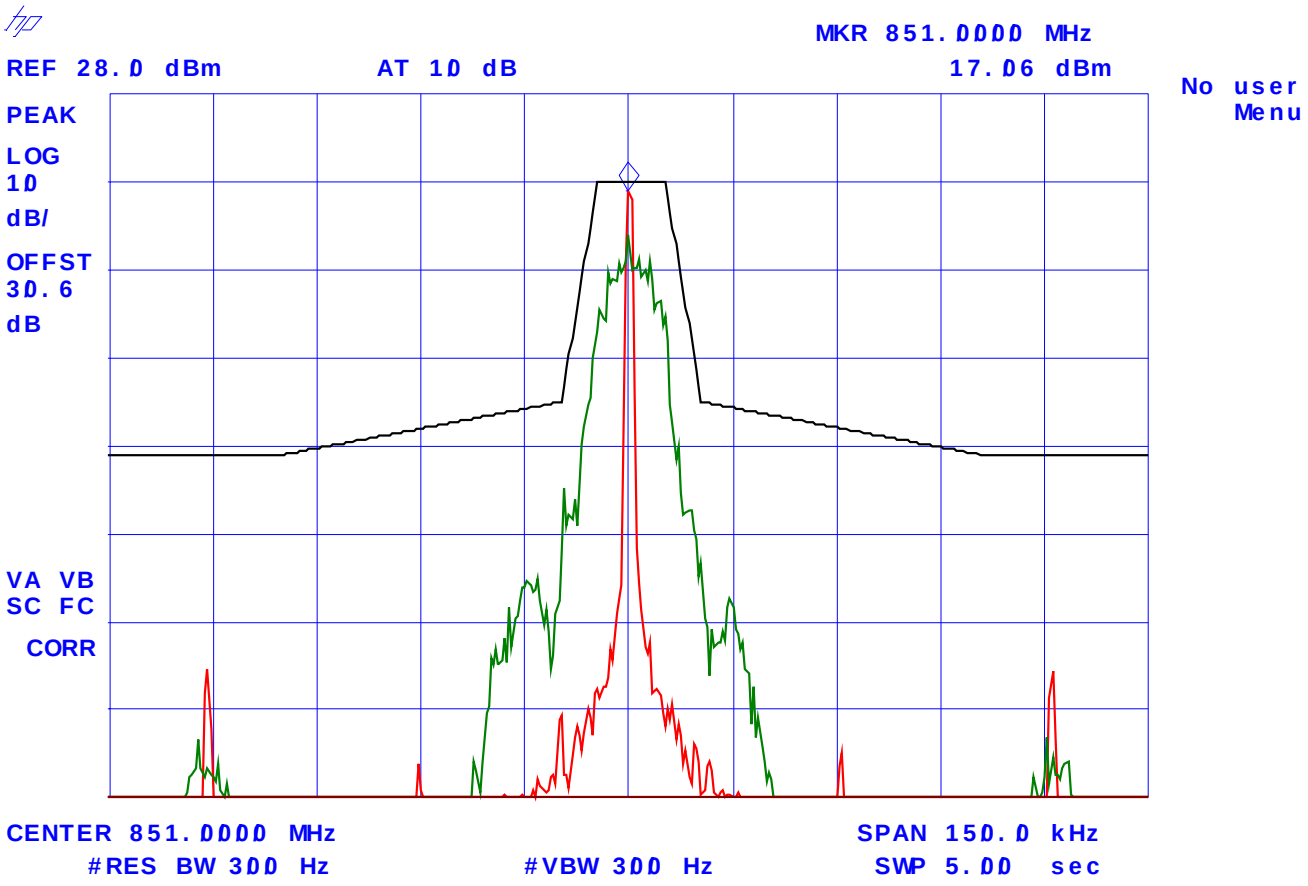
Frequency: 866 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 49: Emissions Mask G

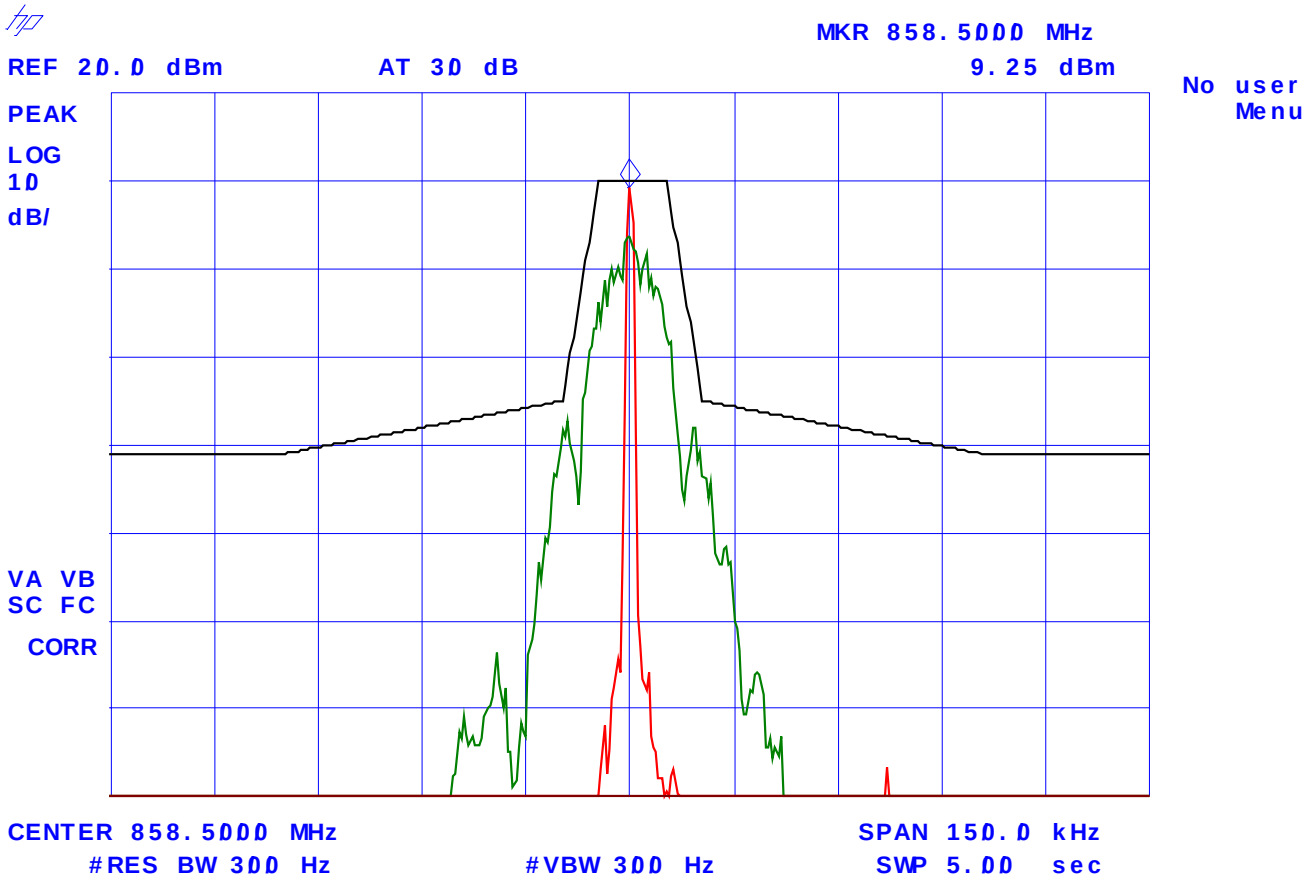
Frequency: 851 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 50: Emissions Mask G

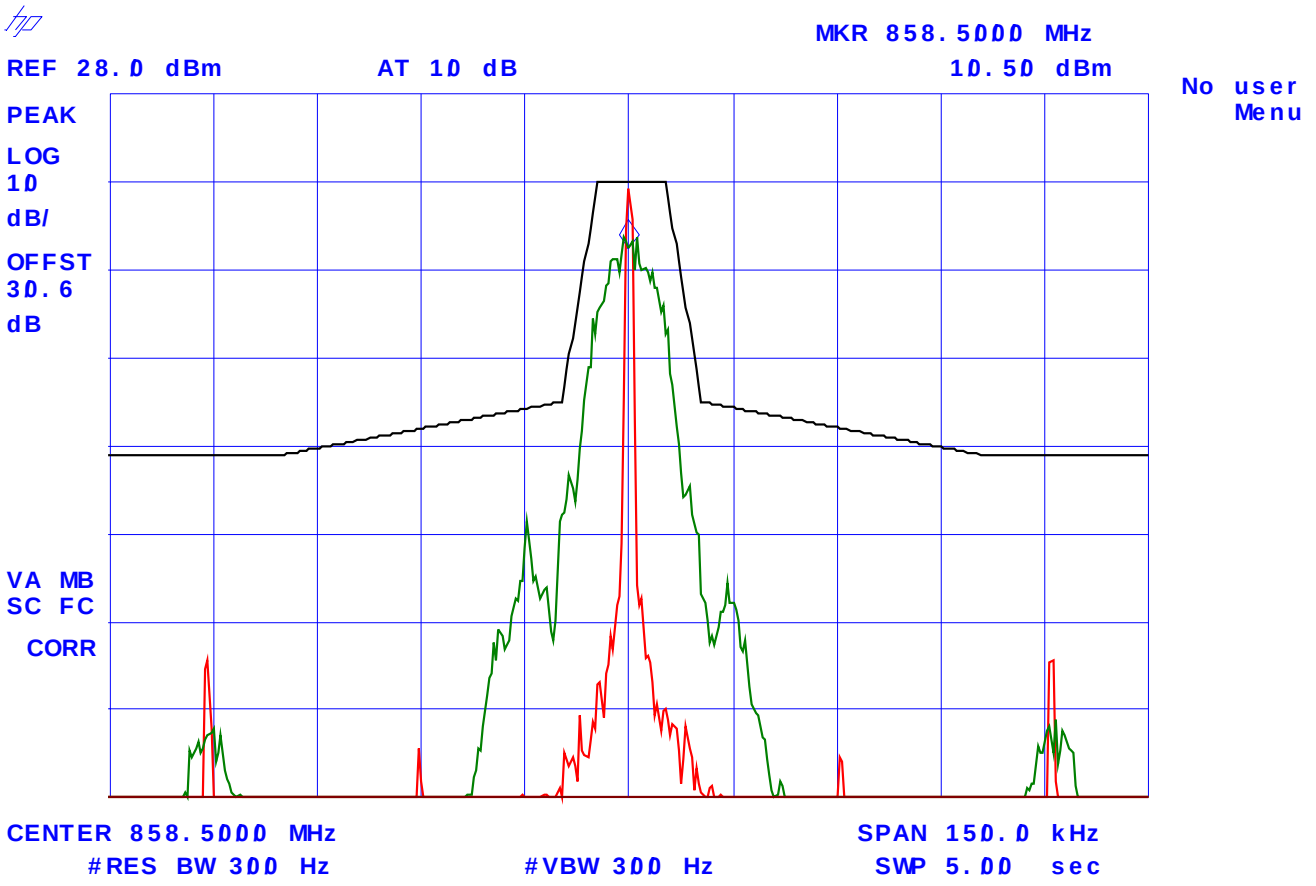
Frequency: 858.5 MHz, 25 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 51: Emissions Mask G

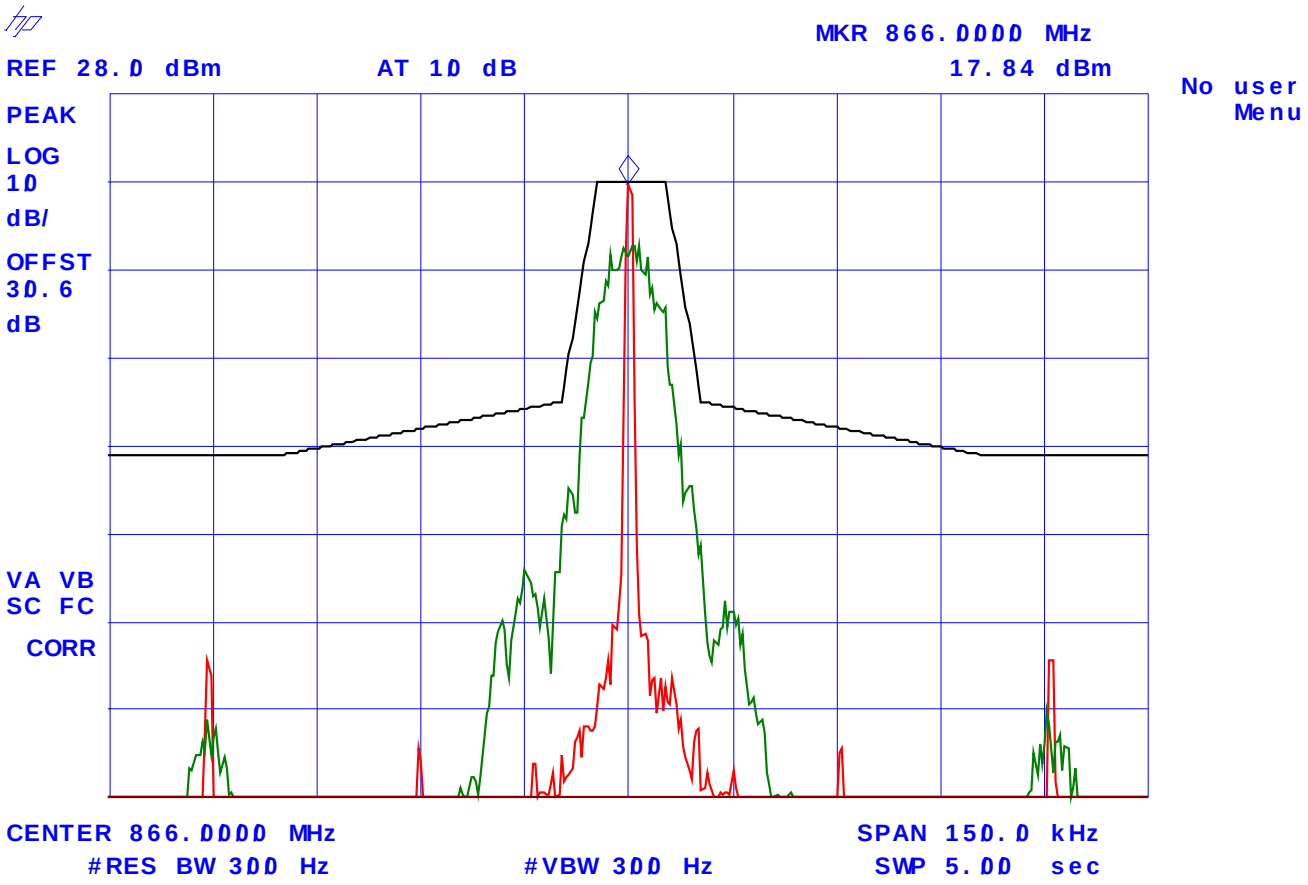
Frequency: 858.5 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 52: Emissions Mask G

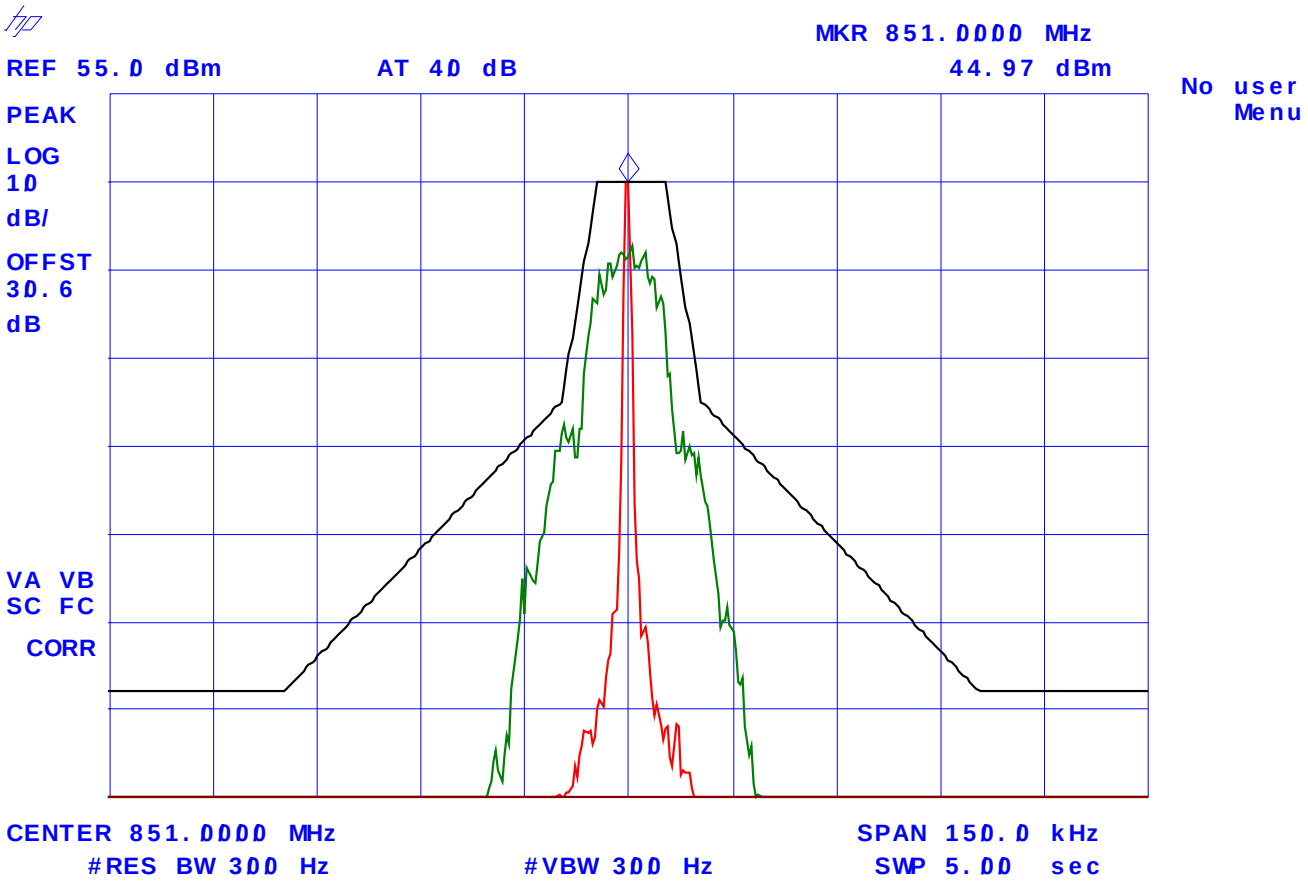
Frequency: 866 MHz, 25 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 53: Emissions Mask G

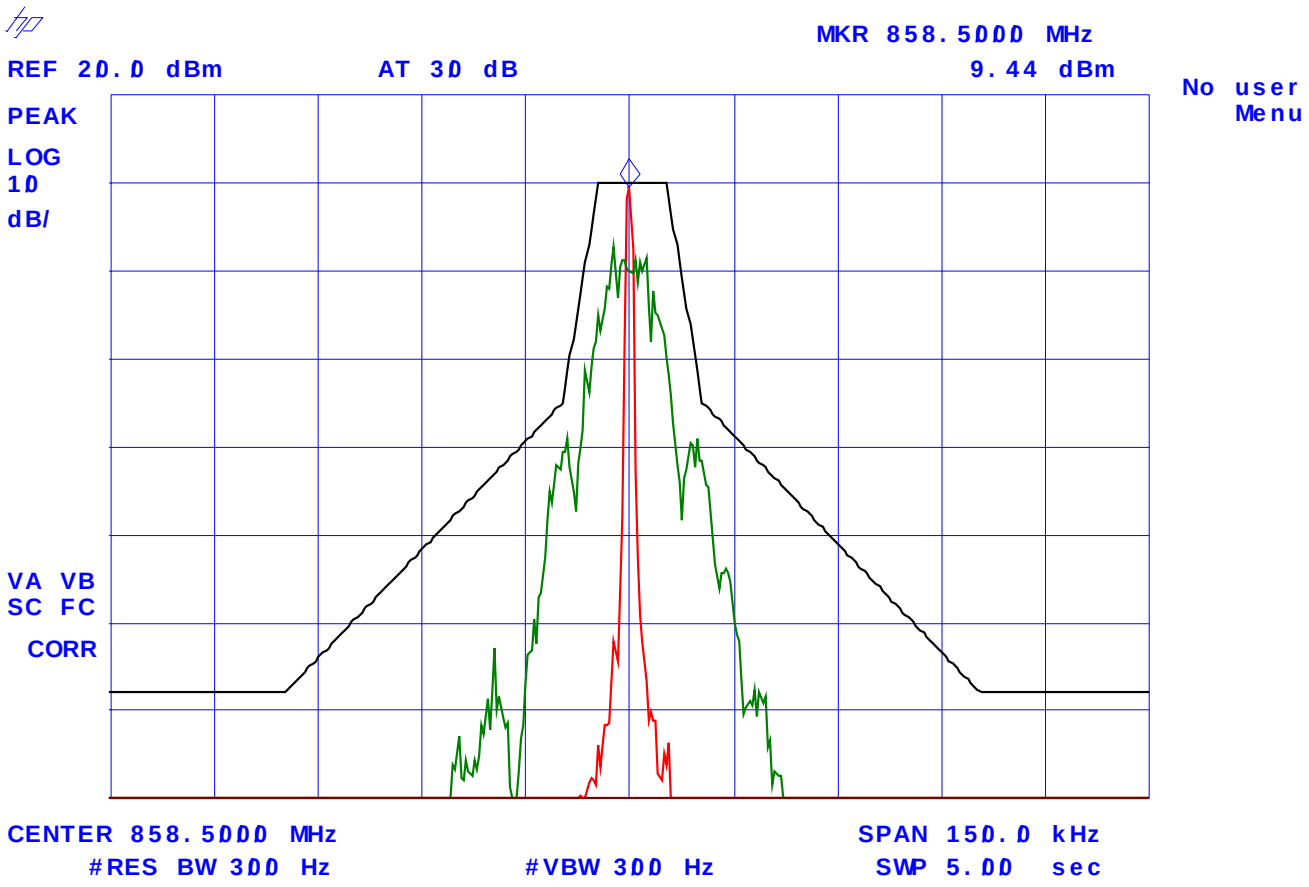
Frequency: 851 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 54: Emissions Mask G

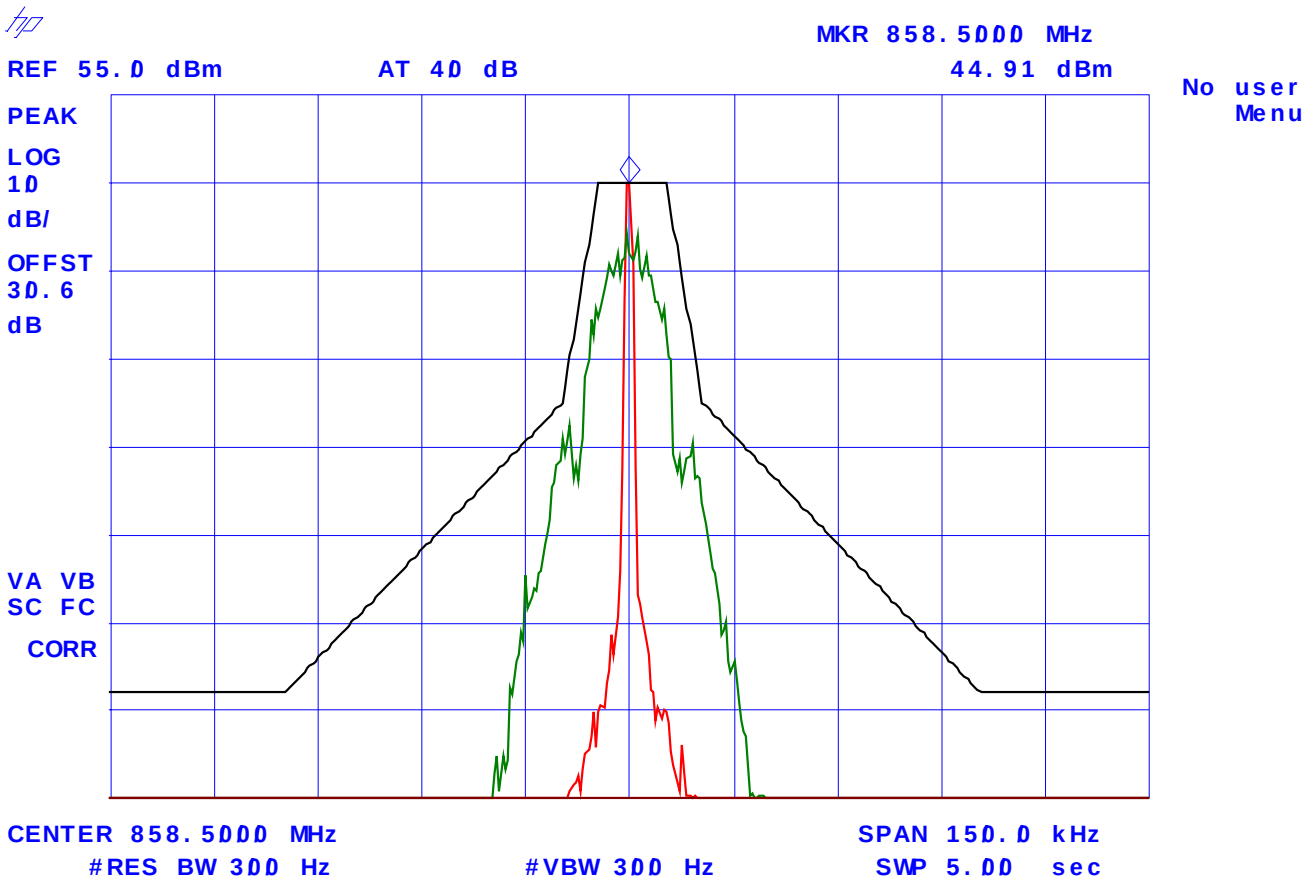
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 55: Emissions Mask G

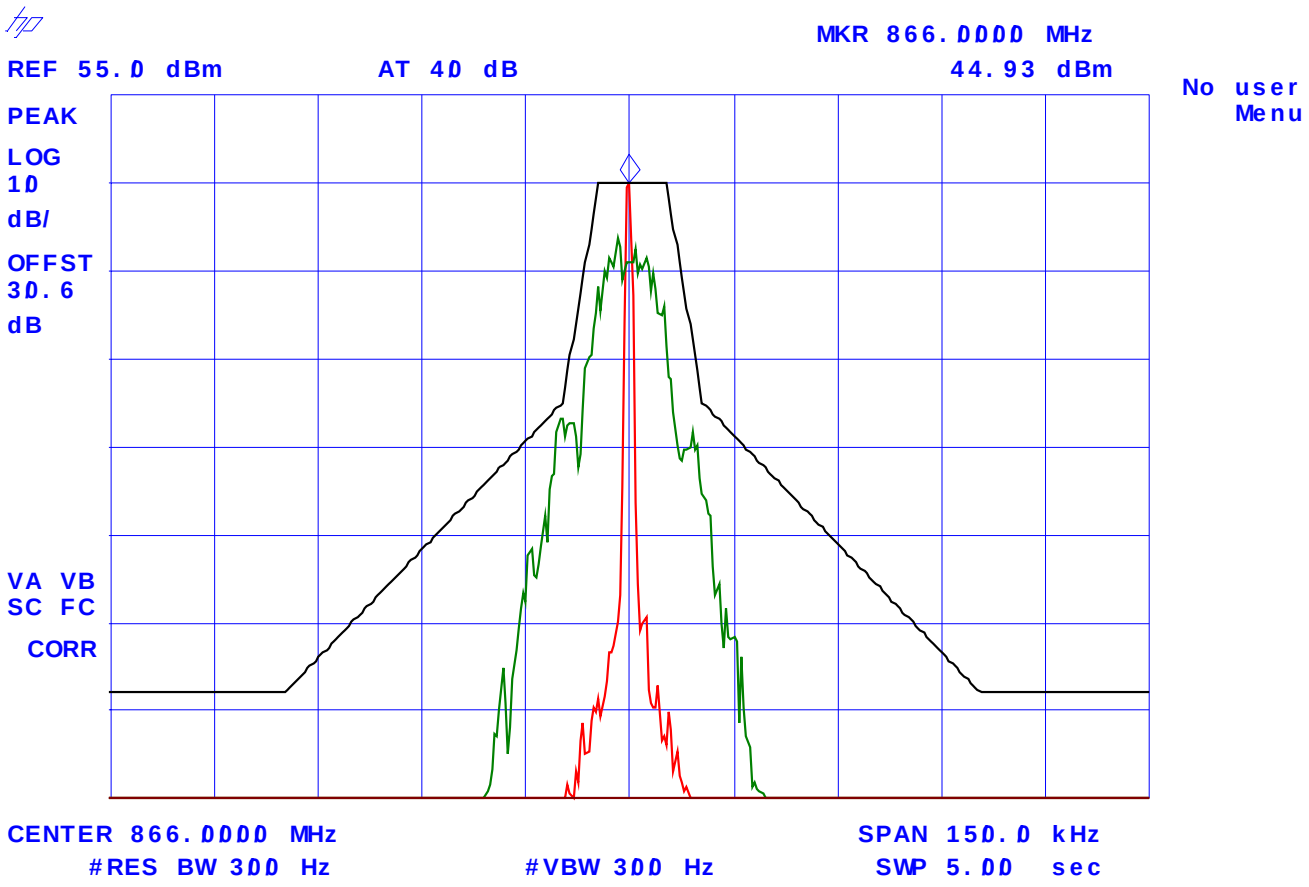
Frequency: 858.5 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 56: Emissions Mask G

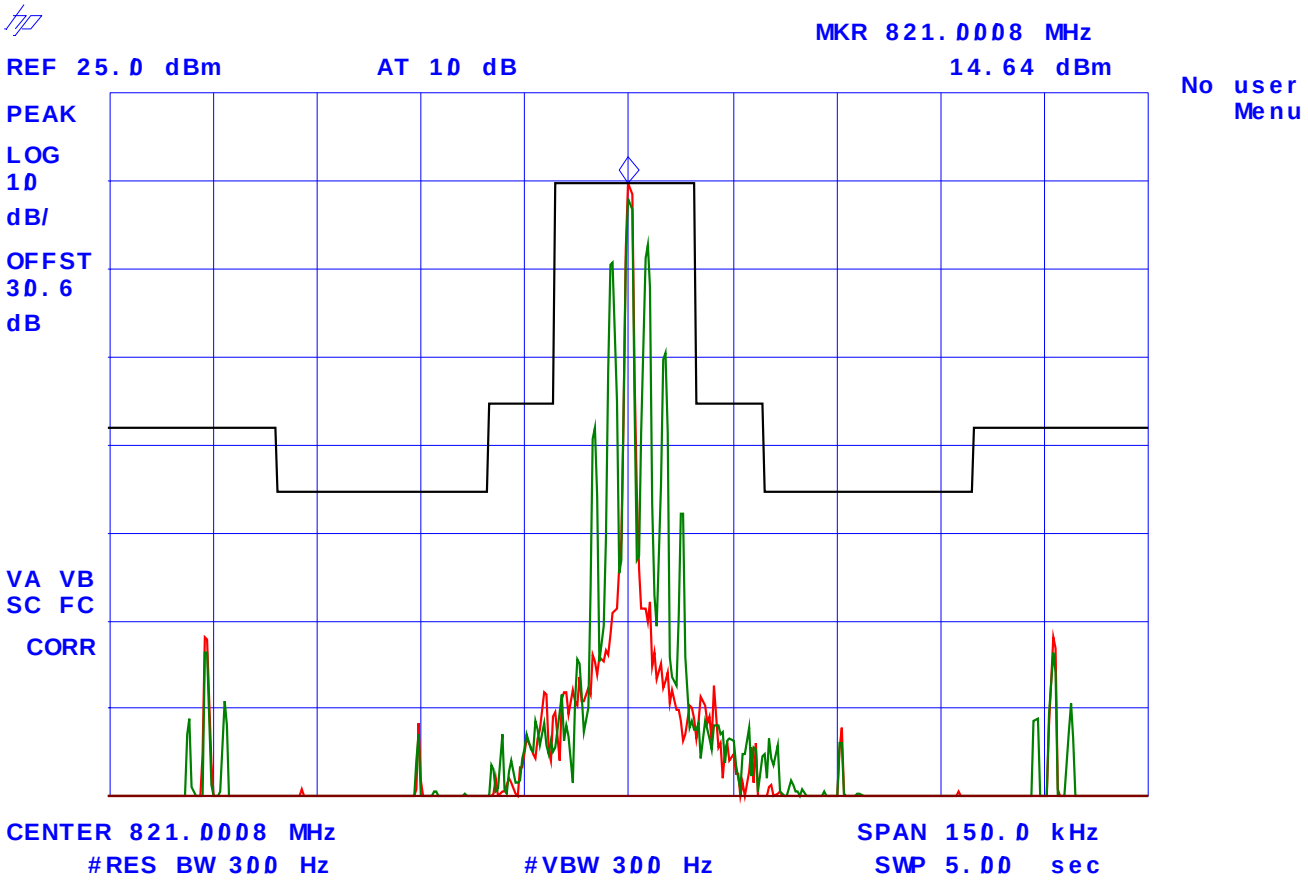
Frequency: 866 MHz, 25 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 57: Emissions Mask B

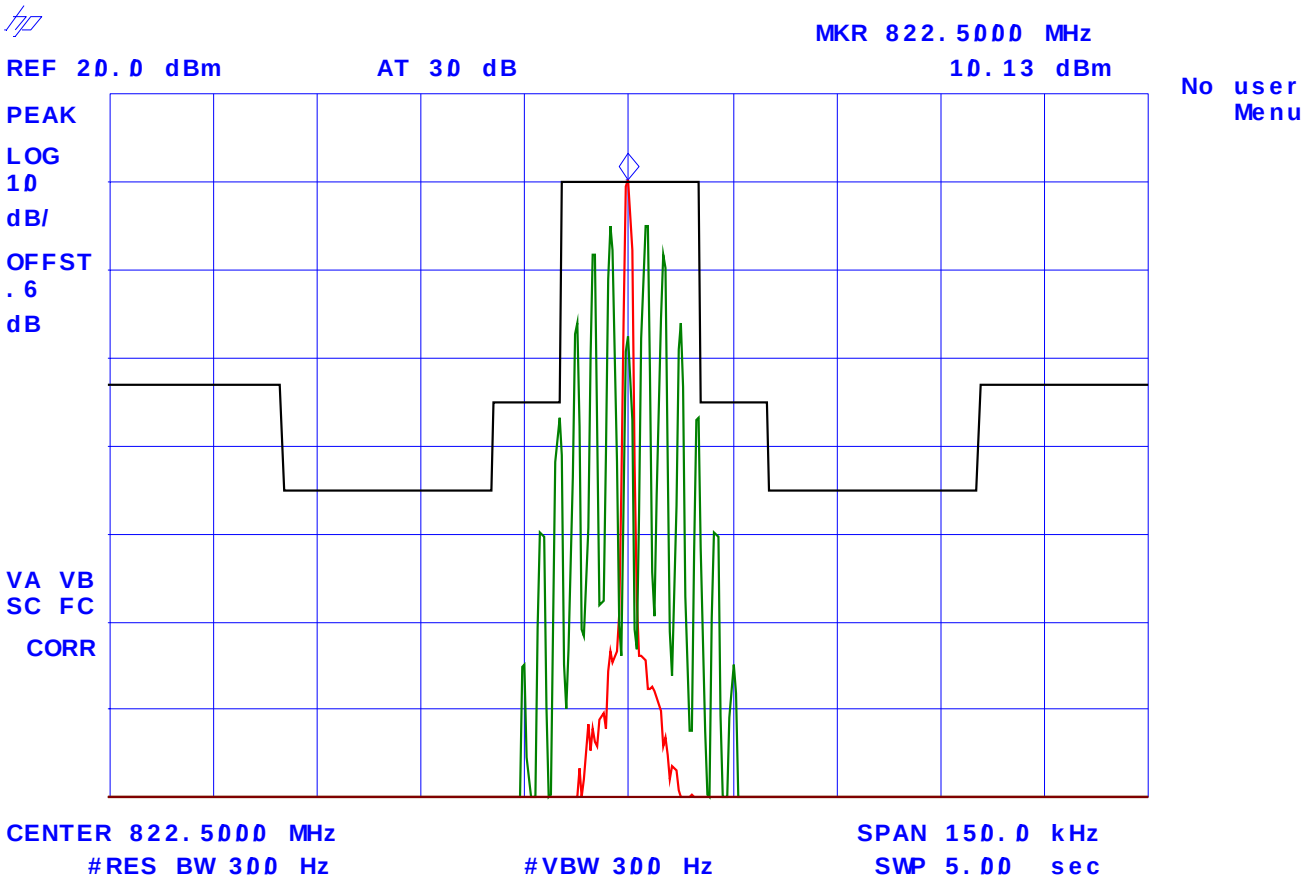
Frequency: 821 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 58: Emissions Mask B

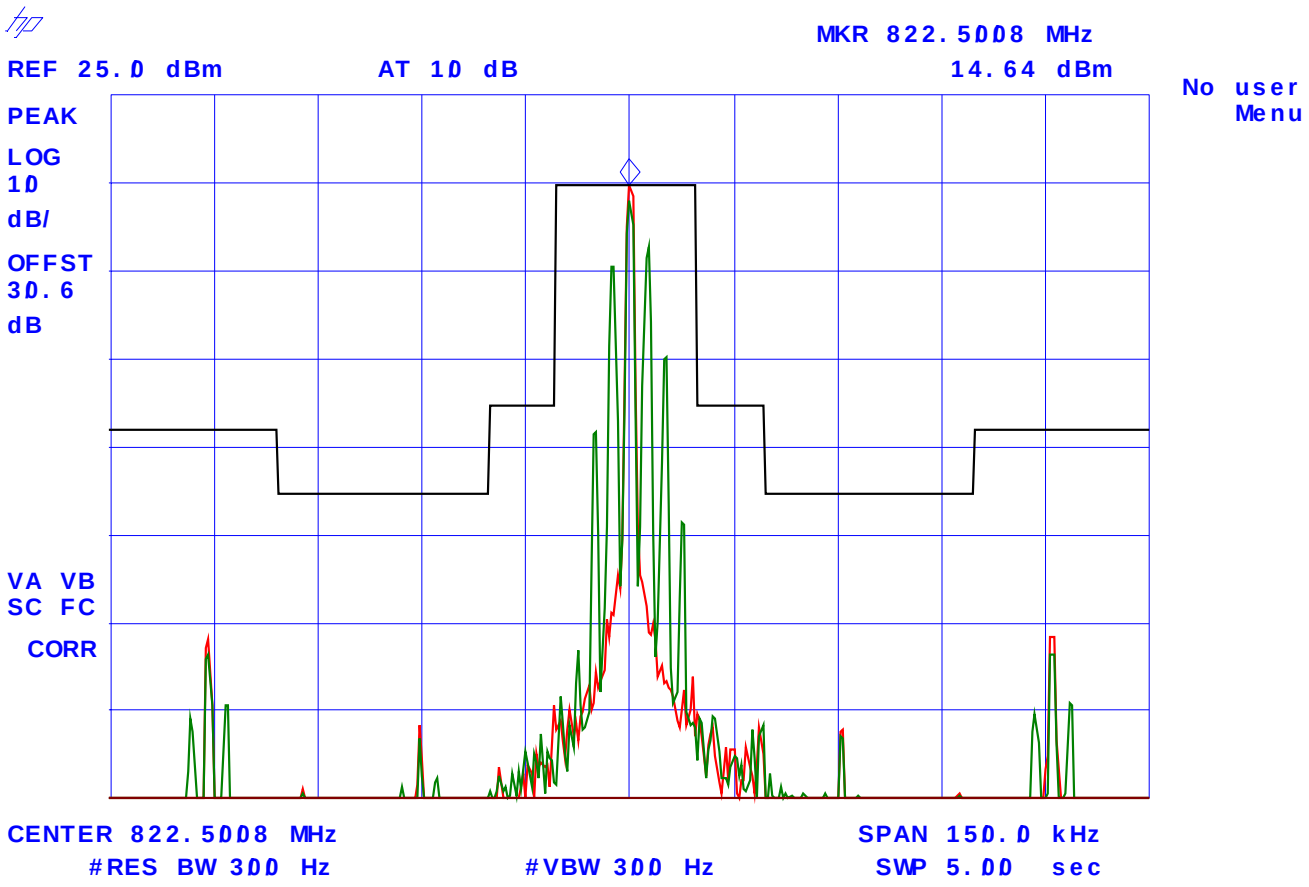
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 59: Emissions Mask B

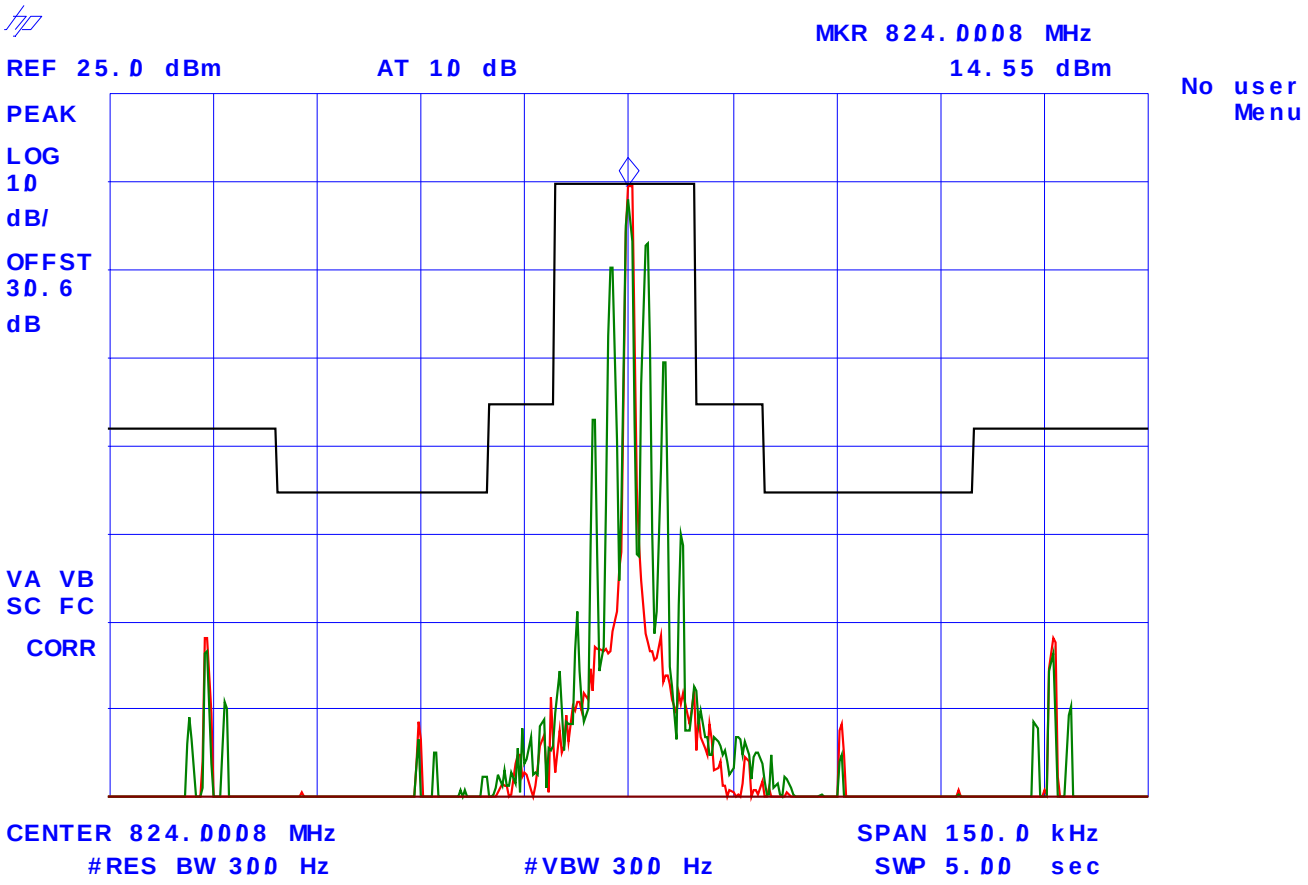
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 60: Emissions Mask B

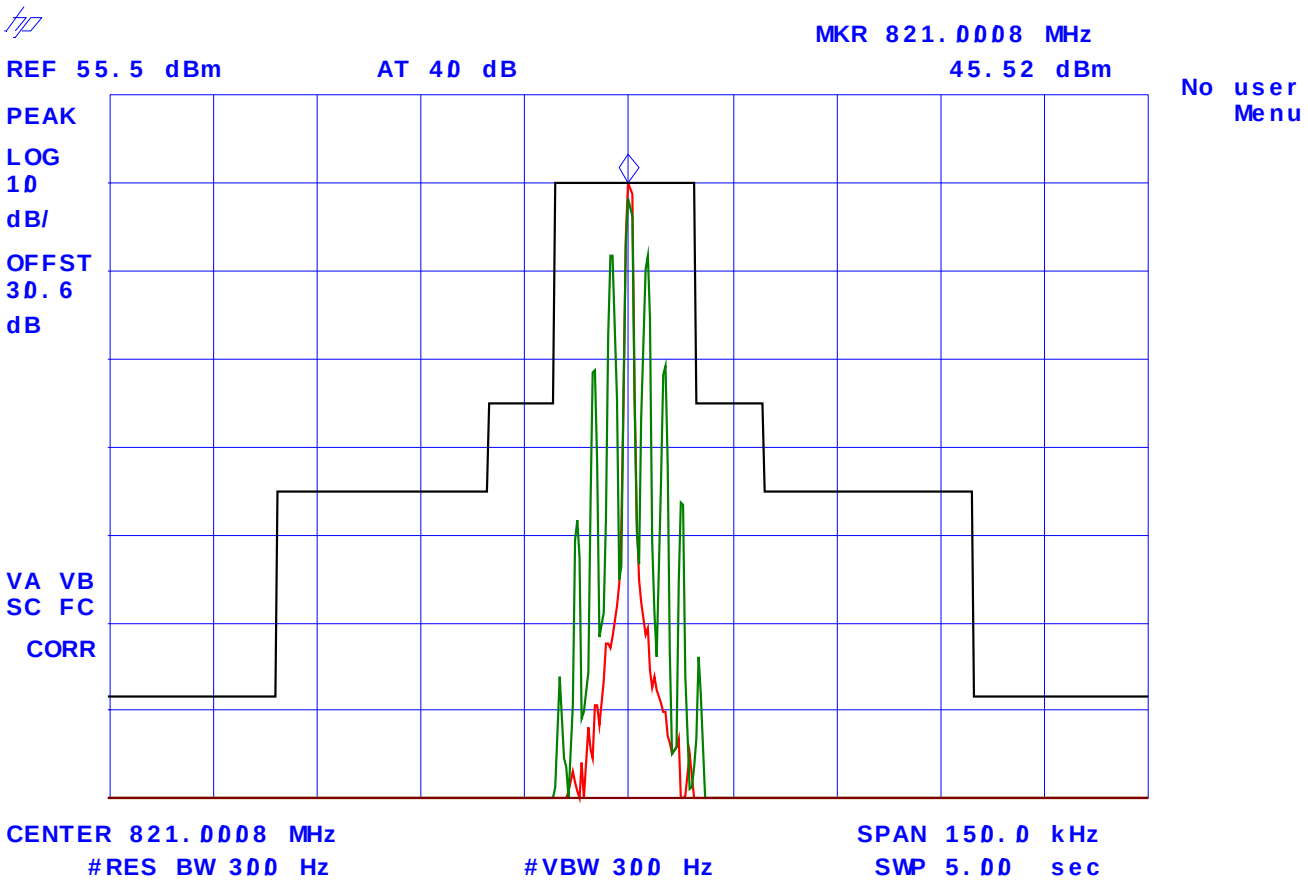
Frequency: 824 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 61: Emissions Mask B

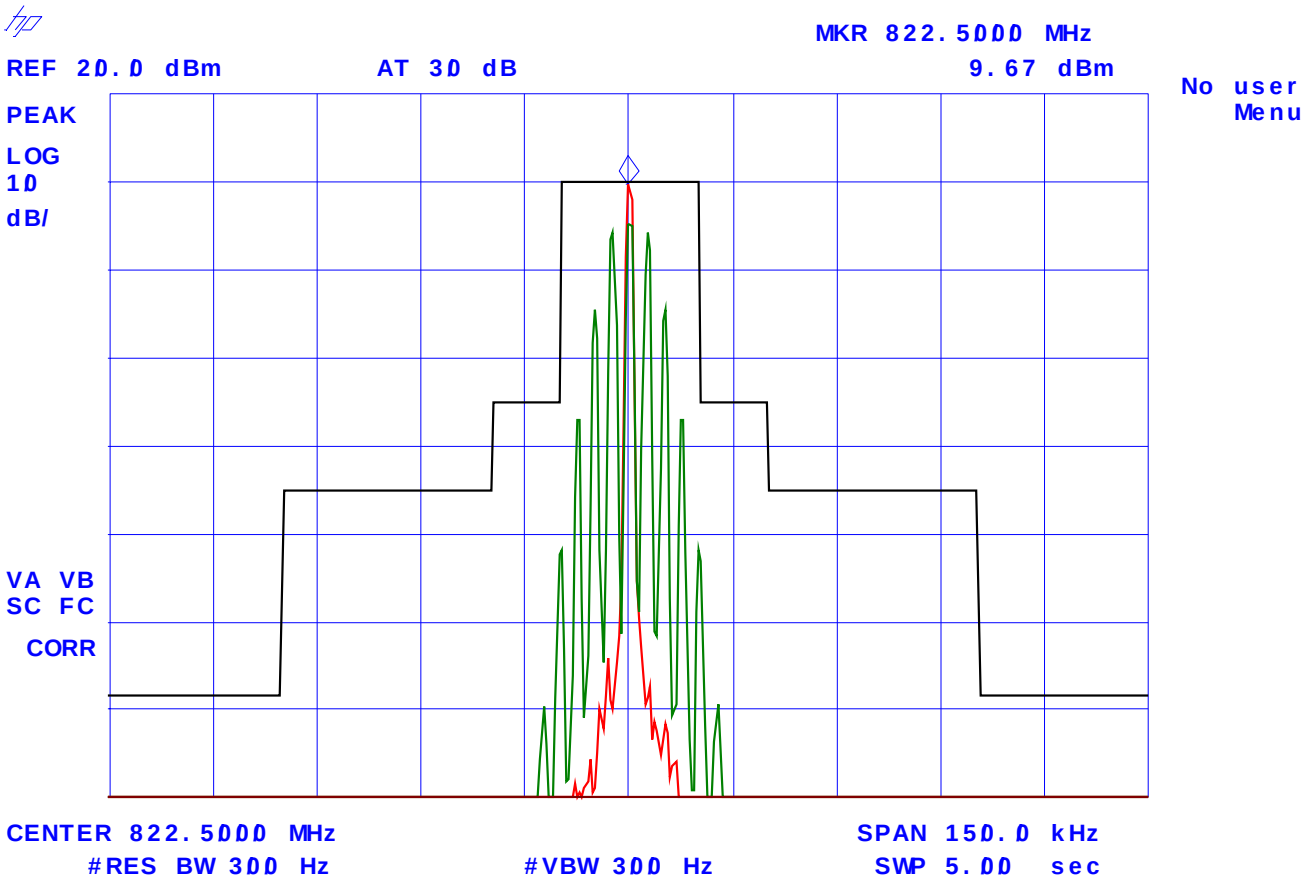
Frequency: 821 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 62: Emissions Mask B

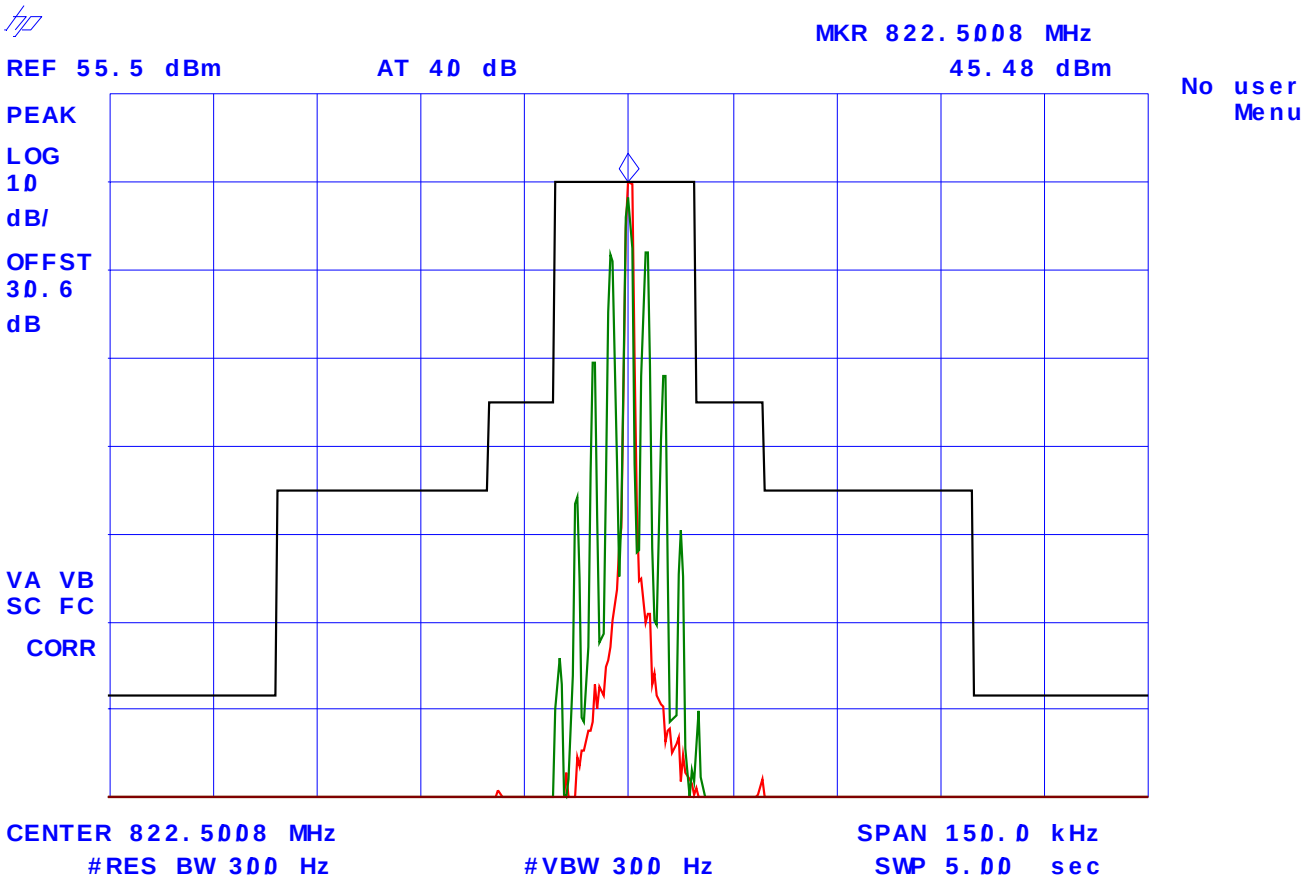
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 63: Emissions Mask B

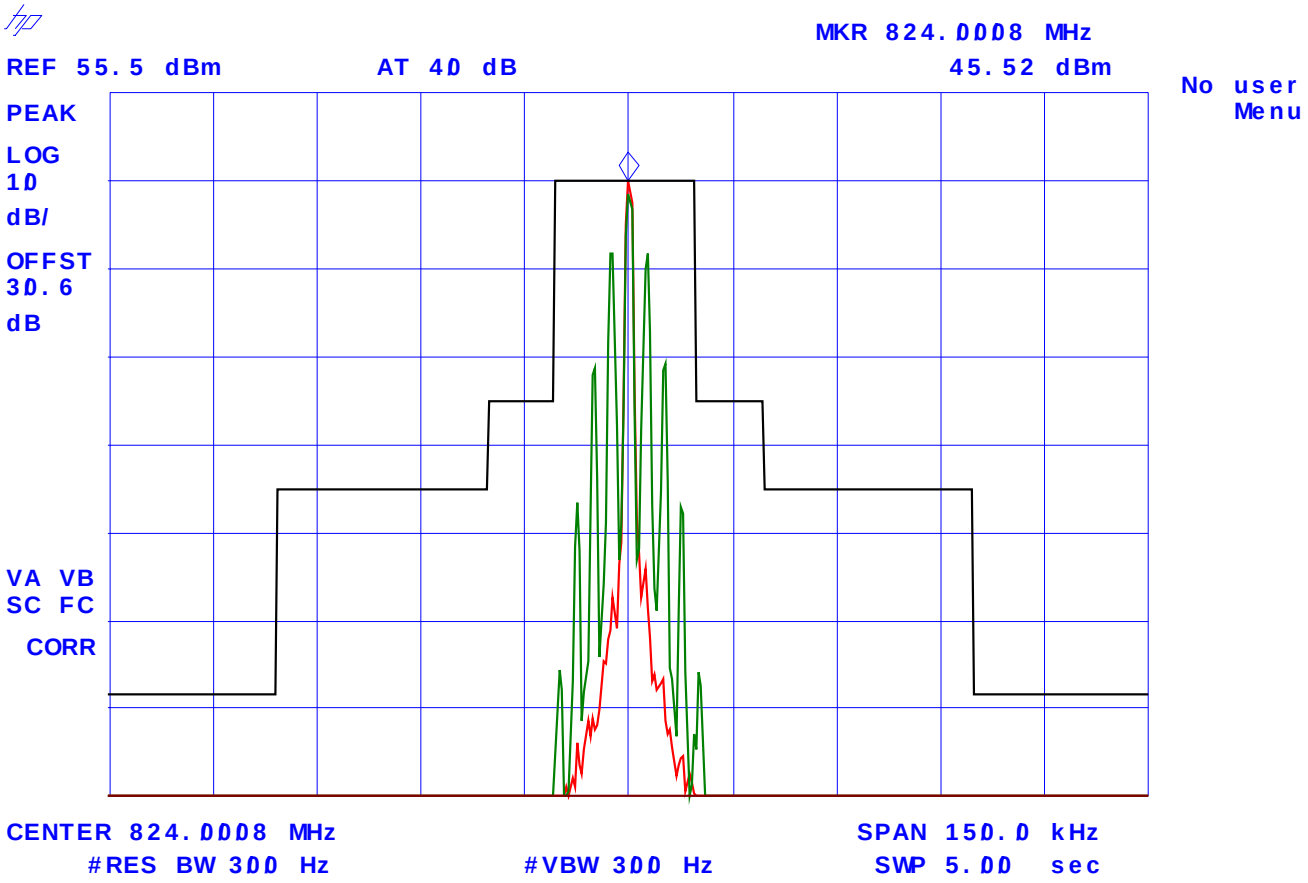
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 64: Emissions Mask B

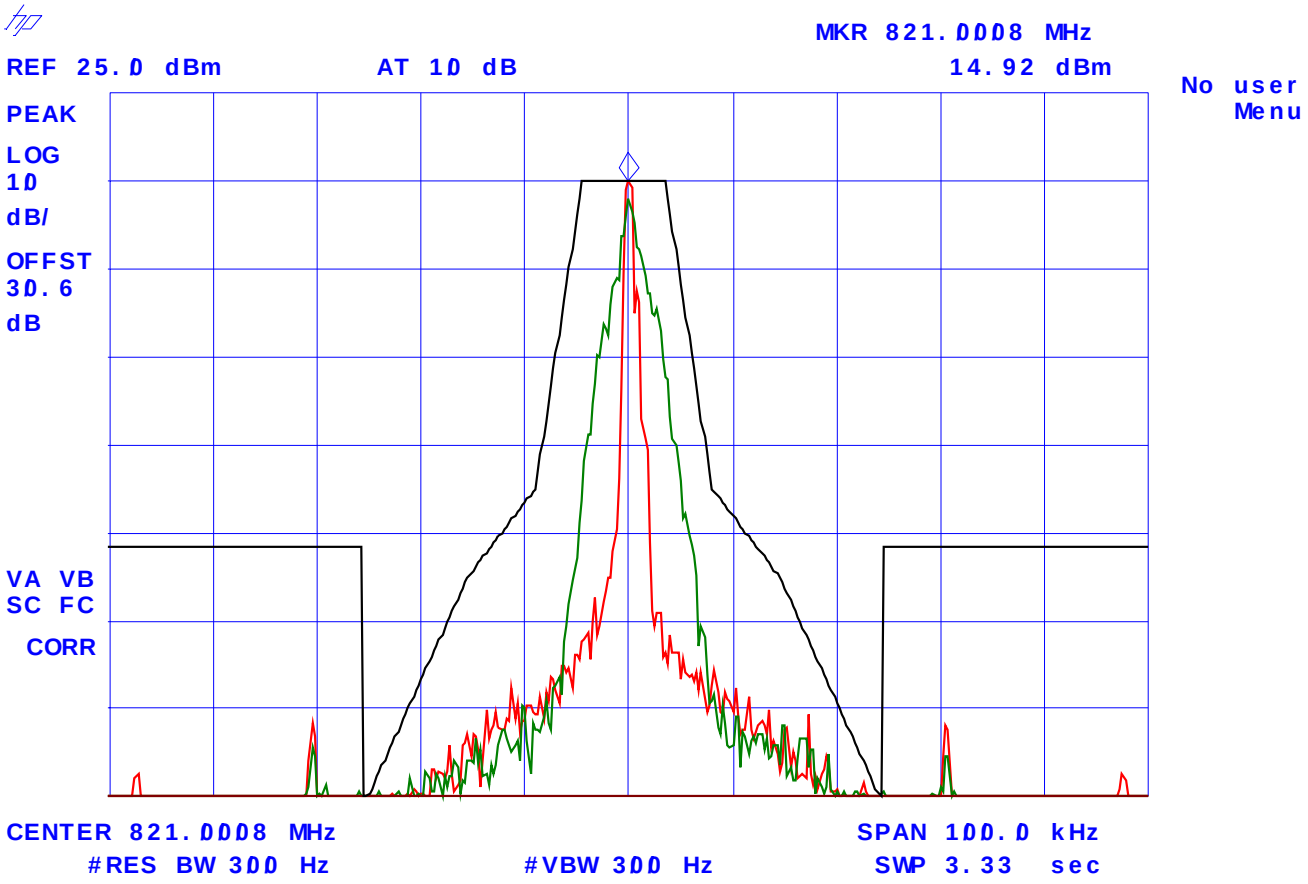
Frequency: 824 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 65: Emissions Mask H

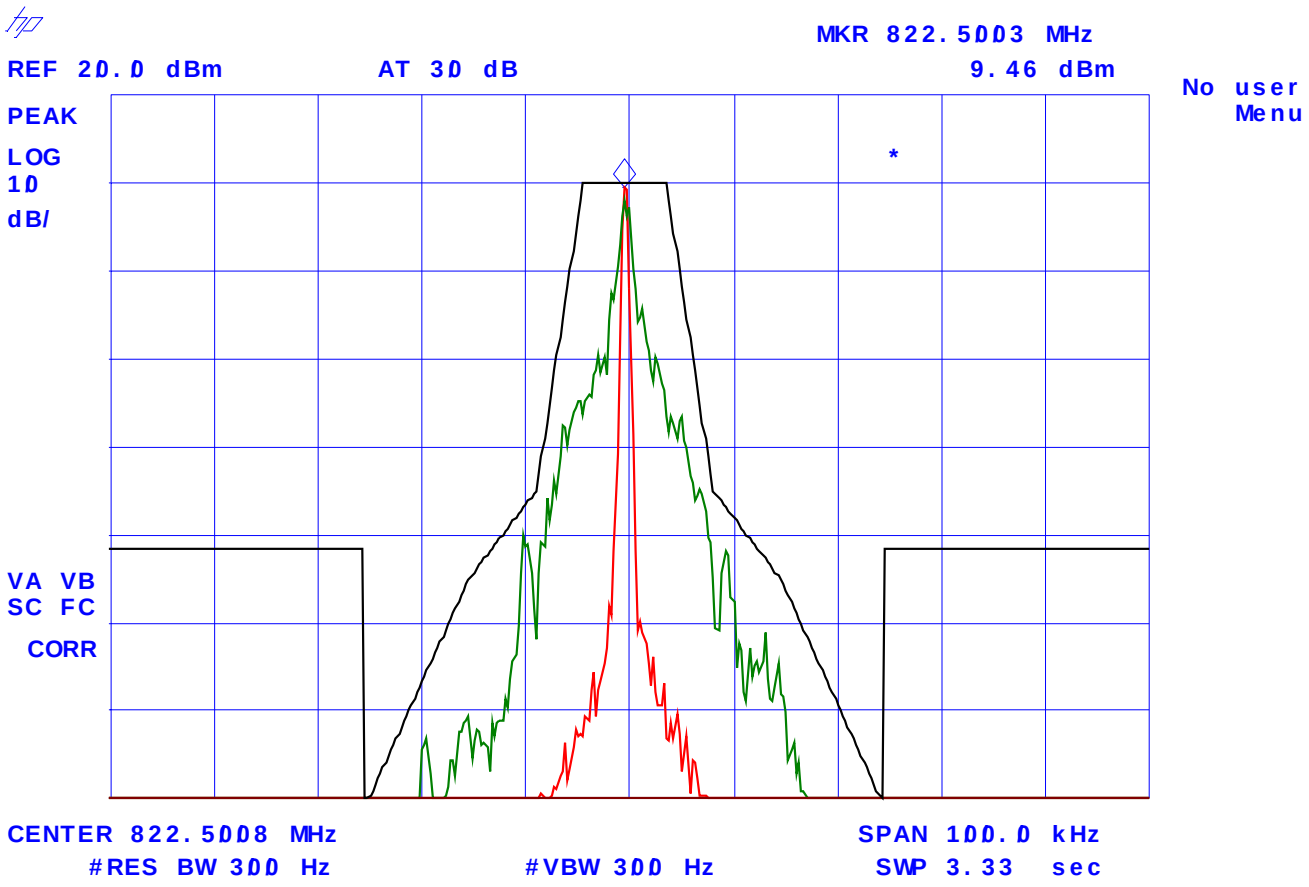
Frequency: 821 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 66: Emissions Mask H

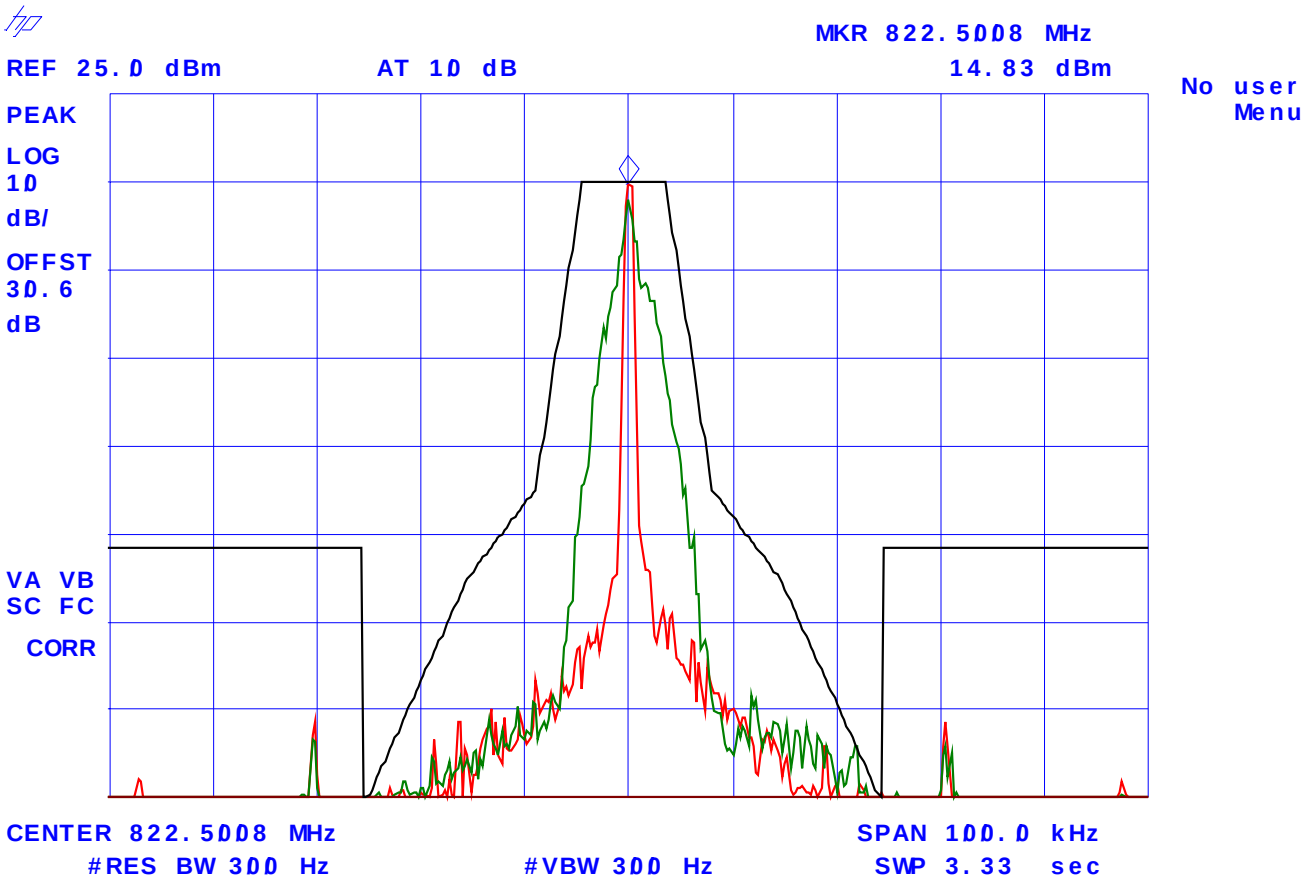
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 67: Emissions Mask H

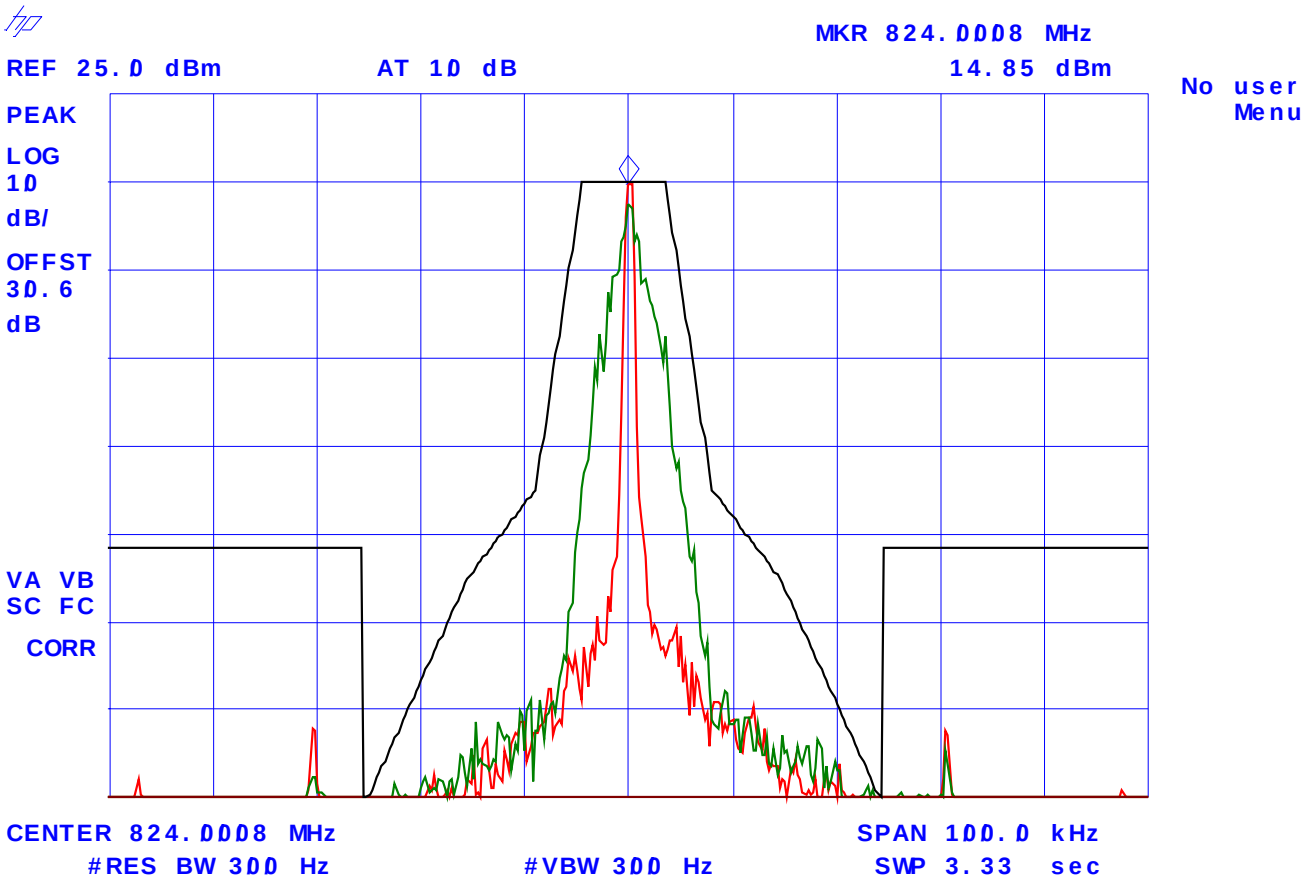
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 68: Emissions Mask H

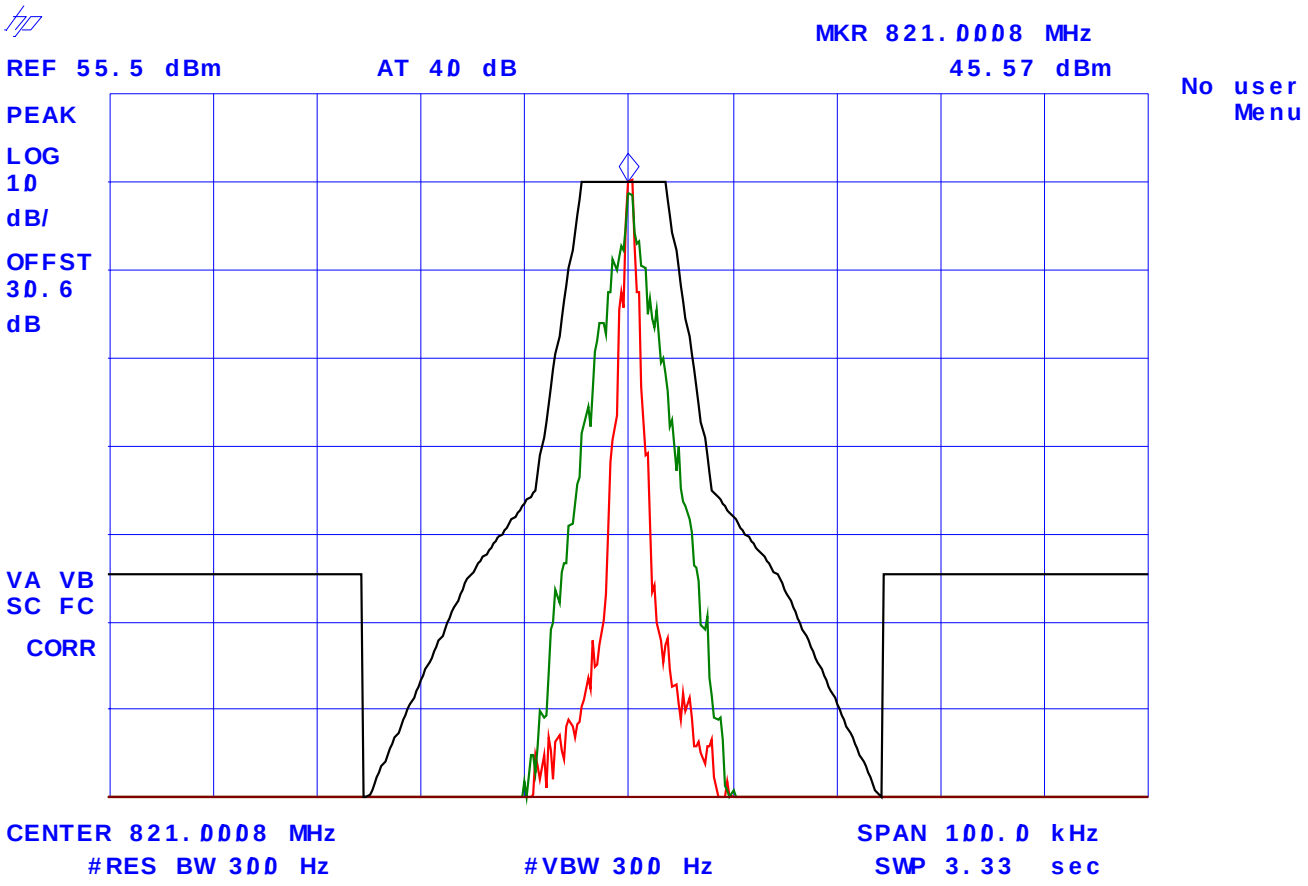
Frequency: 824 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 69: Emissions Mask H

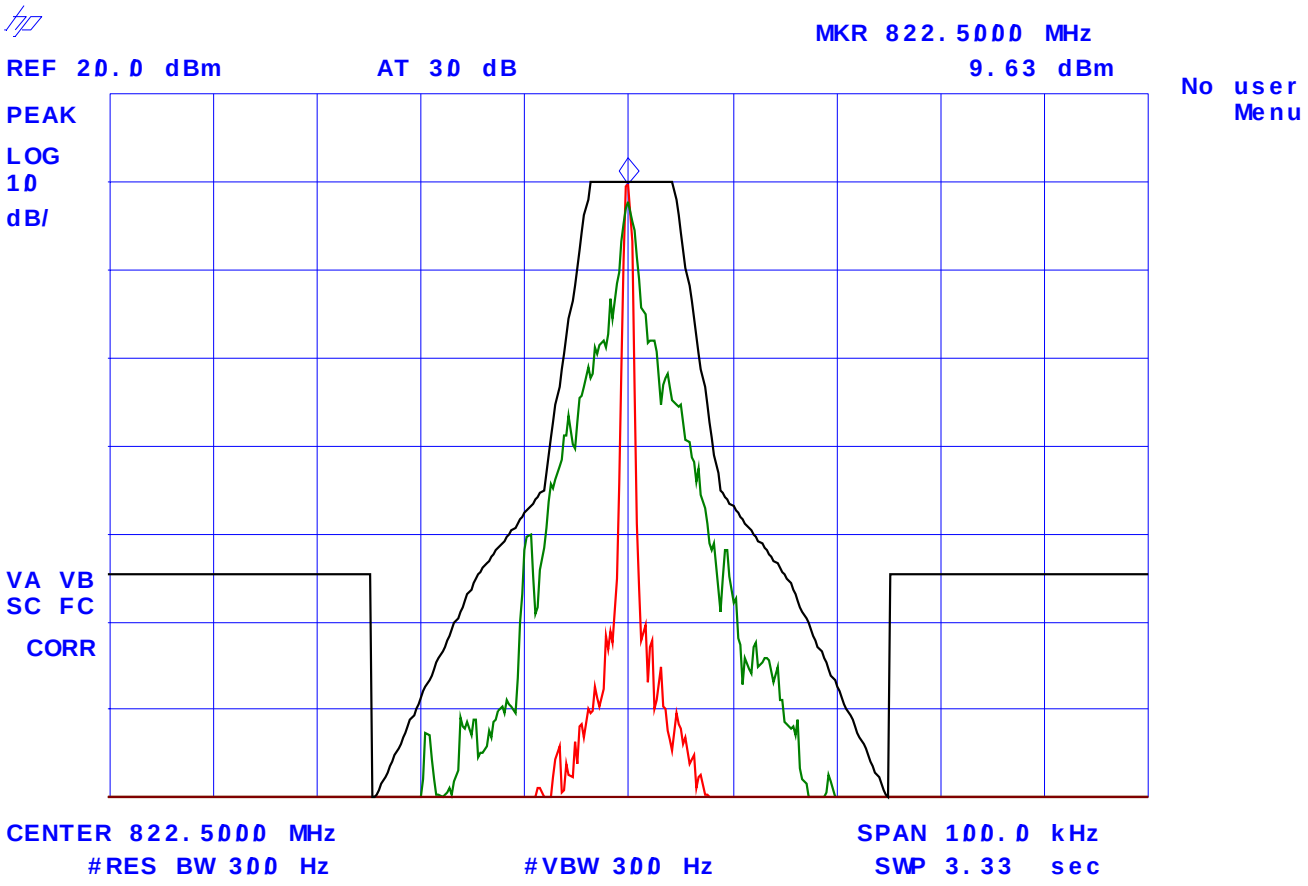
Frequency: 821 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 70: Emissions Mask H

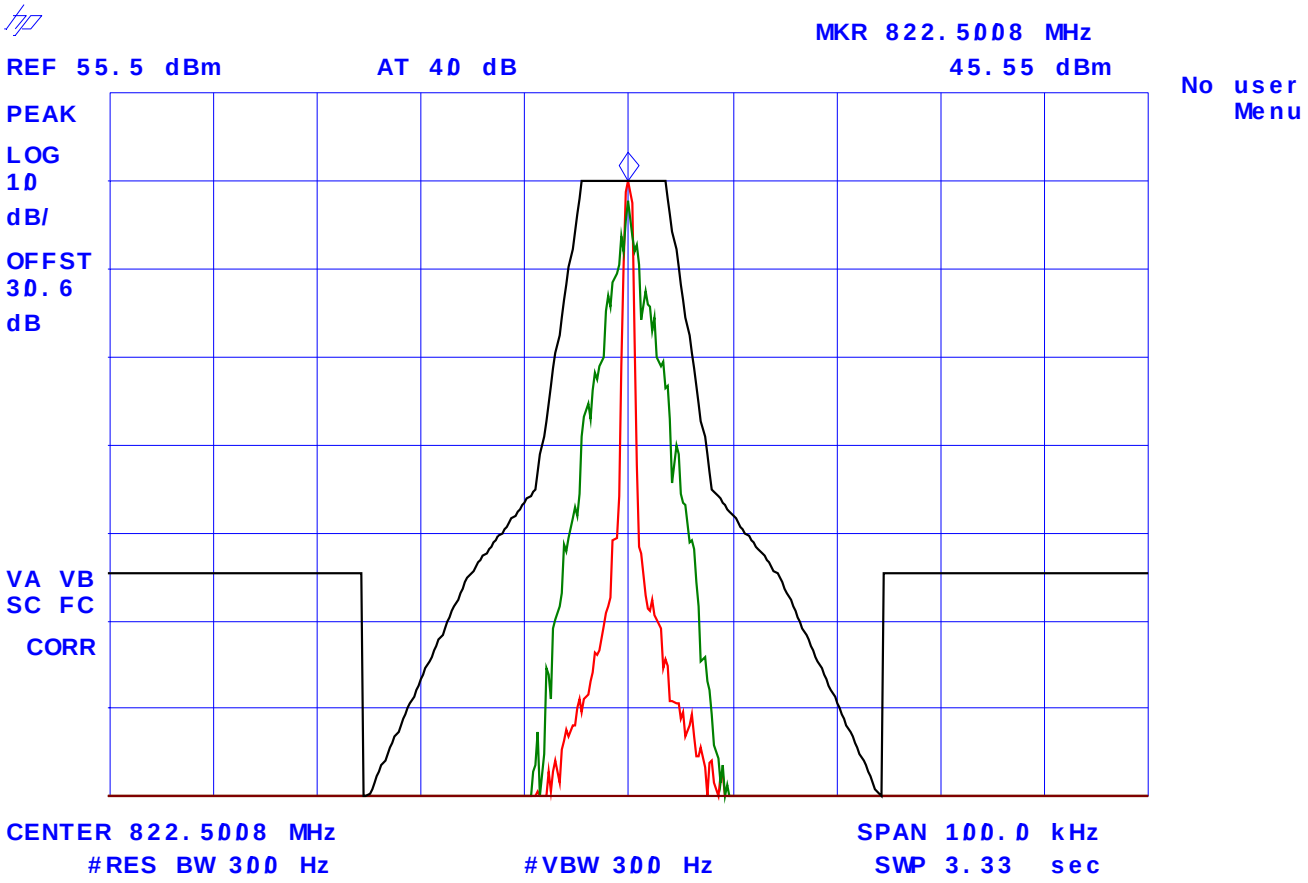
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 71: Emissions Mask H

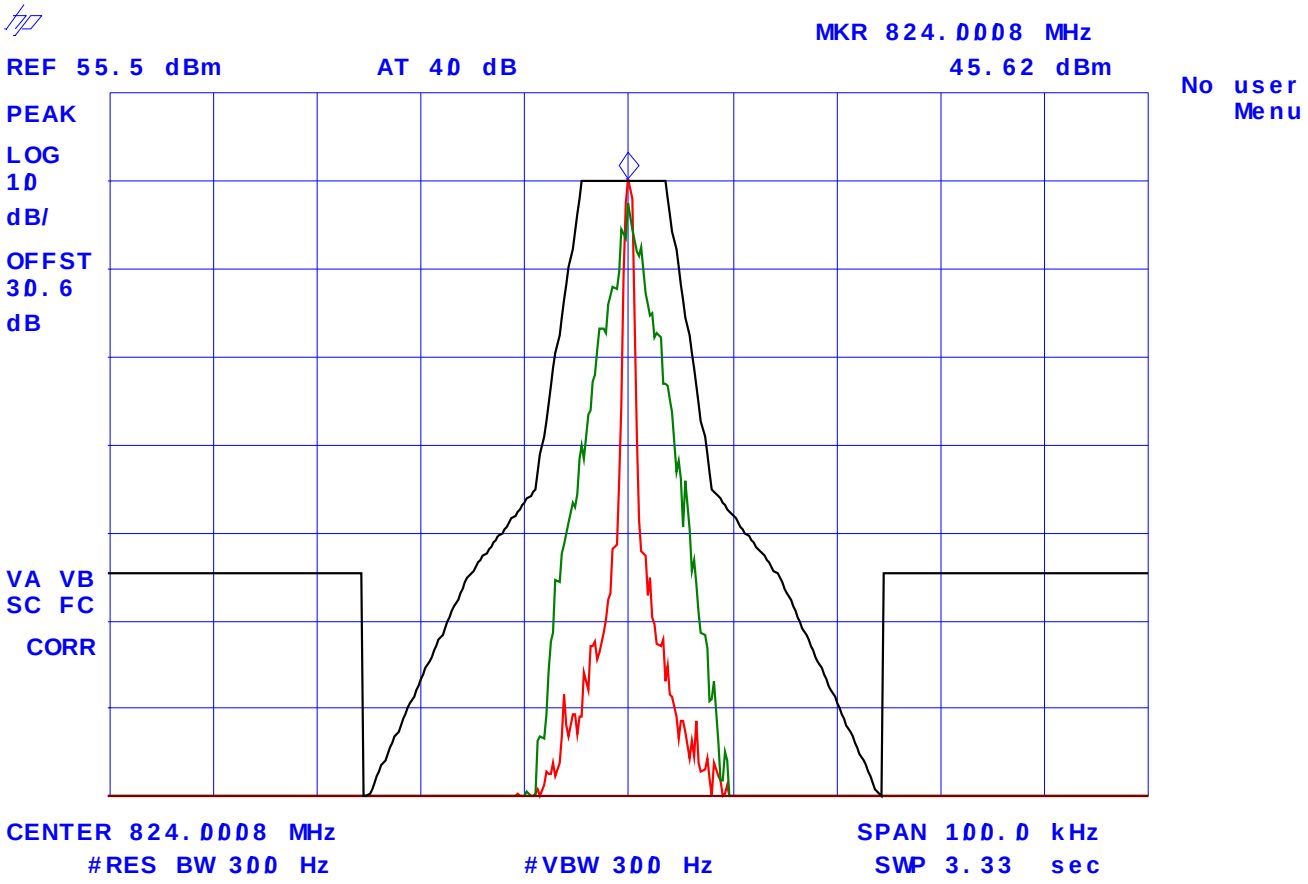
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 72: Emissions Mask H

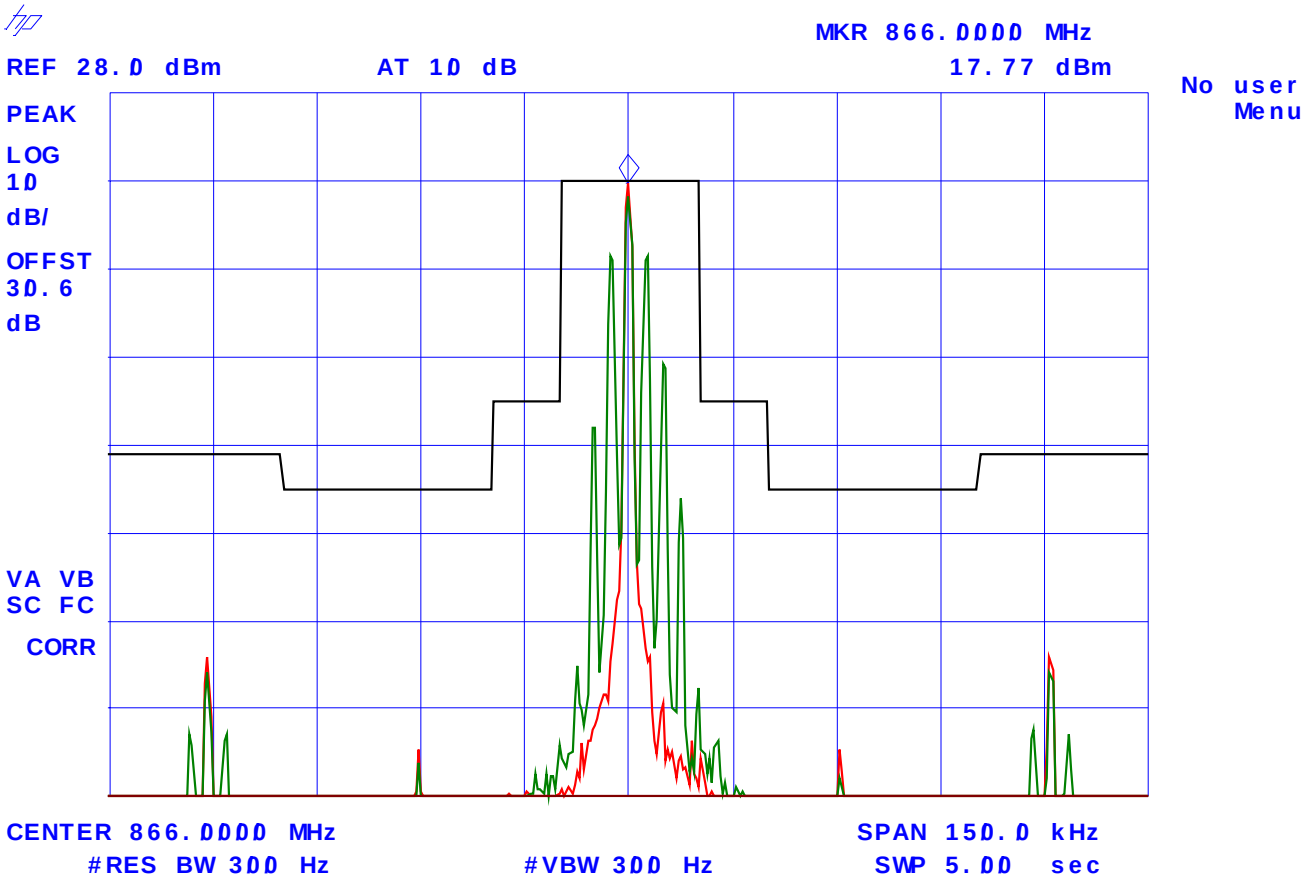
Frequency: 824 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 73: Emissions Mask B

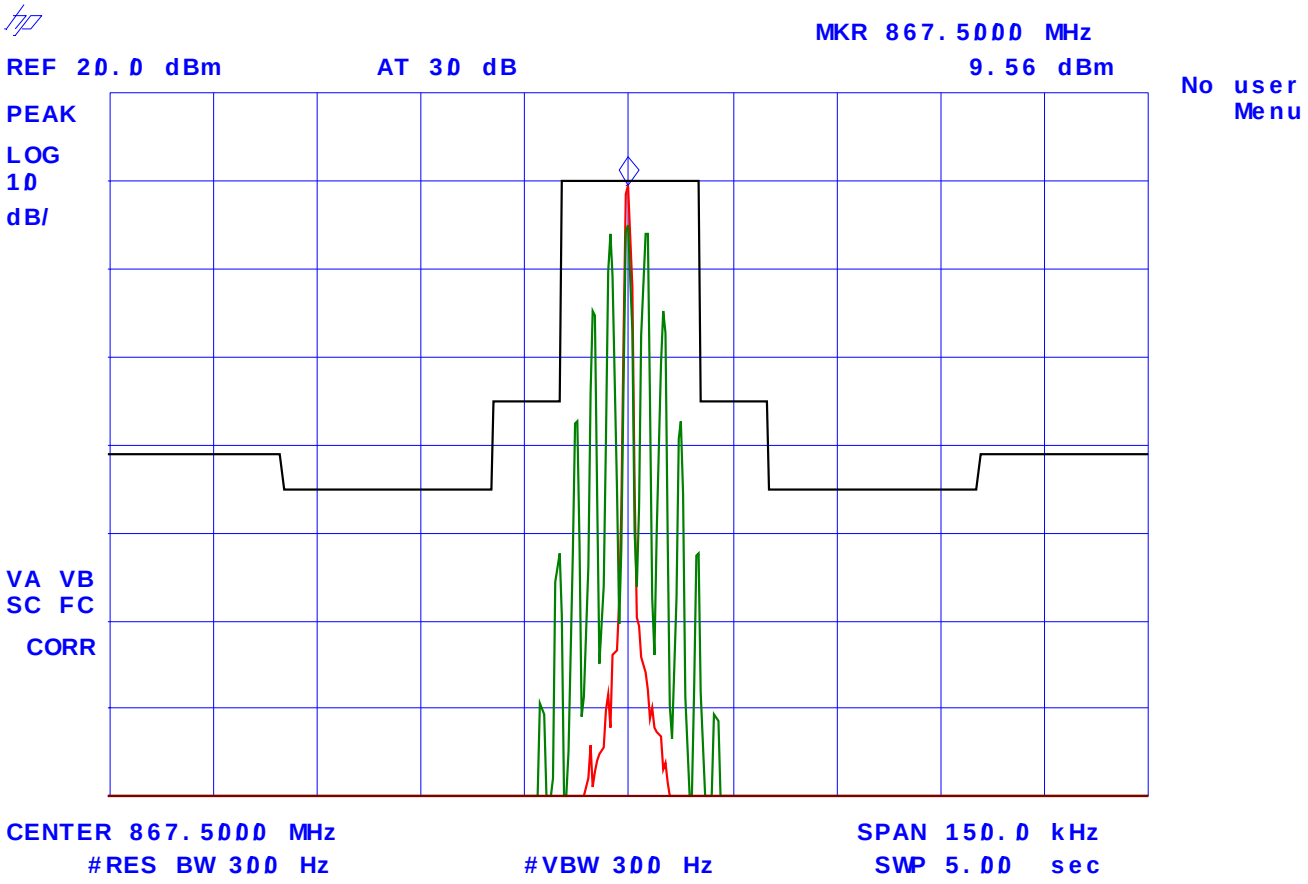
Frequency: 866 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 74: Emissions Mask B

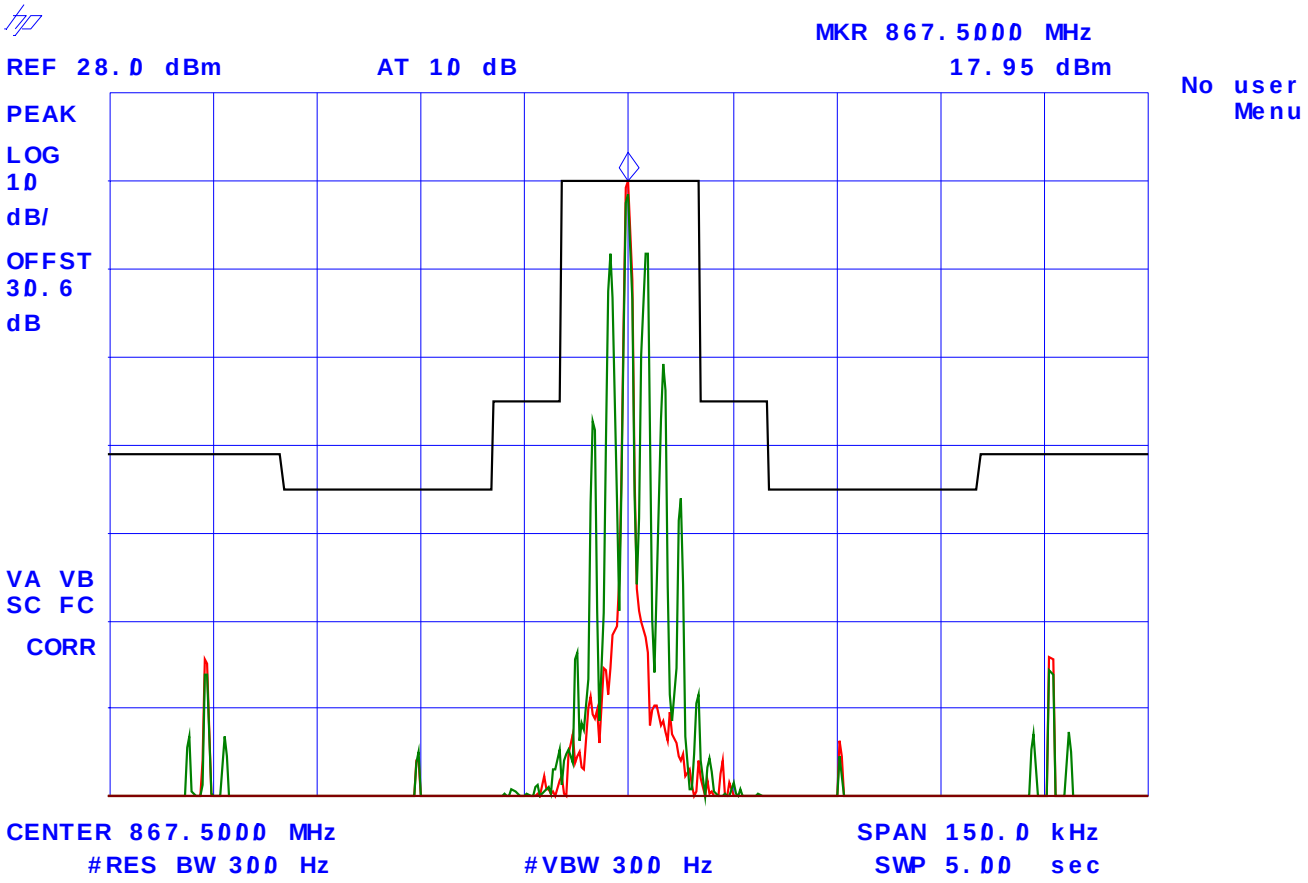
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 75: Emissions Mask B

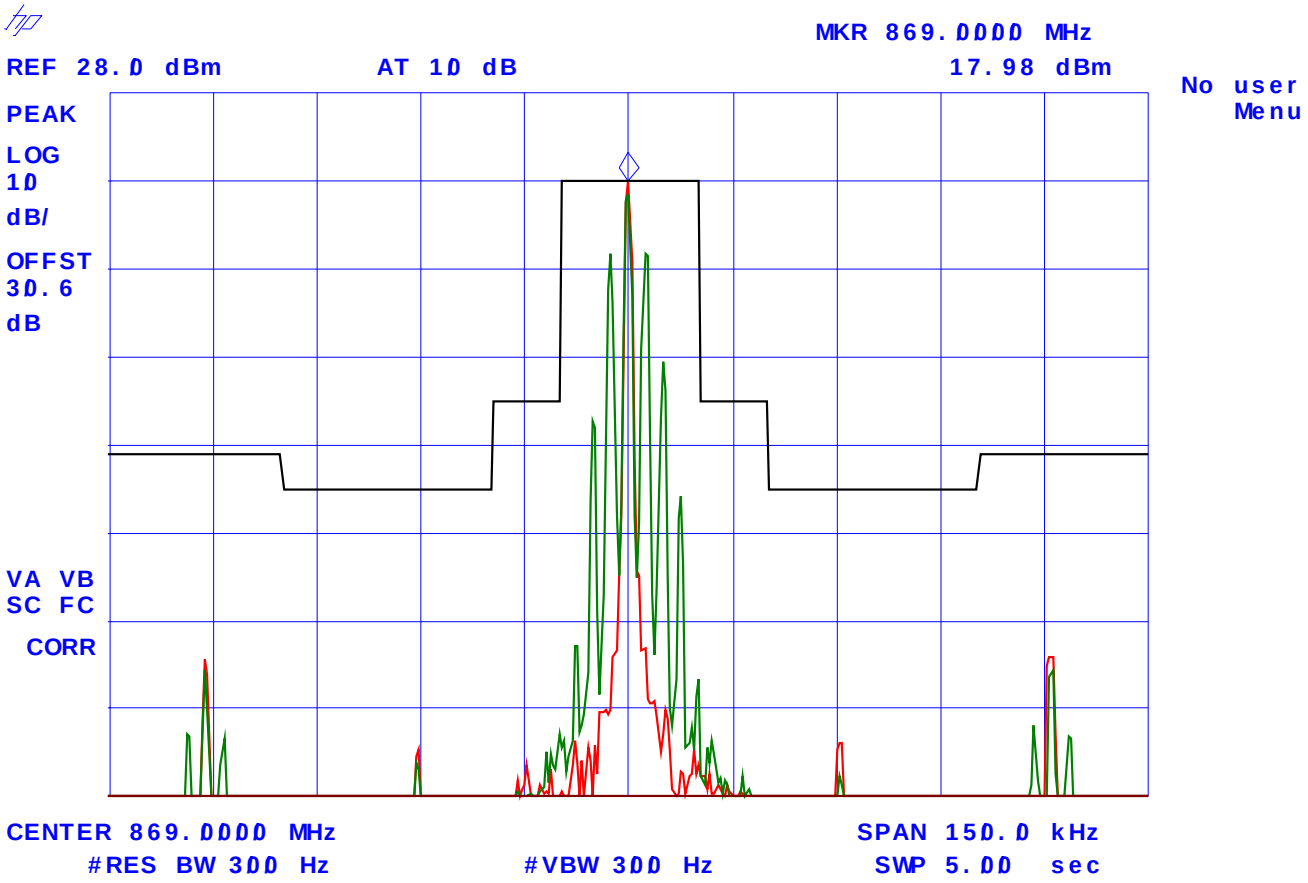
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 76: Emissions Mask B

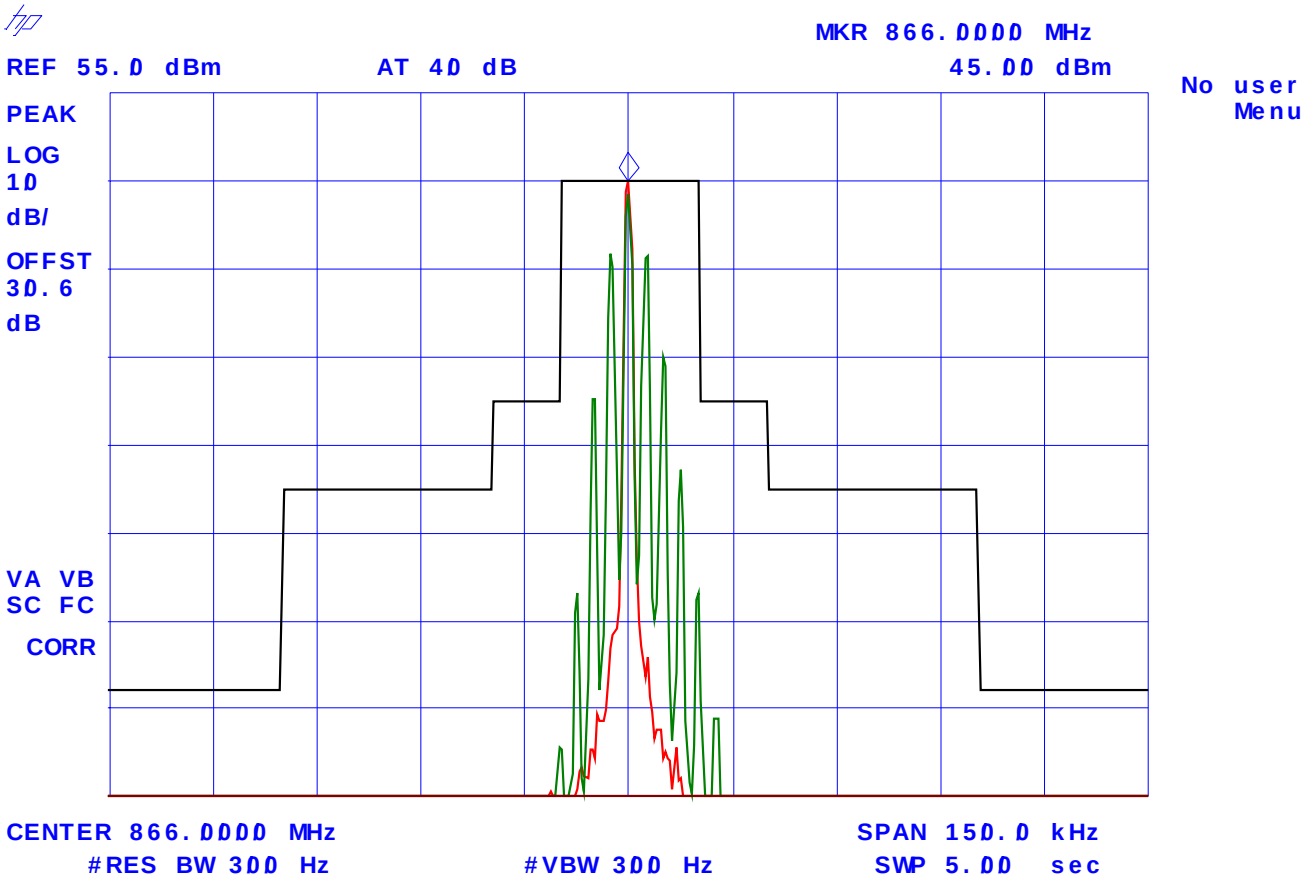
Frequency: 869 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 77: Emissions Mask B

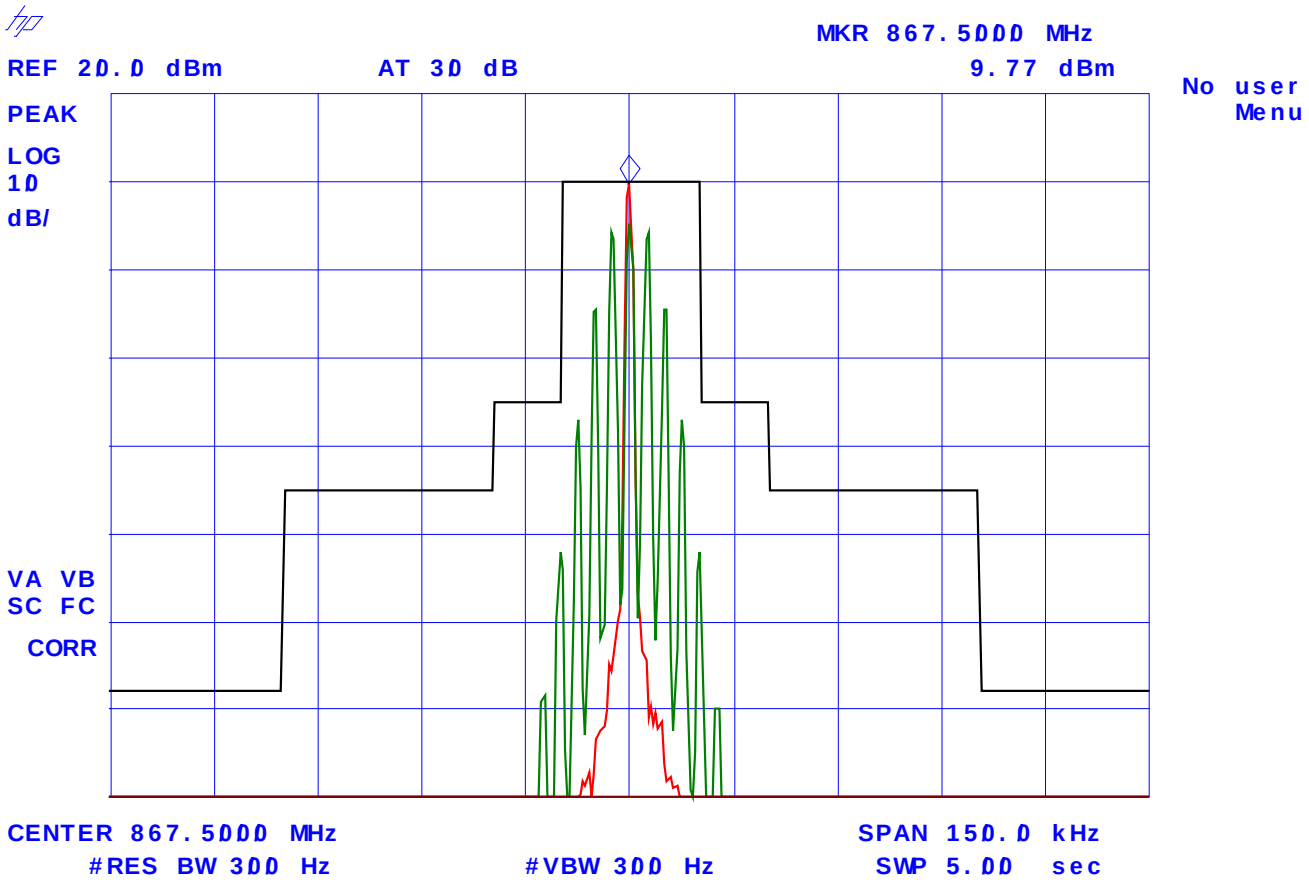
Frequency: 866 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 78: Emissions Mask B

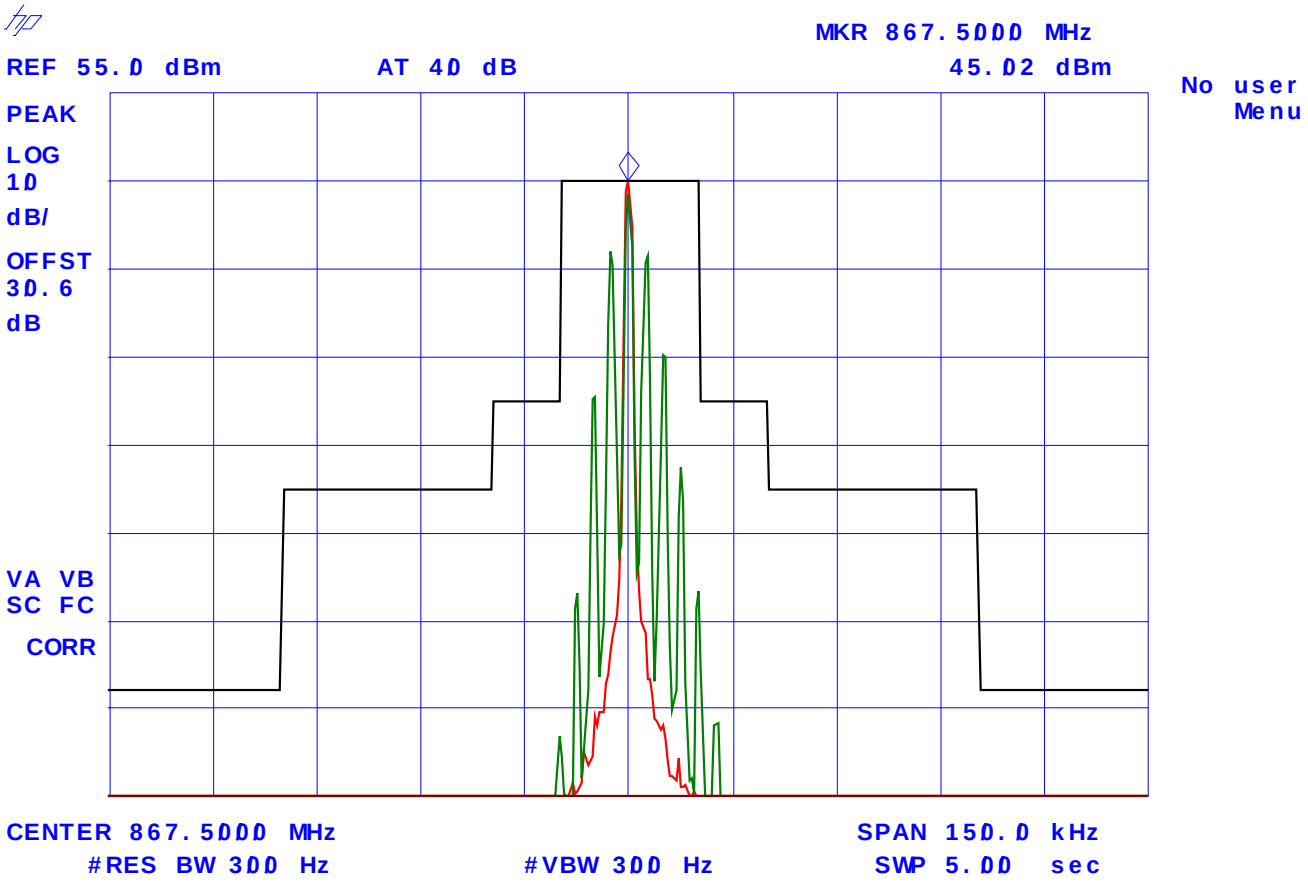
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 79: Emissions Mask B

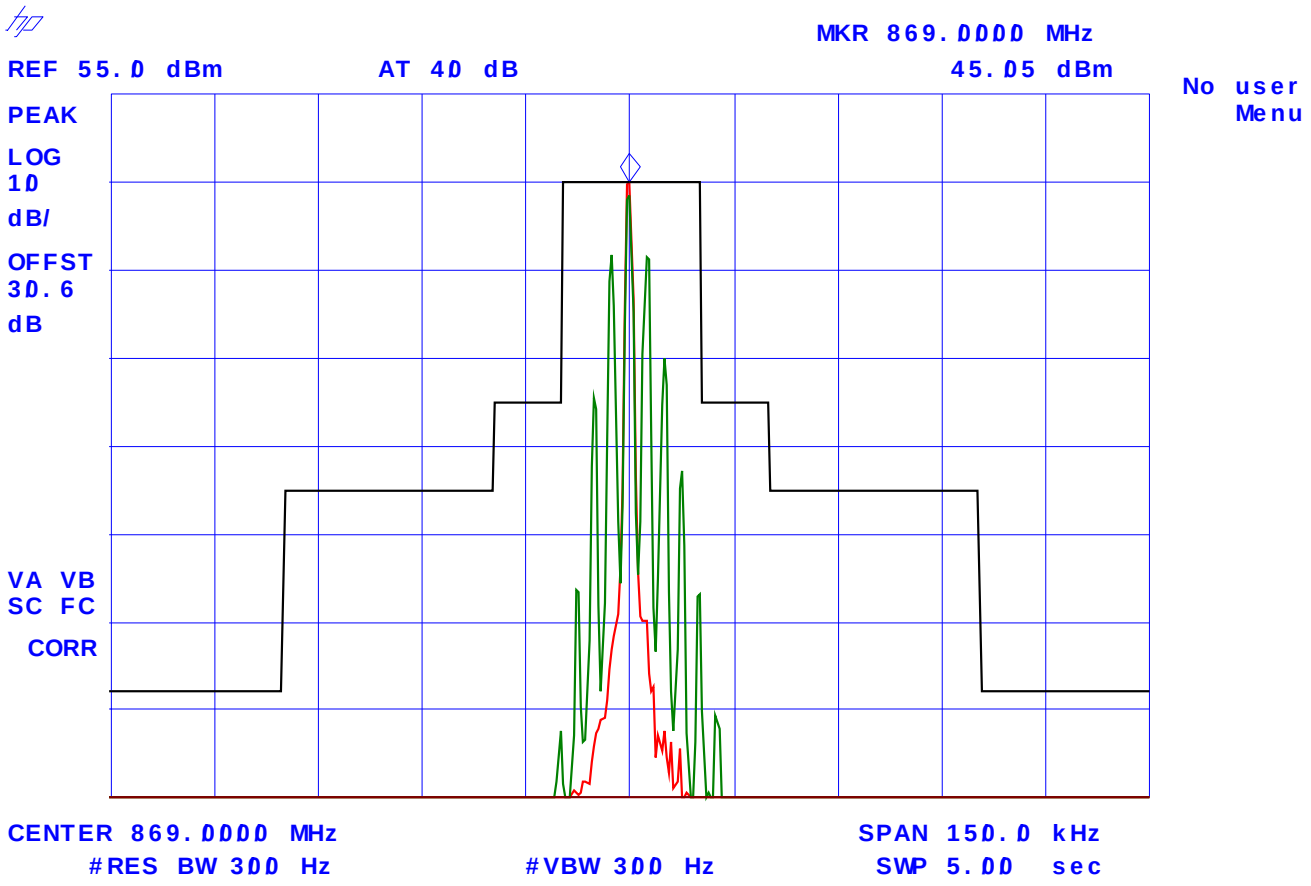
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 80: Emissions Mask B

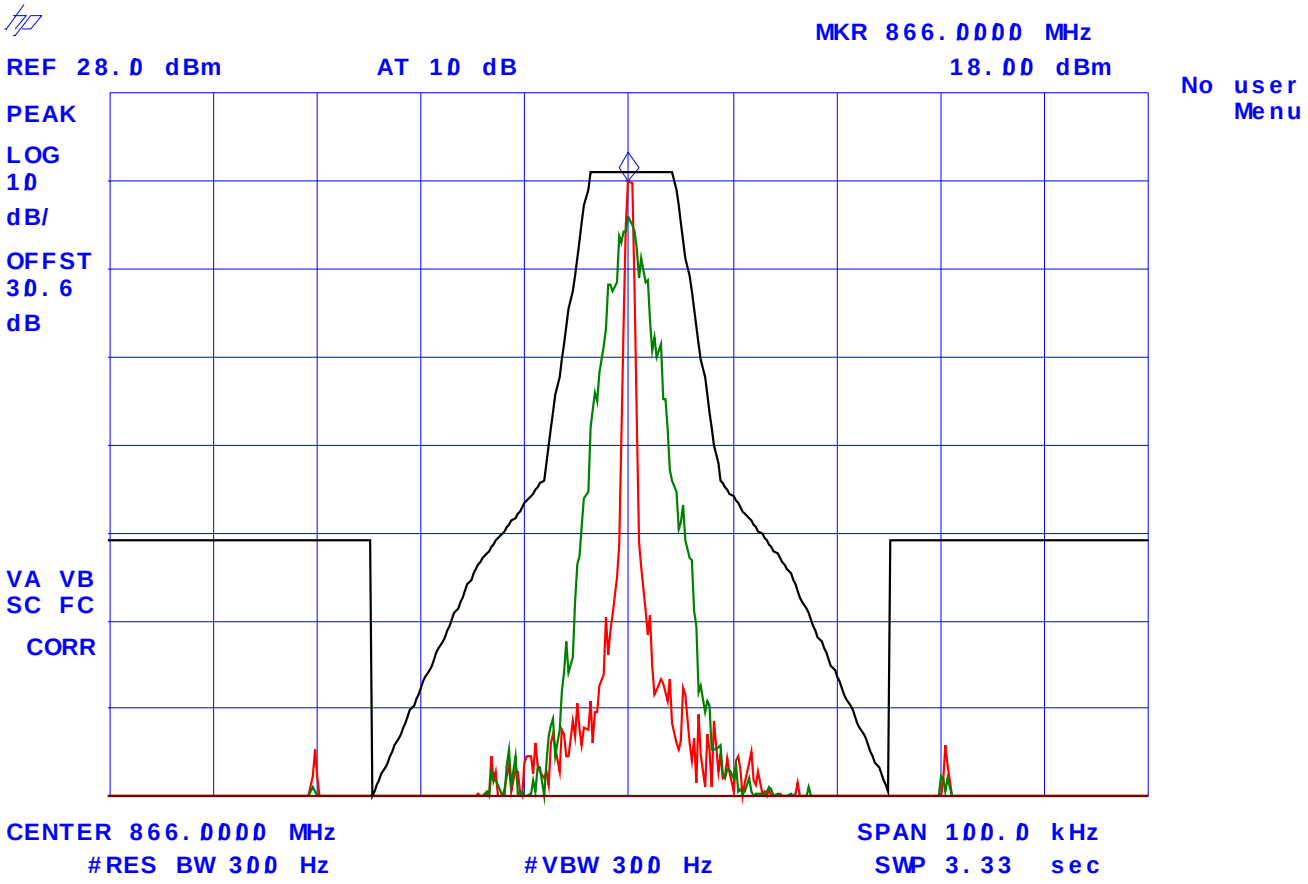
Frequency: 869 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with 2.5 kHz Sine wave signal



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 81: Emissions Mask H

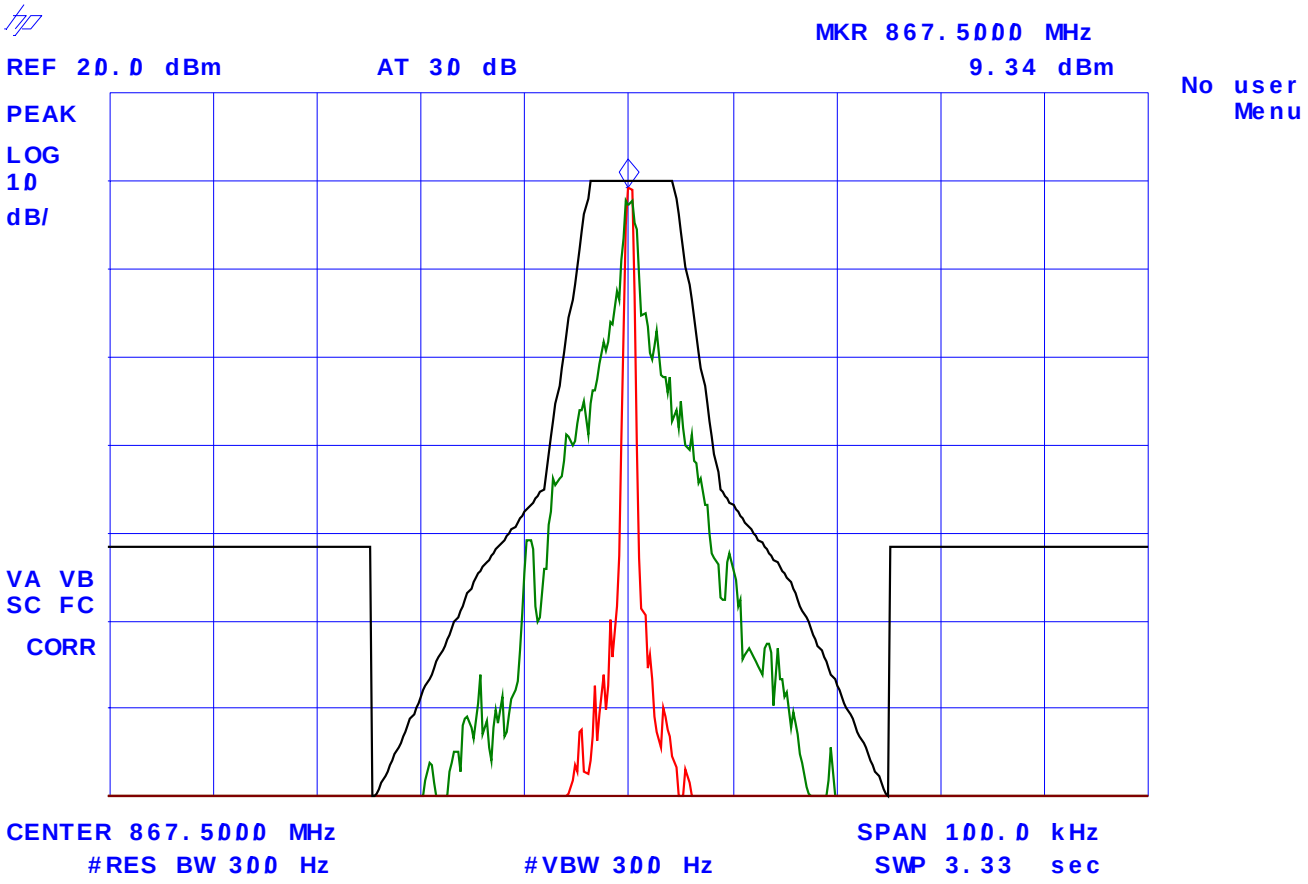
Frequency: 866 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 82: Emissions Mask H

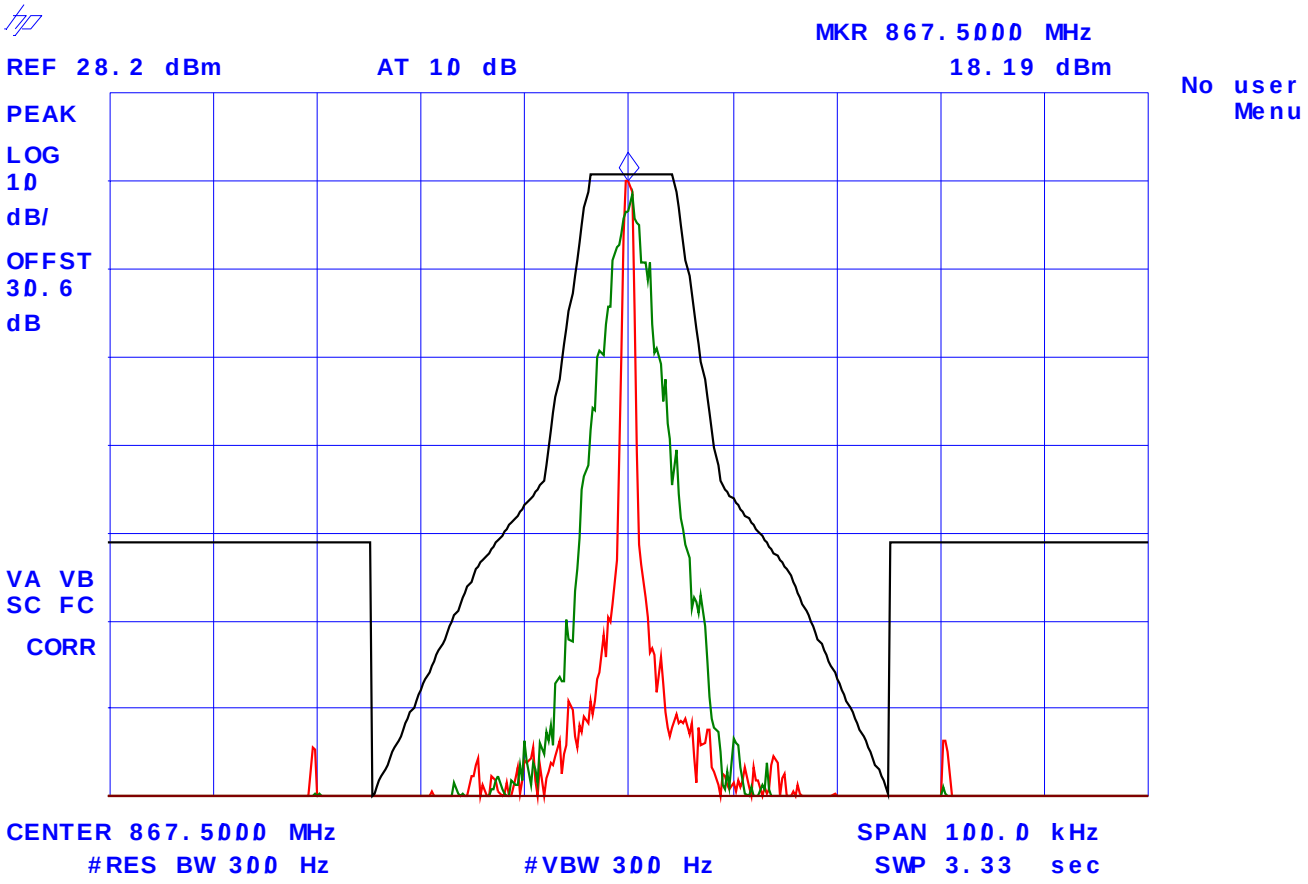
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 83: Emissions Mask H

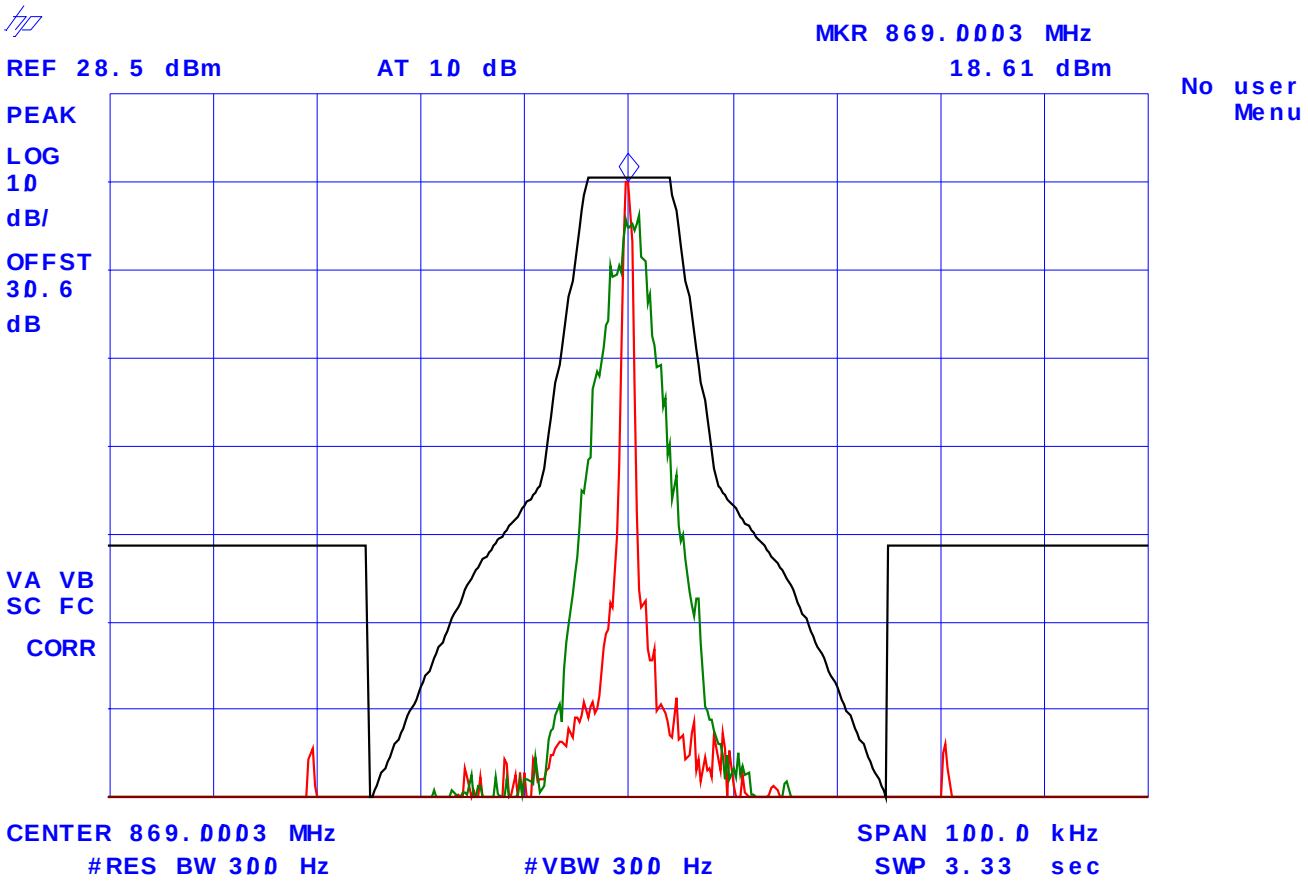
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 84: Emissions Mask H

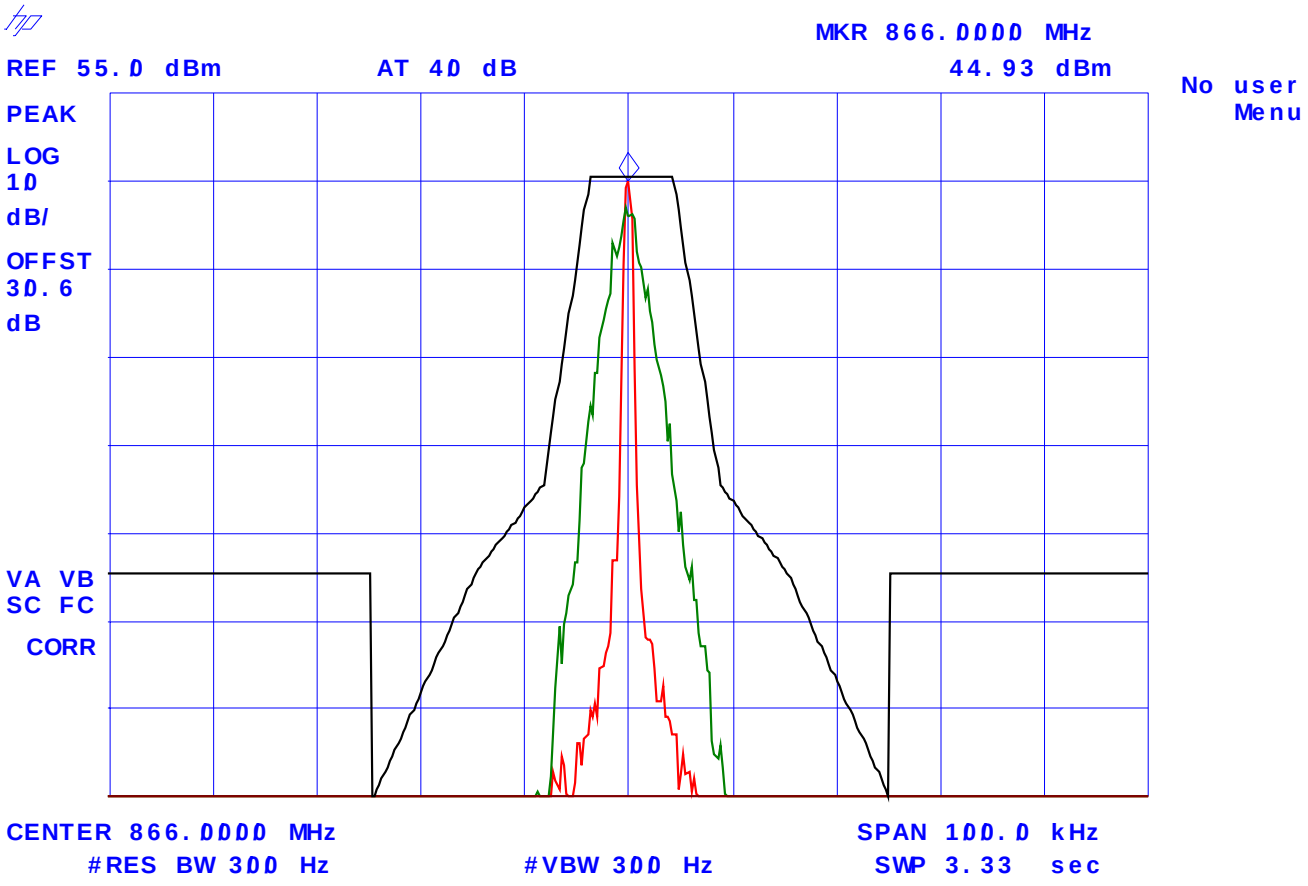
Frequency: 869 MHz, 12.5 kHz Channel Spacing. Low Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 85: Emissions Mask H

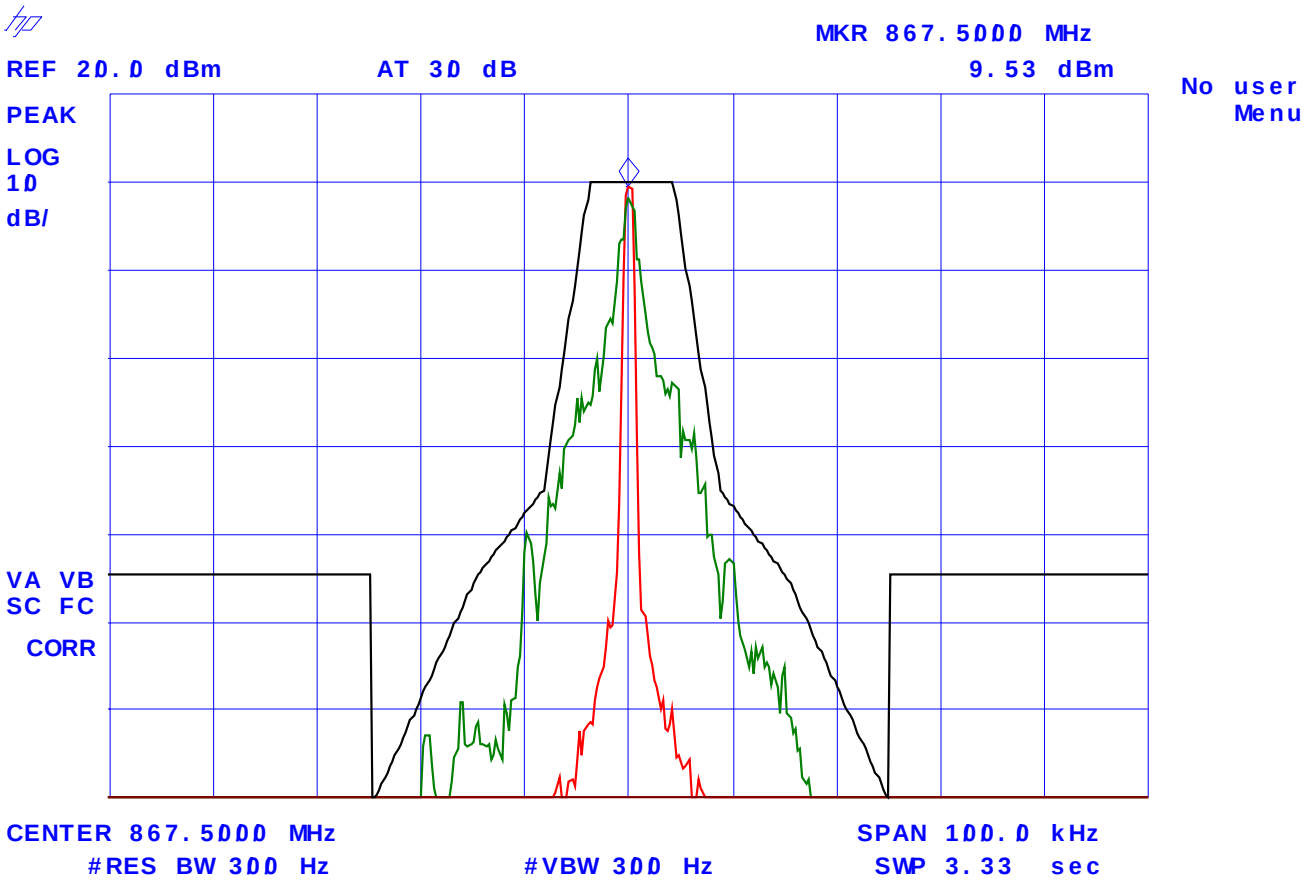
Frequency: 866 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 86: Emissions Mask H

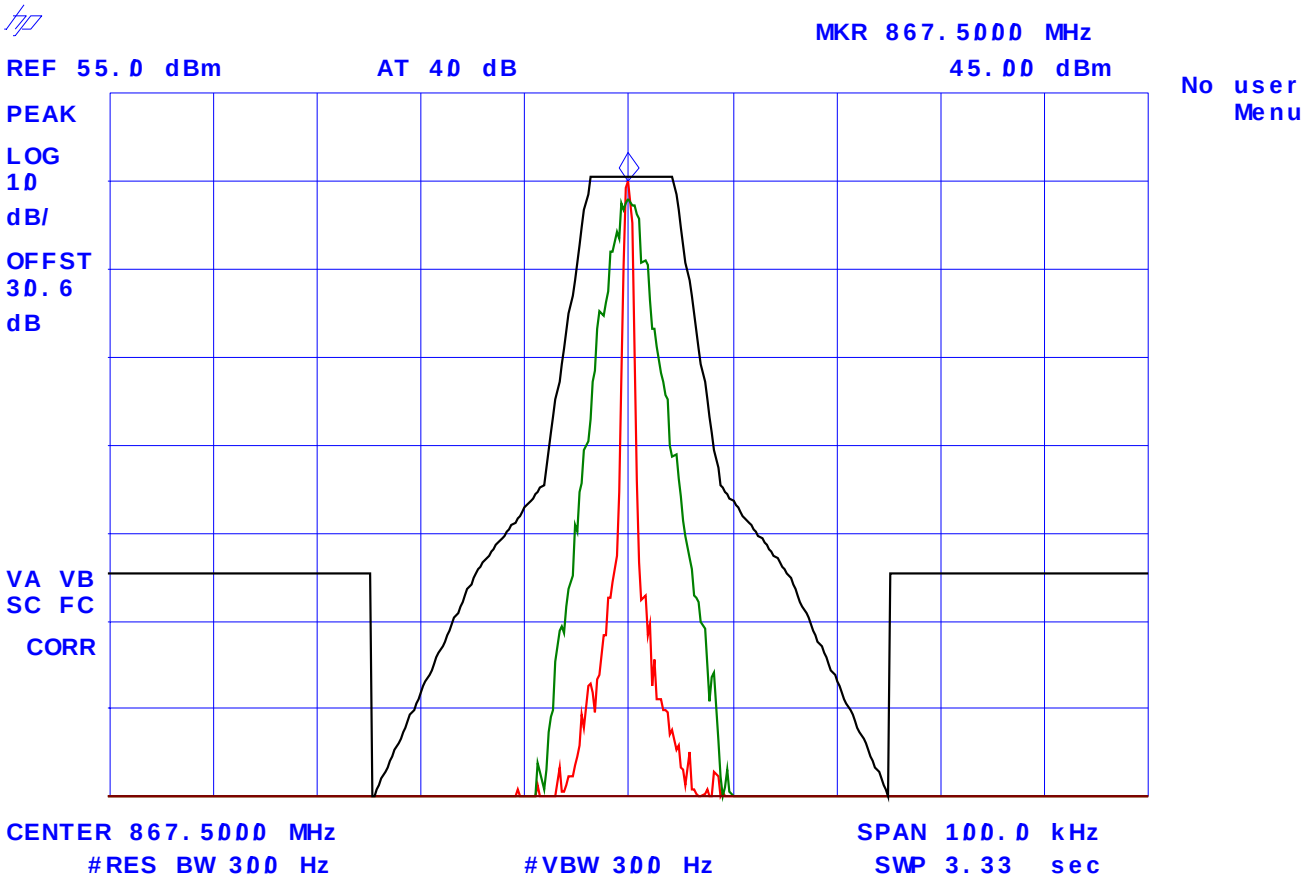
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Input
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 87: Emissions Mask H

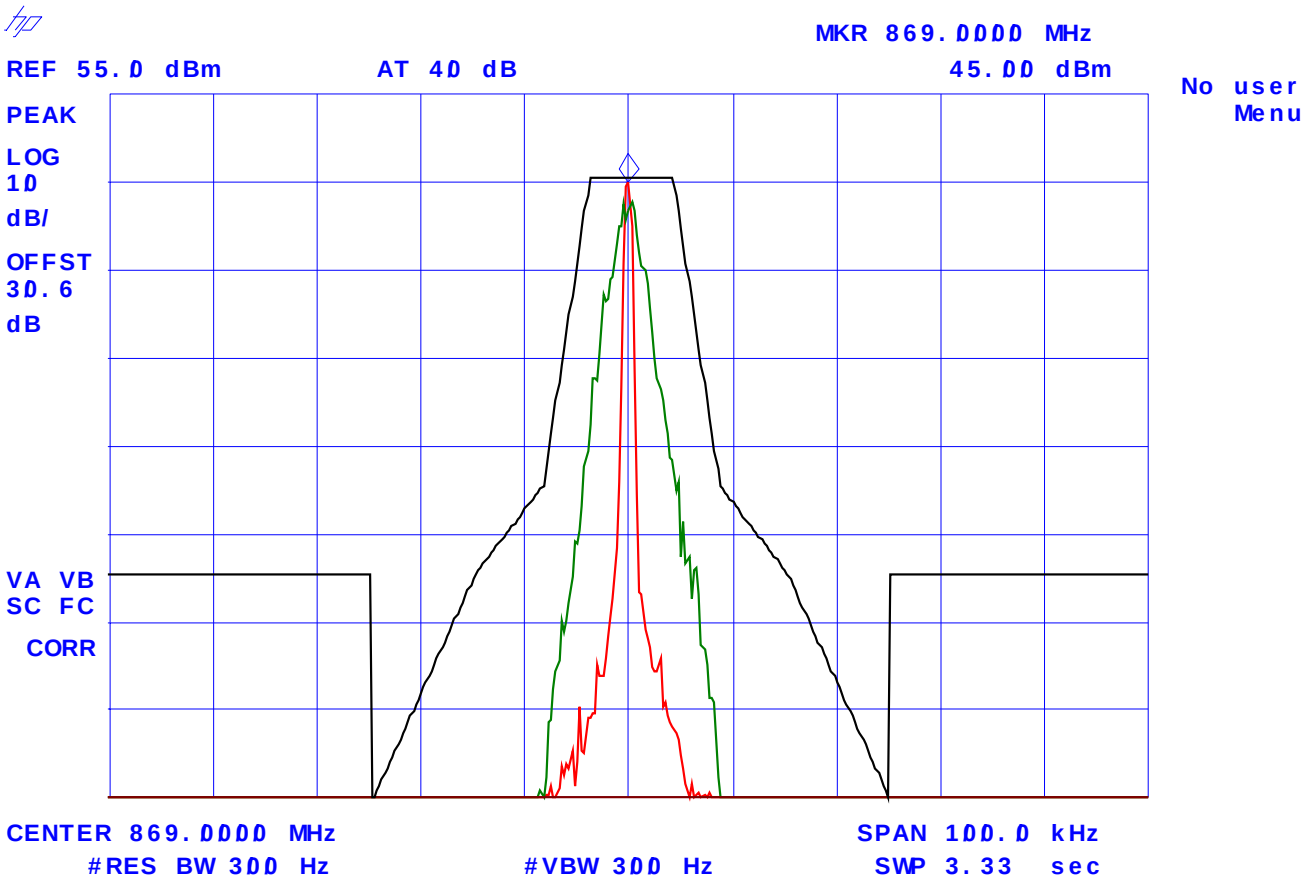
Frequency: 867.5 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 88: Emissions Mask H

Frequency: 869 MHz, 12.5 kHz Channel Spacing. High Power, RF Output
Modulation: FM modulation with an external 9600 b/s random data source



6.11. TRANSMITTER ANTENNA POWER SPURIOUS/HARMONIC CONDUCTED EMISSIONS @ FCC 90.210

6.11.1. Limits @ 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Frequency Range	Attenuation Limit (dBc)
90.210(b)(g) – Voice & data	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	43+10*log(P)
90.210(h) – Voice & data	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	43+log(P)

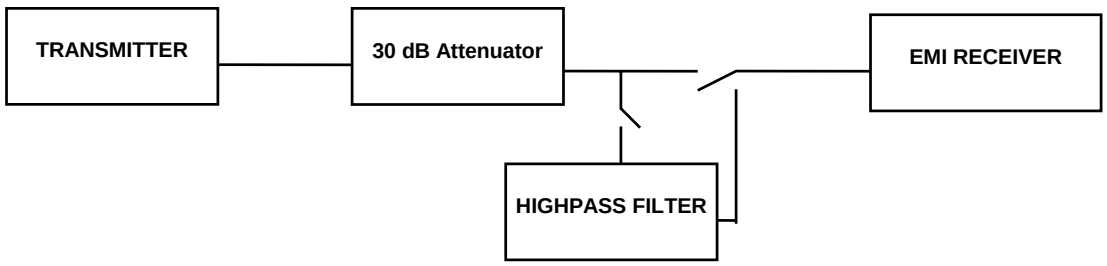
6.11.2. Method of Measurements

Refer to Exhibit 8 § 8.5 of this report for measurement details

6.11.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Audio Oscillator	Hewlett Packard	HP 204C	0989A08798	DC to 1.2 MHz
Highpass Filter, Microphase	Microphase	CR220HID	IITI11000AC	Cut-off Frequency at 600 MHz, 1.3 GHz or 4 GHz

6.11.4. Test Arrangement



6.11.5. Test Data

Remarks:

(1) For the worst case, the most stringent limit for 43+10*log(P in Watts) dBc were applied throughout all permitted bands.

(2) Since the emissions were found to be the same for different modulations (F3E and F1D) and channel spacings (12.5 kHz and 25 kHz), tests were performed with voice modulations only and the results shall represent for all different operations.

6.11.5.1. Transmitter Antenna Conducted Emissions in 806-824 MHz Band

6.11.5.1.1. Lowest Frequency 806 MHz, Lowest Power = 14.6 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
806.00	14.6	--	--	--	--
1612.00	-40.4	-55.0	-27.6	-27.4	PASS
3224.00	-44.8	-59.4	-27.6	-31.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 89 to 91 for detailed measurements.

6.11.5.1.2. Middle Frequency 815 MHz, Lowest Power = 14.7 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
815.00	14.7	--	--	--	--
1630.00	-35.8	-50.5	-27.7	-22.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 92 to 94 for detailed measurements.

6.11.5.1.3. Highest Frequency 824 MHz, Lowest Power = 15.6 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
824.00	15.6	--	--	--	--
1648.00	-43.8	-59.4	-28.6	-30.8	PASS
4941.00	-48.0	-63.6	-28.6	-35.0	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 95 to 97 for detailed measurements.

6.11.5.1.4. Lowest Frequency 806 MHz, Highest Power = 45.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
806.00	45.3	--	--	--	--
1613.00	-30.8	-76.1	-58.3	-17.8	PASS
2416.00	-26.7	-72.0	-58.3	-13.7	PASS
3220.00	-22.7	-68.0	-58.3	-9.7	PASS
4036.00	-25.8	-71.1	-58.3	-12.8	PASS
4835.00	-39.4	-84.7	-58.3	-26.4	PASS
5634.00	-32.2	-77.5	-58.3	-19.2	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 98 to 100 for detailed measurements.

6.11.5.1.5. Middle Frequency 815 MHz, Highest Power = 44.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
815.00	44.3		--	--	--
1632.00	-31.0	-75.3	-57.3	-18.0	PASS
2444.00	-24.7	-69.0	-57.3	-11.7	PASS
3255.00	-27.3	-71.6	-57.3	-14.3	PASS
4072.00	-23.0	-67.3	-57.3	-10.0	PASS
4888.00	-30.2	-74.5	-57.3	-17.2	PASS
5705.00	-31.1	-75.4	-57.3	-18.1	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 101 to 103 for detailed measurements.

6.11.5.1.6. Highest Frequency 824 MHz, Highest Power = 45.5 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
824.00	45.5				
1646.00	-31.2	-76.7	-58.5	-18.2	PASS
2473.00	-23.5	-69.0	-58.5	-10.5	PASS
3291.00	-30.4	-75.9	-58.5	-17.4	PASS
4125.00	-22.4	-67.9	-58.5	-9.4	PASS
4941.00	-29.5	-75.0	-58.5	-16.5	PASS
5758.00	-30.8	-76.3	-58.5	-17.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 104 to 106 for detailed measurements.

6.11.5.2. Transmitter Antenna Conducted Emissions in 851-869 MHz Band

6.11.5.2.1. Lowest Frequency 851 MHz, Lowest Power = 18.2 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
851.00	18.2	--	--	--	--
1703.00	-49.0	-67.2	-31.2	-36.0	PASS
2533.00	-49.2	-67.4	-31.2	-36.2	PASS
3397.00	-49.5	-67.7	-31.2	-36.5	PASS
4249.00	-49.6	-67.8	-31.2	-36.6	PASS
5101.00	-48.7	-66.9	-31.2	-35.7	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 107 to 109 for detailed measurements.

6.11.5.2.2. Middle Frequency 860 MHz, Lowest Power = 17.5 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
860.00	17.5				
1717.00	-49.5	-67.0	-30.5	-36.5	PASS
2577.00	-50.0	-67.5	-30.5	-37.0	PASS
3433.00	-44.0	-61.5	-30.5	-31.0	PASS
4302.00	-48.2	-65.7	-30.5	-35.2	PASS
5154.00	-51.0	-68.4	-30.5	-37.9	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 110 to 112 for detailed measurements.

6.11.5.2.3. Highest Frequency 869 MHz, Lowest Power = 18.9 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
869.00	18.9	--	--	--	--
1736.00	-49.0	-67.9	-31.9	-36.0	PASS
2606.00	-48.8	-67.7	-31.9	-35.8	PASS
3468.00	-47.3	-66.2	-31.9	-34.3	PASS
4338.00	-49.6	-68.5	-31.9	-36.6	PASS
5208.00	-50.3	-69.2	-31.9	-37.3	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 113 to 115 for detailed measurements.

6.11.5.2.4. Lowest Frequency 851 MHz, Highest Power = 45.4 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
851.00	45.4				
1703.00	-31.0	-76.4	-58.4	-18.0	PASS
2533.00	-30.8	-76.2	-58.4	-17.8	PASS
3397.00	-27.5	-72.9	-58.4	-14.5	PASS
4249.00	-25.4	-70.8	-58.4	-12.4	PASS
5101.00	-25.5	-70.9	-58.4	-12.5	PASS
6823.00	-28.5	-73.9	-58.4	-15.5	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 116 to 118 for detailed measurements.

6.11.5.2.5. Middle Frequency 860 MHz, Highest Power = 43.5 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
860.00	43.5				
1717.00	-31.1	-74.7	-56.5	-18.1	PASS
2577.00	-30.2	-73.8	-56.5	-17.3	PASS
3433.00	-23.9	-67.4	-56.5	-10.9	PASS
4302.00	-23.4	-66.9	-56.5	-10.4	PASS
5154.00	-23.8	-67.3	-56.5	-10.8	PASS
6894.00	-28.6	-72.1	-56.5	-15.6	PASS

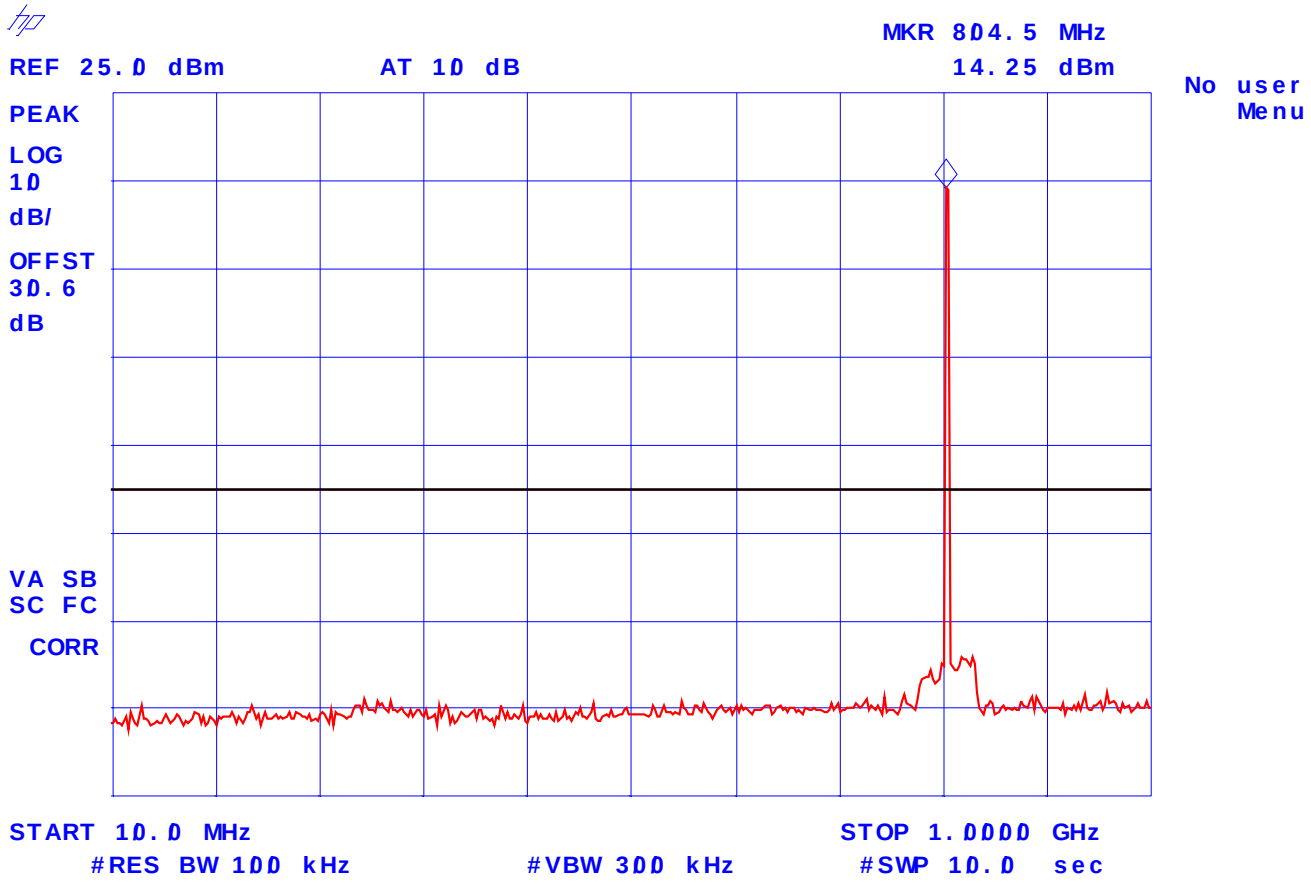
- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 119 to121 for detailed measurements.

6.11.5.2.6. Highest Frequency 869 MHz, Highest Power = 45.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

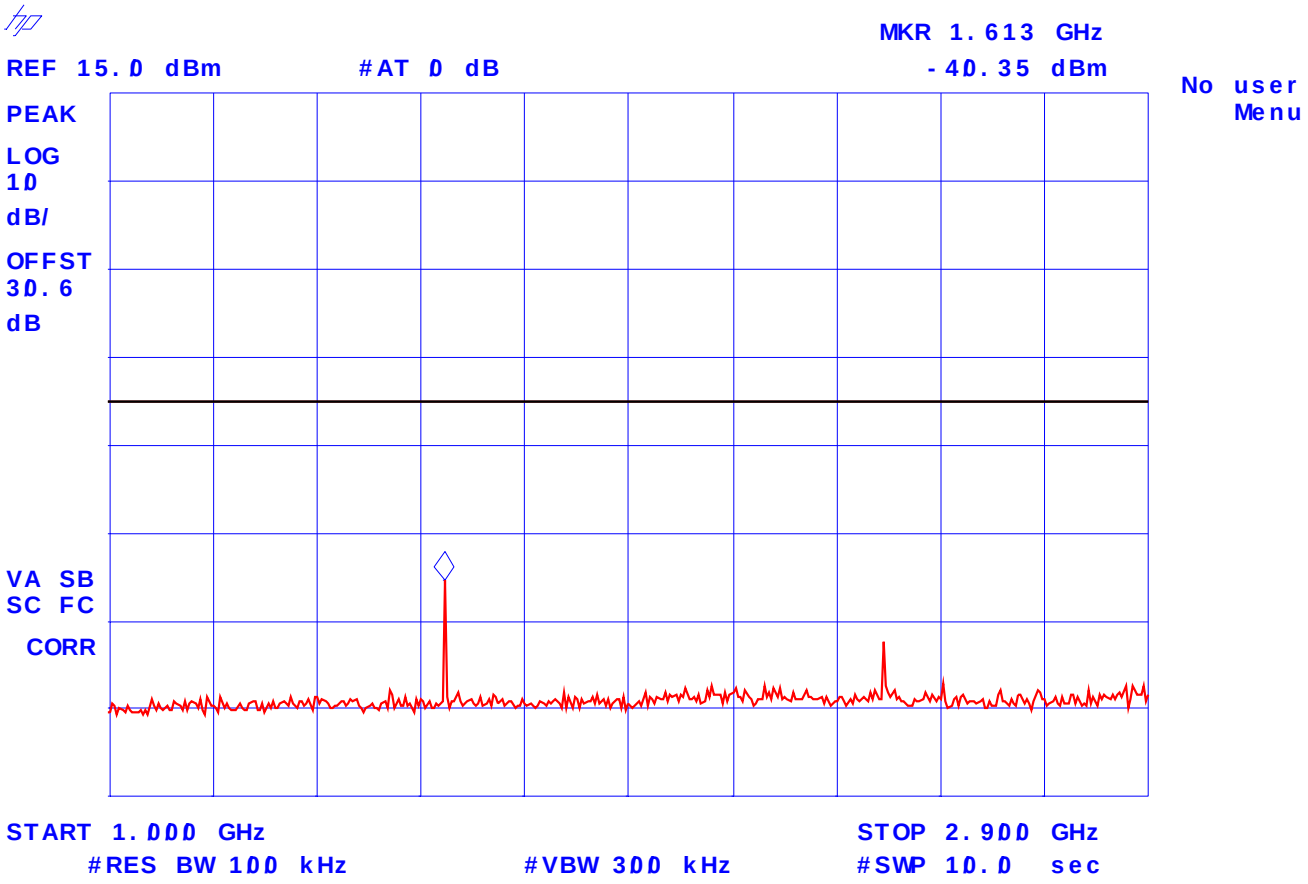
FREQUENCY (MHz)	TRANSMITTER CONDUCTED ANTENNA EMISSIONS (dBm)	(dBc)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
869.00	45.3				
1736.00	-31.2	-76.5	-58.3	-18.2	PASS
2606.00	-26.3	-71.6	-58.3	-13.3	PASS
3468.00	-29.6	-74.9	-58.3	-16.6	PASS
4338.00	-24.2	-69.5	-58.3	-11.2	PASS
5208.00	-22.0	-67.3	-58.3	-9.0	PASS
6965.00	-32.2	-77.5	-58.3	-19.2	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions within 30 dB below the limits were recorded.
- Refer to Plots # 122 to 124 for detailed measurements.

Plot # 89: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz. Low Power

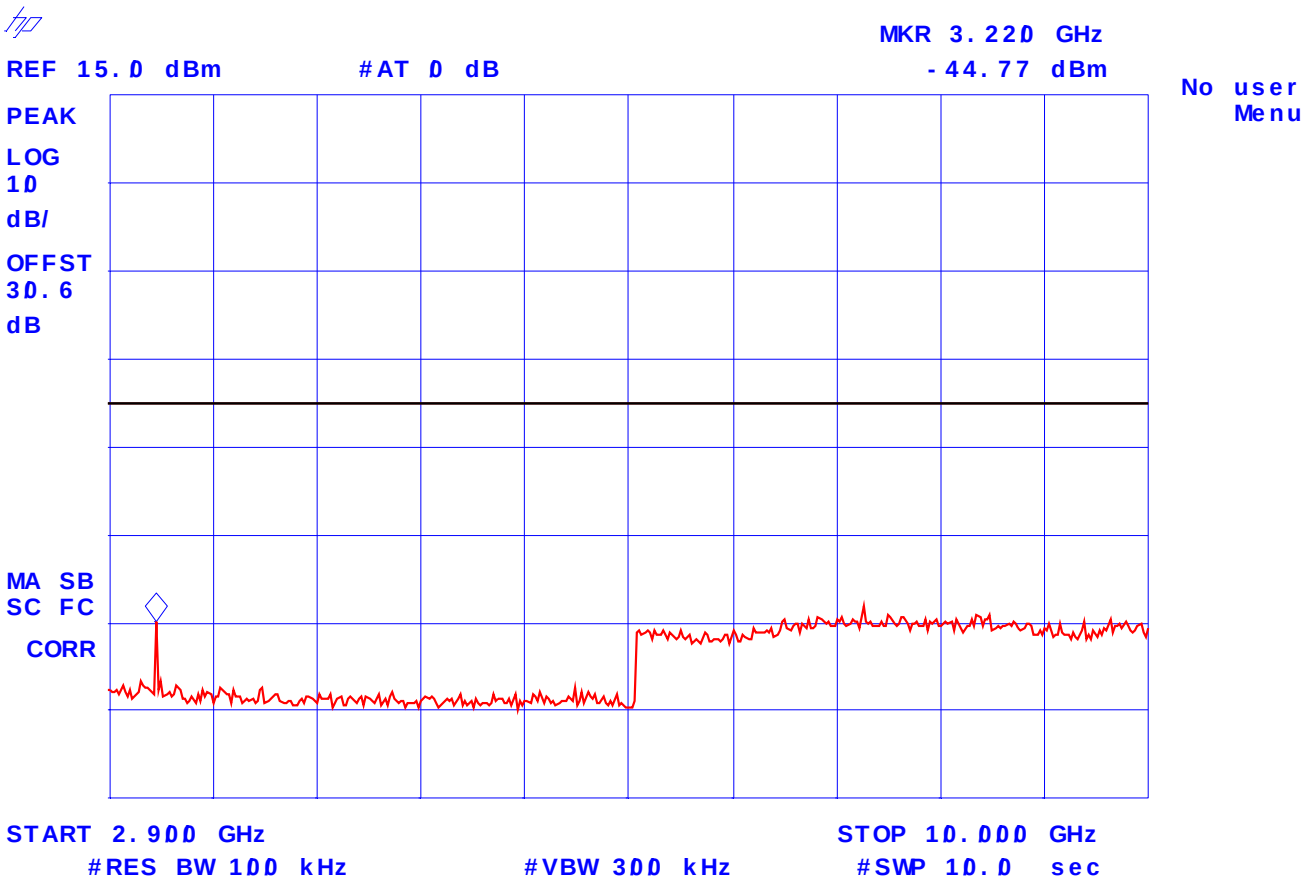


Plot # 90: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz. Low Power



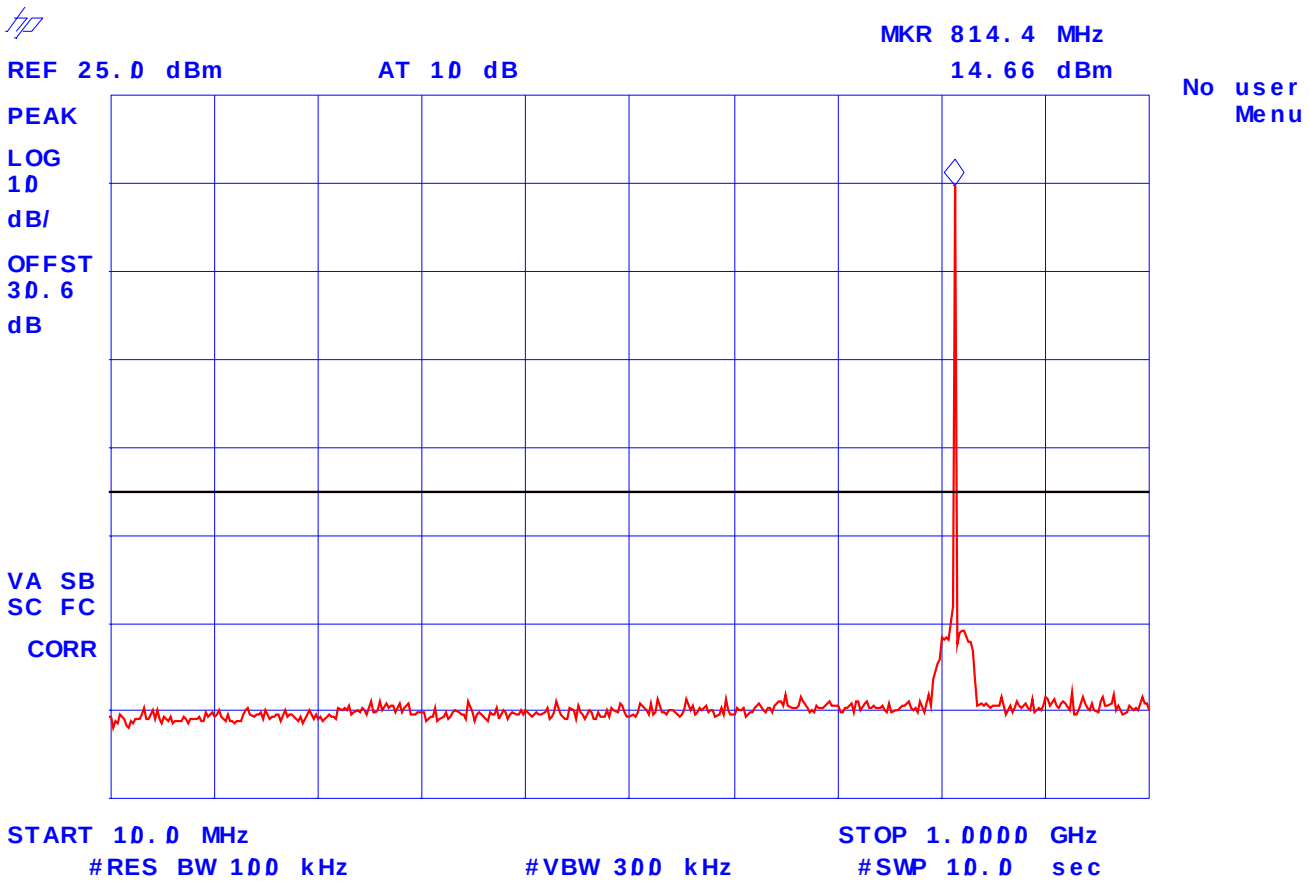
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 91: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz. Low Power



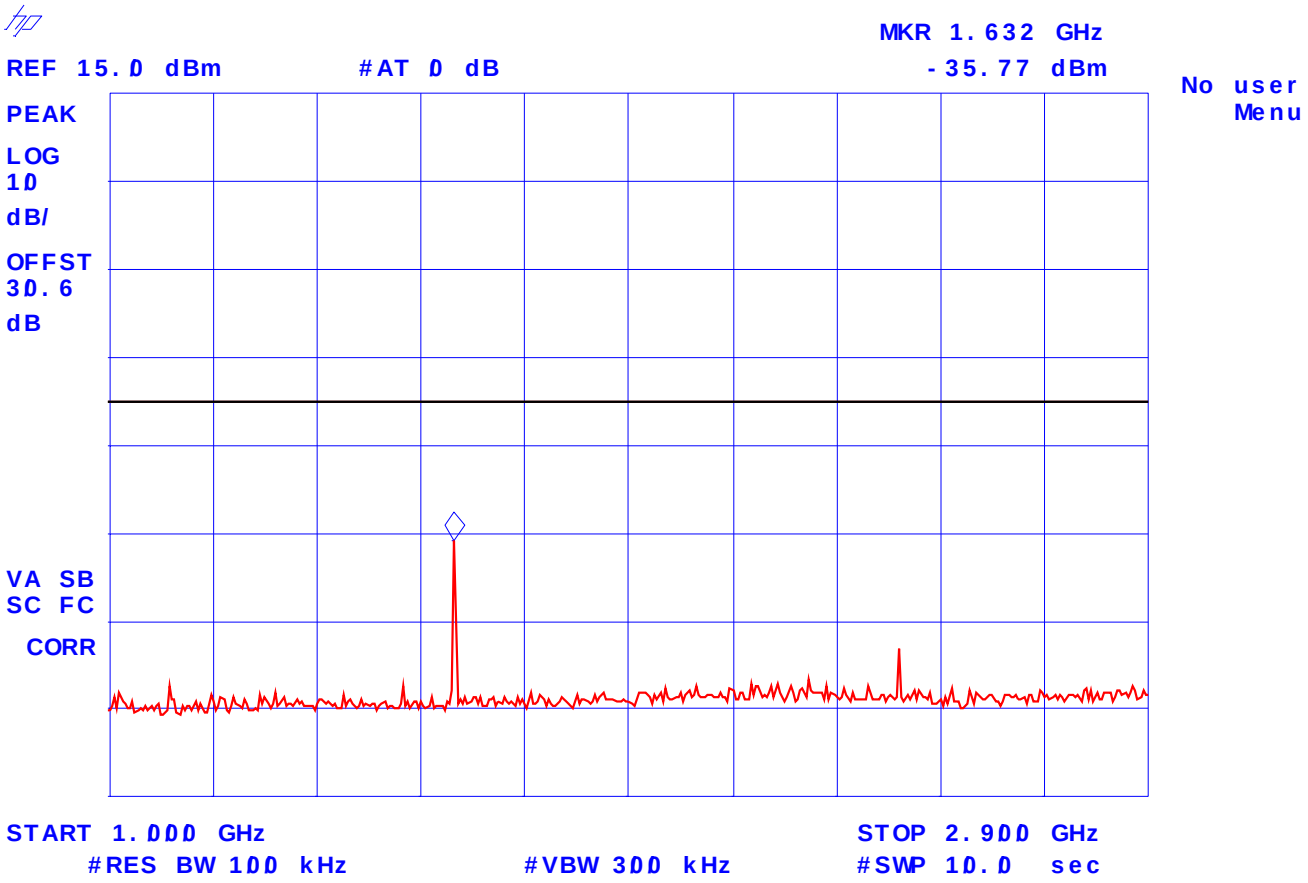
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 92: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz. Low Power



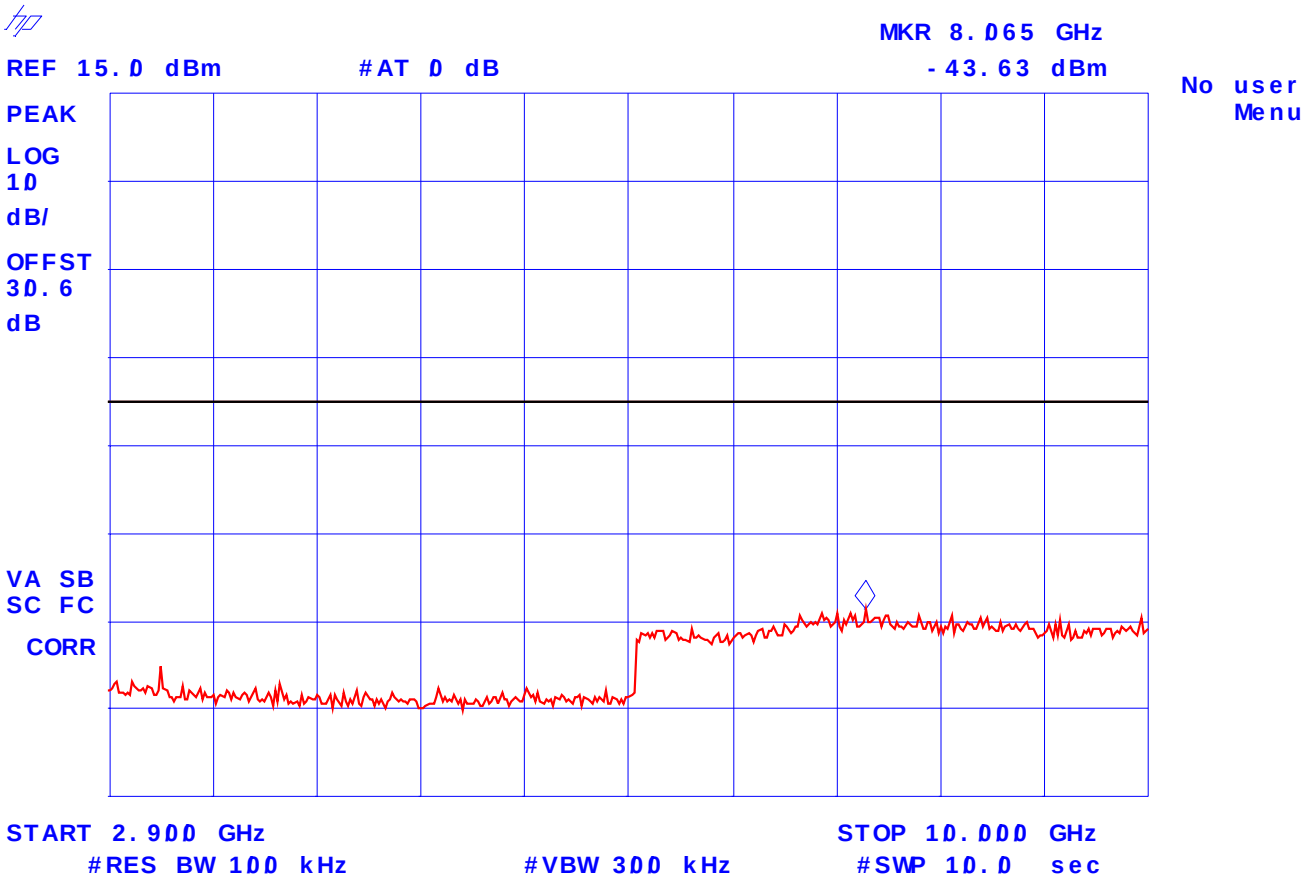
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 93: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz. Low Power



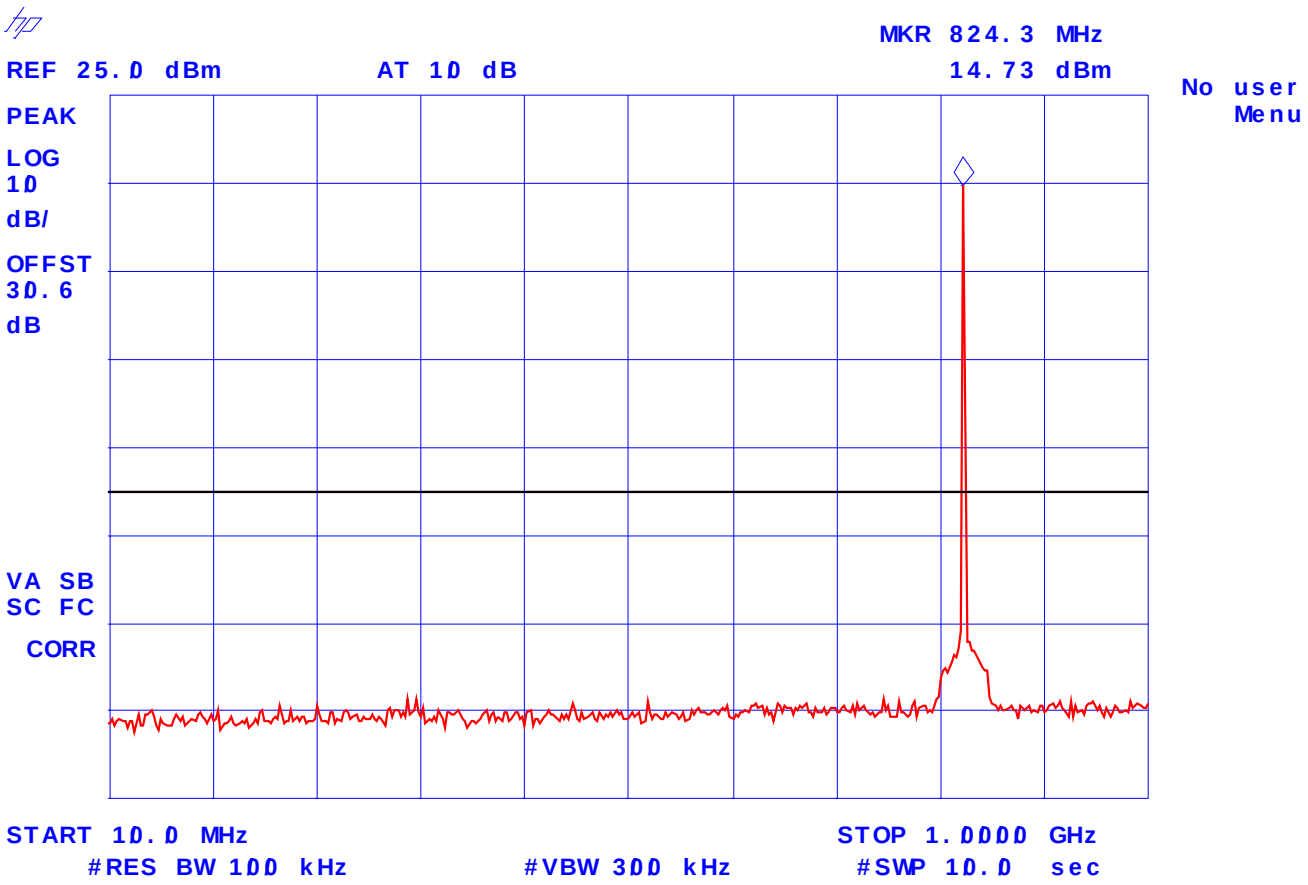
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 94: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz. Low Power

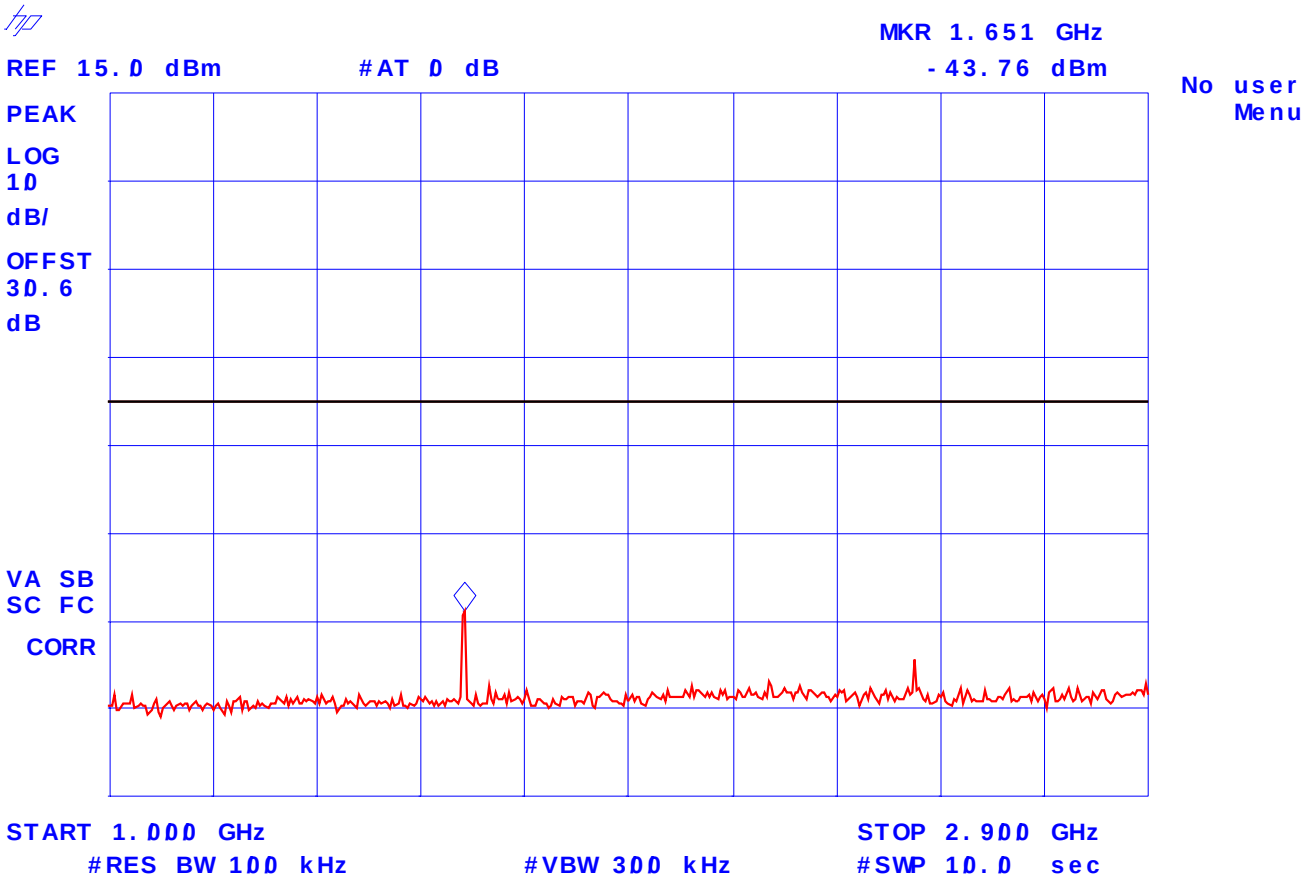


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 95: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz. Low Power

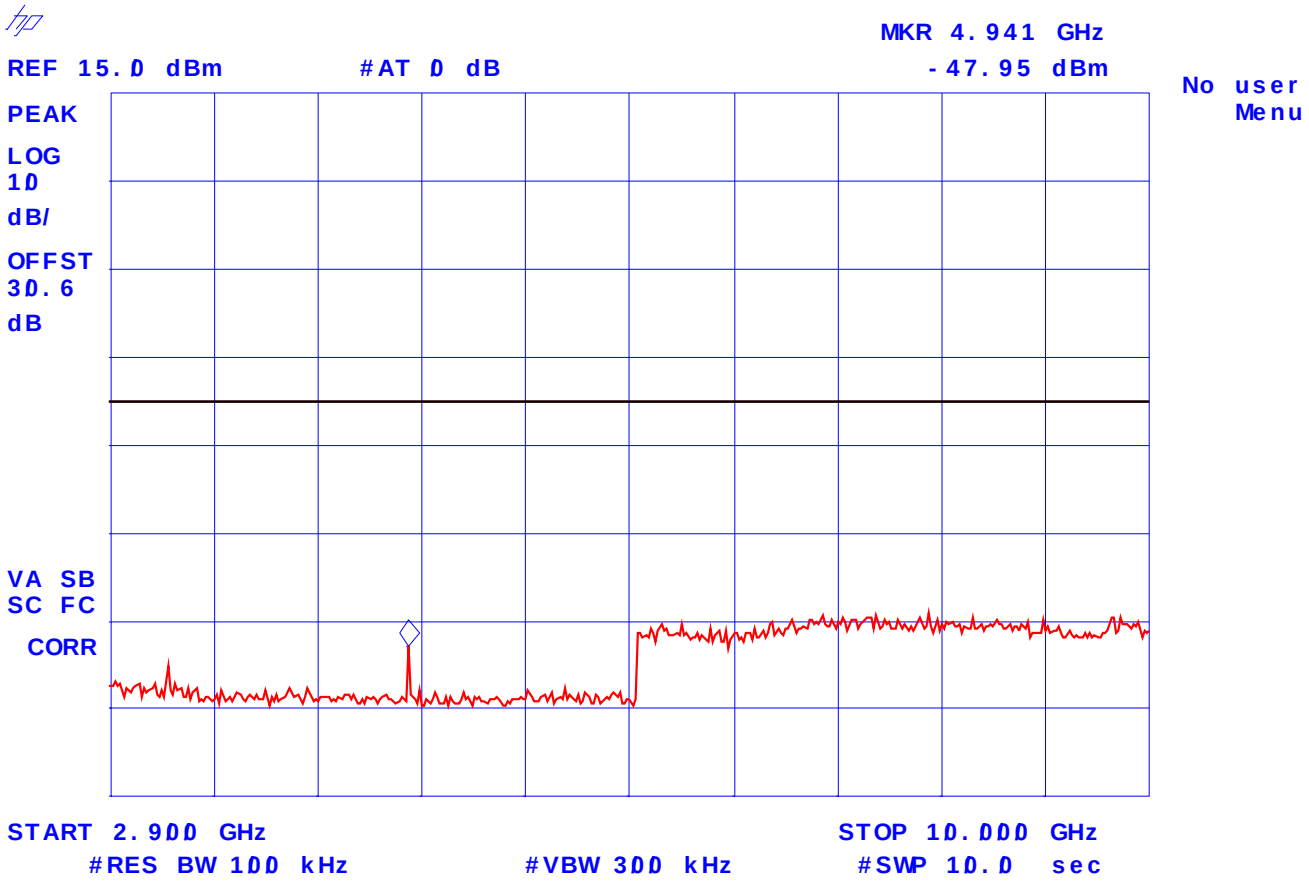


Plot # 96: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz. Low Power



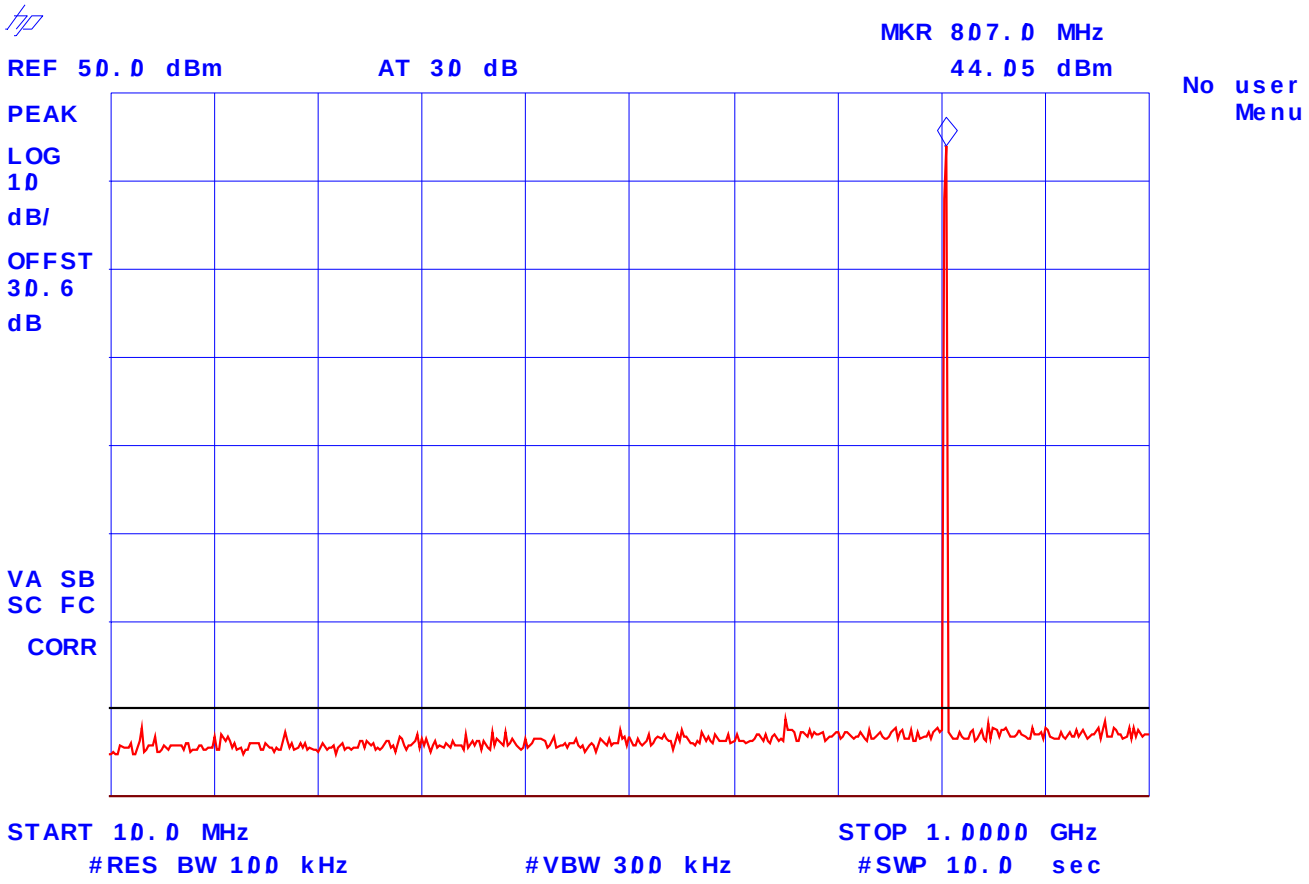
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 97: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz. Low Power



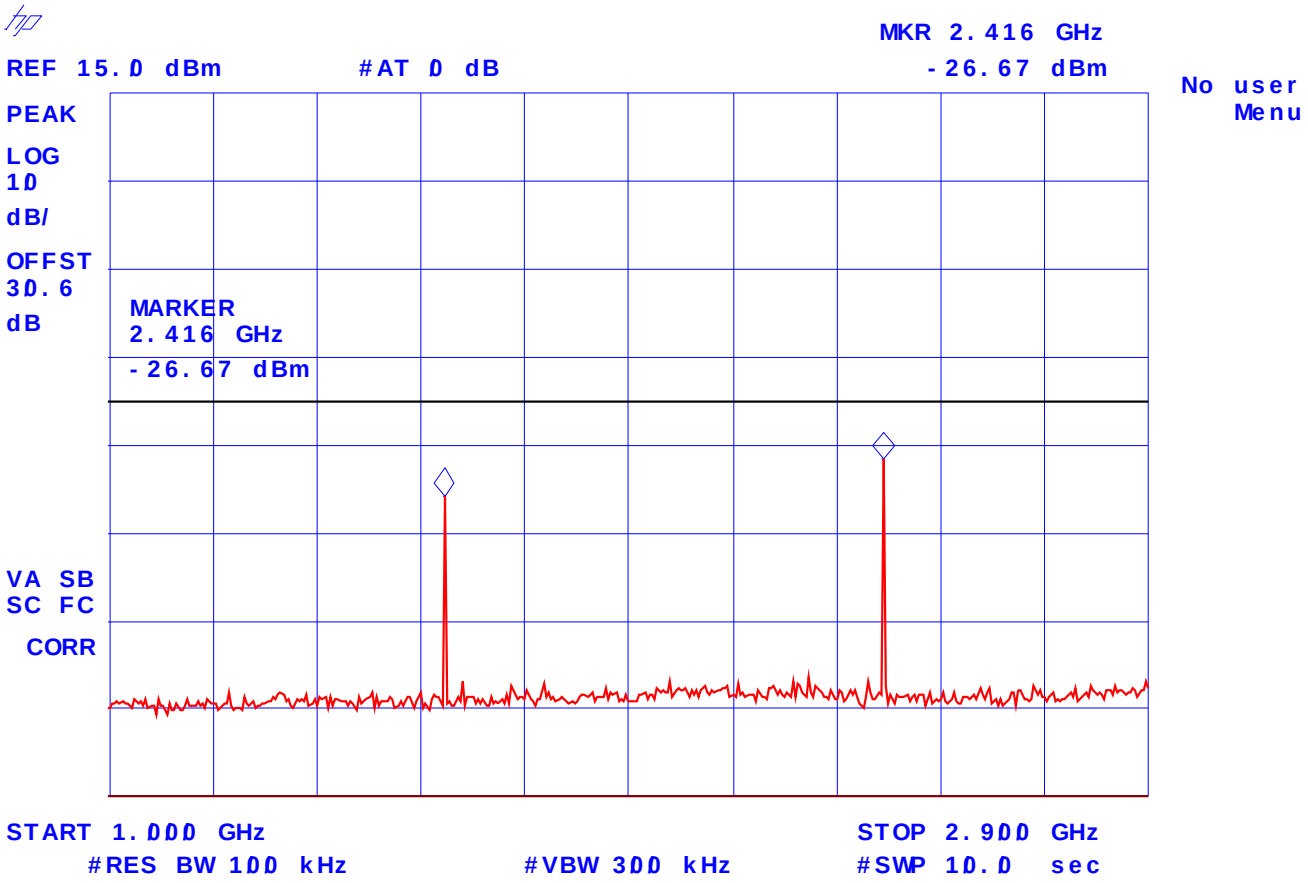
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 98: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz, High Power



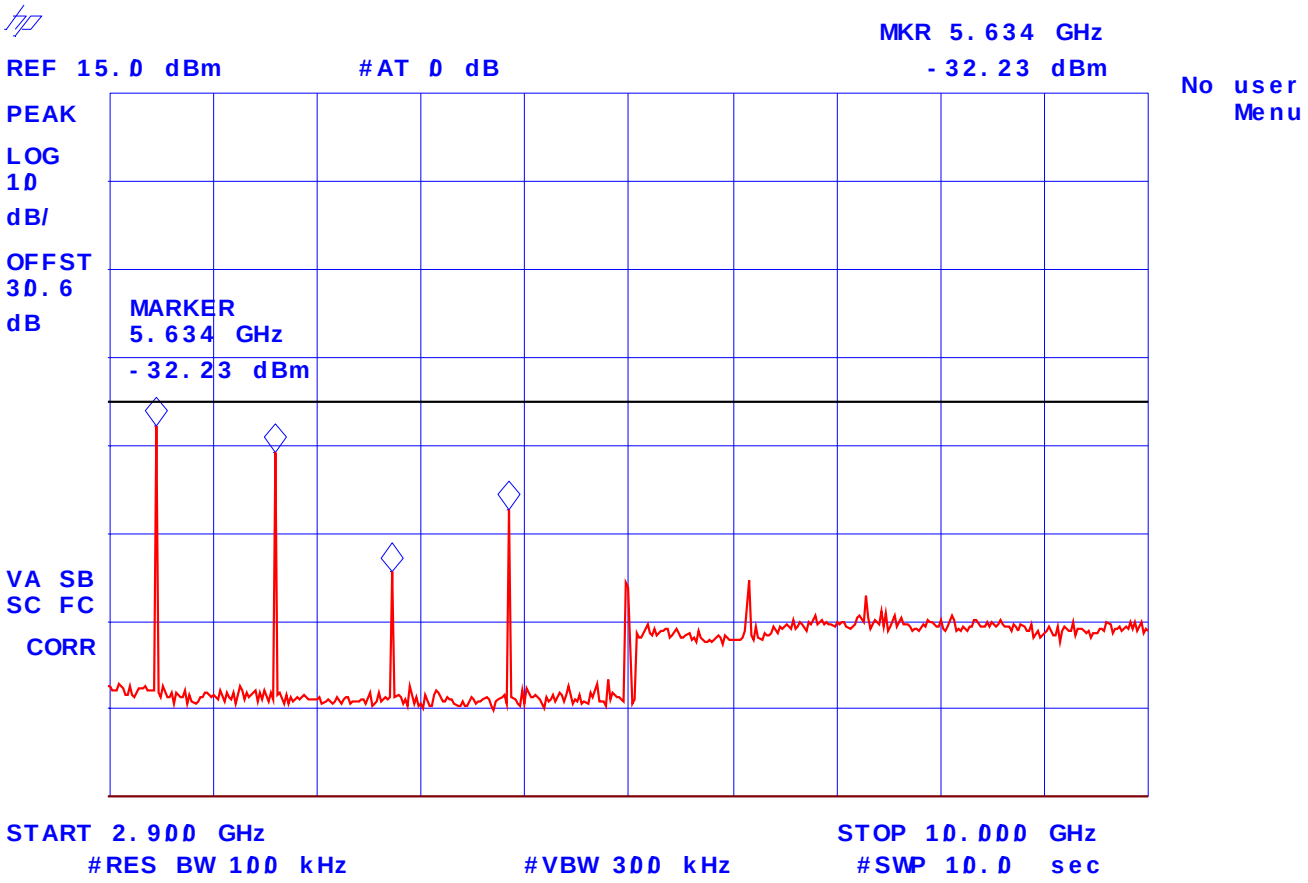
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 99: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz, High Power
(1) 1613 MHz, -30.83 dBm
(2) 2416 MHz, -26.67 dBm



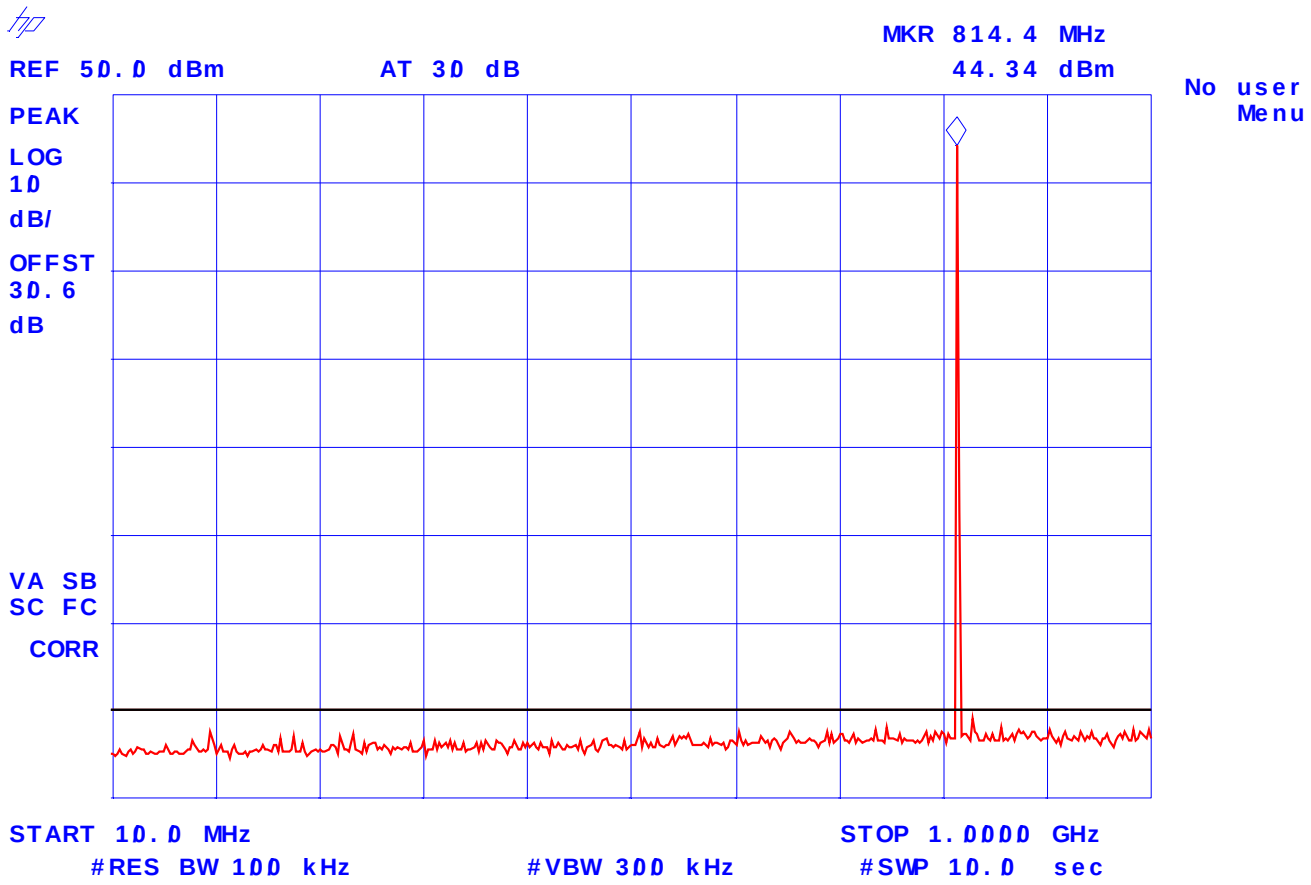
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 100: Transmitter Antenna Power Conducted Emissions
Frequency: 806 MHz, High Power
(3) 3220 MHz, -22.73 dBm
(4) 4036 MHz, -25.75 dBm
(5) 4835 MHz, -39.35 dBm
(6) 5634 MHz, -32.23 dBm

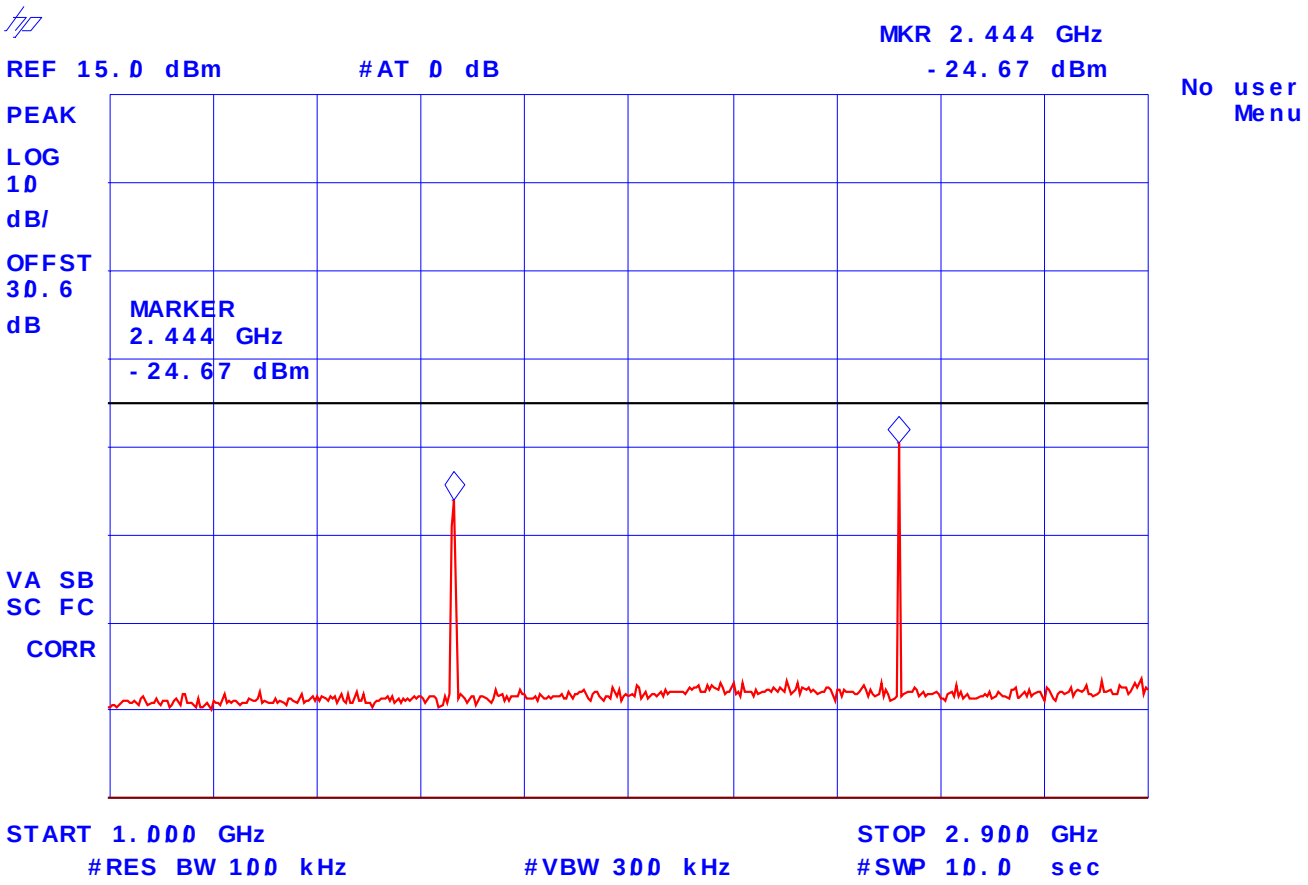


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 101: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz, High Power

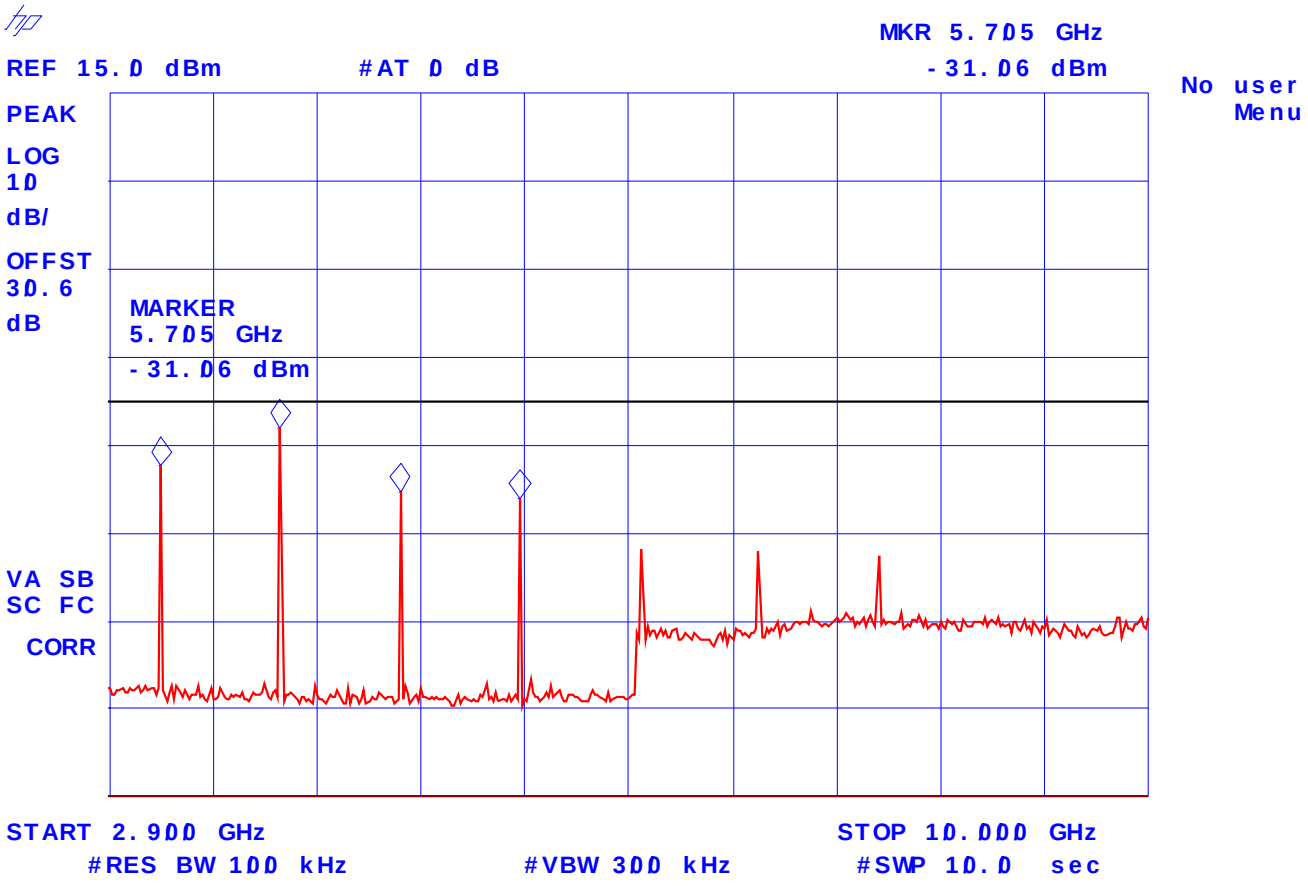


Plot # 102: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz, High Power
(1) 1632 MHz, -30.98 dBm
(2) 2444 MHz, -24.67 dBm

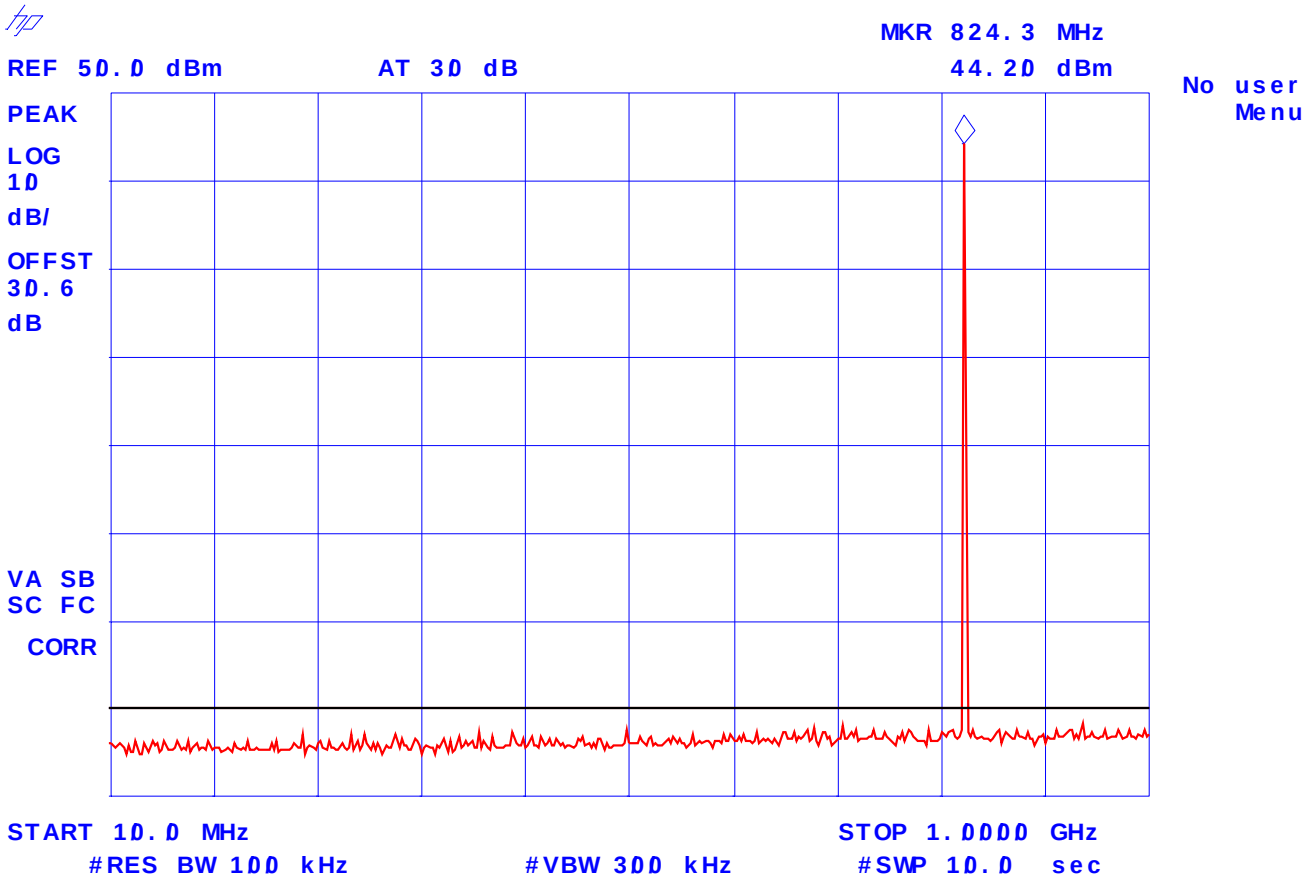


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 103: Transmitter Antenna Power Conducted Emissions
Frequency: 815 MHz, High Power
(3) 3255 MHz, -27.31 dBm
(4) 4072 MHz, -23.03 dBm
(5) 4888 MHz, -30.23 dBm
(6) 5705 MHz, -31.06 dBm

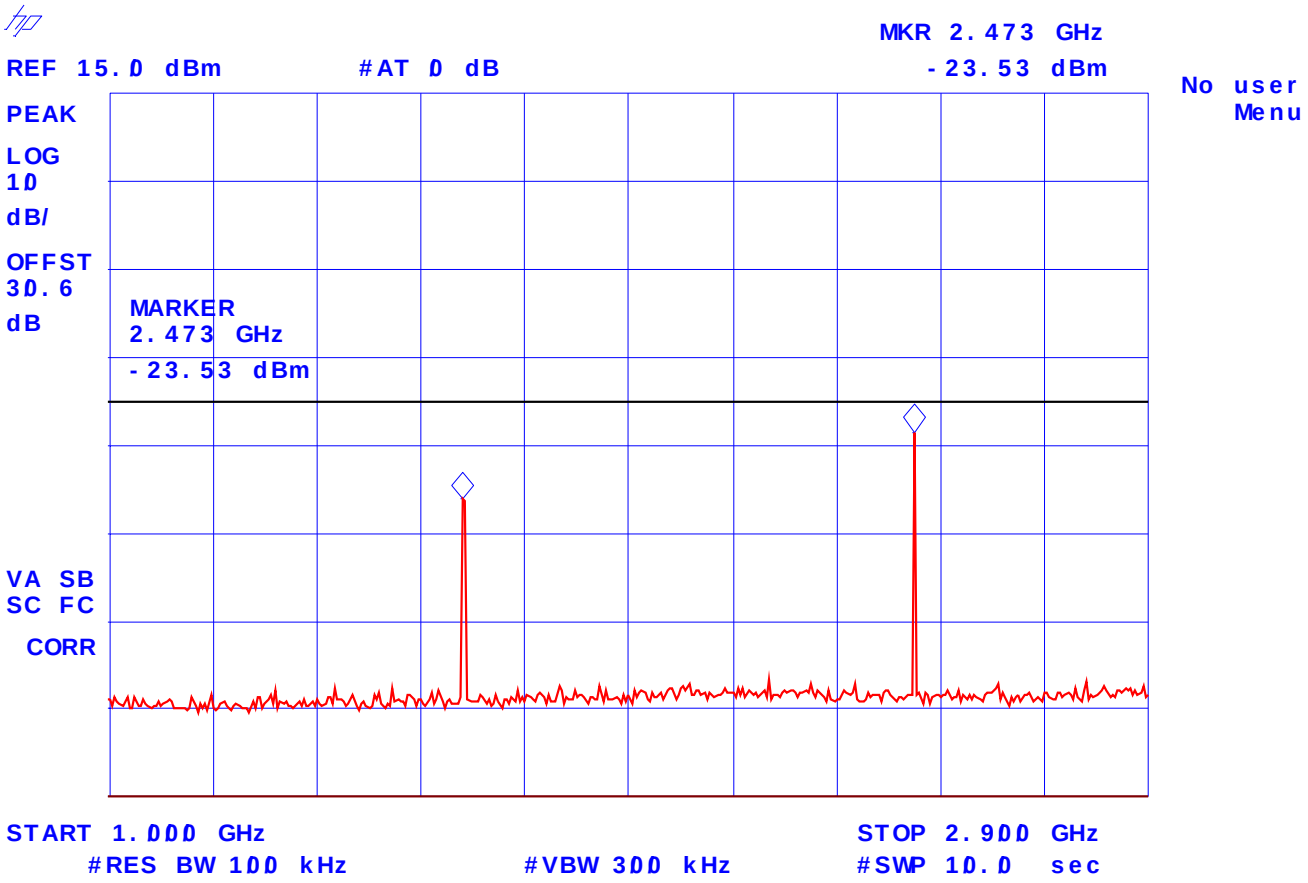


Plot # 104: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz, High Power



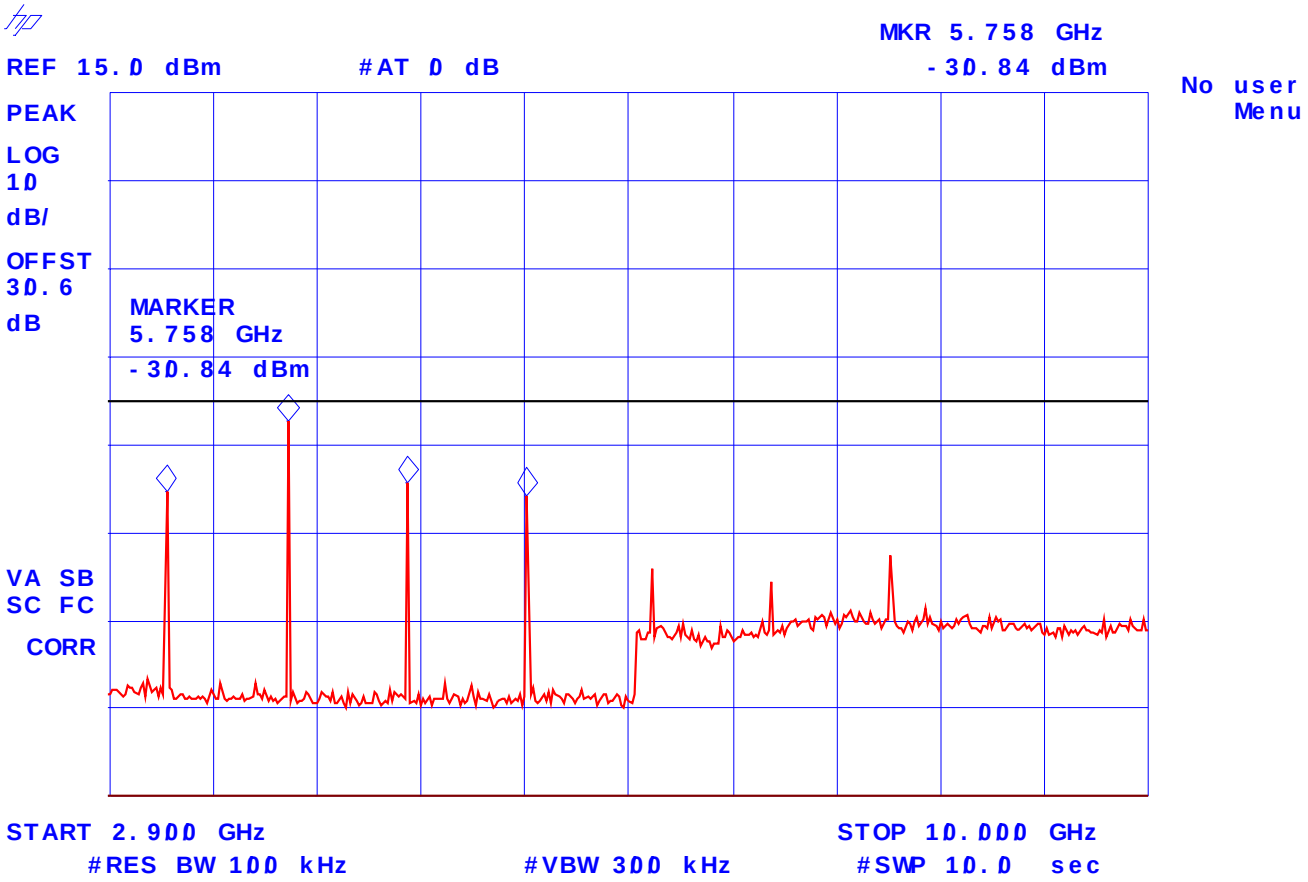
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 105: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz, High Power
(1) 1646 MHz, -31.18 dBm
(2) 2473 MHz, -23.53 dBm



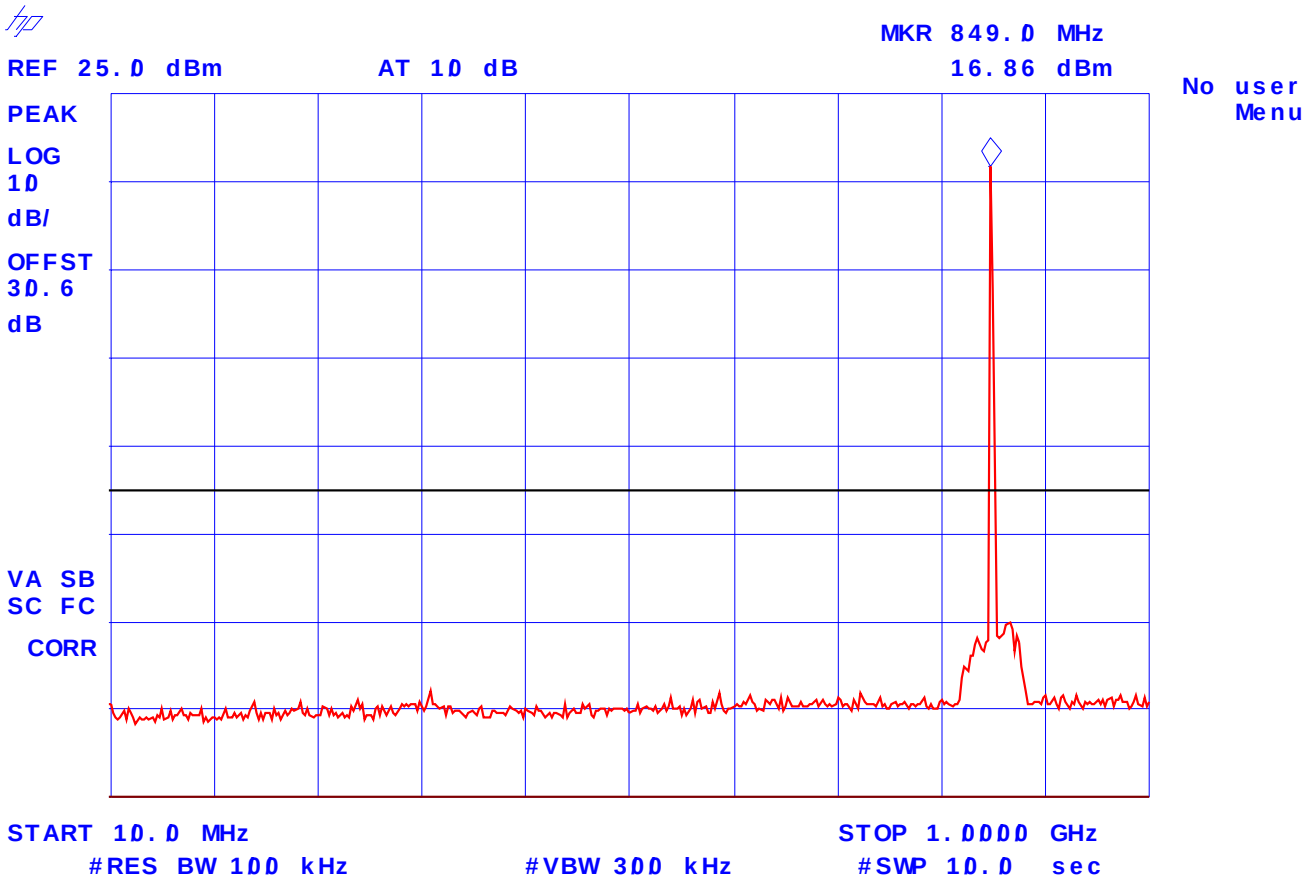
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 106: Transmitter Antenna Power Conducted Emissions
Frequency: 824 MHz, High Power
(3) 3291 MHz, -30.44 dBm
(4) 4125 MHz, -22.40 dBm
(5) 4941 MHz, -29.45 dBm
(6) 5758 MHz, -30.84 dBm



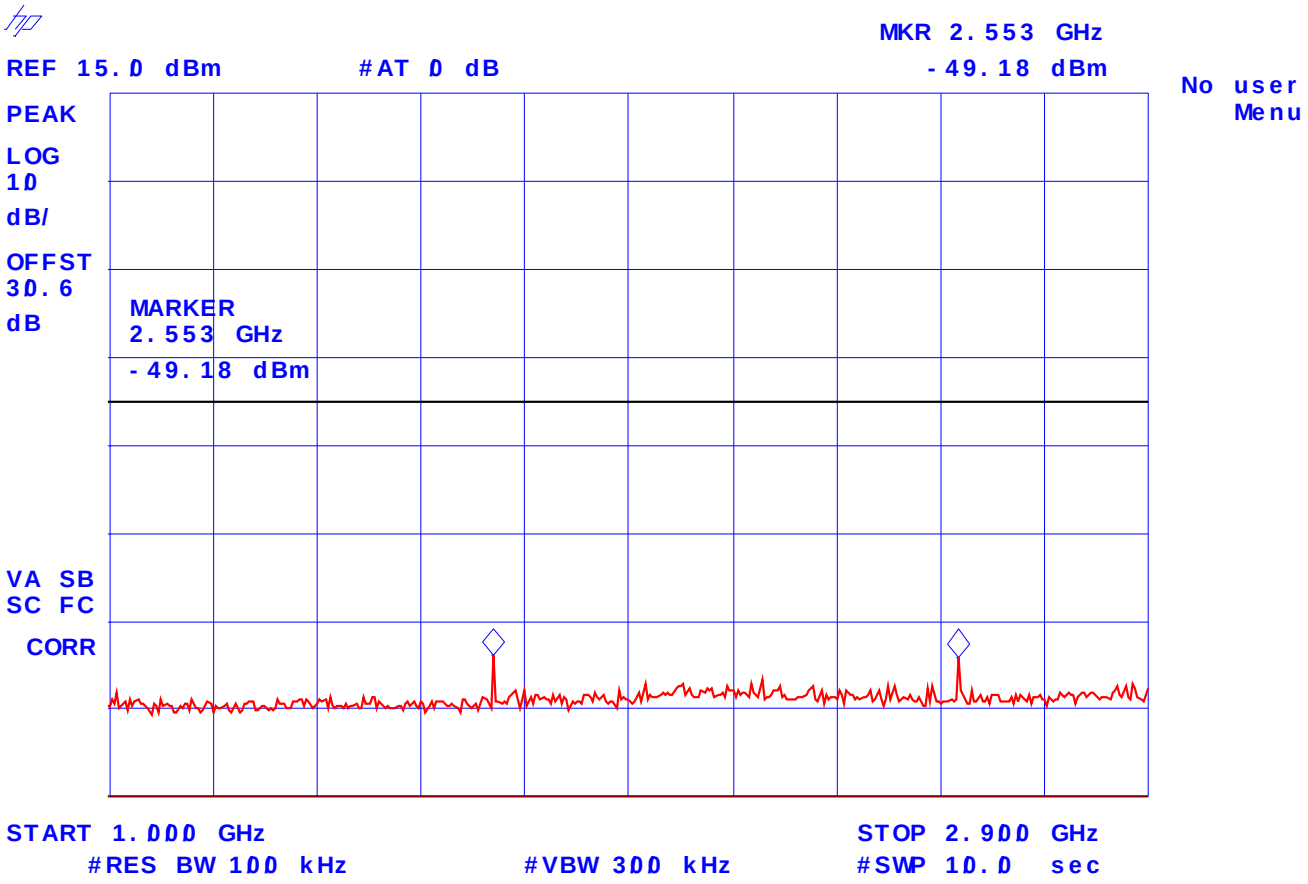
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 107: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz. Low Power



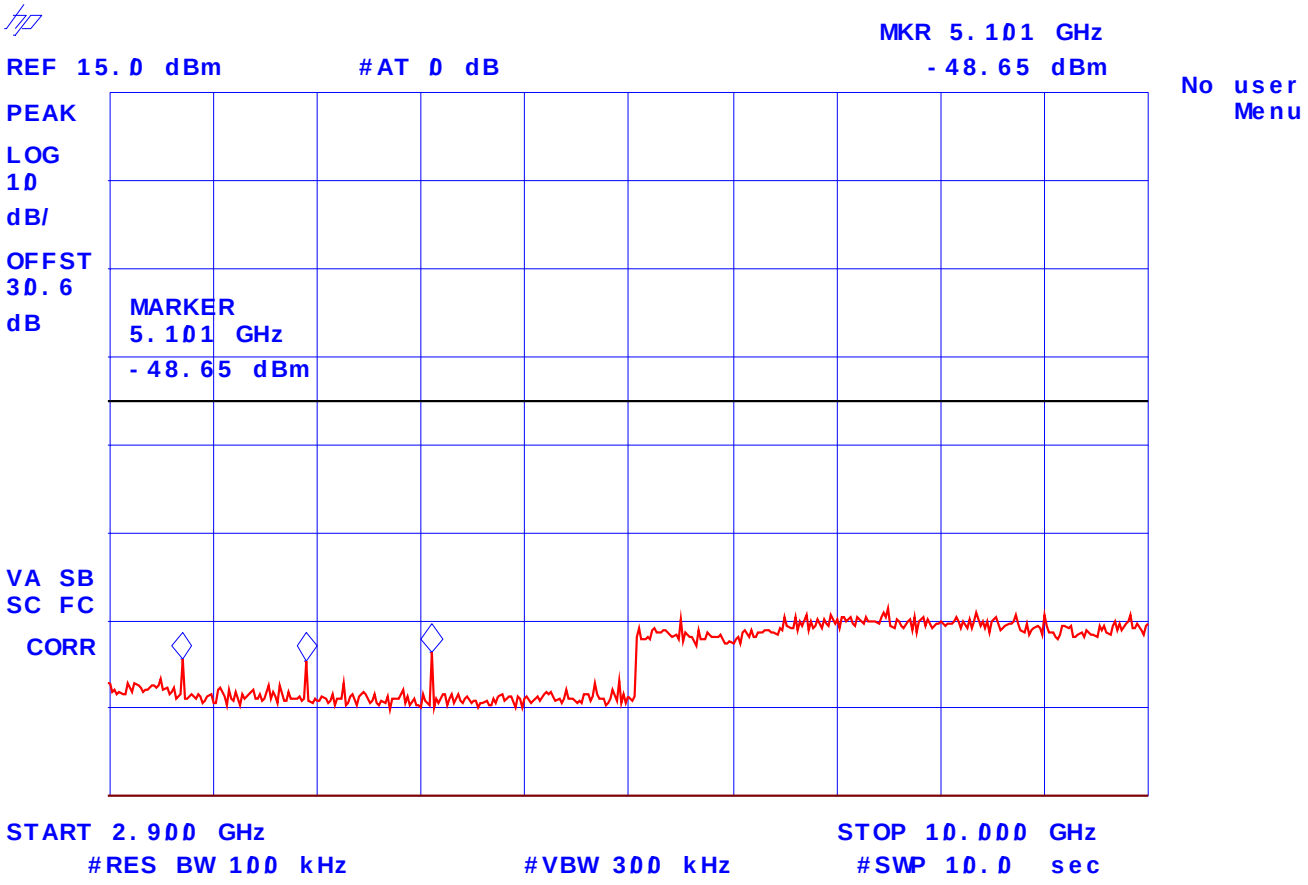
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 108: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz, Low Power
(1) 1703 MHz, -48.95 dBm
(2) 2553 MHz, -49.18 dBm



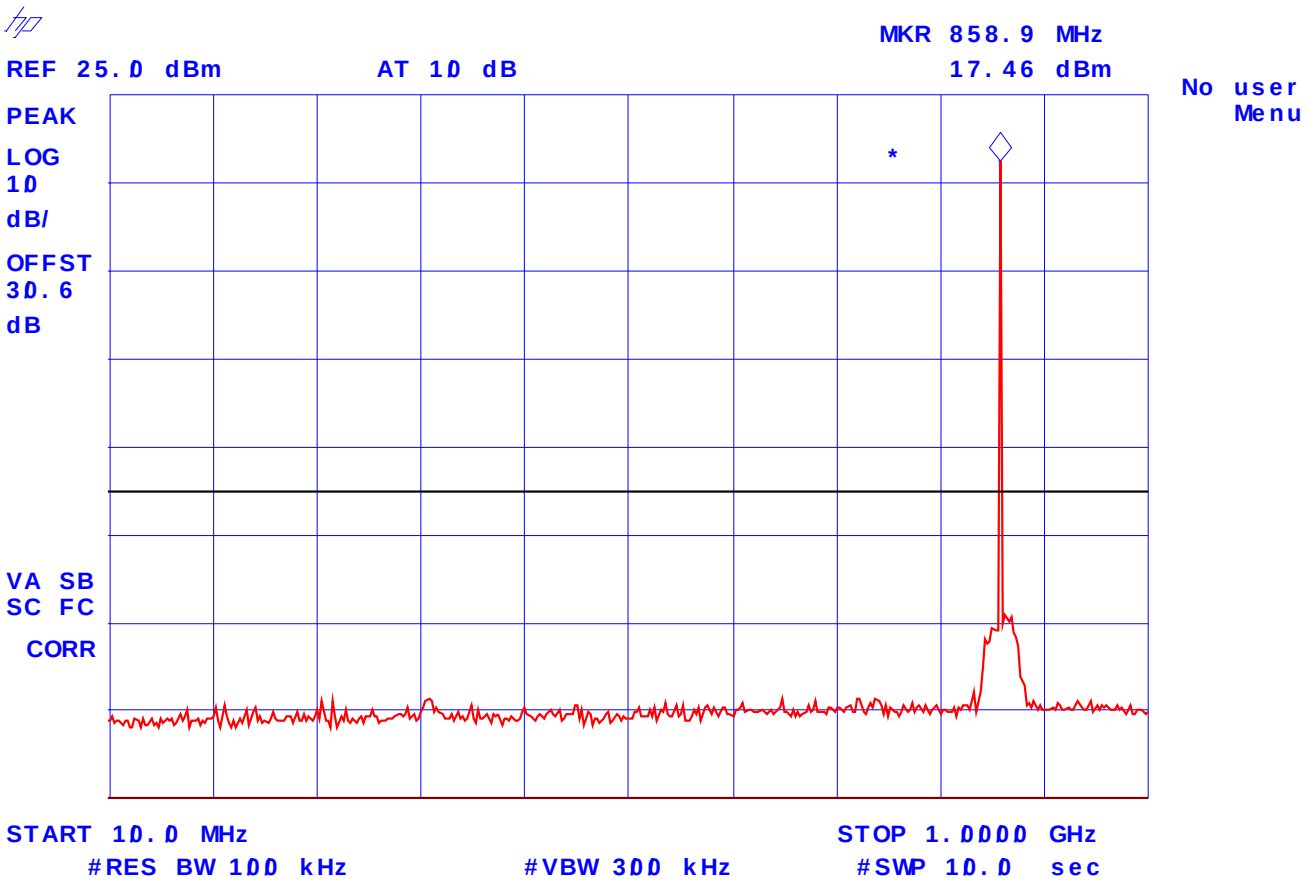
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 109: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz, Low Power
(3) 3397 MHz, -49.49 dBm
(4) 4249 MHz, -49.56 dBm
(5) 5101 MHz, -48.65 dBm



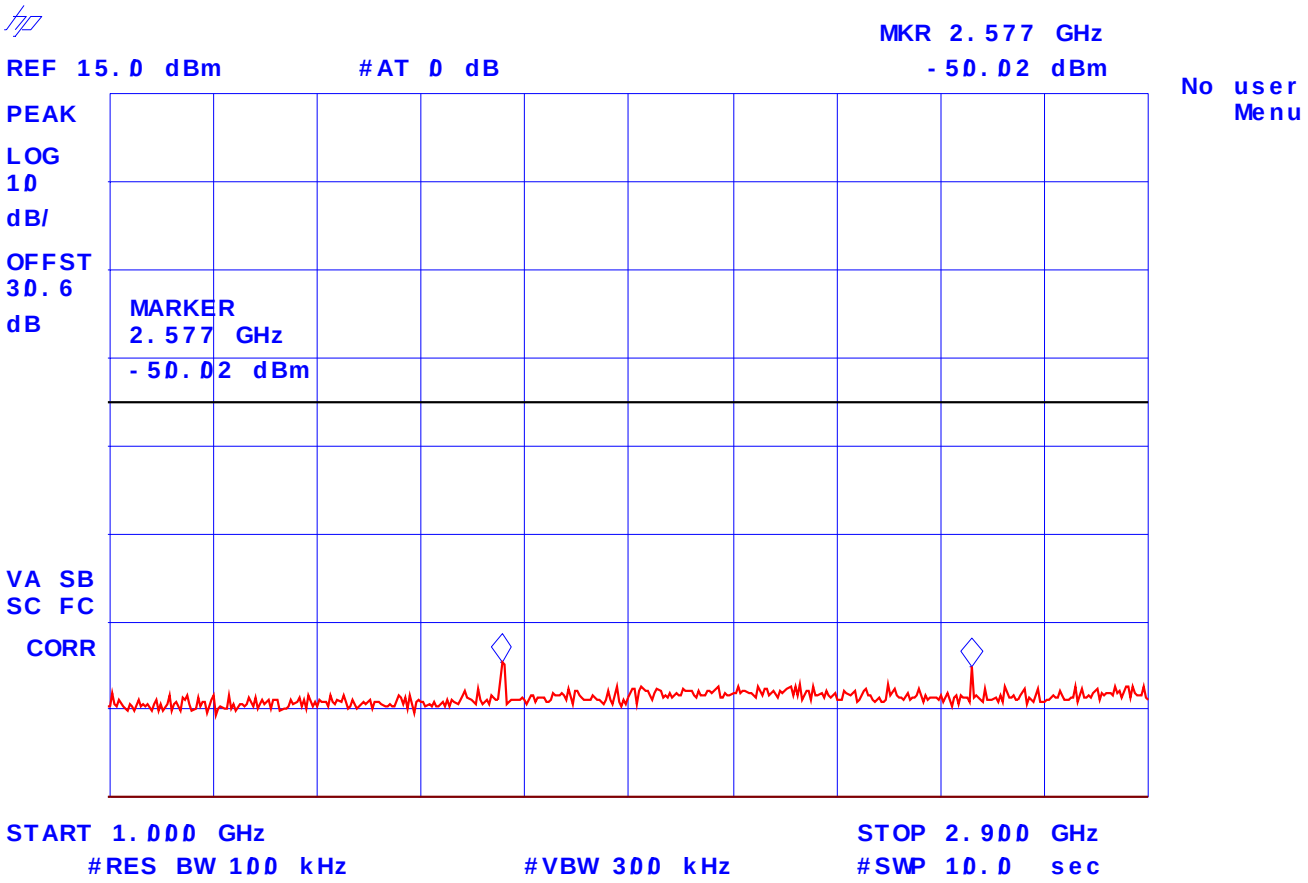
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 110: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, Low Power



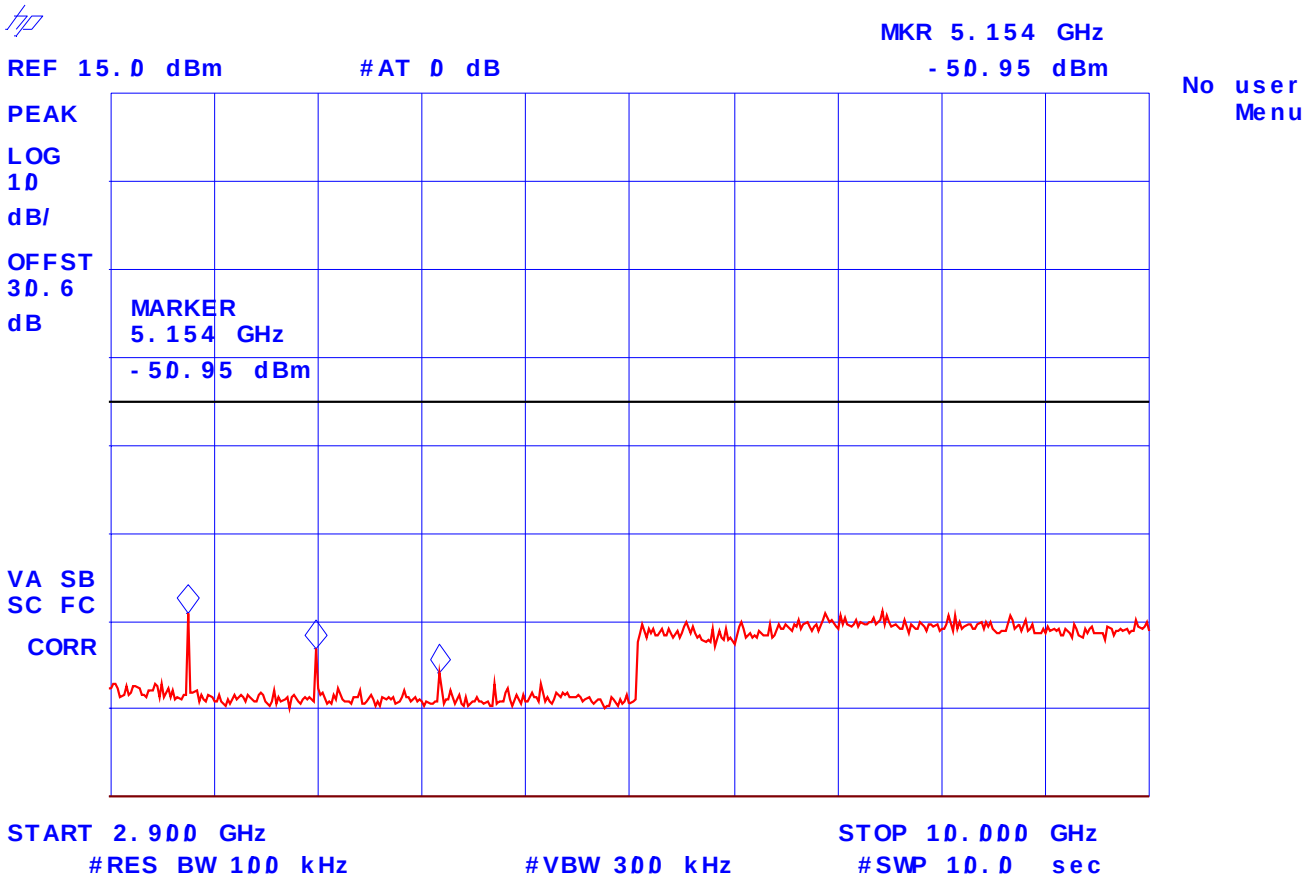
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 111: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, Low Power
(1) 1717 MHz, -49.52 dBm
(2) 2577 MHz, -50.02 dBm



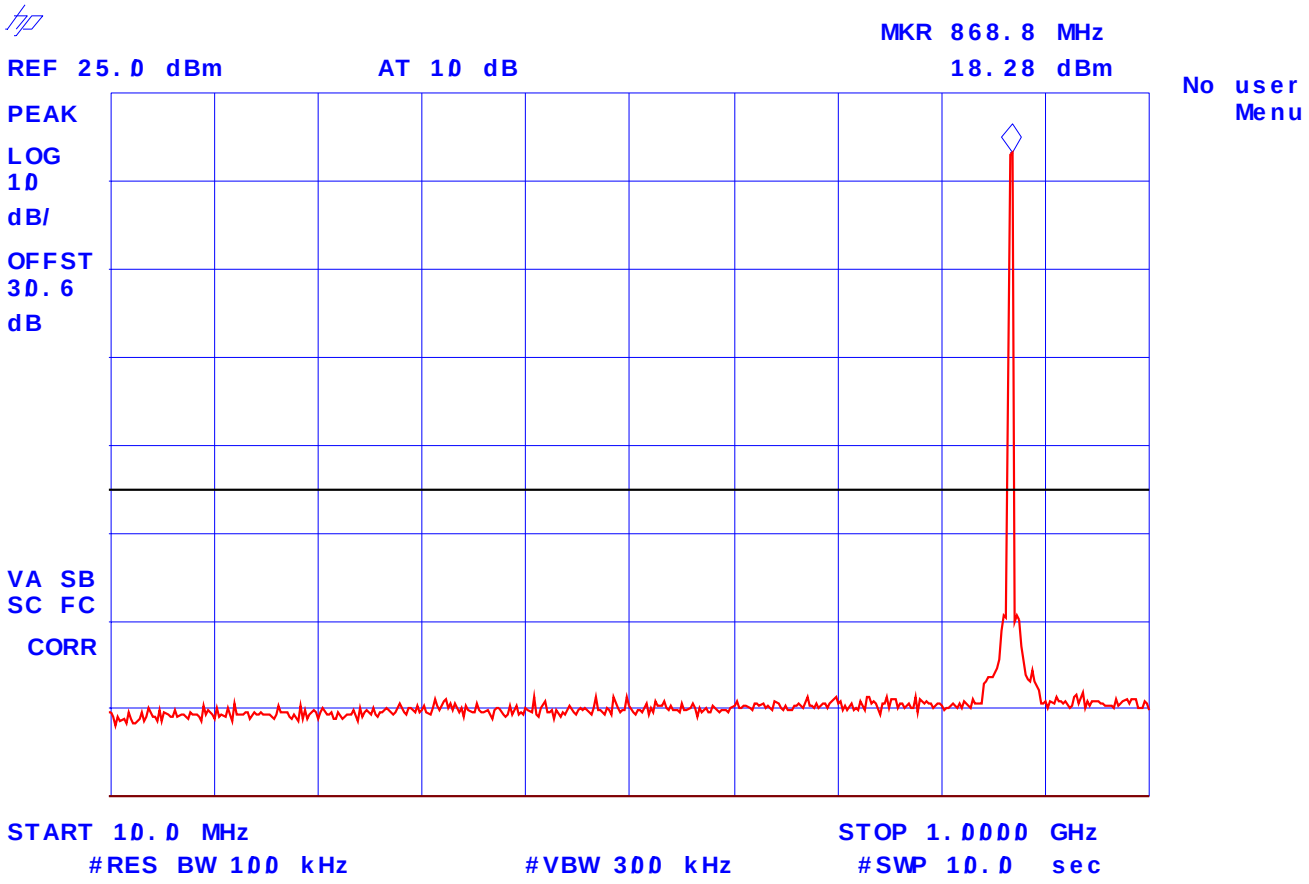
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 112: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, Low Power
(3) 3433 MHz, -44.02 dBm
(4) 4302 MHz, -48.19 dBm
(5) (10) 5154 MHz, -50.95 dBm



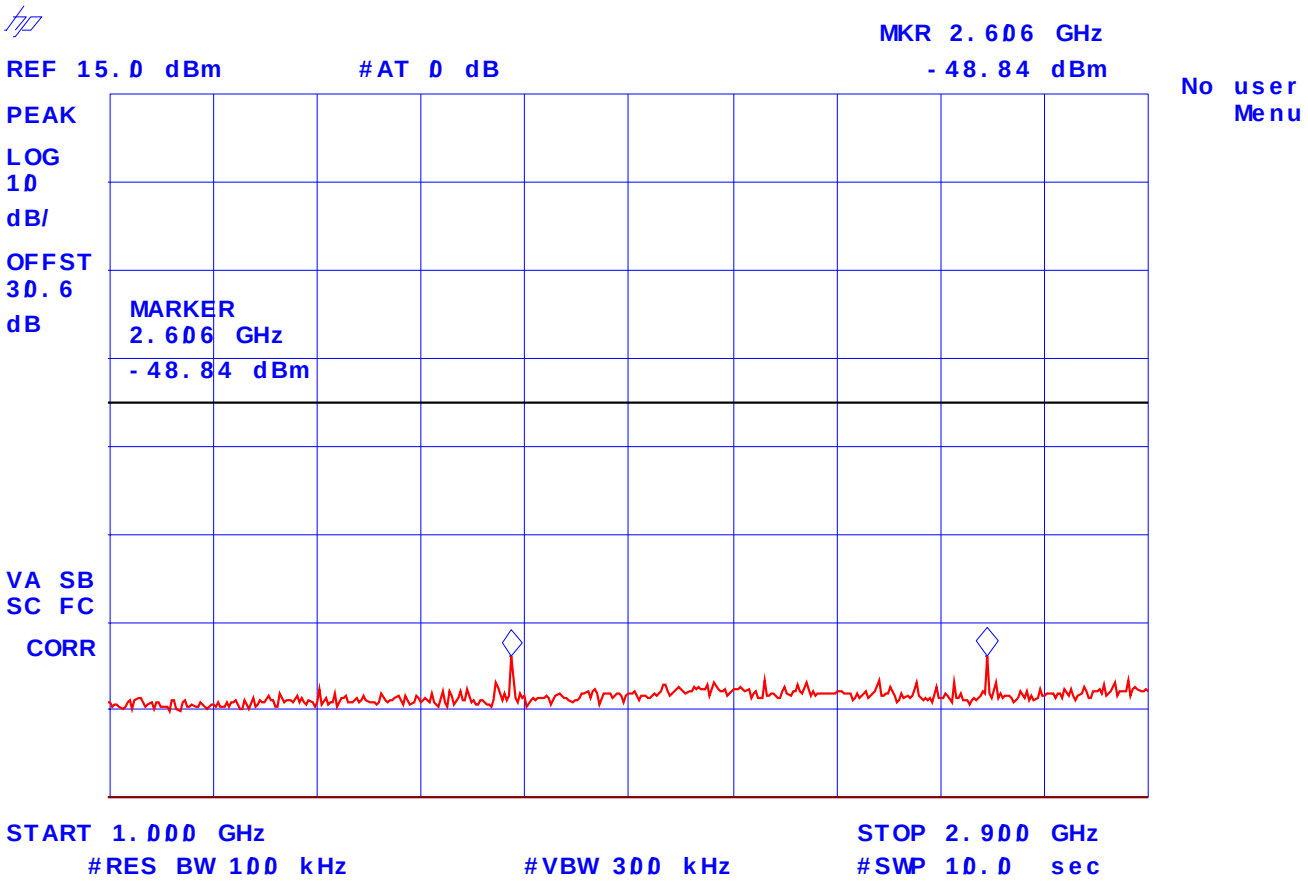
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 113: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, Low Power



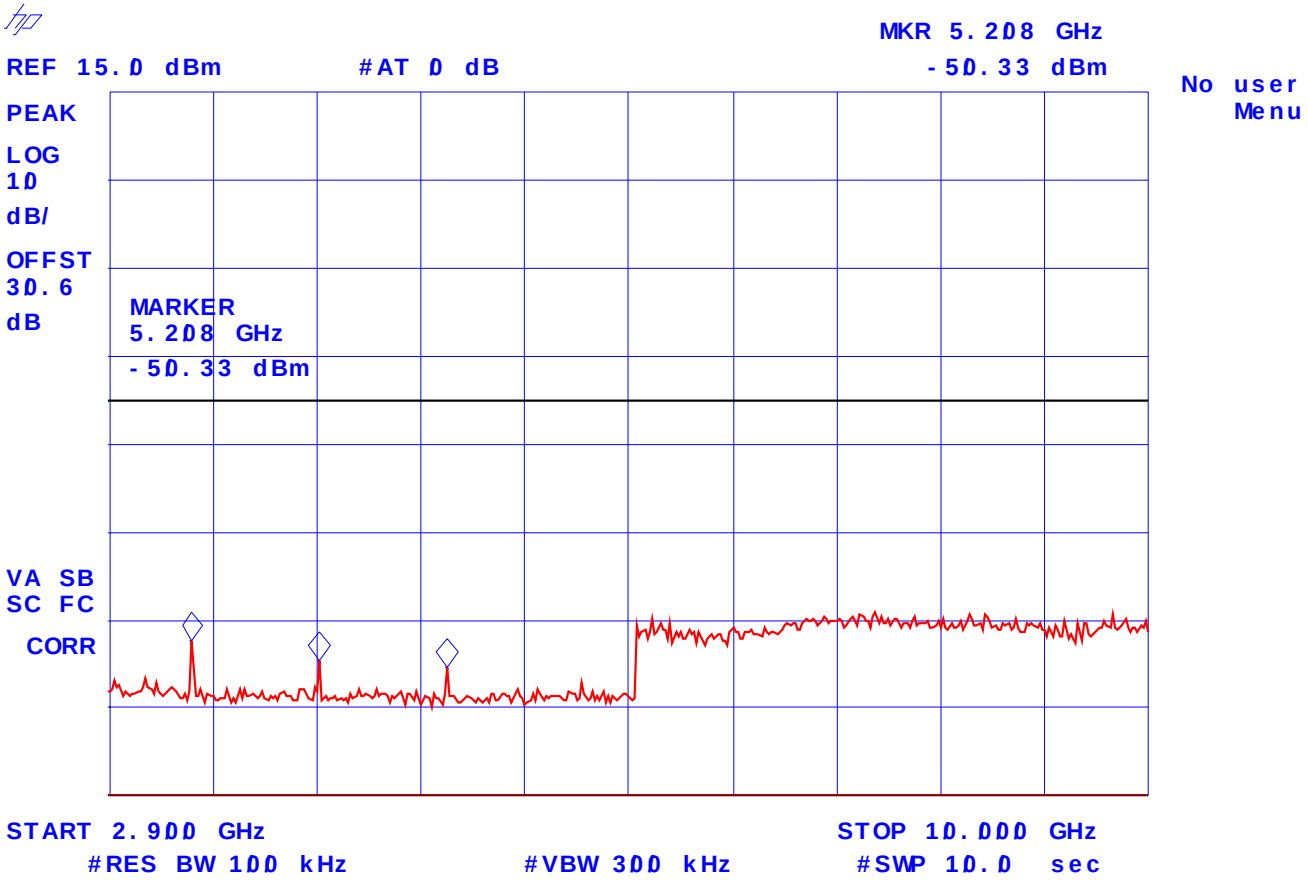
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 114: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, Low Power
(1) 1736 MHz, -48.97 dBm
(2) 2606 MHz, -48.84 dBm



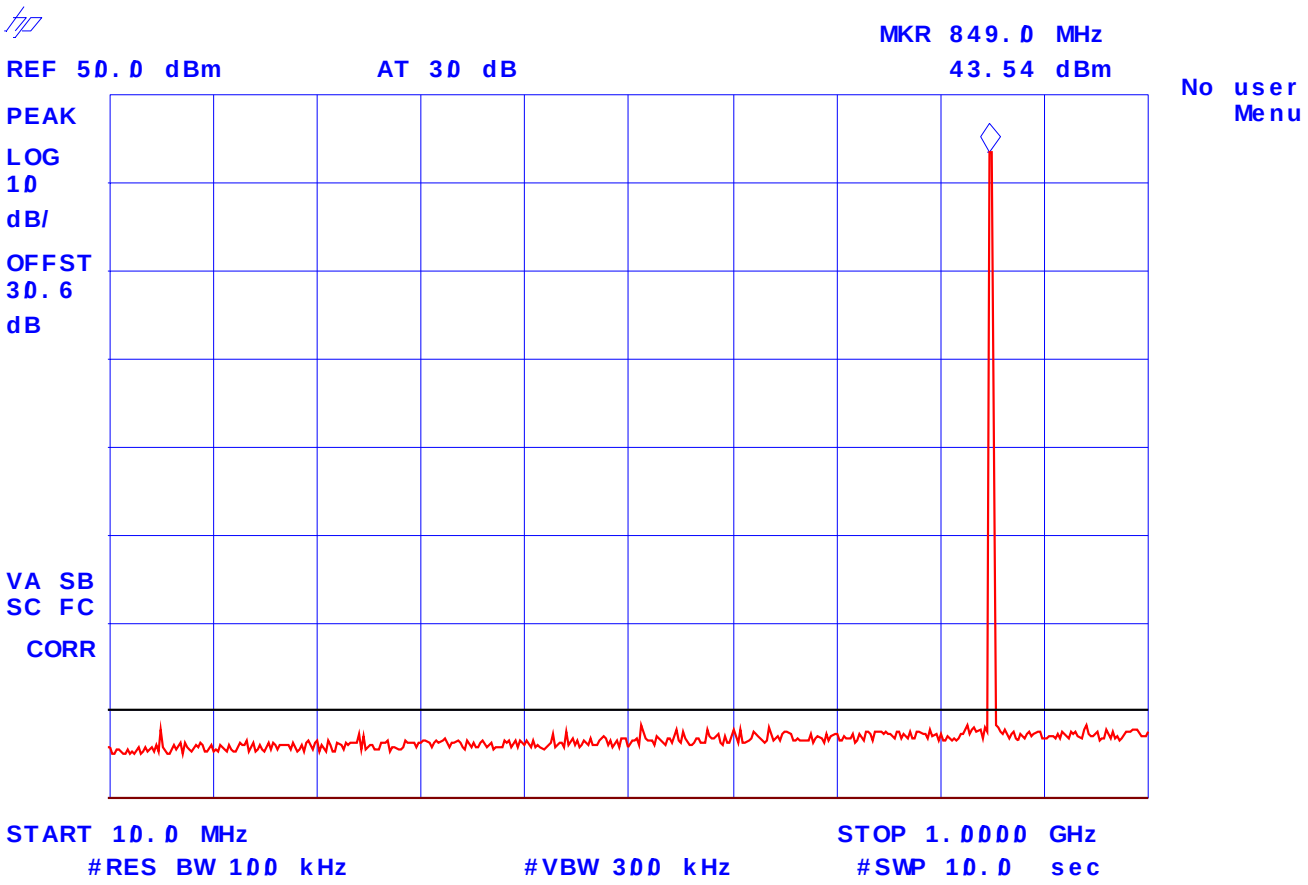
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 115: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, Low Power
(1) 3468 MHz, -47.31 dBm
(2) 4338 MHz, -49.55 dBm
(3) 5208 MHz, -50.30 dBm

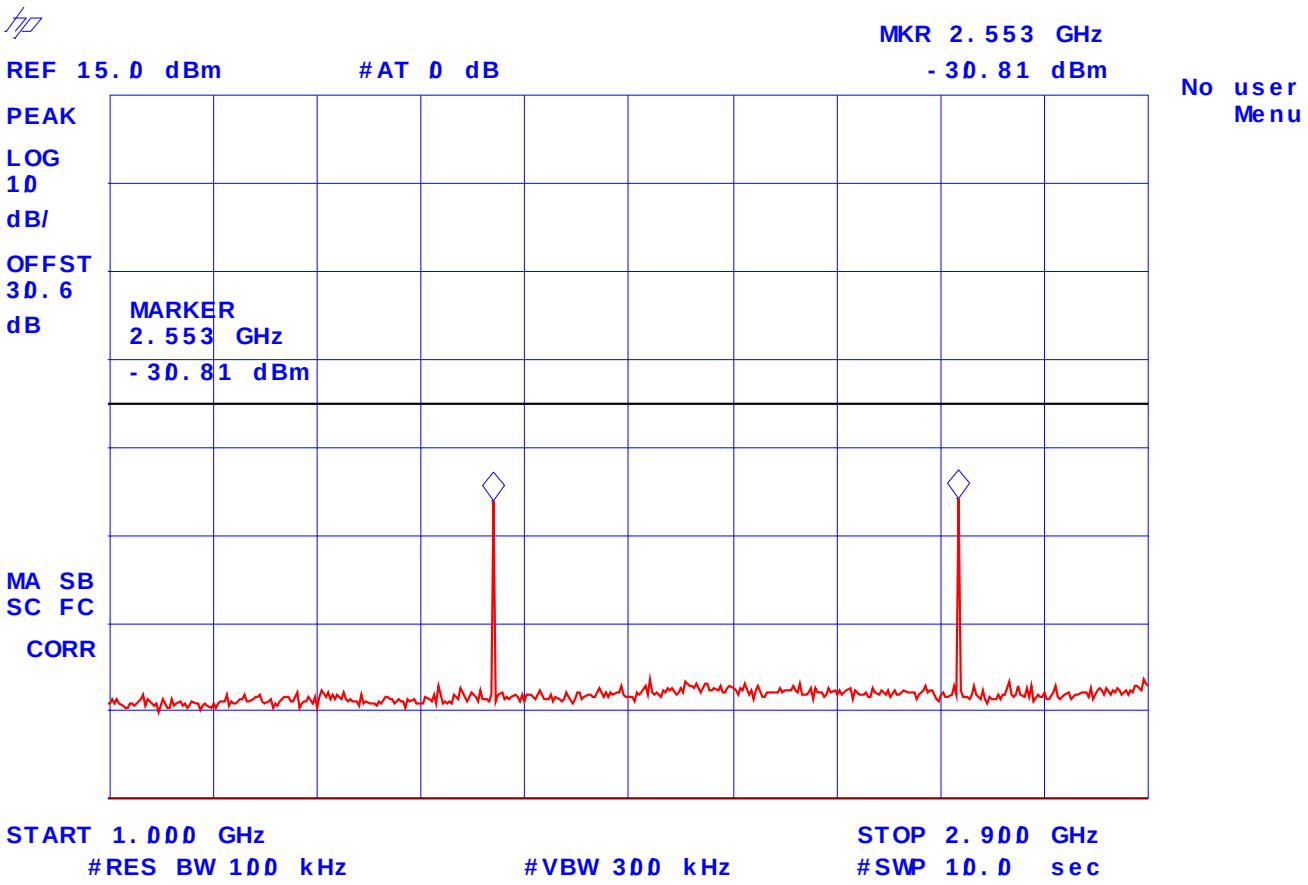


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 116: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz. High Power

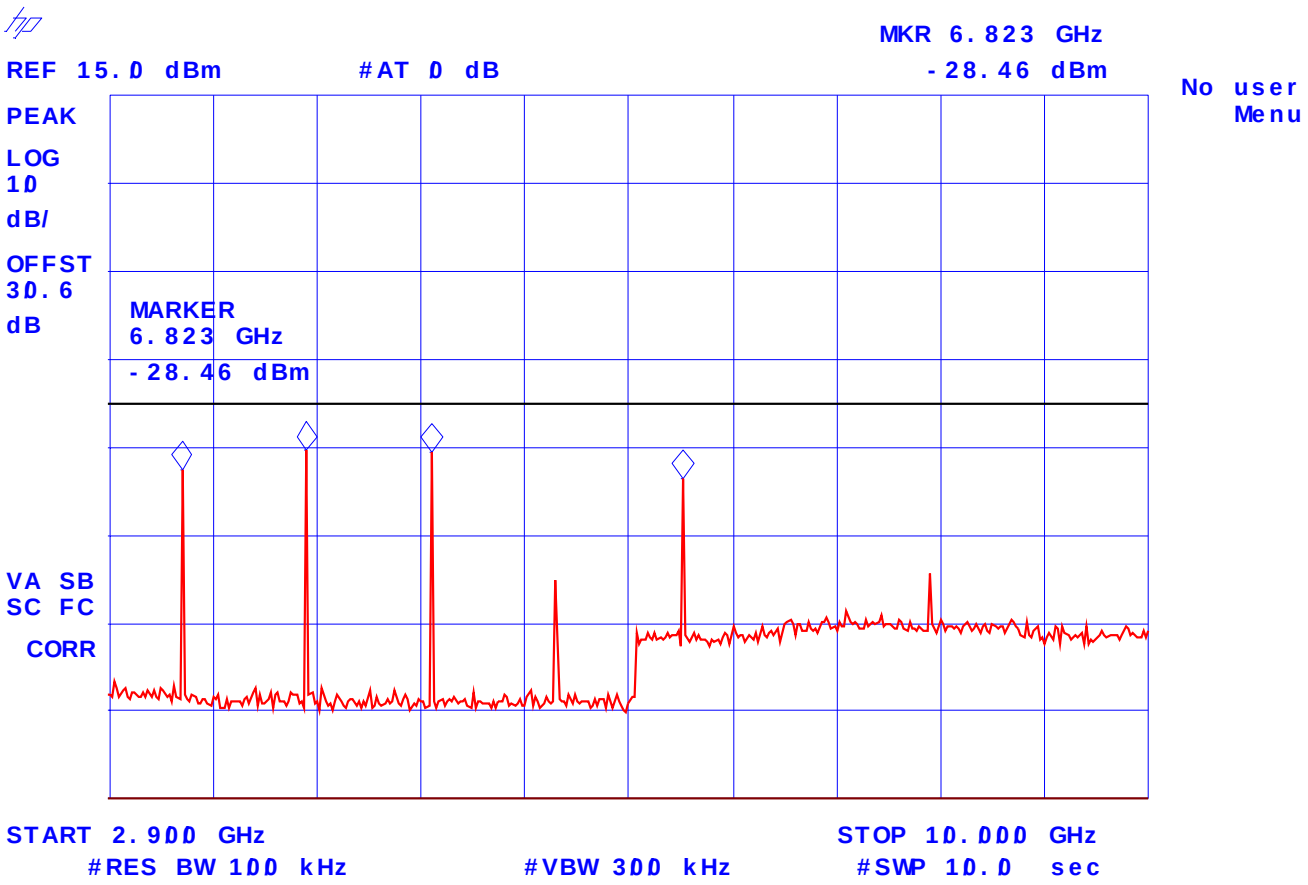


Plot # 117: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz, High Power
(4) 1703 MHz, -31.04 dBm
(5) 2553 MHz, -30.81 dBm



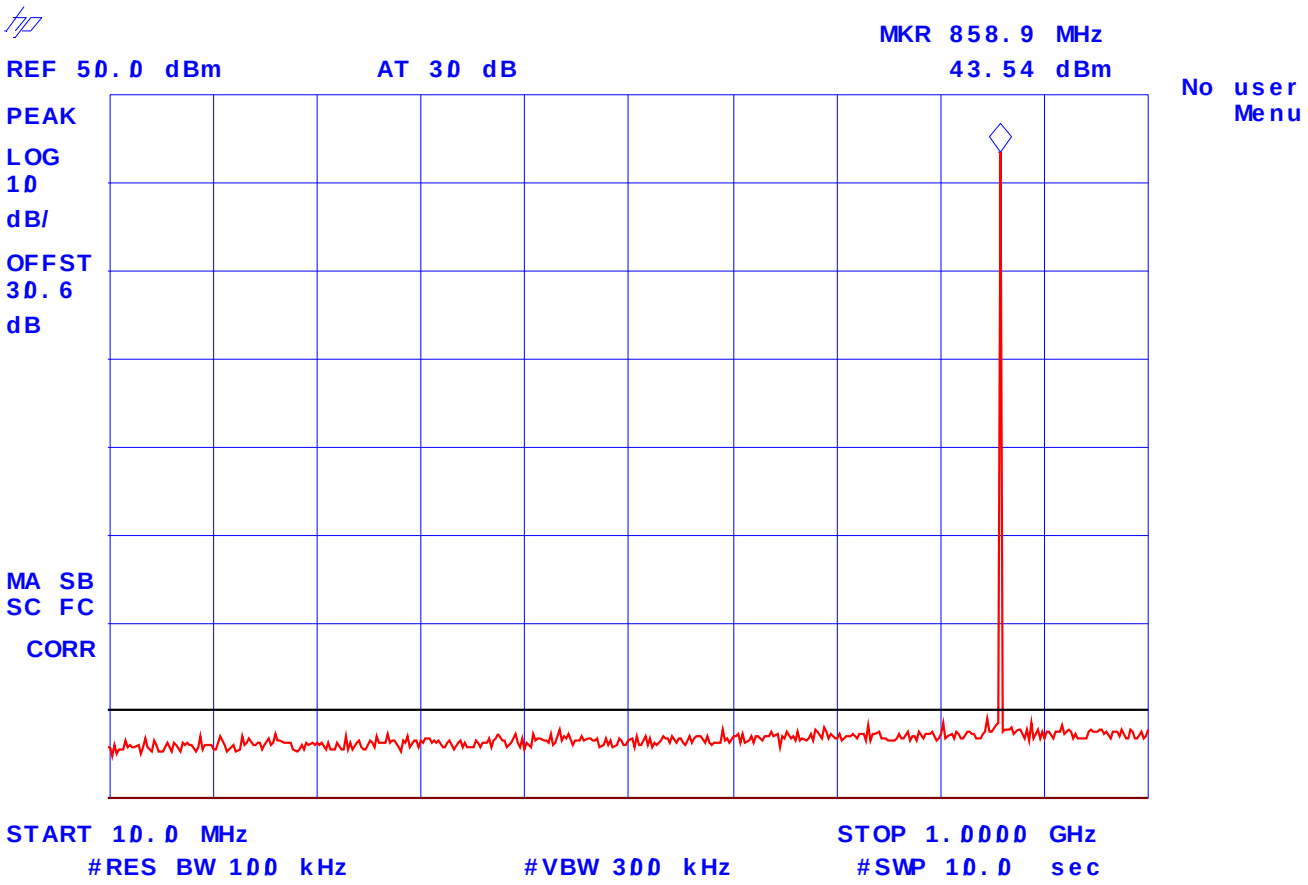
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 118: Transmitter Antenna Power Conducted Emissions
Frequency: 851 MHz, High Power
(6) 3397 MHz, -27.52 dBm
(7) 4249 MHz, -25.36 dBm
(8) 5101 MHz, -25.52 dBm
(9) 6823 MHz, -28.46 dBm



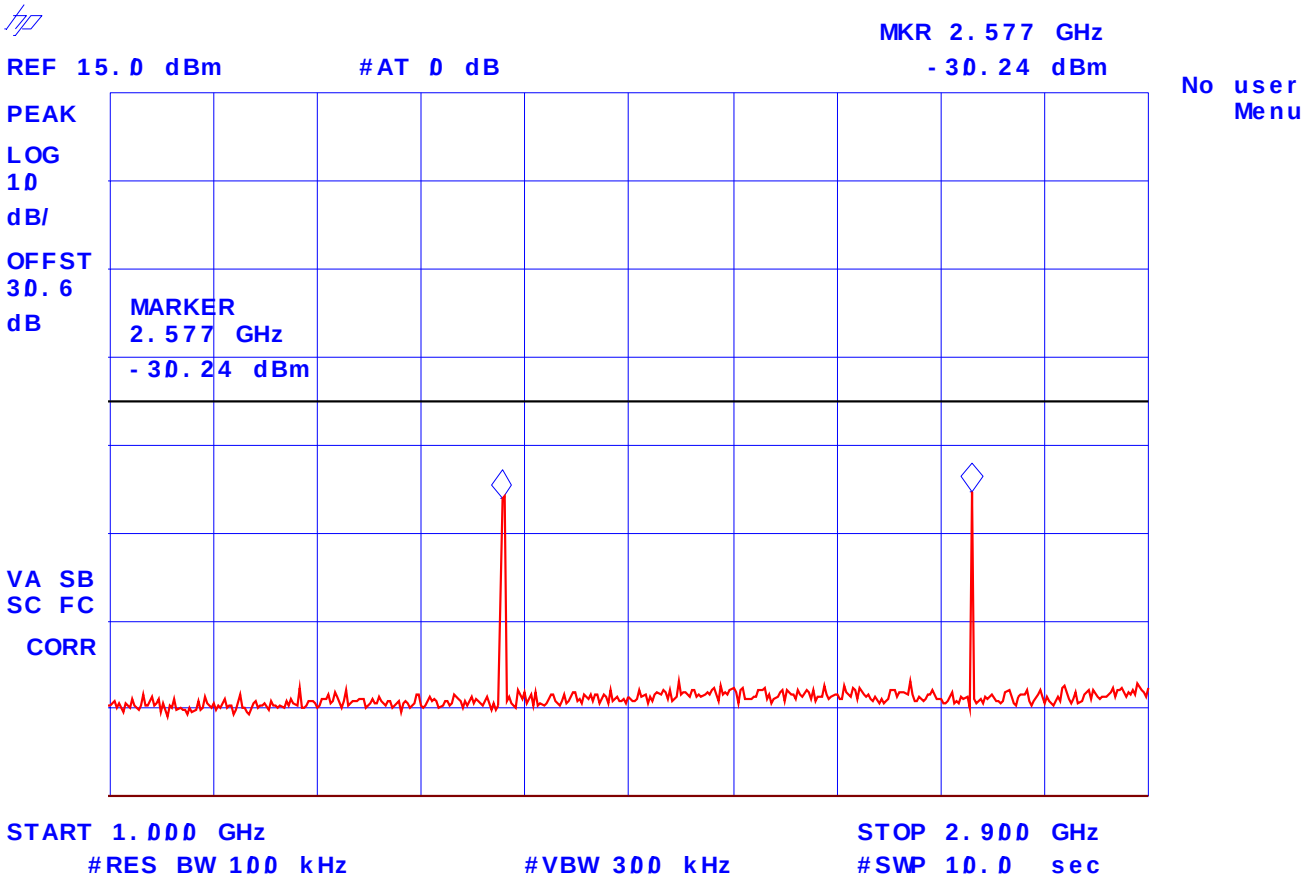
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 119: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, High Power



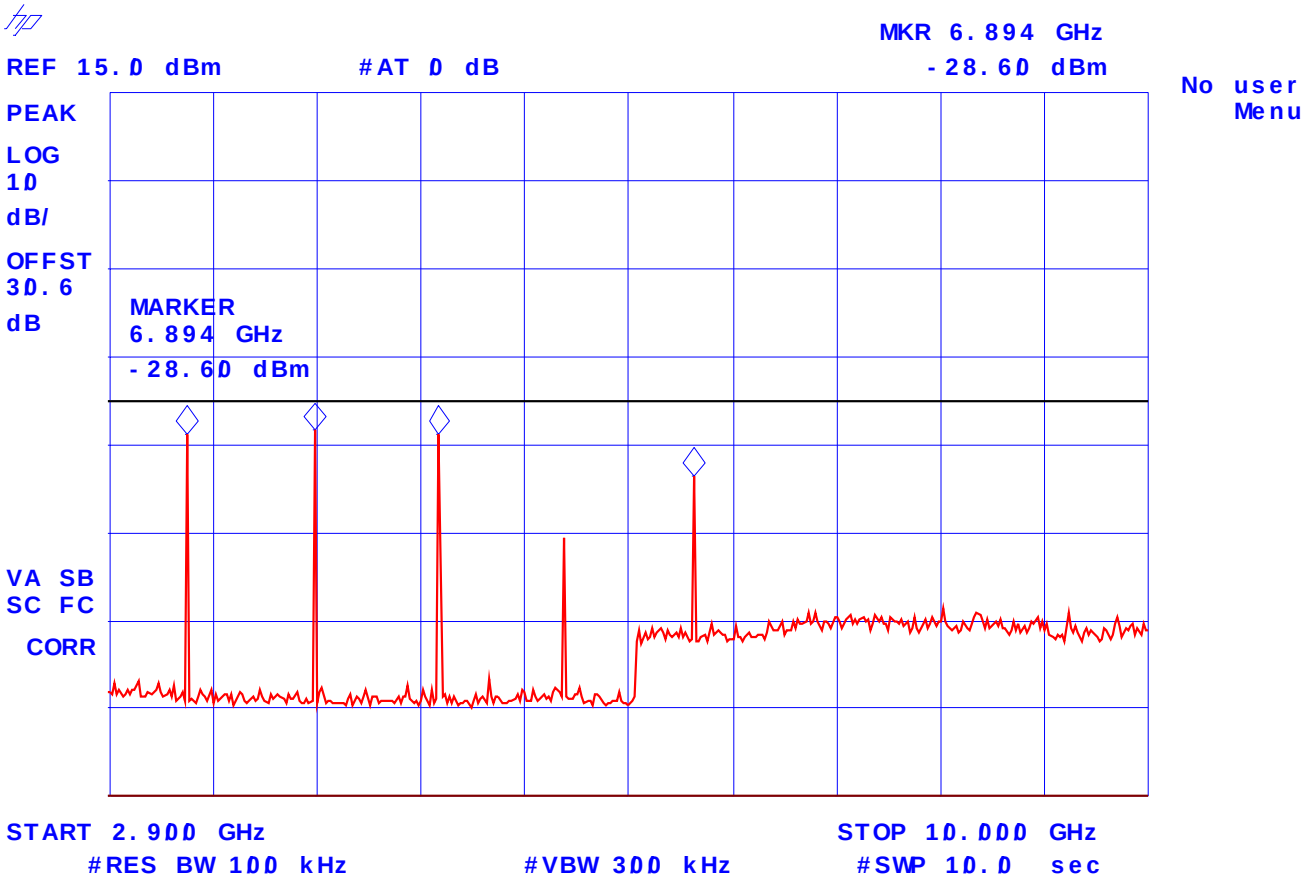
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 120: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, High Power
(1) 1717 MHz, -31.13 dBm
(2) 2577 MHz, -30.24 dBm



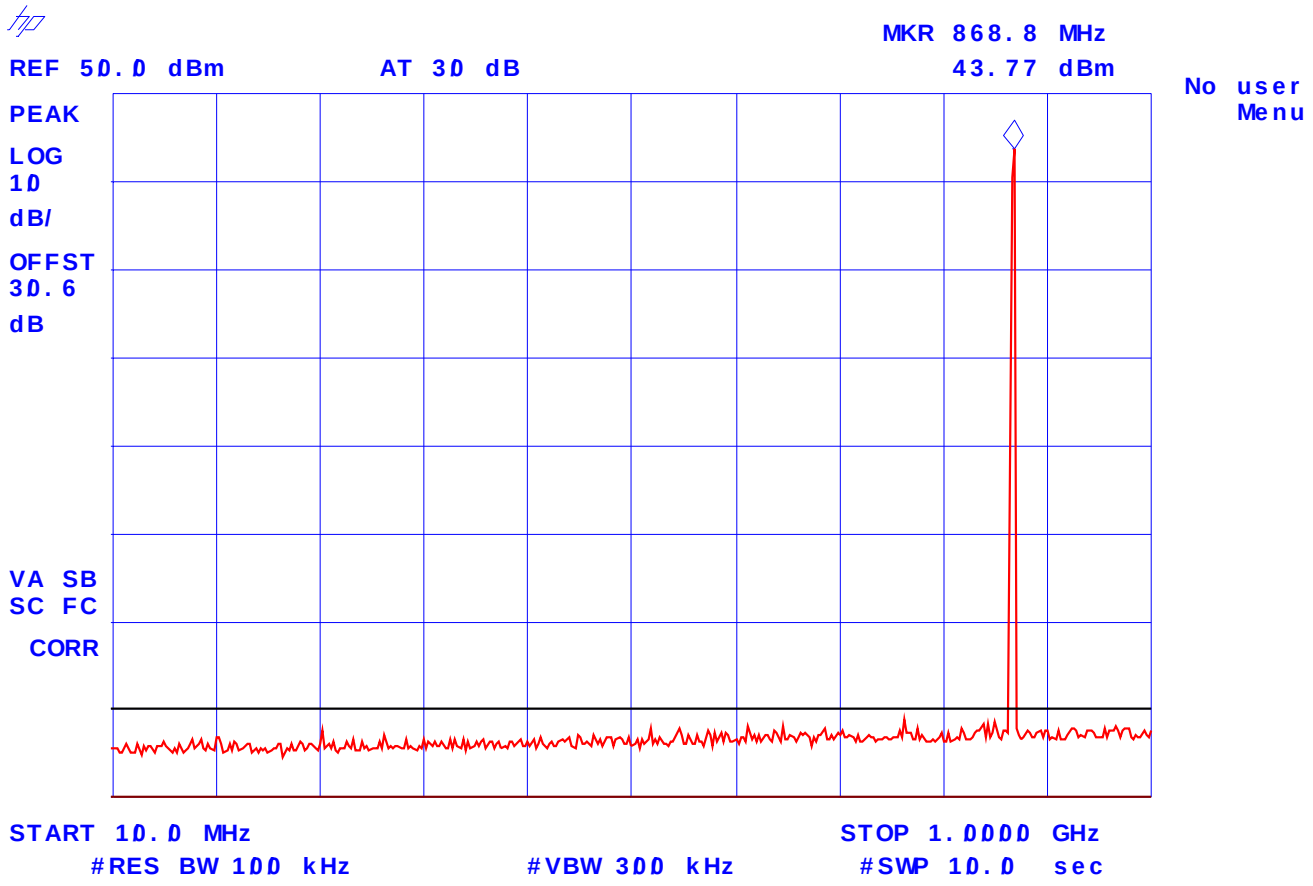
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 121: Transmitter Antenna Power Conducted Emissions
Frequency: 860 MHz, High Power
(3) 3433 MHz, -23.86 dBm
(4) 4302 MHz, -23.40 dBm
(5) 5154 MHz, -23.80 dBm
(6) 6894 MHz, -28.60 dBm



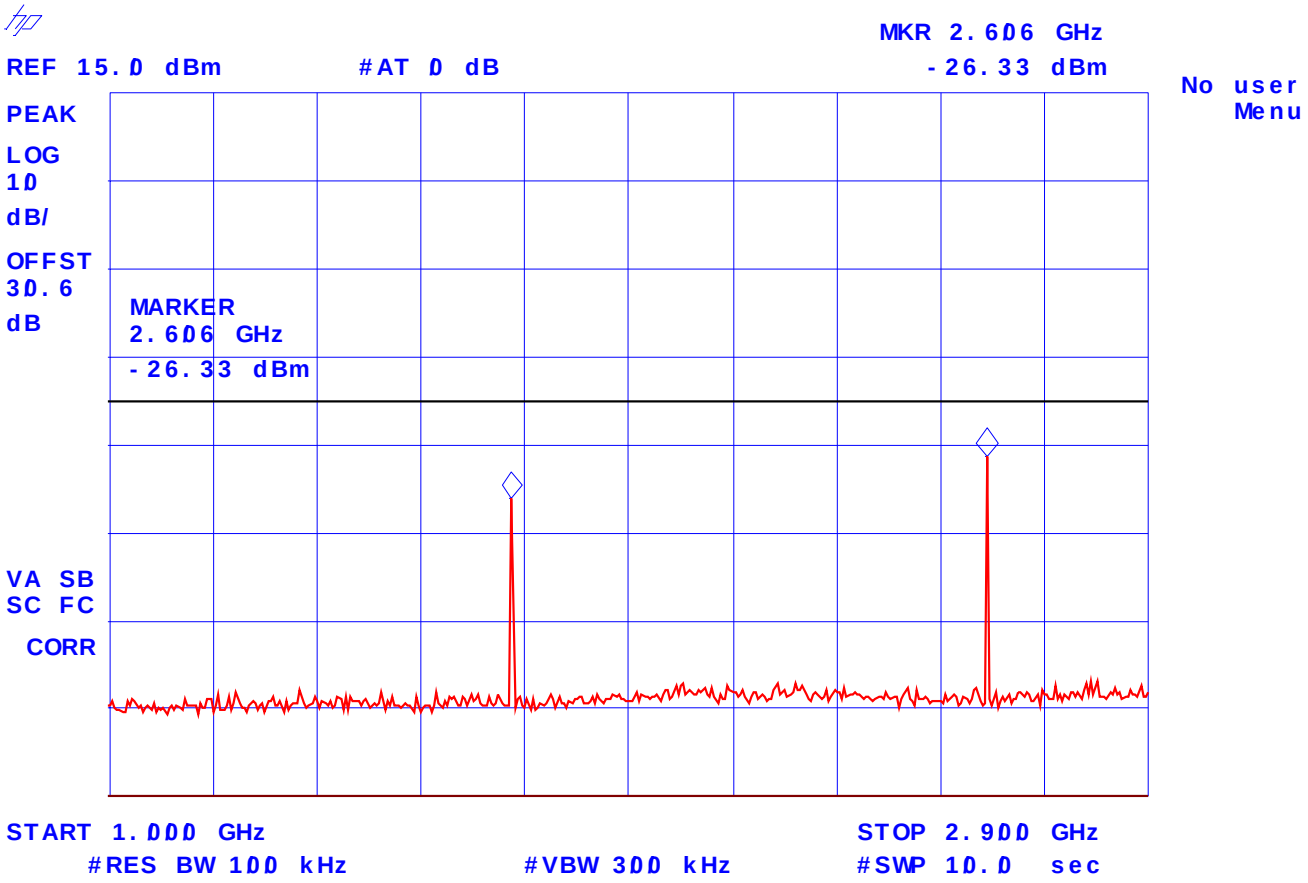
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 122: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, High Power



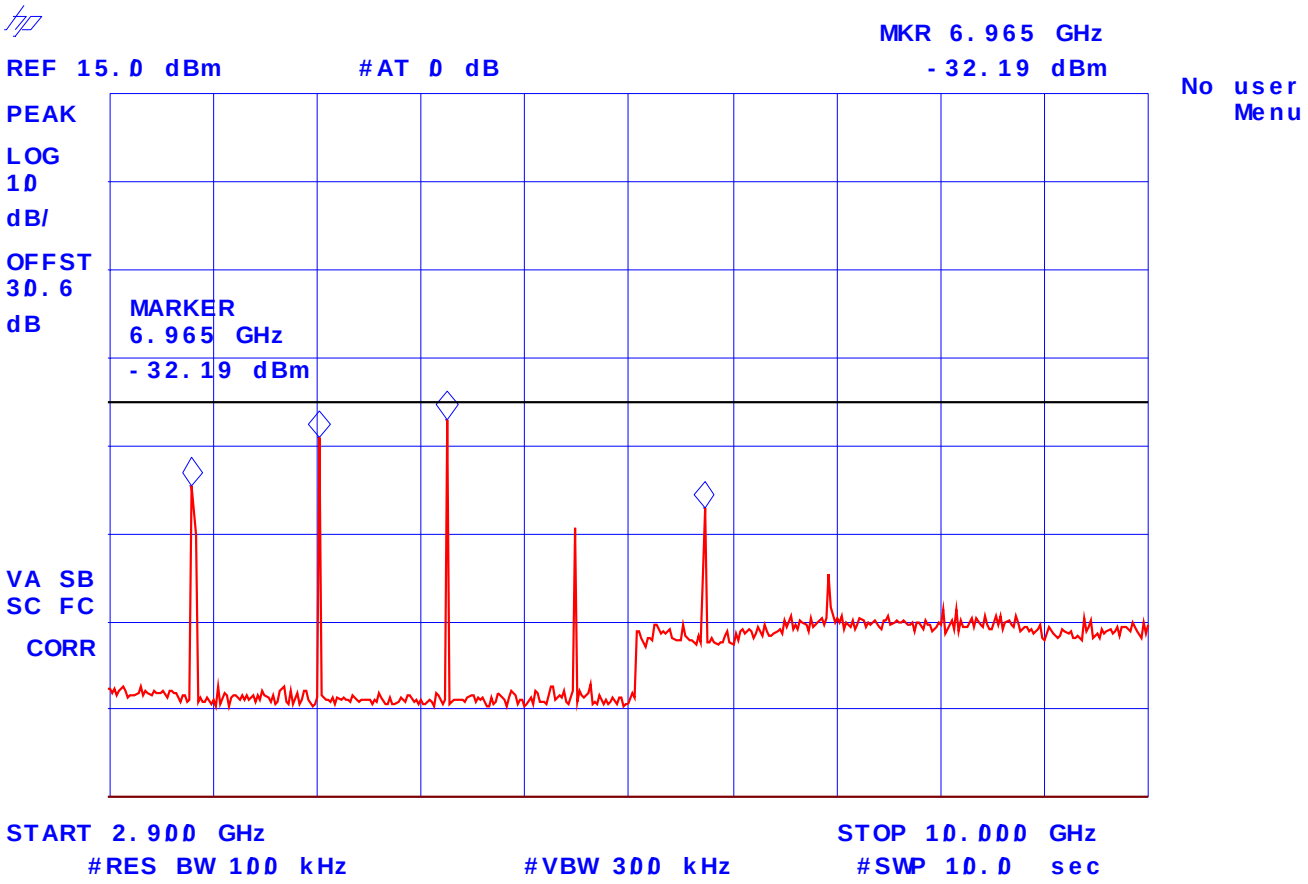
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 123: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, High Power
(1) 1736 MHz, -31.20 dBm
(2) 2606 MHz, -26.33 dBm



- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 124: Transmitter Antenna Power Conducted Emissions
Frequency: 869 MHz, High Power
(3) 3468 MHz, -29.61 dBm
(4) 4338 MHz, -24.19 dBm
(5) 5208 MHz, -21.97 dBm
(6) 6965 MHz, -32.19 dBm



6.12. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS @ FCC 90.210

6.12.1. Limits @ FCC 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Frequency Range	Attenuation Limit (dBc)
90.210(b)(g) – Voice & data	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	43+10*log(P)
90.210(h) – Voice & data	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	43+log(P)

6.12.2. Method of Measurements

The spurious/harmonic ERP measurements are using substitution method specified in Exhibit 8, § 8.2 of this report and its value in dBc is calculated as follows:

(1) If the transmitter's antenna is an integral part of the EUT, the ERP is measured using substitution method.
(2) If the transmitter's antenna is non-integral and diverse, the lowest ERP of the carrier with 0 dBi antenna gain is used for calculation of the spurious/harmonic emissions in dBc:
Lowest ERP of the carrier = EIRP – 2.15 dB = Pc + G - 2.15 dB = xxx dBm (conducted) + 0 dBi – 2.15 dB
(3) Spurious /harmonic emissions levels expressed in dBc (dB below carrier) are as follows:

ERP of spurious/harmonic (dBc) = ERP of carrier (dBm) – ERP of spurious/harmonic emission (dBm)

6.12.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8546A	…	9 kHz to 5.6 GHz with built-in 30 dB Gain Pre-selector, QP, Average & Peak Detectors.
RF Amplifier	Com-Power	PA-102		1 MHz to 1 GHz, 30 dB gain nomimal
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz, 30 dB nominal
Biconilog Antenna	EMCO	3142	10005	30 MHz to 2 GHz
Dipole Antenna	EMCO	3121C	8907-434	30 GHz – 1 GHz
Dipole Antenna	EMCO	3121C	8907-440	30 GHz – 1 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3155	9911-5955	1 GHz – 18 GHz
RF Signal Generator	Hewlett Packard	HP 83752B	3610A00457	0.01 – 20 GHz

6.12.4. Test Setup

Please refer to Photo # 1 to 2 in Annex 1 for detailed of test setup.

6.12.5. Test Data

Remarks:

(1) For the worst case, the most stringent limit for 43+10*log(P in Watts) dBc were applied throughout all permitted bands.

(2) Since the emissions were found to be the same for different modulations (F3E and F1D) and channel spacings (12.5 kHz and 25 kHz), tests were performed with voice modulations only and the results shall represent for all different operations.

(3) The rf emissions with the highest power setting were found to be the worst case based on the Transmitter Antenna Conducted Emissions test results; therefore, only radiated emissions with the highest power setting were conducted for the worst case.

6.12.5.1. Transmitter Radiated Emissions at 3 meters in 806-824 MHz Band

6.12.5.1.1. Lowest Frequency 806 MHz, Highest Power = 45.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-58.3	< -38.3	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

6.12.5.1.2. Middle Frequency 815 MHz, Highest Power = 44.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-57.3	< -37.3	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

6.12.5.1.3. Highest Frequency 824 MHz, Highest Power = 45.5 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-58.5	< -38.5	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

6.12.5.2. Transmitter Radiated Emissions at 3 meters in 851-869 MHz Band

6.12.5.2.1. Lowest Frequency 851 MHz, Highest Power = 45.4 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-58.4	< -38.5	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

6.12.5.2.2. Middle Frequency 860 MHz, Highest Power = 43.5 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-56.5	< -36.5	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

6.12.5.2.3. Highest Frequency 869 MHz, Highest Power = 45.3 dBm, Modulation: FM with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	E-FIELD Level @3m (dBuV/m)	ERP Substitution measured by Method (dBm)	(dBc)	EMI Receiver Detector (Peak/QP)	ANTENNA PLANE (H/V)	LIMIT (dBc)	MARGIN (dB)	PASS/ FAIL
10 – 10,0000	**	**	**	PEAK	V & H	-58.3	< -38.3	PASS
• The emissions were scanned from 10 MHz to 10 GHz and no rf spurious/harmonic emissions were found to be less than 20 dB below the FCC Limits.								

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994)

7.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivit	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67$(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB

EXHIBIT 8. MEASUREMENT METHODS

8.1. CONDUCTED POWER MEASUREMENTS

- The following shall be applied to the combination(s) of the radio device and its intended antenna(e).
- I f the RF level is user adjustable, all measurements shall be made with the highest power level available to the user for that combination.
- The following method of measurement shall apply to both conducted and radiated measurements.
- The radiated measurements are performed at the Ultratech Calibrated Open Field Test Site.
- The measurement shall be performed using normal operation of the equipment with modulation.

Test procedure shall be as follows:

Step 1: Duty Cycle measurements if the transmitter's transmission is transient

- Using a EMI Receiver with the frequency span set to 0 Hz and the sweep time set at a suitable value to capture the envelope peaks and the duty cycle of the transmitter output signal;
- The duty cycle of the transmitter, x = Tx on / (Tx on + Tx off) with 0<x<1, is measure and recorded in the test report. For the purpose of testing, the equipment shall be operated with a duty cycle that is equal or more than 0.1.

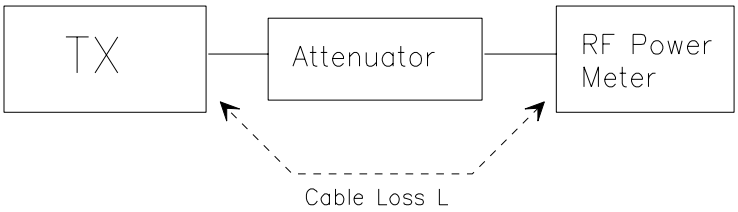
Step 2: Calculation of Average EIRP. See Figure 1

- The average output power of the transmitter shall be determined using a wideband, calibrated RF average power meter with the power sensor with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- The e.i.r.p. shall be calculated from the above measured power output "A", the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:

EIRP = A + G + 10log(1/x)

{ X = 1 for continuous transmission => 10log(1/x) = 0 dB }

Figure 1.



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8.2. RADIATED POWER MEASUREMENTS (ERP & EIRP) USING SUBSTITUTION METHOD

8.2.1. Maximizing RF Emission Level (E-Field)

(a) The measurements was performed with full rf output power and modulation.
(b) Test was performed at listed 3m open area test site (listed with FCC, IC, ITI, NVLAP, ACA & VCCI).
(c) The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
(d) The BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.
(e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level

Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)

(f) Set the EMI Receiver and #2 as follows:

Center Frequency:	test frequency
Resolution BW:	100 kHz
Video BW:	same
Detector Mode:	positive
Average:	off
Span:	3 x the signal bandwidth

(g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.
(h) The transmitter was rotated through 360^{o} about a vertical axis until a higher maximum signal was received.
(i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.
(j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.
(k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.
(l) Repeat for all different test signal frequencies

8.2.2. Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring EIRP) as follows:

Center Frequency:	equal to the signal source
Resolution BW:	10 kHz
Video BW:	same
Detector Mode:	positive
Average:	off
Span:	3 x the signal bandwidth

(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level

Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)

(c) Select the frequency and E-field levels obtained in the Section 8.2.1 for ERP/EIRP measurements.
(d) Substitute the EUT by a signal generator and one of the following transmitting antenna (substitution antenna):
- ♦ DIPOLE antenna for frequency from 30-1000 MHz or
- ♦ HORN antenna for frequency above 1 GHz }.

(e) Mount the transmitting antenna at 1.5 meter high from the ground plane.
(f) Use one of the following antenna as a receiving antenna:
- ♦ DIPOLE antenna for frequency from 30-1000 MHz or
- ♦ HORN antenna for frequency above 1 GHz }.

(g) If the DIPOLE antenna is used, tune it's elements to the frequency as specified in the calibration manual.
(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.
(i) Tune the EMI Receivers to the test frequency.
(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(k) The transmitter was rotated through 360° about a vertical axis until a higher maximum signal was received.
(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.
(n) Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:

P = P1 - L1 = (P2 + L2) – L1 = P3 + A + L2 - L1
EIRP = P + G1 = P3 + L2 - L1 + A + G1
ERP = EIRP – 2.15 dB
Total Correction factor in EMI Receiver # 2 = L2 – L1 + G1

Where: P: Actual RF Power fed into the substitution antenna port after corrected.
P1: Power output from the signal generator
P2: Power measured at attenuator A input
P3: Power reading on the Average Power Meter
EIRP: EIRP after correction
ERP: ERP after correction

(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)
(p) Repeat step (d) to (o) for different test frequency
(q) Repeat steps (c) to (j) with the substitution antenna oriented in horizontal polarization.
(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.:

Figure 2

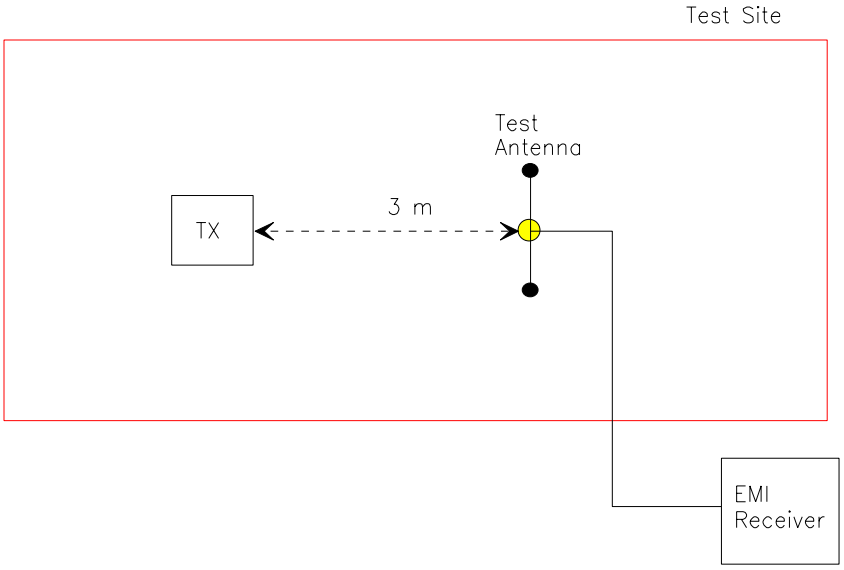
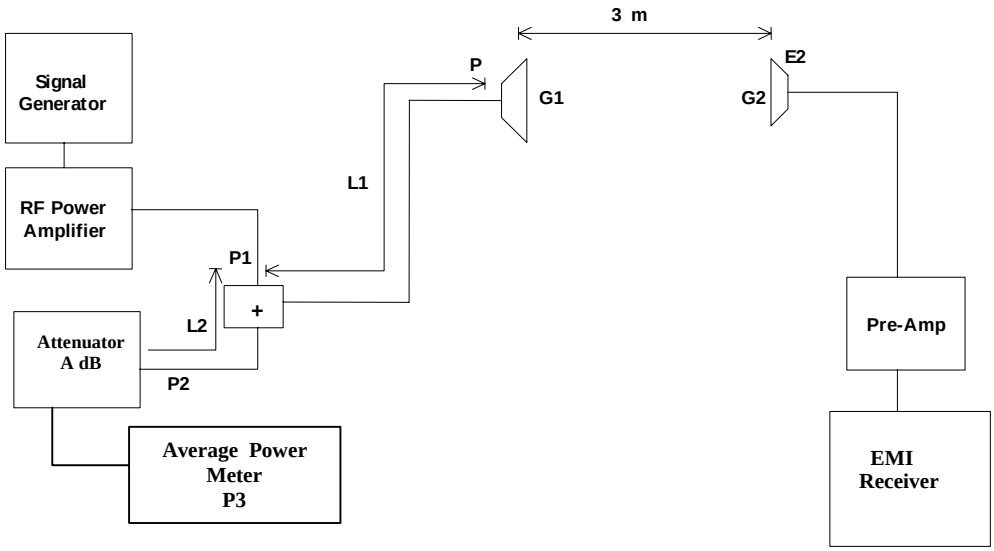


Figure 3



8.3. FREQUENCY STABILITY

Refer to FCC @ 2.1055.

(a) The frequency stability shall be measured with variation of ambient temperature as follows: From -30 to +50 centigrade except that specified in subparagraph (2) & (3) of this paragraph.

(b) Frequency measurements shall be made at extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stability circuitry need be subjected to the temperature variation test.

(d) The frequency stability supply shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment).

8.4. EMISSION MASK

Voice or Digital Modulation Through a Voice Input Port @ 2.1049(c)(i):- The transmitter was modulated by a 2.5 KHz tone signal at an input level 16 dB greater than that required to produce 50% modulation (e.g.: ±2.5 KHz peak deviation at 1 KHz modulating frequency). The input level was established at the frequency of maximum response of the audio modulating circuit.

Digital Modulation Through a Data Input Port @ 2.1049(h):- Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the Emission Masks shall be shown for operation with any devices used for modifying the spectrum when such devices are operational at the discretion of the user.

The following EMI Receiver bandwidth shall be used for measurement of Emission Mask/Out-of-Band Emission Measurements:

(1) For 25 kHz Channel Spacing: RBW = 300 Hz
(2) For 12.5 kHz or 6.25 kHz Channel Spacings: RBW = 100 Hz

The all cases the Video Bandwidth shall be equal or greater than the measuring bandwidth.

8.5. SPURIOUS EMISSIONS (CONDUCTED)

With transmitter modulation characteristics described in Out-of-Band Emissions measurements @ 2.1049, the transmitter spurious and harmonic emissions were scanned. The spurious and harmonic emissions were measured with the EMI Receiver controls set as RBW = 30 kHz minimum , VBW ≥ RBW and SWEEP TIME = AUTO). The transmitter was operated at a full rated power output, and modulated as follows:

FCC CFR 47, Para. 2.1057 - Frequency spectrum to be investigated:- The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10^{th} harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The
amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC CFR 47, Para. 2.1051 - Spurious Emissions at Antenna Terminal:- The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of the harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.