UltraTech
Group of Labs

31040/SIT

C-1376

Canada
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NVLAP
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BSMI
SL2-IN-E-1119R

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Sep. 24, 2003

FEDERAL COMMUNICATIONS COMMISSION
7435 Oakland Mills Road
Columbia, MD 21046
USA

Subject: **Type Acceptance Application under FCC CFR 47, Parts 2, 22 (Subpart H), 24 (Subpart E) and 90(Subpart I) - Non-Broadcast Bi-directional Radio Amplifiers Operating in the frequency bands 806-821 MHz (Trunking), 824-849 MHz (Base Cellular), 896-901 MHz (Paging) and 1850-1910 MHz (PCS).**

Applicant: **Kaval Telecom Inc.**
Product: **Satelink RF - Fiber Interface Module**
Model: **LNKFIB-R**
FCC ID: **H6M-LNKFIB-RA**

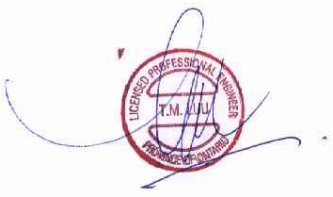
Dear Sir/Madam,

Please find the attached test reports which cover FCC applicable tests for the uplink bands **806-824, 824-849, 896-901 and 1850-1910 MHz of Model LNKFIB per FCC**'s request.

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.

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SL2-IN-E-1119R

Sep. 24, 2003

Kaval Telecom Inc.
60 Gough Road
Markham, Ontario
Canada, L3R 8X7

Attn.: **Mr. Alan Aslett**

Subject: Certification Testing in accordance with **FCC CFR 47, Parts 2, 22 (Subpart H), 24 (Subpart E) and 90(Subpart I) - Non-Broadcast Bi-directional Radio Amplifiers Operating in the frequency bands 806-824 MHz (Trunking), 824-849 MHz (Base Cellular), 896-901 MHz (Paging) and 1850-1910 MHz (PCS).**

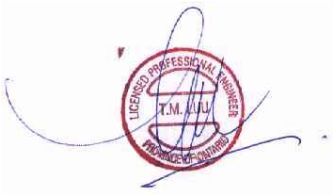
Product: **Satelink RF - Fiber Interface Module**
Model: **LNKFIB-R**
FCC ID: **H6M-LNKFIB-RA**

Dear Mr. Aslett,

Please find the attached test reports which cover FCC applicable tests for the uplink bands **806-821, 824-849, 896-901 and 1850-1910 MHz of Model LNKFIB per FCC**'s request.

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

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ENGINEERING TEST REPORT

Satelink RF - Fiber Interface Module
Model No.: LNKFIB-R
FCC ID: H6M-LNKFIB-RA

Applicant:

Kaval Telecom Inc.
60 Gough Road
Markham, Ontario
Canada, L3R 8X7

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, Parts 2, 22 (Subpart H), 24 (Subpart E) and 90 (Subpart I)

UltraTech's File No.: KTI-035BFCC22-90

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Sep. 24, 2003	
Report Prepared by: Dharmajit Solanki, RFI Engineer Issued Date: Sep. 24, 2003	Tested by: Hung Trinh, RFI Technician Test Dates: Sep. 12 - Sep. 19, 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
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TABLE OF CONTENTS

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Parts 2, 22, 24 and 90
Title:	Telecommunication - Code of Federal Regulations, CFR 47, Parts 2, 22, 24 & 90
Purpose of Test:	To gain FCC Certification Authorization for Radio operating in the frequency bands 806-824 MHz (Trunking), 824-849 MHz (Base Cellular), 896-901 MHz (Paging) and 1850-1910 MHz (PCS).
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.

1.2. RELATED SUBMITAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 2, 22, 24 , 90	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		Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	KAVAL WIRELESS TECHNOLOGIES INC.
Address:	60 Gough Road Markham, Ontario Canada, L3R 8X7
Contact Person:	Mr. Alan Aslett Phone #: 905-946-3397 Fax #: 905-946-3392 Email Address: aaslet@kaval.com

MANUFACTURER	
Name:	KAVAL WIRELESS TECHNOLOGIES INC.
Address:	60 Gough Road Markham, Ontario Canada, L3R 8X7
Contact Person:	Mr. Alan Aslett Phone #: 905-946-3397 Fax #: 905-946-3392 Email Address: asslet@kaval.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

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

Brand Name:	KAVAL WIRELESS TECHNOLOGIES INC.
Product Name:	SATELINK RF - FIBER INTERFACE MODULE
Model Name or Number:	LNKFIB-R
Serial Number:	Pre-porduction
Type of Equipment:	Non-broadcast Bi-directional Amplifier
External Power Supply:	None
Transmitting/Receiving Antenna Type:	Maximum 8 non-integral antennas can be used with the SatelLink LNKFIB-R bi-directional amplifier.
Primary User Functions of EUT:	Bi-directional amplifier for use with CDMA,GSM and TDMA radio signals.

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER (Uplink)	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	[x] Commercial [x] Light Industry & Heavy Industry
Power Supply Requirement:	120V 60Hz
Operating Frequency Range & RF Nominal Output Power:	▪ **806-824 MHz** * 1 input/output signal: 0.165 mWatts * 2 input/output signals: 0.035 mWatts * 3 input/output signals: 0.017 mWatts ▪ **824-849 MHz** * 1 input/output signal: 0.025 mWatts * 2 input/output signals: 0.006 mWatts * 3 input/output signals: 0.010 mWatts ▪ **896-901 MHz** * 1 input/output signal: 0.033 mWatts * 2 input/output signals: 0.006 mWatts * 3 input/output signals: 0.003 mWatts ▪ **1850-1910 MHz** * 1 input/output signal: 0.021 mWatts * 2 input/output signals: 0.004 mWatts * 3 input/output signals: 0.002 mWatts Please refer to page 12 of Users Manual for Power Ratings for 1 to 30 signal inputs/outputs
RF Input Rating:	-40 dBm maximum per Channel as specified by manufacturer.
Gain	- 4 to +2 dB nominal
RF Output Impedance:	50 Ohms
Channel Spacing:	N/A
Occupied Bandwidth (99%):	N/A
Emission Designation*:	EXTENDER
Antenna Connector Type:	SMA

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

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	1 RF Input Port (PCS, Cellular & Paging/Trunking)	1	SMA	Shielded
2	6 RF Output Ports	1	SMA	Shielded
3	RS-232 (Note 2)	1	DB	Shielded

NOTES:

(1) Ports of the EUT which in normal operation were connected to ancillary equipment through interconnecting cables via a representative interconnecting cable to simulate the input/output characteristics. RF input/output was correctly terminated to the 50 Ohm RF Load.

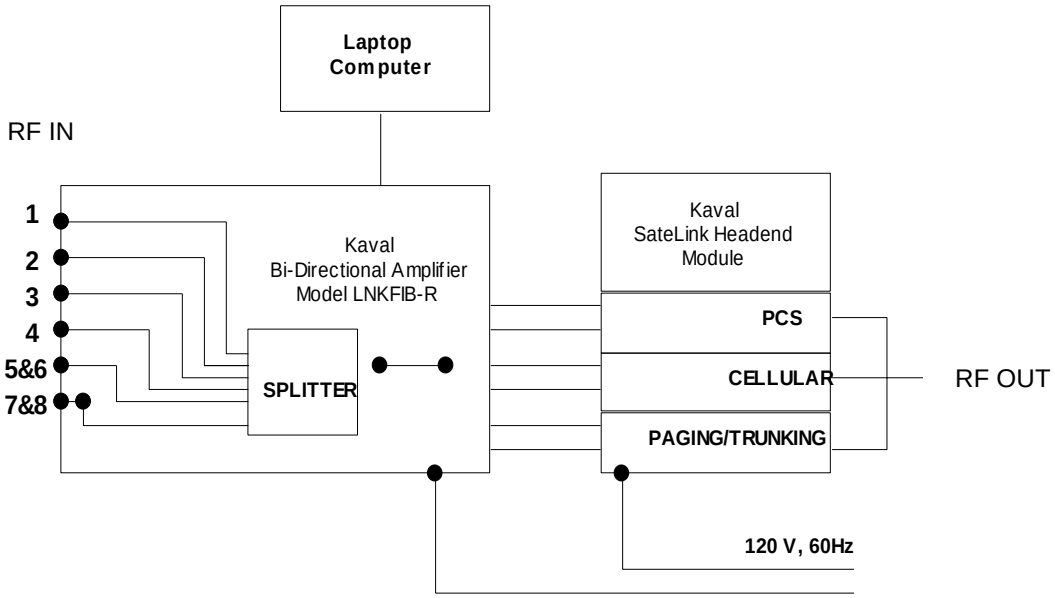
(2) Ports, which are for factory/technical services uses only

2.5. 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:	ThinkPad Laptop
Brand name:	IBM
Model Name or Number:	2625
FCC ID:	ANOKAJIPENCP
Serial Number:	78-WWM4A
Connected to EUT's Port:	RS-232
Notes:	This laptop computer is used for technical services only; therefore, and it is used for control purpose only but not for testing.

2.6. TEST SETUP



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

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	120V 60Hz

3.2. 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:	Utility software provided by Kaval was used for selecting frequency bands of the amplifier.
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, 824-849, 896-901 and 1850-1910 MHz	Near lowest, near middle & near highest frequencies in each frequency bands that the transmitter covers
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	▪ The EUT was adjusted for maximum gain output by the manufacturer.
▪ Normal Test Modulation	▪ Intended for use with RF input signal sources with CDMA, GSM and TDMA modulation
▪ Modulating signal source:	▪ Internal/external

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. 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, 2003.

4.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS @ FCC PART 90, SUBPART I

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 base station and non off-air transmission.
90.213 & 2.1055	Frequency Stability	Not applicable for Amplifier since the output signal tracks input signal exactly. However, tests were performed to confirm.
90.242(b)(8) & 2.1047(a)	Audio Frequency Response	Not applicable for Amplifier since the output signal tracks input signal exactly.
90.210 & 2.1047(b)	Modulation Limiting	Not applicable for Amplifier since the output signal tracks input signal exactly.
90.209 90.210 & 2.1049	Emission Limitation & Emission Mask	The output signal tracks input signal exactly. Therefore, only comparison tests were conducted for proof.
90.210, 2.1057 & 2.1051	Emission Limits - Spurious Emissions at RF Output Port	Yes
90.210, 2.1057 & 2.1053	Emission Limits - Field Strength of Spurious Emissions	Yes

4.3. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS @ FCC PART 22, SUBPART H

FCC PARAGRAPH.	TEST REQUIREMENTS	APPLICABILITY (YES/NO)
22.913 & 2.1046	RF Power Output	Yes
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
22.101(a) & 2.1055	Frequency Stability	Not applicable for Amplifier since the output signal tracks input signal exactly. However, tests were performed to confirm.
22.915(d) & 2.1047(a)	Audio Frequency Response	Not applicable for Amplifier since the output signal tracks input signal exactly.
22.915(a), (b) & (c) & 2.1047(b)	Modulation Limiting	Not applicable for Amplifier since the output signal tracks input signal exactly.
22.917(a),(b),(c) & (d) & 2.1049	Emission Limitation & Emission Mask	The output signal tracks input signal exactly. Therefore, only comparison tests were conducted for proof.
22.917(e), (f) & (g), 2.1057 & 2.1051	Emission Limits - Spurious Emissions at RF Output Port	Yes
22.917(e), (f) & (g), 2.1057 & 2.1053	Emission Limits - Field Strength of Spurious Emissions	Yes

4.4. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS @ FCC PART 24, SUBPART E

FCC PARAGRAPH.	TEST REQUIREMENTS	APPLICABILITY (YES/NO)
24.229	Frequencies	N/A for the amplifier
24.232 & 2.1046	Effective Radiated Power (ERP) Limits	Yes
24.235 & 2.1055	Frequency Stability	Not applicable for Amplifier since the output signal tracks input signal exactly. However, tests were performed to confirm.
24.238 & 2.1051	Emission Limits (Conducted)	Yes
24.236 & 24.238, 2.1057 & 2.1053	Emission Limits (Radiated)	Yes

4.5. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS @ FCC PART 15, SUBPART B

Satelink RF - Fiber Interface Module, **Model No.: LNKFIB-R**, by **Kaval Telecom 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.

4.6. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

4.7. DEVIATION OF STANDARD TEST PROCEDURES

None

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Exhibit 7 of this report

5.2. 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.

5.3. 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.

5.4. 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.

5.5. RF POWER OUTPUTS & INTERMODULATION @ FCC 2.1046, 22.913, 24.232 & 90.205

5.5.1. Limits

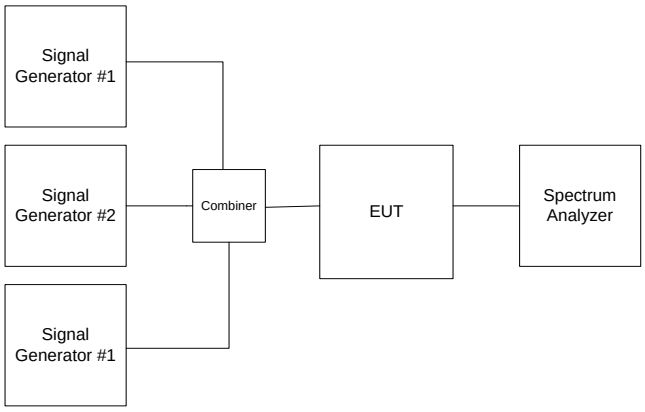
Please refer to FCC CFR 47, Paragraphs 22.913, 24.232 and 90.205 for power limits in different frequency bands:

EUT's Operating Frequency Band (MHz)	FCC Allowable Frequency band (MHz)	FCC Rules	FCC Maximum ERP Limits (Watts)
806-821 MHz (Trunking)	806-821	90.635	100 Watts peak ERP
824-849 MHz (Cellular Base)	824-849	22.913	7 Watts ERP
896-901 MHz (Paging Base)	896-901	90.635	100 Watts peak ERP
1850-1910 MHz (PCS Base)	1850-1910	24.232	2 Watts peak ERP

5.5.2. Method of Measurements

Refer to Exhibit 7, § 7.1 (Conducted) and 7.2 (Radiated) of this report for measurement details

5.5.3. Test Arrangement



5.5.4. Test Data

5.5.4.1. INTERMODULATION IN & PEAK POWERS IN 806-824 MHz Band

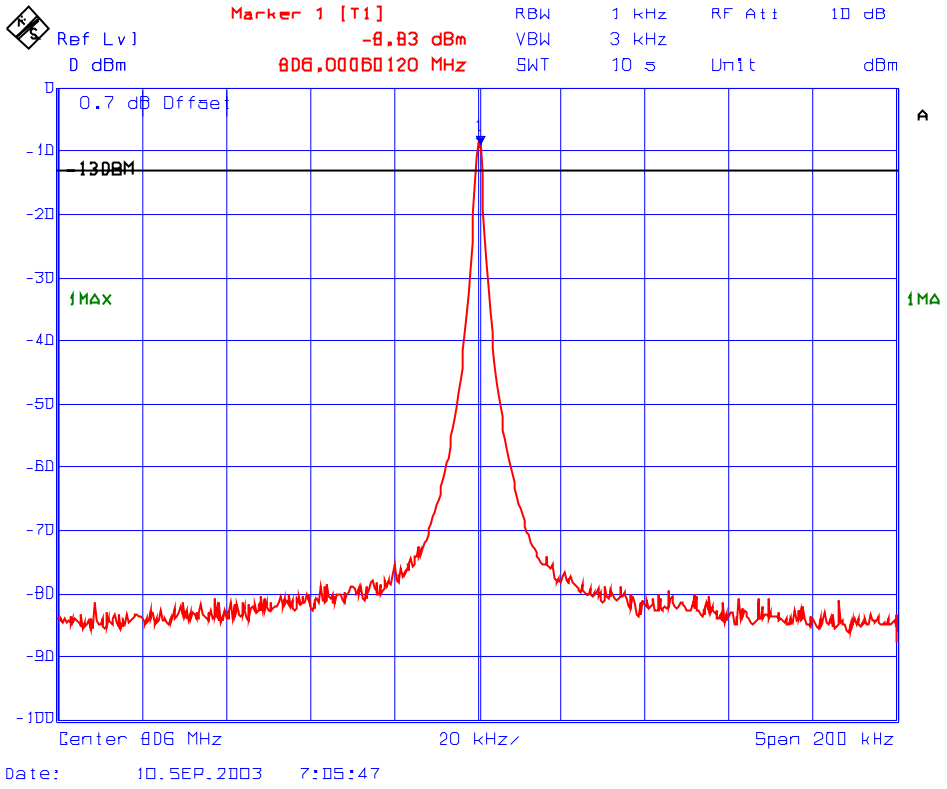
Frequency (MHz)	Number of In/Out Channels	Modulation	Maximum RF Input (conducted) (dBm)	Maximum RF Output (conducted) (dBm)
806	1	unmodulated	-40.0	-8.8
806,806.025	2	unmodulated	-46.5	-15.7
806,806.025, 806.05	3	unmodulated	-49.5	-17.8
815	1	unmodulated	-40.0	-7.8
815,815.025	2	unmodulated	-46.5	-14.5
814.075,815, 815.025	3	unmodulated	-49.5	-17.6
824	1	unmodulated	-40.0	-8.4
823.075,824,	2	unmodulated	-46.5	-14.9
823.05, 823.075, 824	3	unmodulated	-49.5	-18.3

Note :

(1) Refer to Plots # 1 to 9 for detailed measurements of RF Output power and Intermodulation.
(2) The RF Output form the EUT will be connected to the RF input port of the any FCC Certified head end unit. Therefore, the EIRP or ERP can not be evaluated in this report for FCC RF Exposure Compliance. The Head End Unit shall comply with FCC RF Exposure and Power Limit requirements under its own FCC Grant Notes.

Plot # 1 RF Output Power with 1 RF signal input/output in 806 – 824 MHz

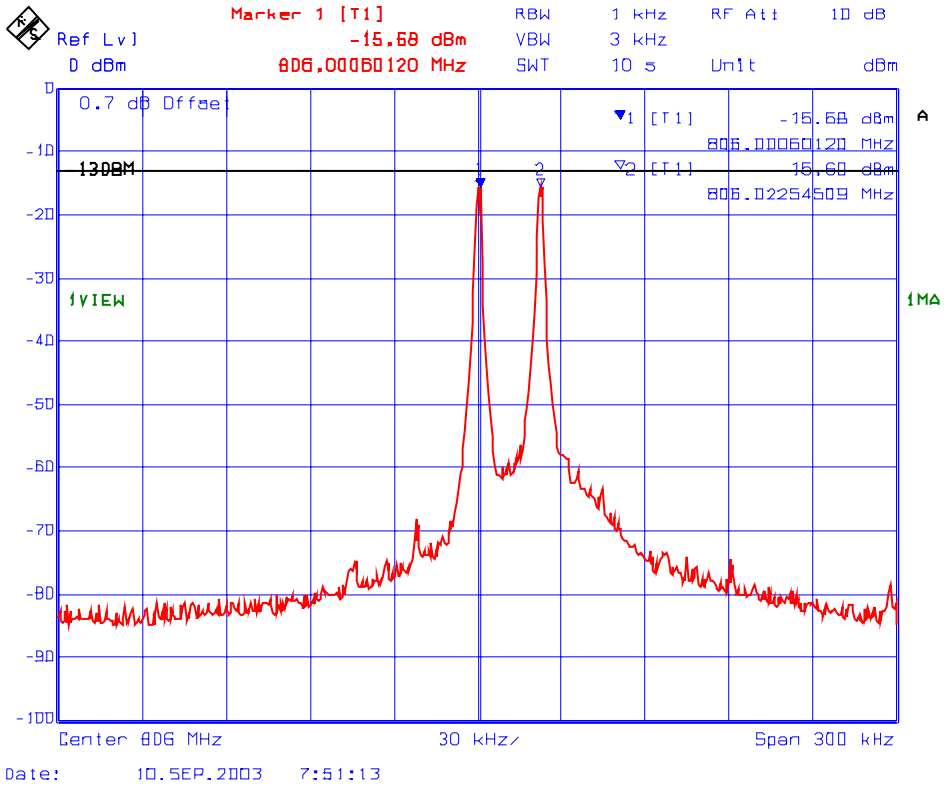
Fc: 806 MHz , RF Input: -40 dBm



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

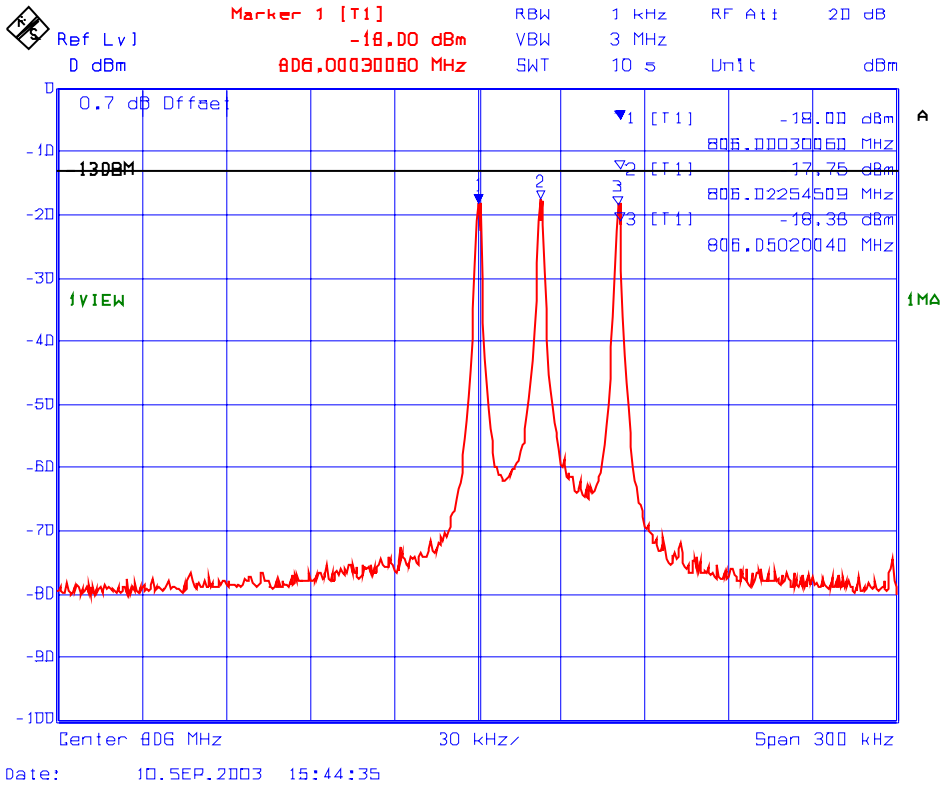
Plot # 2 RF Output Power with 2 RF signal input/output in 806 – 824 MHz

Fc: 806 MHz, Fc + 25 kHz
RF Input 1: -46.50 dBm, RF Input 2: -46.50 dBm



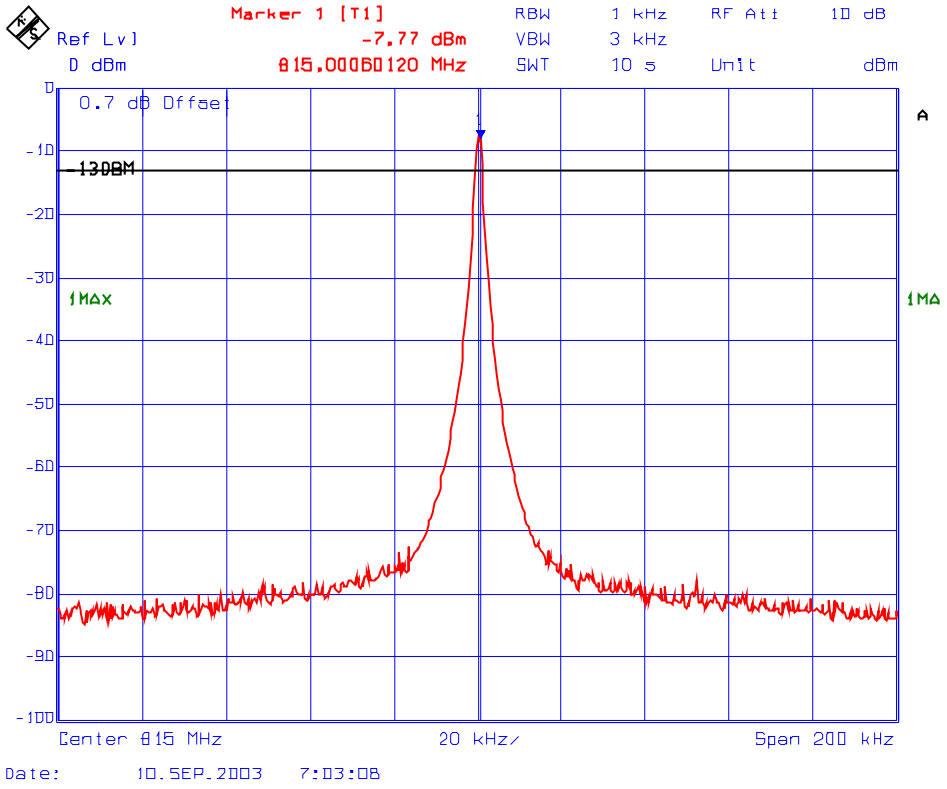
Plot # 3 RF Output Power with 3 RF signal input/output in 806 – 824 MHz

Fc: 806 MHz, Fc + 25 kHz, Fc + 50 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



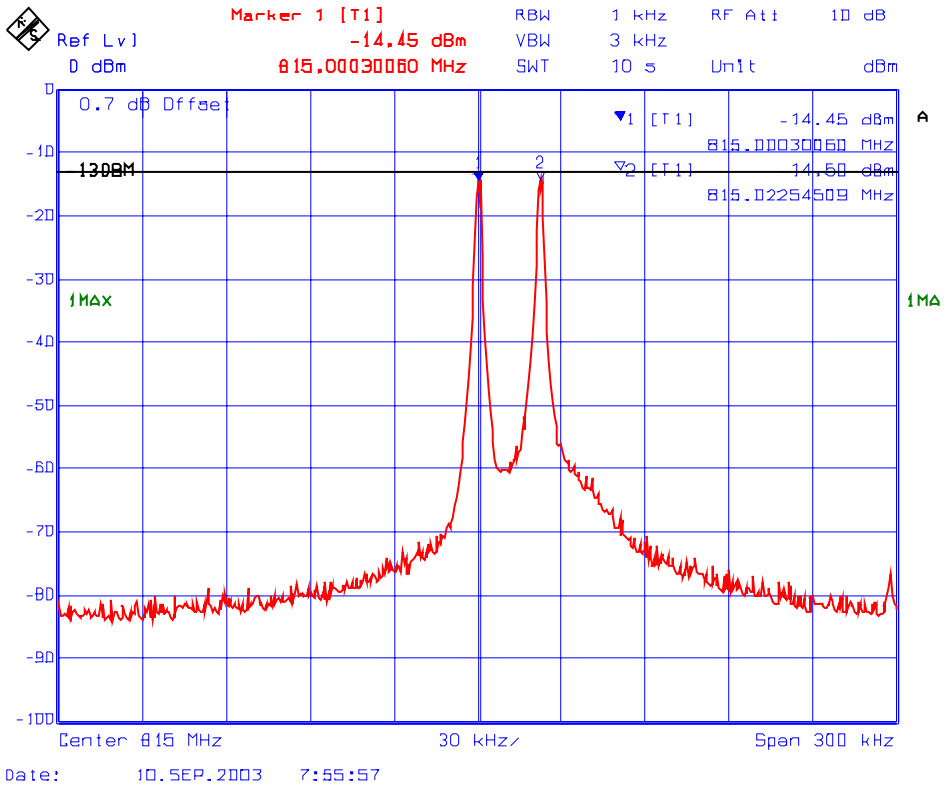
Plot # 4 RF Output Power with 1 RF signal input/output in 806 – 824 MHz

Fc: 815 MHz , RF Input: -40 dBm



Plot # 5 RF Output Power with 2 RF signal input/output in 806 – 824 MHz

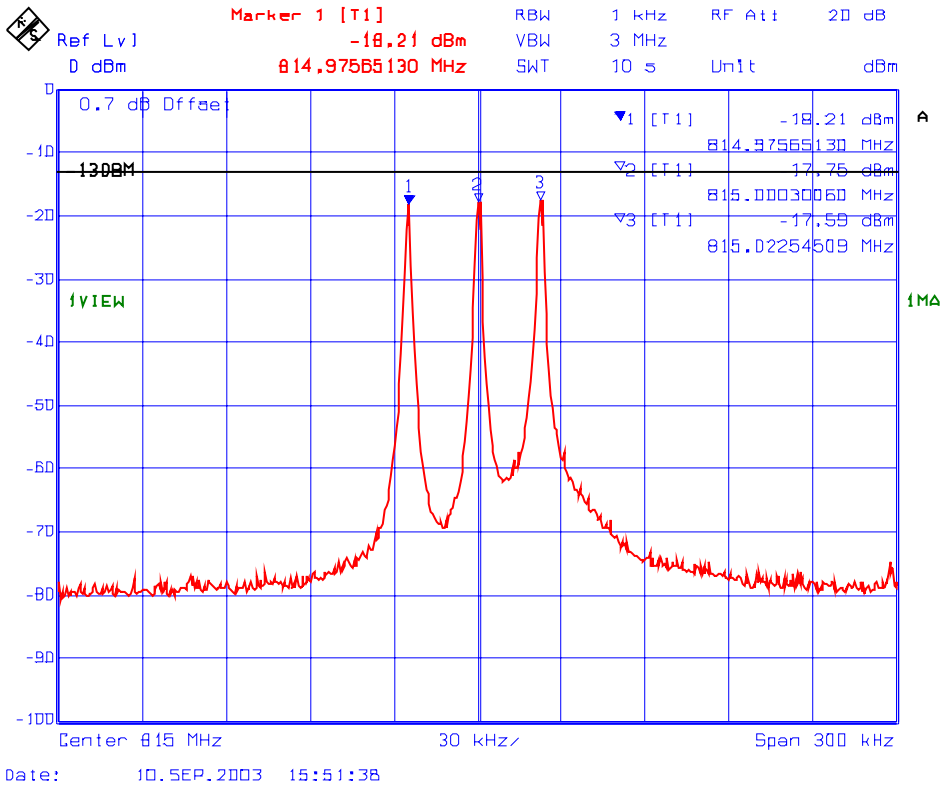
Fc: 815 MHz, Fc + 25 kHz
RF Input 1: -46.50 dBm, RF Input 2: -46.50 dBm



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

Plot # 6 RF Output Power with 3 RF signal input/output in 806 – 824 MHz

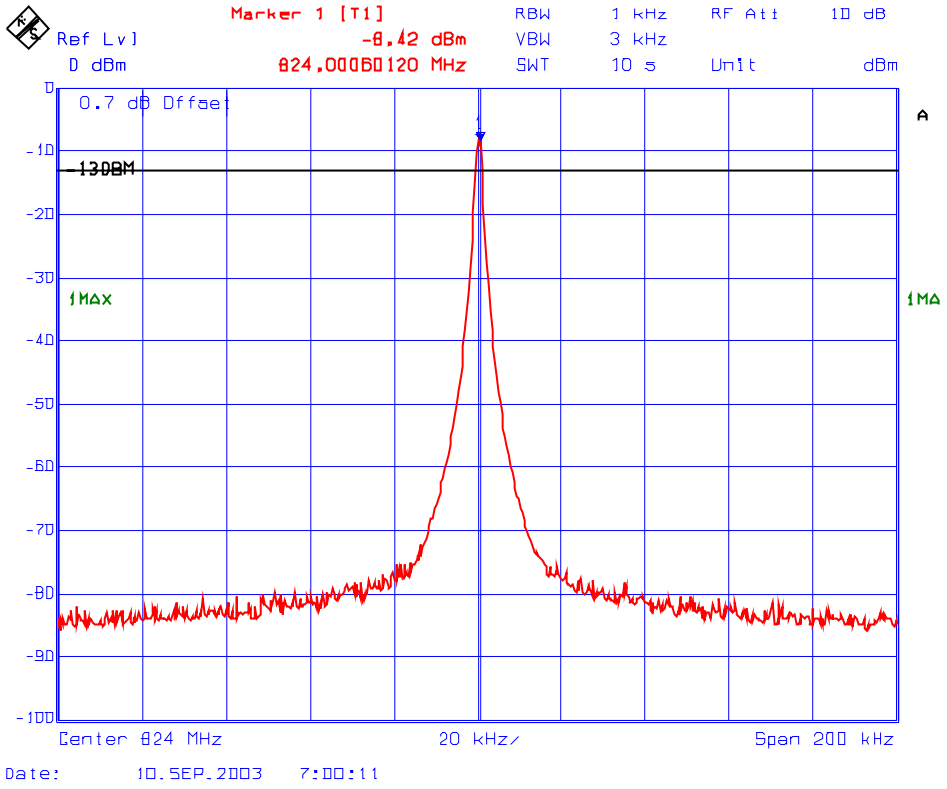
Fc: 815 MHz, Fc + 25 kHz, Fc - 25 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



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

Plot # 7 RF Output Power with 1 RF signal input/output in 806 – 824 MHz

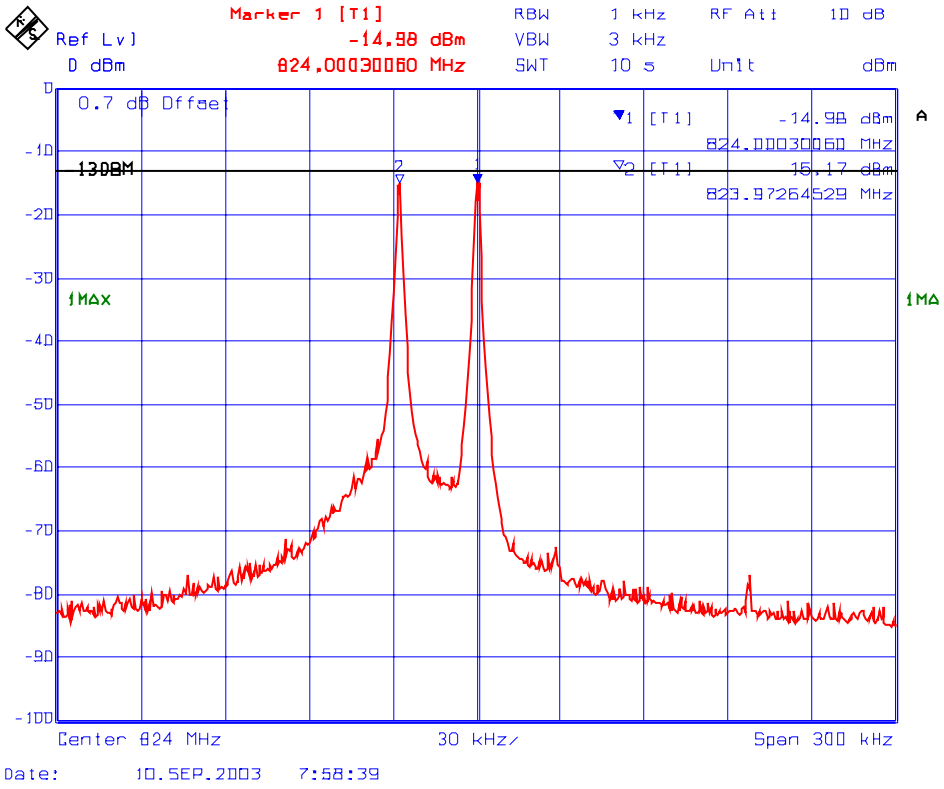
Fc: 824 MHz ,RF Input: -40 dBm



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

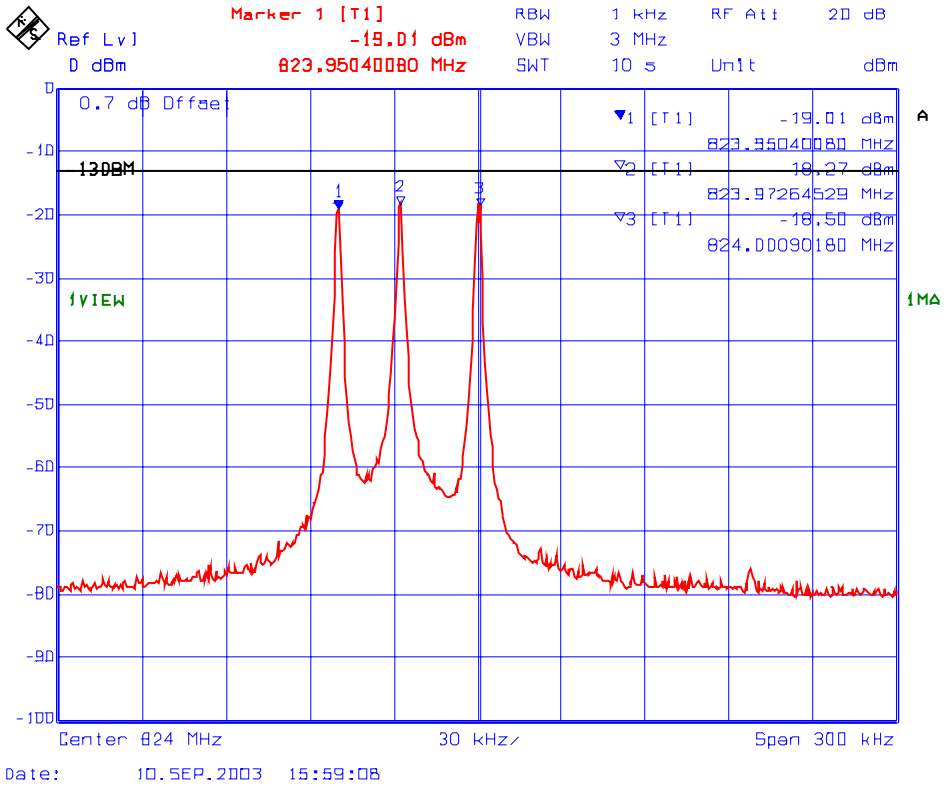
Plot # 8 RF Output Power with 2 RF signal input/output in 806 – 824 MHz

Fc: 824 MHz, Fc - 25 kHz
RF Input 1: -46.50 dBm, RF Input 2: -46.50 dBm



Plot # 9 RF Output Power with 3 RF signal input/output in 806 – 824 MHz

Fc: 824 MHz, Fc - 25 kHz, Fc - 50 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



5.5.4.2. INTERMODULATION IN & PEAK POWERS IN 824-849 MHz Band

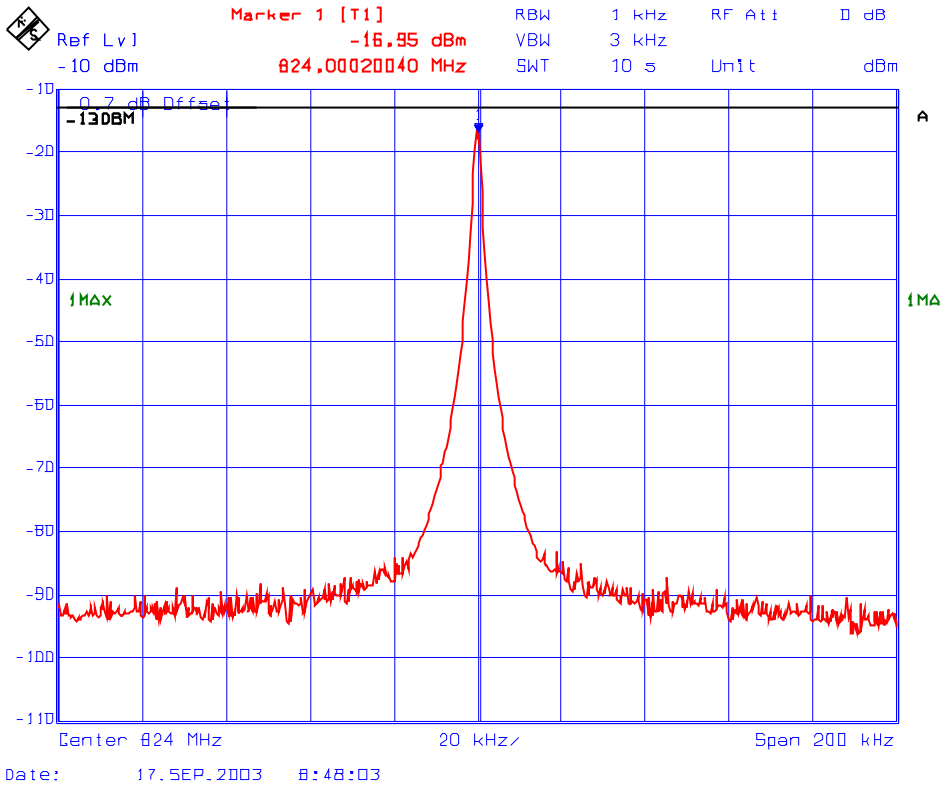
Frequency (MHz)	Number of In/Out Channels	Modulation	Maximum RF Input (conducted) (dBm)	Maximum RF Output (conducted) (dBm)
824	1	unmodulated	-40.0	-16.9
824,824.03	2	unmodulated	-46.3	-23.1
824,824.03, 824.06	3	unmodulated	-42.7	-20.1
836.5	1	unmodulated	-40.0	-15.9
836.5,836.53	2	unmodulated	-46.3	-22.3
836.47, 836.5,836.53	3	unmodulated	-42.7	-26.2
849	1	unmodulated	-40.0	-20.1
848.97,849	2	unmodulated	-46.3	-26.3
824	1	unmodulated	-40.0	-16.9

Note :

(1) Refer to Plots # 10 to 18 for detailed measurements of RF Output power and Intermodulation.
(2) The RF Output form the EUT will be connected to the RF input port of the any FCC Certified head end unit. Therefore, the EIRP or ERP can not be evaluated in this report for FCC RF Exposure Compliance. The Head End Unit shall comply with FCC RF Exposure and Power Limit requirements under its own FCC Grant Notes.

Plot #10 RF Output Power with 1 RF signal input/output in 824 – 849 MHz

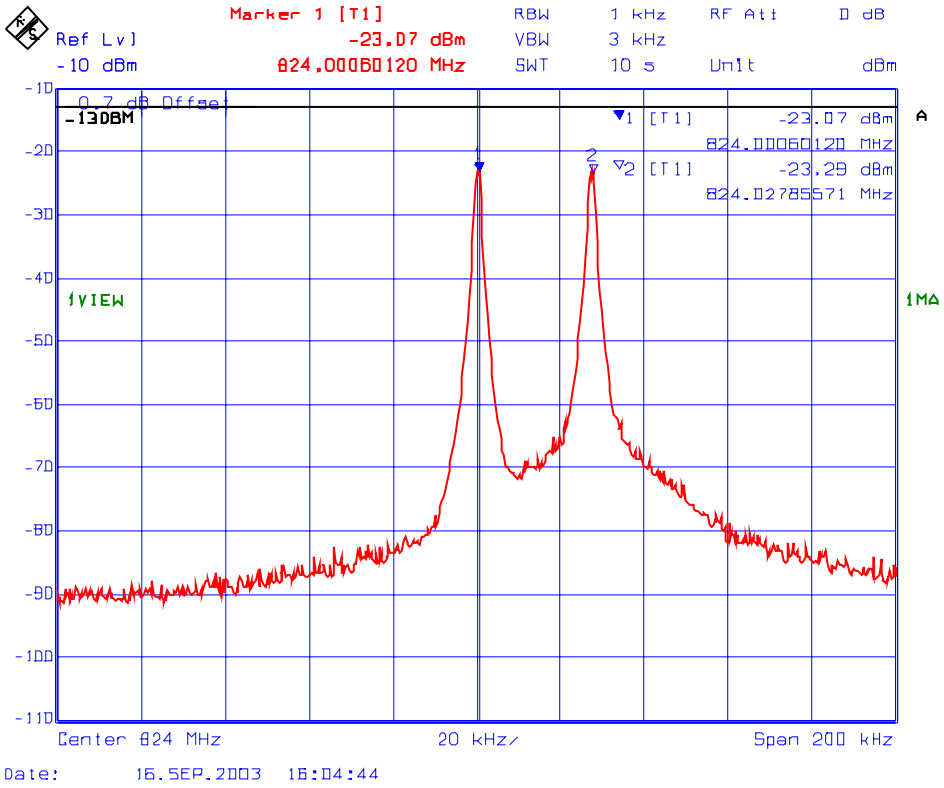
Fc: 824 MHz , RF Input: -40 dBm



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

Plot #11 RF Output Power with 2 RF signal input/output in 824 – 849 MHz

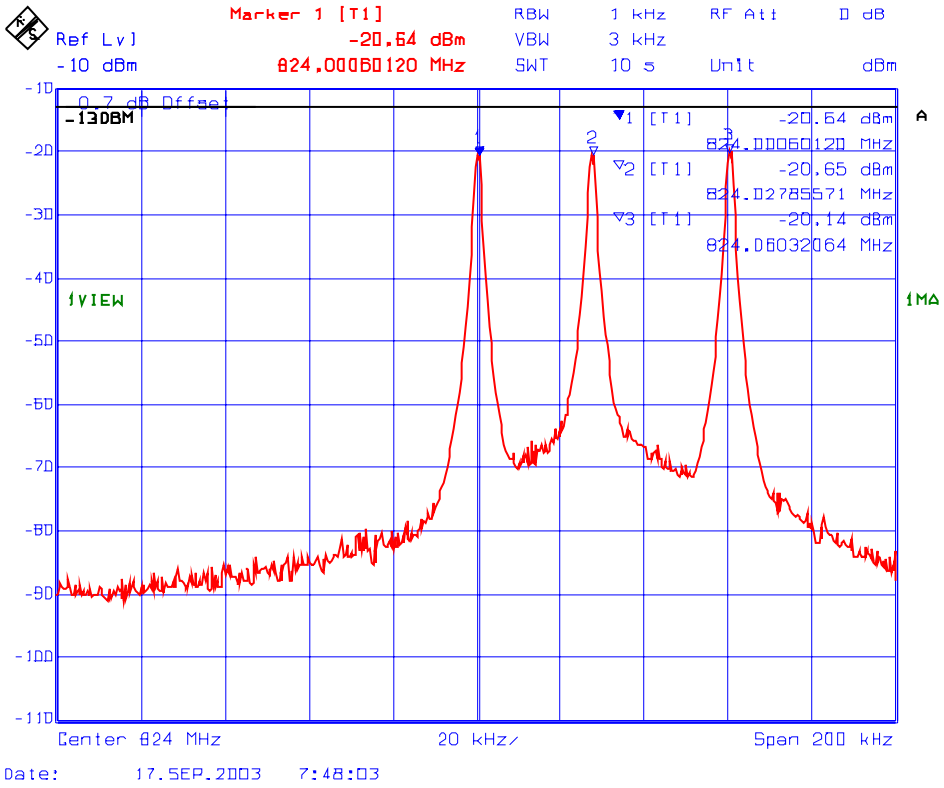
Fc: 824 MHz, Fc + 30 kHz
RF Input 1: -46.27 dBm, RF Input 2: -46.27 dBm



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

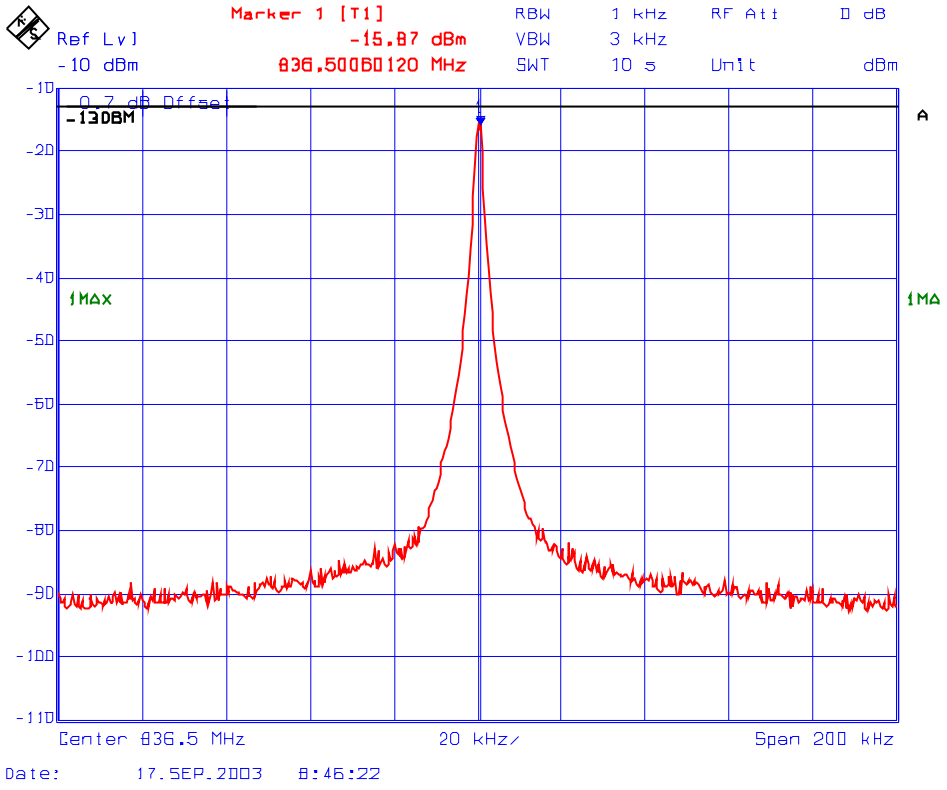
Plot #12 RF Output Power with 3 RF signal input/output in 824 – 849 MHz

Fc: 824 MHz, Fc + 30 kHz, Fc + 60 kHz
RF Input 1: -42.68 dBm, RF Input 2: -42.68 dBm, RF Input 3: -42.68 dBm



Plot #13 RF Output Power with 1 RF signal input/output in 824 – 849 MHz

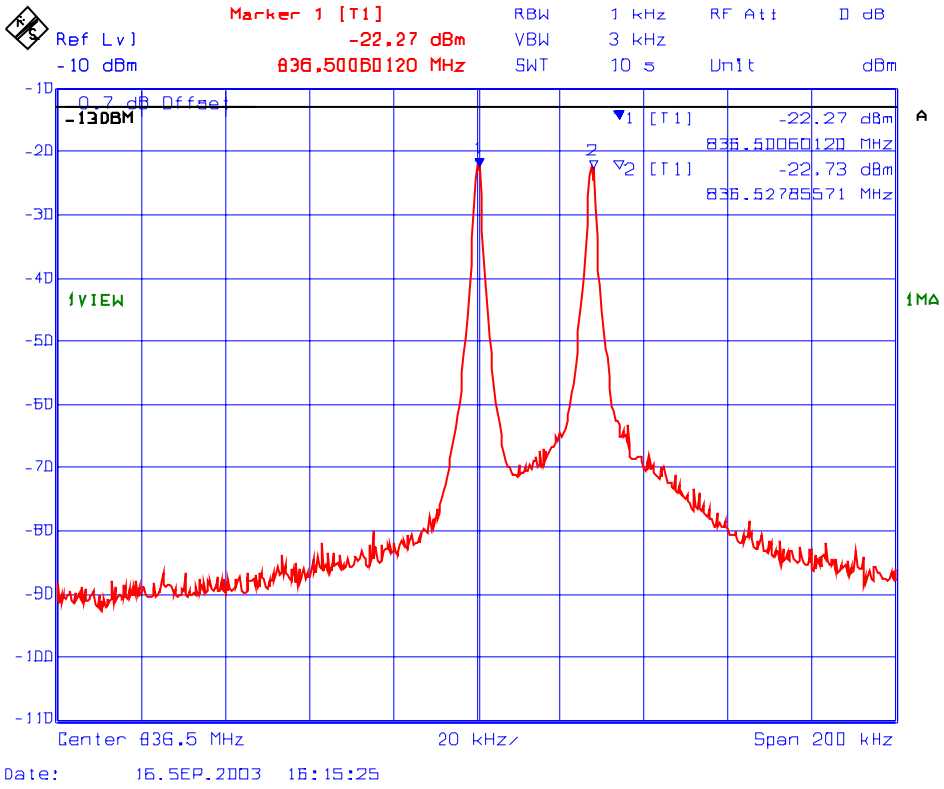
Fc: 836.5 MHz , RF Input: -40 dBm



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

Plot #14 RF Output Power with 2 RF signal input/output in 824 – 849 MHz

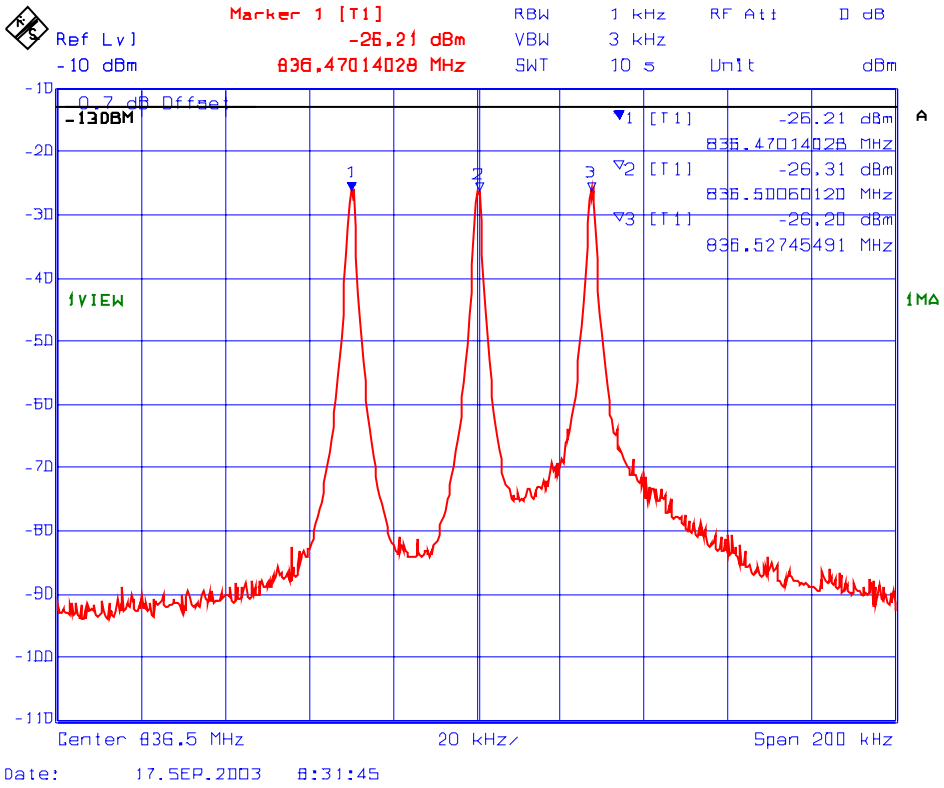
Fc: 836.5 MHz, Fc + 30 kHz
RF Input 1: -46.27 dBm, RF Input 2: -46.27 dBm



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

Plot #15 RF Output Power with 3 RF signal input/output in 824 – 849 MHz

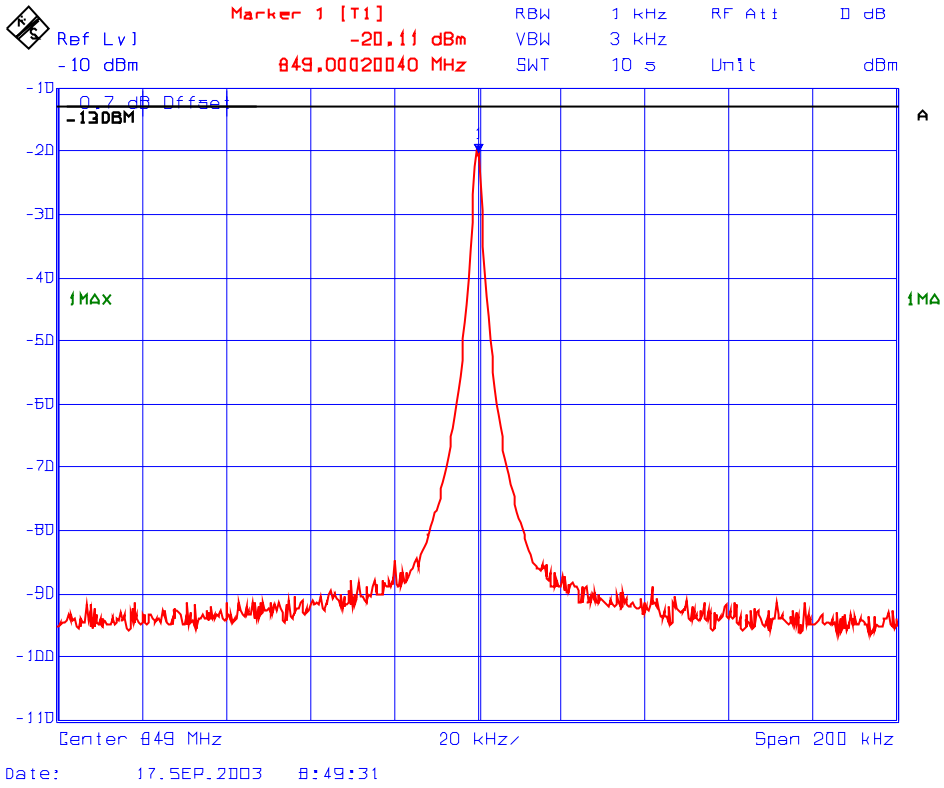
Fc: 836.5 MHz, Fc + 30 kHz, Fc - 30 kHz
RF Input 1: -42.68 dBm, RF Input 2: -42.68 dBm, RF Input 3: -42.68 dBm



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

Plot #16 RF Output Power with 1 RF signal input/output in 824 – 849 MHz

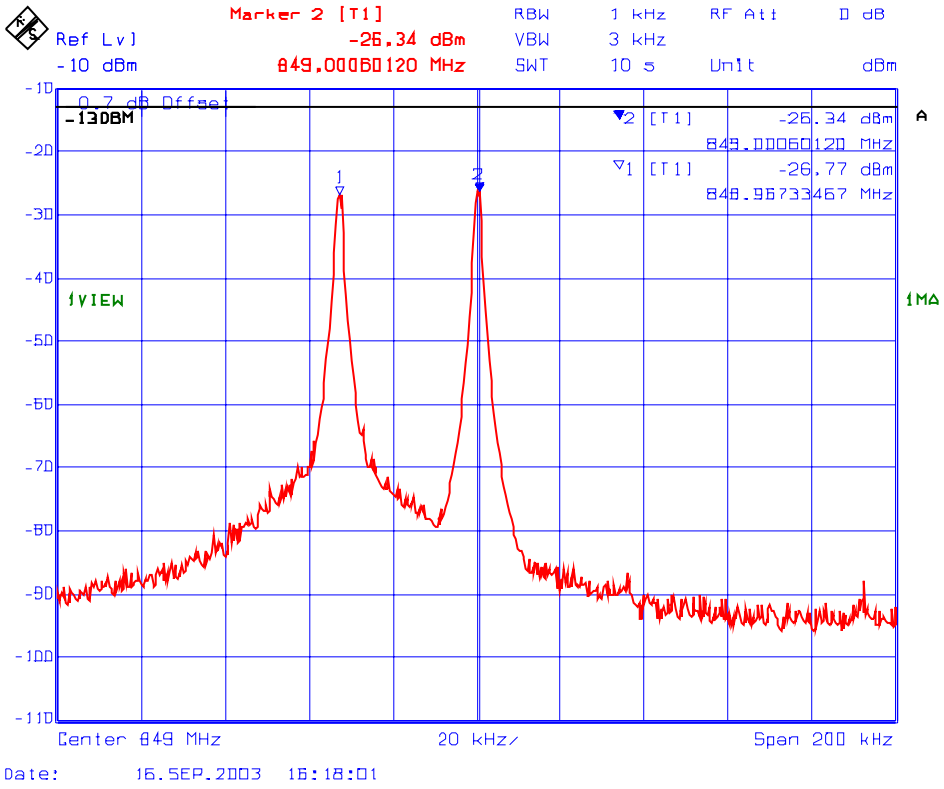
Fc: 849 MHz , RF Input: -40 dBm



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

Plot #17 RF Output Power with 2 RF signal input/output in 824 – 849 MHz

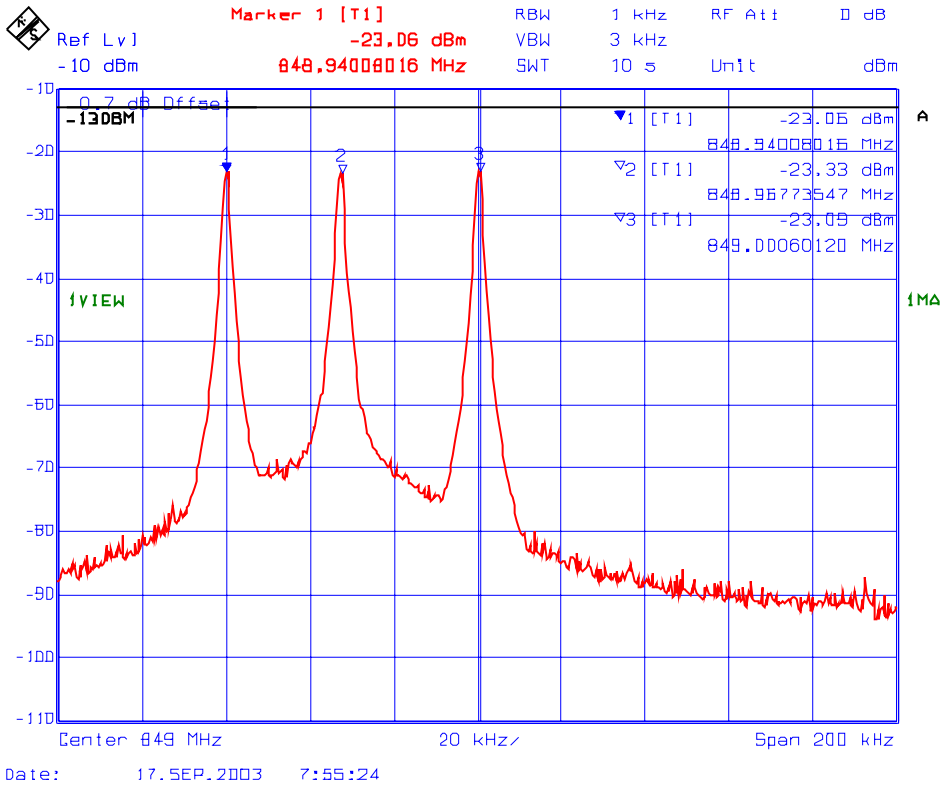
Fc: 849 MHz, Fc - 30 kHz
RF Input 1: -46.27 dBm, RF Input 2: -46.27 dBm



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

Plot #18 RF Output Power with 3 RF signal input/output in 824 – 849 MHz

Fc: 849 MHz, Fc - 30 kHz, Fc - 60 kHz
RF Input 1: -42.68 dBm, RF Input 2: -42.68 dBm, RF Input 3: -42.68 dBm



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

5.5.4.3. INTERMODULATION IN & PEAK POWERS IN 896-901 MHz Band

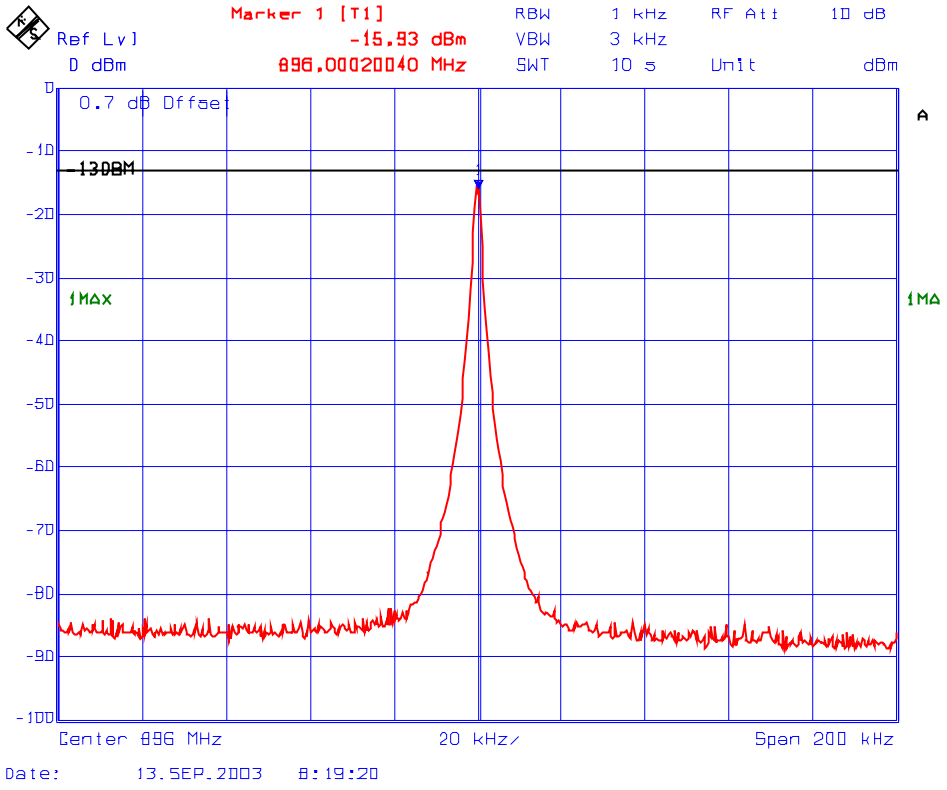
Frequency (MHz)	Number of In/Out Channels	Modulation	Maximum RF Input (conducted) (dBm)	Maximum RF Output (conducted) (dBm)
896	1	unmodulated	-40.0	-15.9
896,896.0125	2	unmodulated	-46.3	-23.2
896,896.0125,896.025	3	unmodulated	-49.6	-26.4
901	1	unmodulated	-40.0	-14.8
900.9875,901	2	unmodulated	-46.3	-21.9
900.975, 900.9875,901	3	unmodulated	-49.6	-25.1

Note :

(1) Refer to Plots # 19 to 24 for detailed measurements of RF Output power and Intermodulation.
(2) The RF Output form the EUT will be connected to the RF input port of the any FCC Certified head end unit. Therefore, the EIRP or ERP can not be evaluated in this report for FCC RF Exposure Compliance. The Head End Unit shall comply with FCC RF Exposure and Power Limit requirements under its own FCC Grant Notes.

Plot #19 RF Output Power with 1 RF signal input/output in 896 – 901 MHz

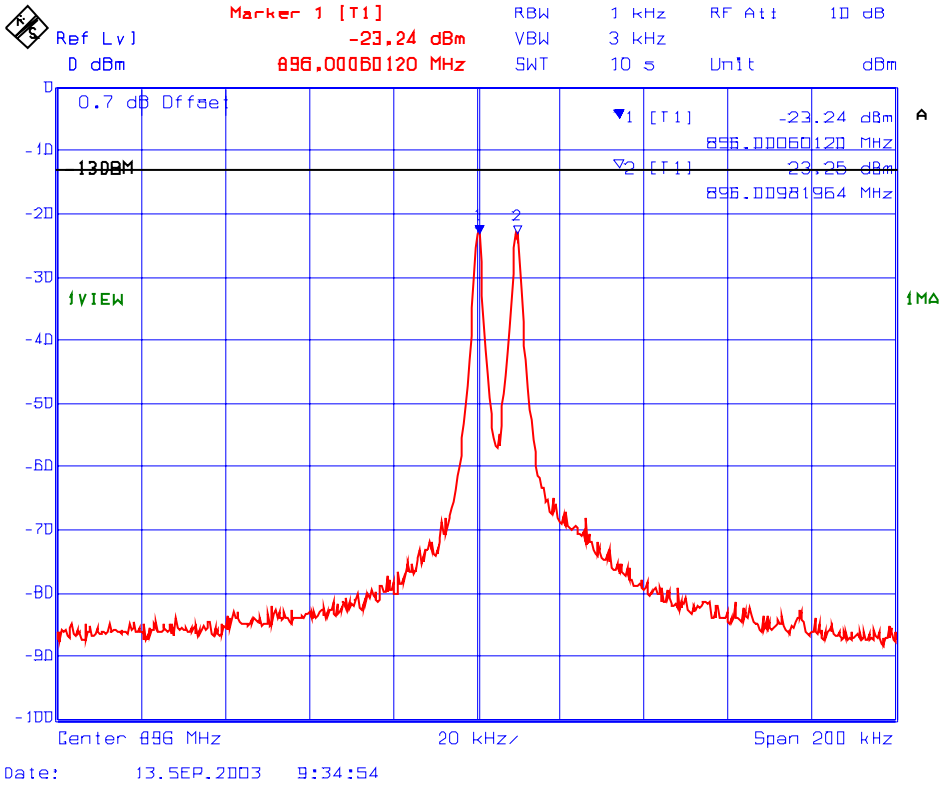
Fc: 896 MHz , RF Input: -40 dBm



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

Plot # 20 RF Output Power with 2 RF signal input/output in 896 – 901 MHz

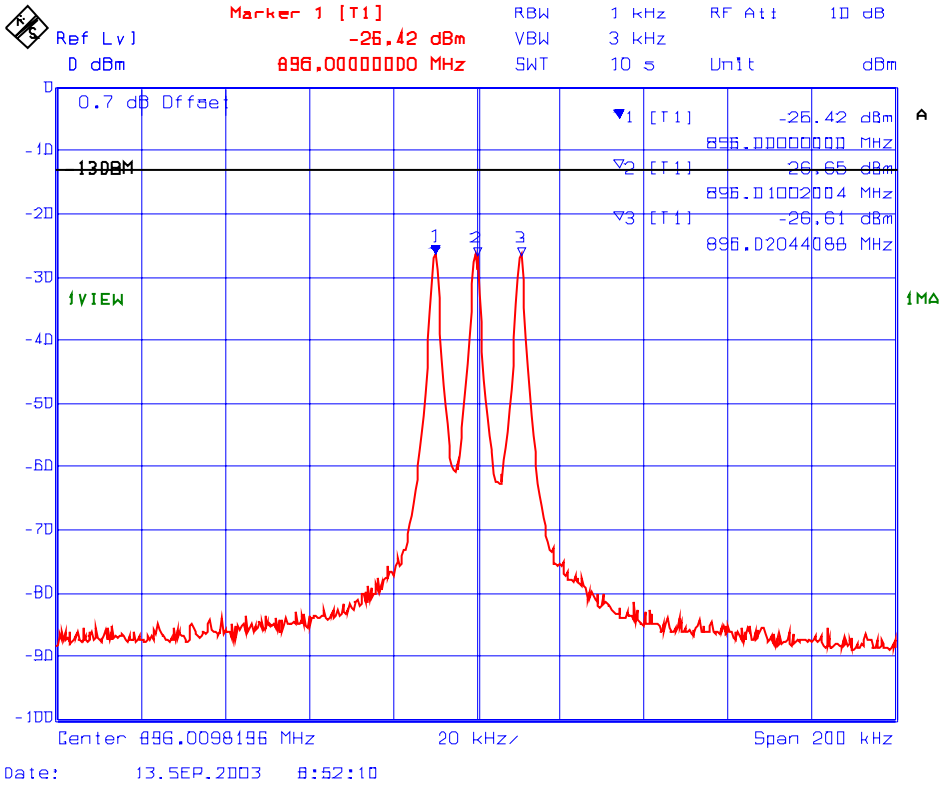
Fc: 896 MHz, Fc + 12.5 kHz
RF Input 1: -46.32 dBm, RF Input 2: -46.32 dBm



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

Plot #21 RF Output Power with 3 RF signal input/output in 896 – 901 MHz

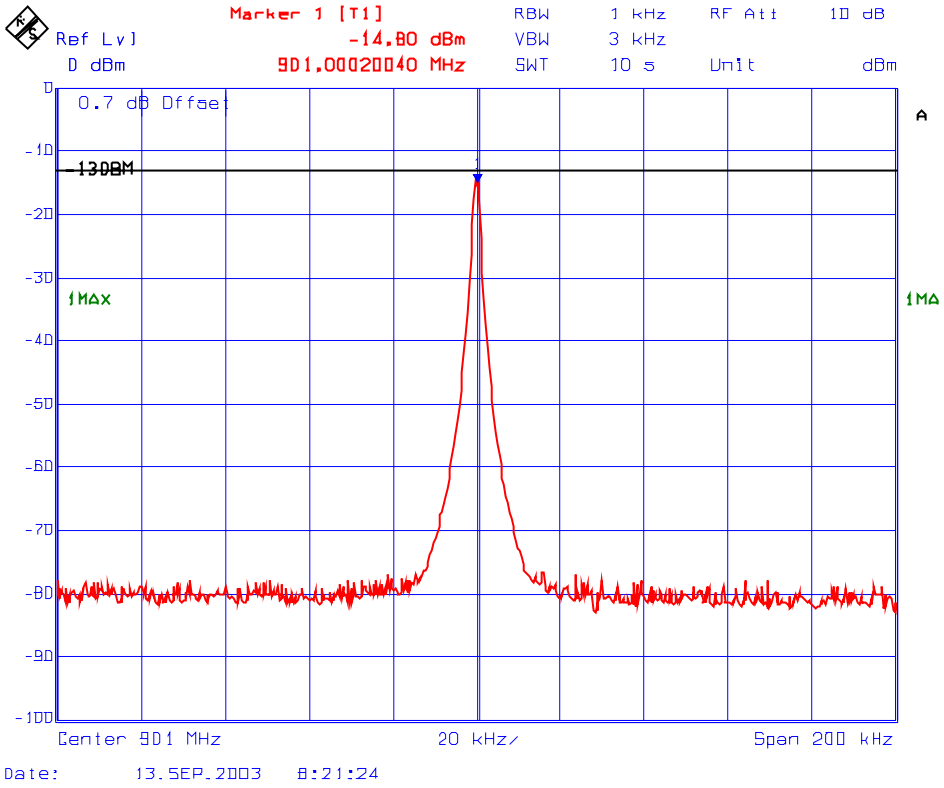
Fc: 896 MHz, Fc + 12.5 kHz, Fc + 25 kHz
RF Input 1: -49.60 dBm, RF Input 2: -49.60 dBm, RF Input 3: -49.60 dBm



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

Plot #22 RF Output Power with 1 RF signal input/output in 896 – 901 MHz

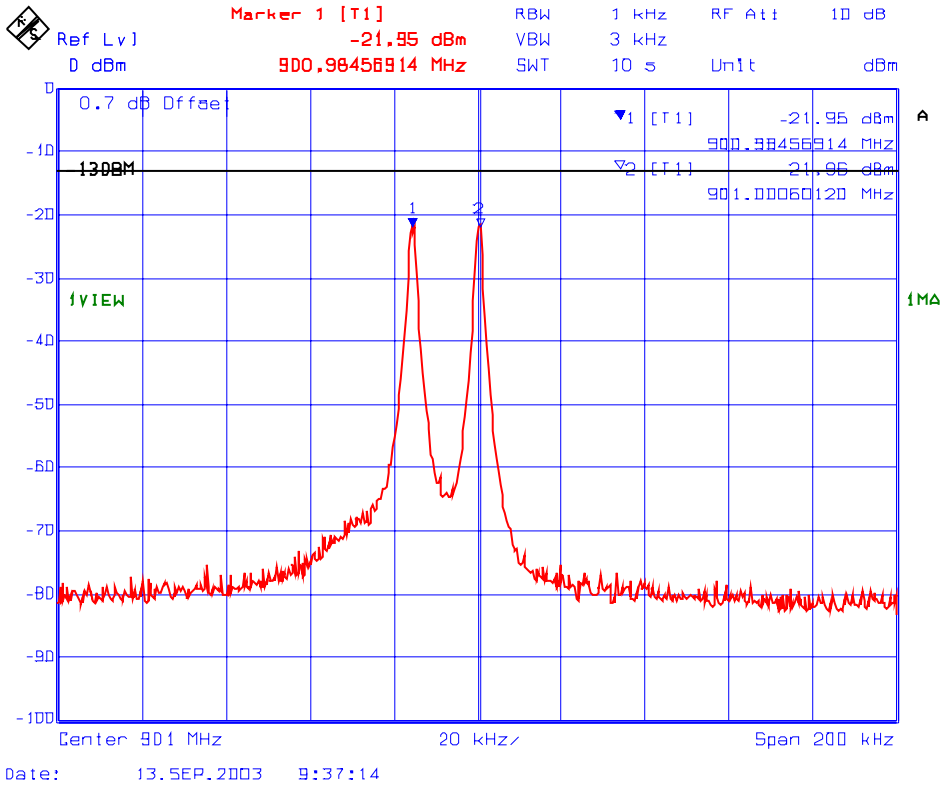
Fc: 901 MHz , RF Input: -40 dBm



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

Plot #23 RF Output Power with 2 RF signal input/output in 896 – 901 MHz

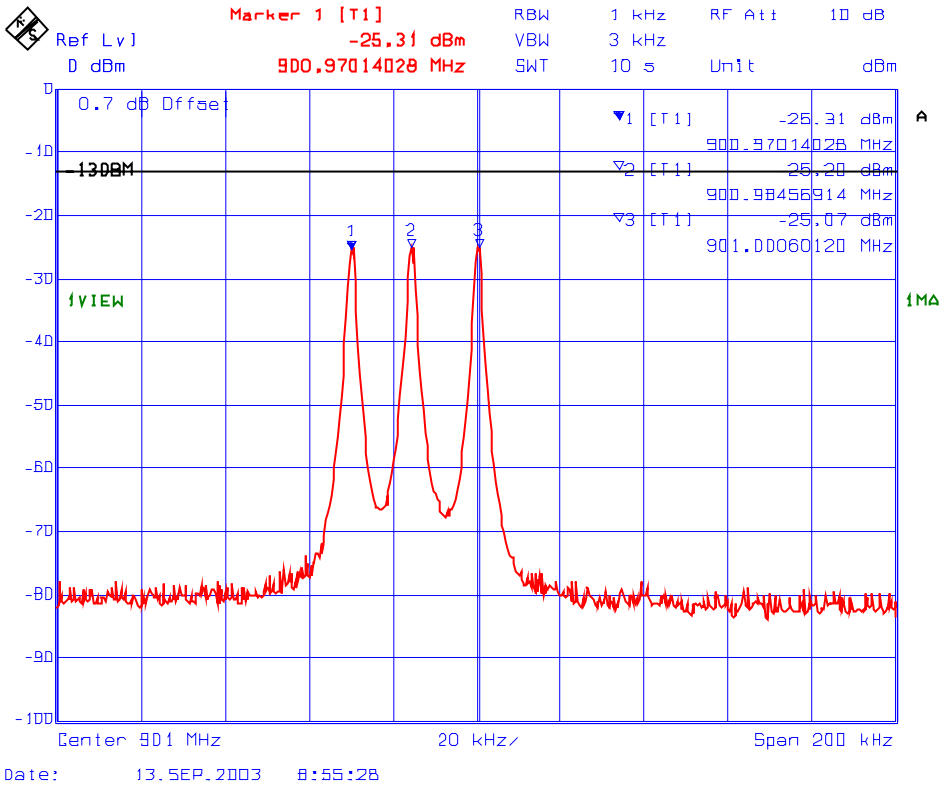
Fc: 901 MHz, Fc - 12.5 kHz
RF Input 1: -46.32 dBm, RF Input 2: -46.32 dBm



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

Plot #24 RF Output Power with 3 RF signal input/output in 896 – 901 MHz

Fc: 901 MHz, Fc - 12.5 kHz, Fc - 25 kHz
RF Input 1: -49.60 dBm, RF Input 2: -49.60 dBm, RF Input 3: -49.60 dBm



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

5.5.4.4. INTERMODULATION IN & PEAK ERP POWERS IN 1850 - 1910 MHz Band (PCS)

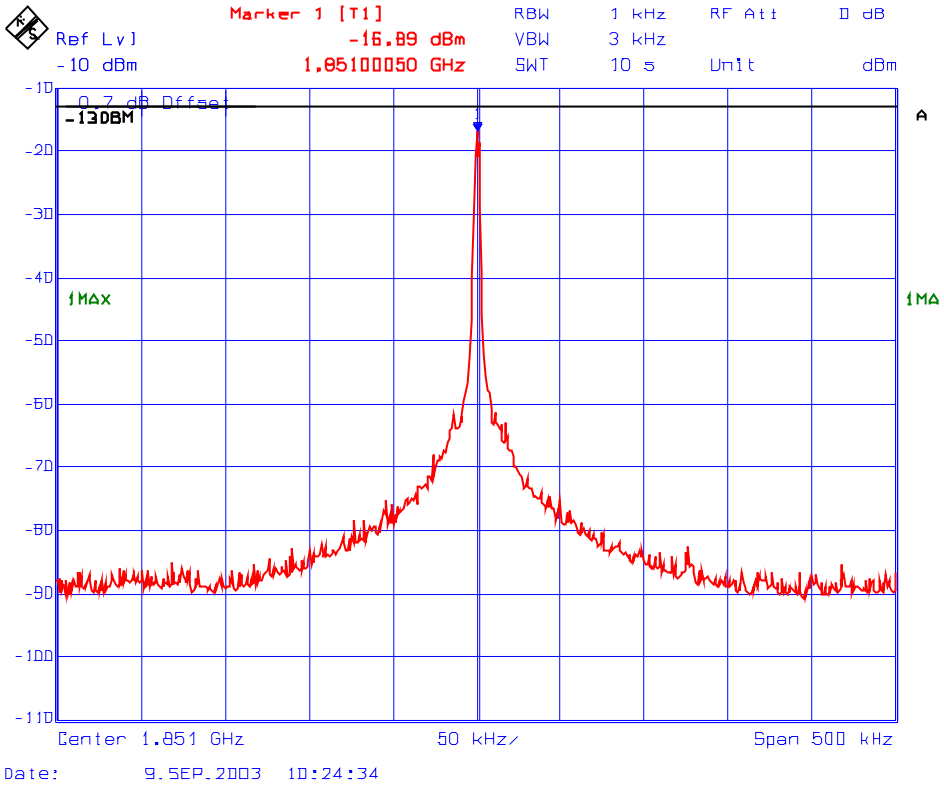
Frequency (MHz)	Number of In/Out Channels	Modulation	Maximum RF Input (conducted) (dBm)	Maximum RF Output (conducted) (dBm)
1851	1	No modulation	-40.0	-16.9
1851 & 1851.2	2	No modulation	-46.4	-23.7
1851, 1851.2 1851.4	3	No modulation	-49.5	-27.4
1880	1	No modulation	-40.0	-18.2
1880 & 1880.2	2	No modulation	-46.4	-25.0
1879.8, 1880 & 1880.2	3	No modulation	-49.5	-28.6
1909	1	No modulation	-40.0	-18.2
1908.8 & 1909	2	No modulation	-46.4	-24.5
1908.6, 1908.8 & 1909	3	No modulation	-49.5	-28.6

Note :

(1) Refer to Plots # 25 to 33 for detailed measurements of RF Output power and Intermodulation.
(2) The RF Output form the EUT will be connected to the RF input port of the any FCC Certified head end unit. Therefore, the EIRP or ERP can not be evaluated in this report for FCC RF Exposure Compliance. The Head End Unit shall comply with FCC RF Exposure and Power Limit requirements under its own FCC Grant Notes.

Plot #25 RF Output Power with 1 RF signal input/output in 1850 – 1910 MHz

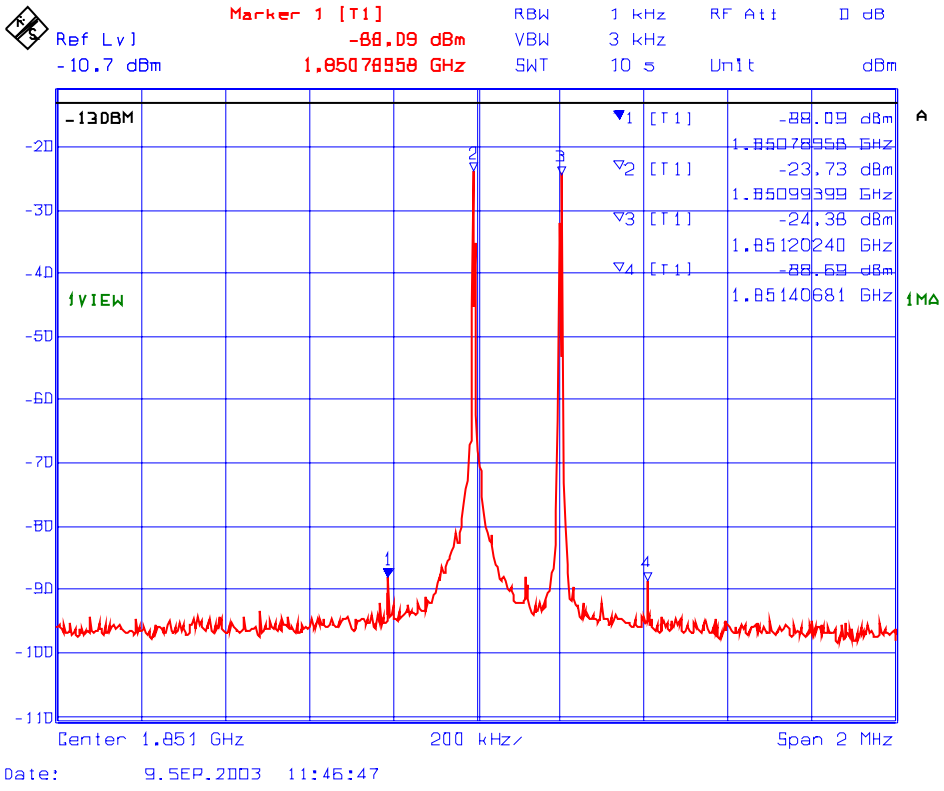
Fc: 1851 MHz , RF Input: -40 dBm



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

Plot #26 RF Output Power with 2 RF signal input/output in 1850 – 1910 MHz

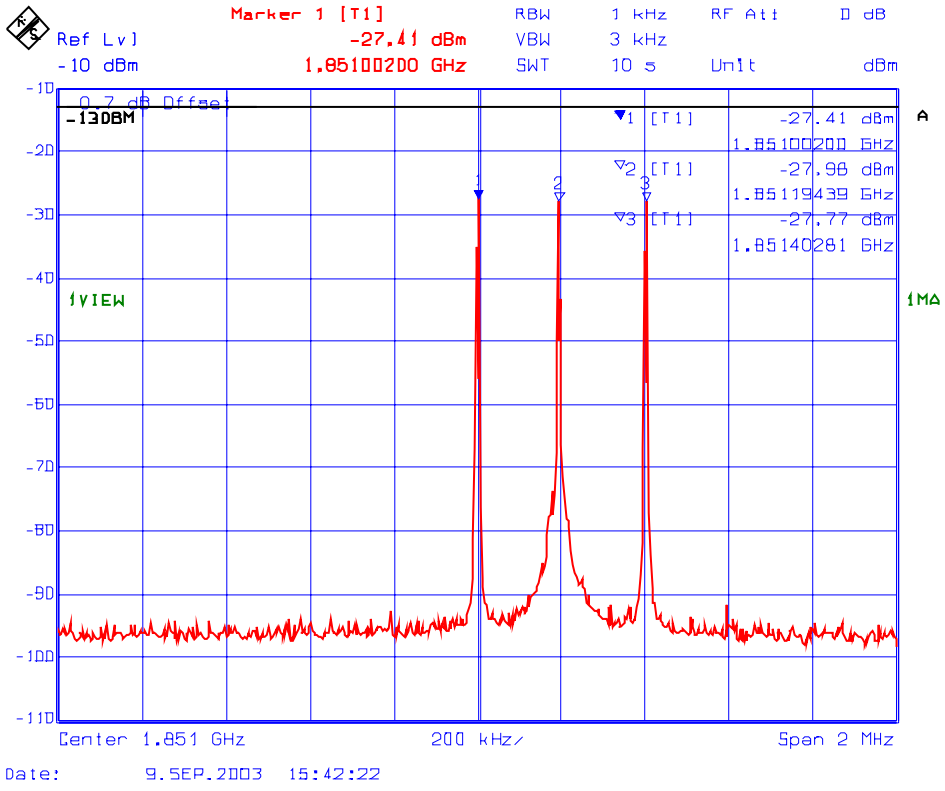
Fc: 1851 MHz, Fc + 200 kHz
RF Input 1: -46.40 dBm, RF Input 2: -46.40 dBm



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

Plot #27 RF Output Power with 3 RF signal input/output in 1850 – 1910 MHz

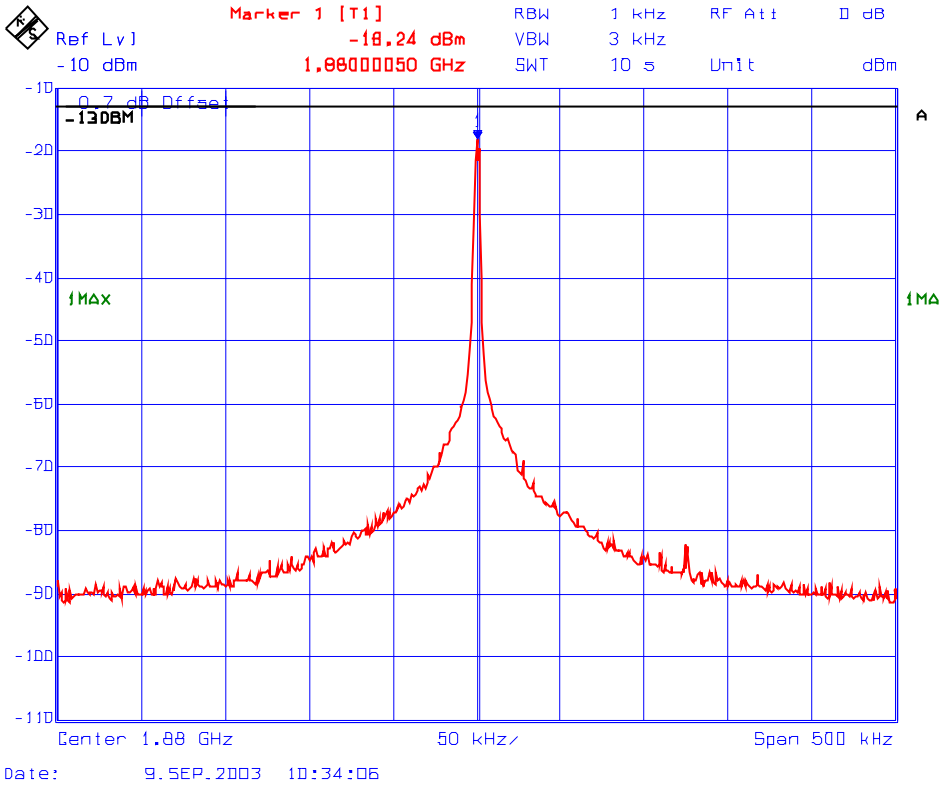
Fc: 1851 MHz, Fc + 200 kHz, Fc + 400 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



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

Plot #28 RF Output Power with 1 RF signal input/output in 1850 – 1910 MHz

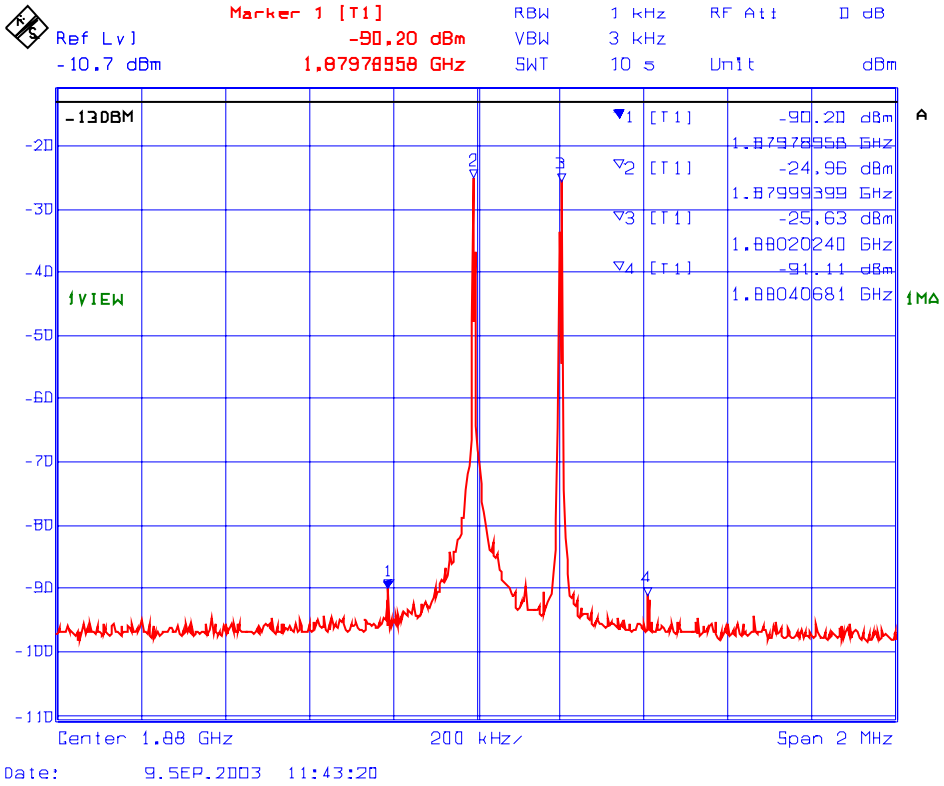
Fc: 1880 MHz , RF Input: -40 dBm



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

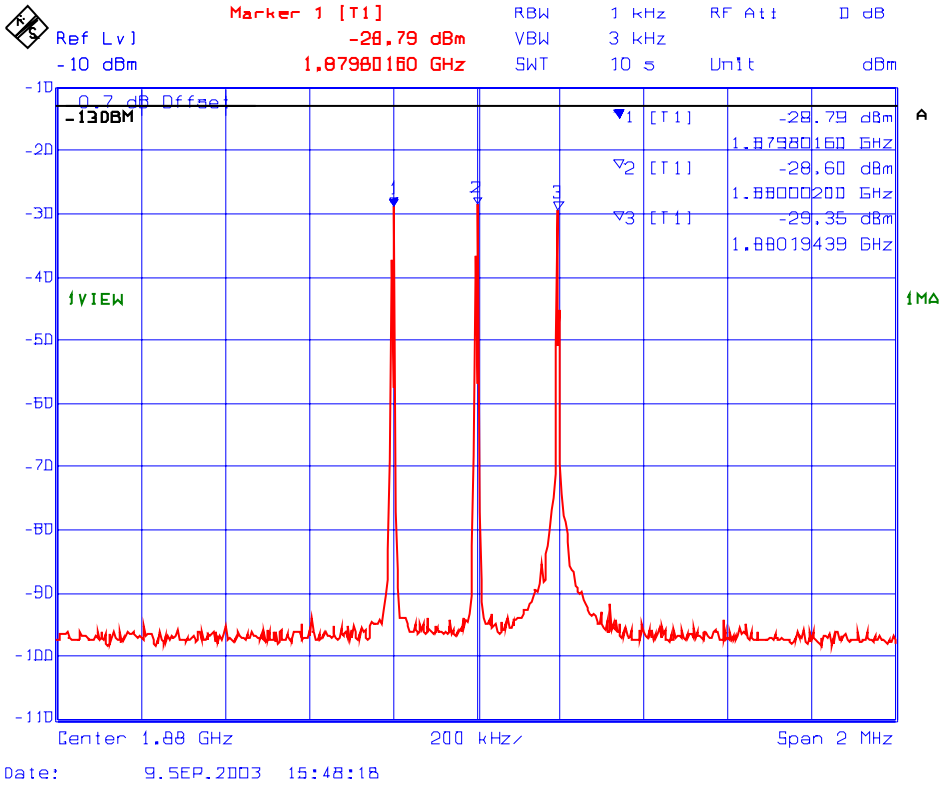
Plot #29 RF Output Power with 2 RF signal input/output in 1850 – 1910 MHz

Fc: 1880 MHz, Fc + 200 kHz
RF Input 1: -46.40 dBm, RF Input 2: -46.40 dBm



Plot #30 RF Output Power with 3 RF signal input/output in 1850 – 1910 MHz

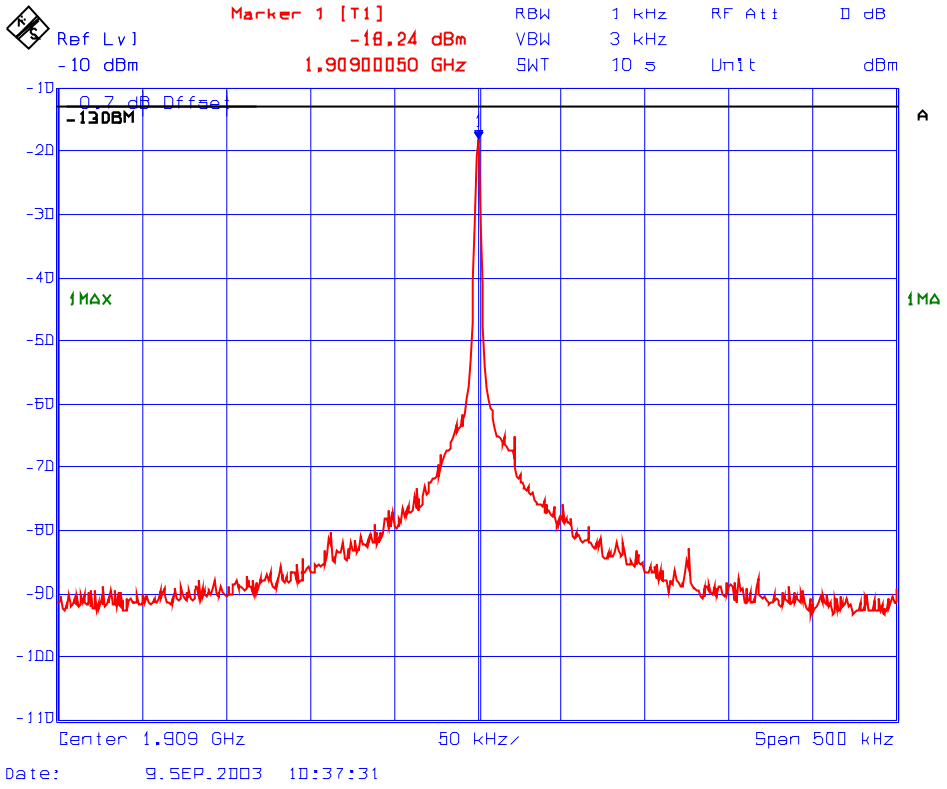
Fc: 1880 MHz, Fc + 200 kHz, Fc – 200 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



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

Plot #31 RF Output Power with 1 RF signal input/output in 1850 – 1910 MHz

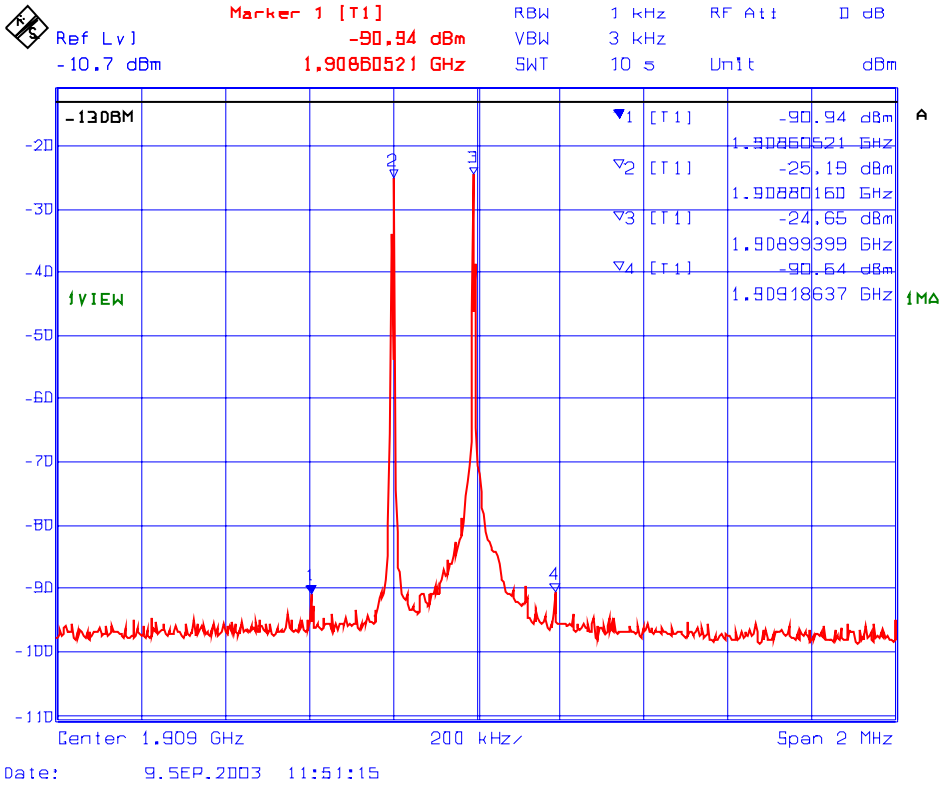
Fc: 1909 MHz , RF Input: -40 dBm



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

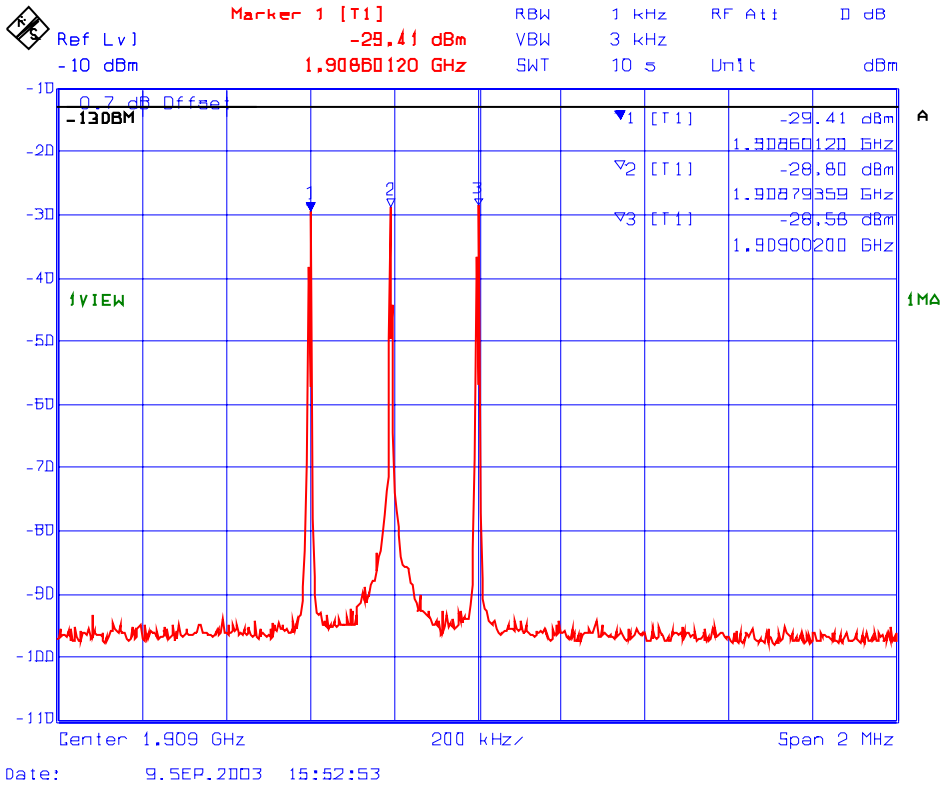
Plot #32 RF Output Power with 2 RF signal input/output in 1850 – 1910 MHz

Fc: 1909 MHz, Fc - 200 kHz
RF Input 1: -46.40 dBm, RF Input 2: -46.40 dBm



Plot #33 RF Output Power with 3 RF signal input/output in 1850 – 1910 MHz

Fc: 1909 MHz, Fc - 200 kHz, Fc - 400 kHz
RF Input 1: -49.50 dBm, RF Input 2: -49.50 dBm, RF Input 3: -49.50 dBm



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

5.6. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

The RF Output form the EUT will be connected to the RF input port of the any FCC Certified head end unit. Therefore, the EIRP or ERP can not be evaluated in this report for FCC RF Exposure Compliance. The Head End Unit shall comply with FCC RF Exposure and Power Limit requirements under its own FCC Grant Notes

5.7. FREQUENCY STABILITY @ FCC 2.1055, 22.101(A), 24.235 & 90.213

5.7.1. Limits

* **Please refer to FCC CFR 47, Part 22, Subpart H, Sec. 22.101(a)**

FREQUENCY RANGE (MHz)	FREQUENCY TOLERANCE (ppm)
824-849 (Mobile)	±1.5

* **Please refer to FCC CFR 47, Part 24, Subpart E, Sec. 24.235**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

* **Please refer to FCC CFR 47, Part 90, Subpart I, Para. 90.213**

FREQUENCY RANGE (MHz)	MOBILE STATIONS (ppm)
806-821	2.5
821-824	1.5
896-901	1.5

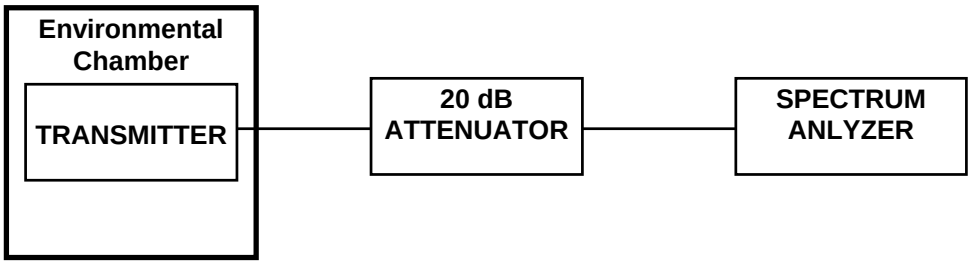
5.7.2. Method of Measurements

Refer to Exhibit 7, § 7.3 of this report for measurement details

5.7.3. 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

5.7.4. Test Arrangement



5.7.5. Test Data

5.7.5.1. Frequency Stability in 806-824 MHz Band

Center Frequency:	806 MHz
Full Power Level:	-7.7 dBm
Frequency Tolerance Limit:	±2.5 ppm
Max. Frequency Tolerance Measured:	±0 ppm
Input Voltage Rating:	120VAC, 60Hz

CENTER FREQUENCY & RF POWER OUTPUT VARIATION

Ambient Temperature (°C)	Supply Voltage (Nominal) 120 Volts	Supply Voltage (85% of Nominal) 102 Volts	Supply Voltage (115% of Nominal) 138 Volts
	Hz	Hz	Hz
-30	0	0	0
-20	0	0	0
-10	0	0	0
0	0	0	0
+10	0	0	0
+20	0	0	0
+30	0	0	0
+40	0	0	0
+50	0	0	0

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

5.7.5.2. Frequency Stability in 824-849 MHz Band

Center Frequency:	824 MHz
Full Power Level:	-10.2 dBm
Frequency Tolerance Limit:	±1.5 ppm
Max. Frequency Tolerance Measured:	±0 ppm
Input Voltage Rating:	120VAC, 60Hz

CENTER FREQUENCY & RF POWER OUTPUT VARIATION

Ambient Temperature (°C)	Supply Voltage (Nominal) 120 Volts	Supply Voltage (85% of Nominal) 102 Volts	Supply Voltage (115% of Nominal) 138 Volts
	Hz	Hz	Hz
-30	0	0	0
-20	0	0	0
-10	0	0	0
0	0	0	0
+10	0	0	0
+20	0	0	0
+30	0	0	0
+40	0	0	0
+50	0	0	0

5.7.5.3. Frequency Stability in 896-901 MHz Band

Center Frequency:	896 MHz
Full Power Level:	-14.4 dBm
Frequency Tolerance Limit:	±1.5 ppm
Max. Frequency Tolerance Measured:	± 0 ppm
Input Voltage Rating:	120VAC, 60Hz

CENTER FREQUENCY & RF POWER OUTPUT VARIATION

Ambient Temperature (^{o}C)	**Supply Voltage (Nominal) 120 Volts**	**Supply Voltage (85% of Nominal) 102 Volts**	**Supply Voltage (115% of Nominal) 138 Volts**
	Hz	**Hz**	**Hz**
-30	0	0	0
-20	0	0	0
-10	0	0	0
0	0	0	0
+10	0	0	0
+20	0	0	0
+30	0	0	0
+40	0	0	0
+50	0	0	0

5.7.5.4. Frequency Stability in 1850-1910 MHz Band

Center Frequency:	1850 MHz
Full Power Level:	-17.57 dBm
Frequency Tolerance Limit:	0.1 ppm
Max. Frequency Tolerance Measured:	Stay within permitted bands
Input Voltage Rating:	120VAC, 60Hz

CENTER FREQUENCY & RF POWER OUTPUT VARIATION

Ambient Temperature (^{o}C)	Supply Voltage (Nominal) Volts Hz	Supply Voltage (85% of Nominal) Volts Hz	Supply Voltage (115% of Nominal) Volts Hz
-30	0	0	0
-20	0	0	0
-10	0	0	0
0	0	0	0
+10	0	0	0
+20	0	0	0
+30	0	0	0
+40	0	0	0
+50	0	0	0

5.8. OCCUPIED BANDWIDTH & AMPLIFIER GAIN BANDPASS @ FCC 2.1049 & 90.209

5.8.1. Limits

FCC 90.209:

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
806-821	25.0	20
821-824	12.5	20
896-901	12.5	13.6

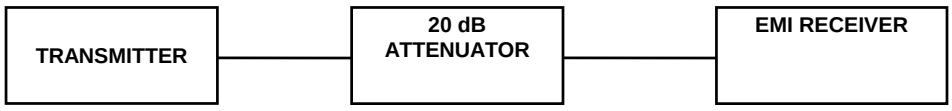
5.8.2. Method of Measurements

Refer to Exhibit 7, § 7.4 of this report for measurement details

5.8.3. 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

5.8.4. Test Arrangement



5.8.5. Test Data

Remark: Tests were performed on the RF Input and RF Output Signals for comparison purpose. The RF input signals from the signal generator are the same at all frequencies; therefore only 1 rf input signal plot is provided for review.

5.8.5.1. 20 dB Bandwidth and Gain of the Amplifier (806-824 MHz)

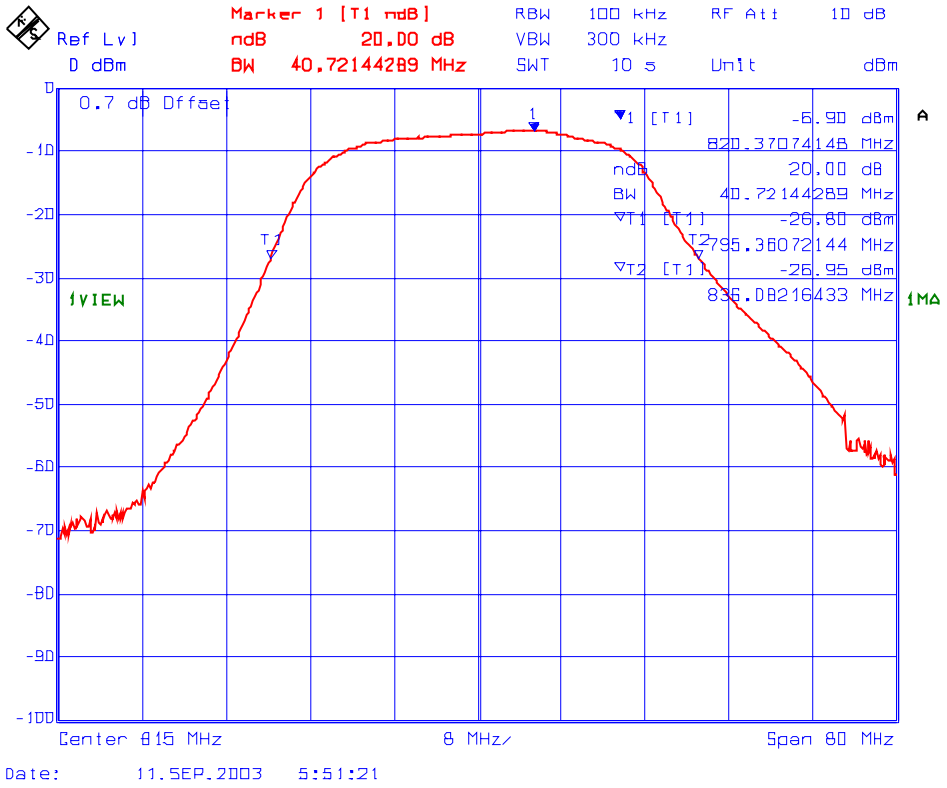
Refer to Plot # 34 for detailed measurements of 20 dB and maximum gain of the Amplifier

5.8.5.2. 99% Occupied Bandwidth(806-824 MHz)

Frequency (MHz)	Channel Spacing (kHz)	Modulation	Measured 99% OBW of RF Input Signal (kHz)	Measured 99% OBW of RF Output Signal (kHz)	Recommended 99% OBW (kHz)
806.0	25	FM Voice	15.75	15.75	20
813.5	25	FM Voice	15.75	15.75	20
821.0	25	FM Voice	15.75	15.75	20
▪ Refer to Plots 35 to 38 below for the details of the above measurements					
806.0	25	FM Data	20.32	20.62	20
813.5	25	FM Data	20.32	20.74	20
821.0	25	FM Data	20.32	20.50	20
▪ Refer to Plots 39 to 42 below for the details of the above measurements					
821.0	12.5	FM Voice	10.46	10.46	20
822.5	12.5	FM Voice	10.46	10.46	20
824.0	12.5	FM Voice	10.46	10.50	20
▪ Refer to Plots 43 to 46 below for the details of the above measurements					
821.0	12.5	FM Data	11.98	12.02	20
822.5	12.5	FM Data	11.98	12.02	20
824.0	12.5	FM Data	11.98	11.78	20
▪ Refer to Plots 47 to 50 below for the details of the above measurements					

Plot # 34 : 20 dB BW of the 806 - 824 MHz band pass gain

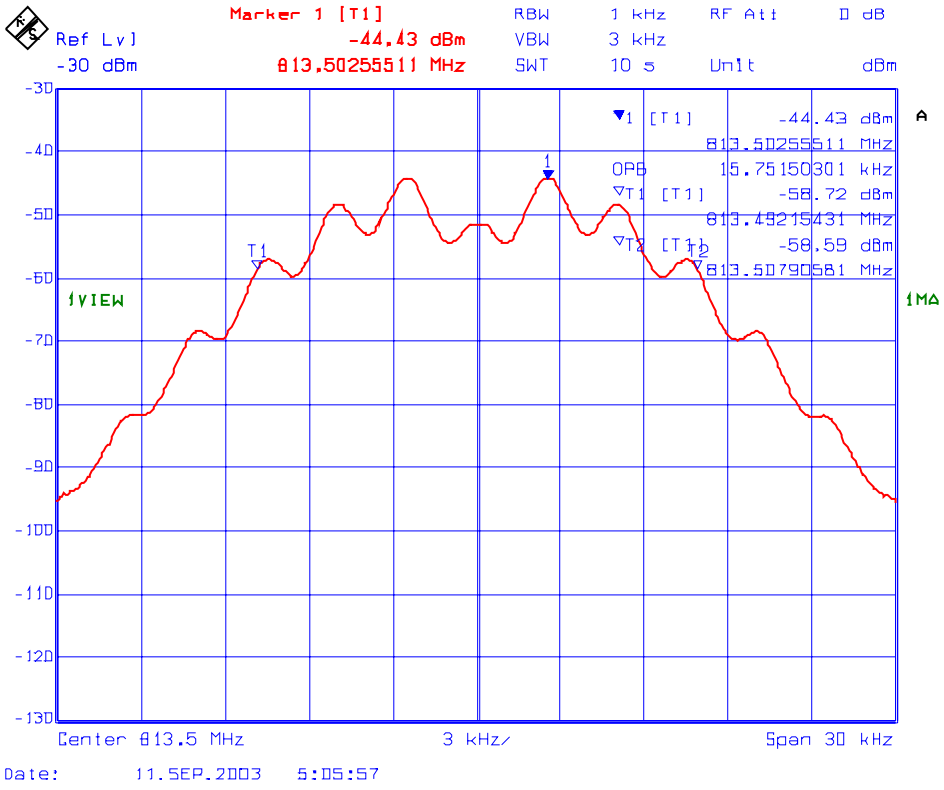
RF Input: -40 dBm from 750 –850 MHz
MAX. GAIN: 33.1 dB



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

Plot # 35 : 99% OBW, RF Input Signal

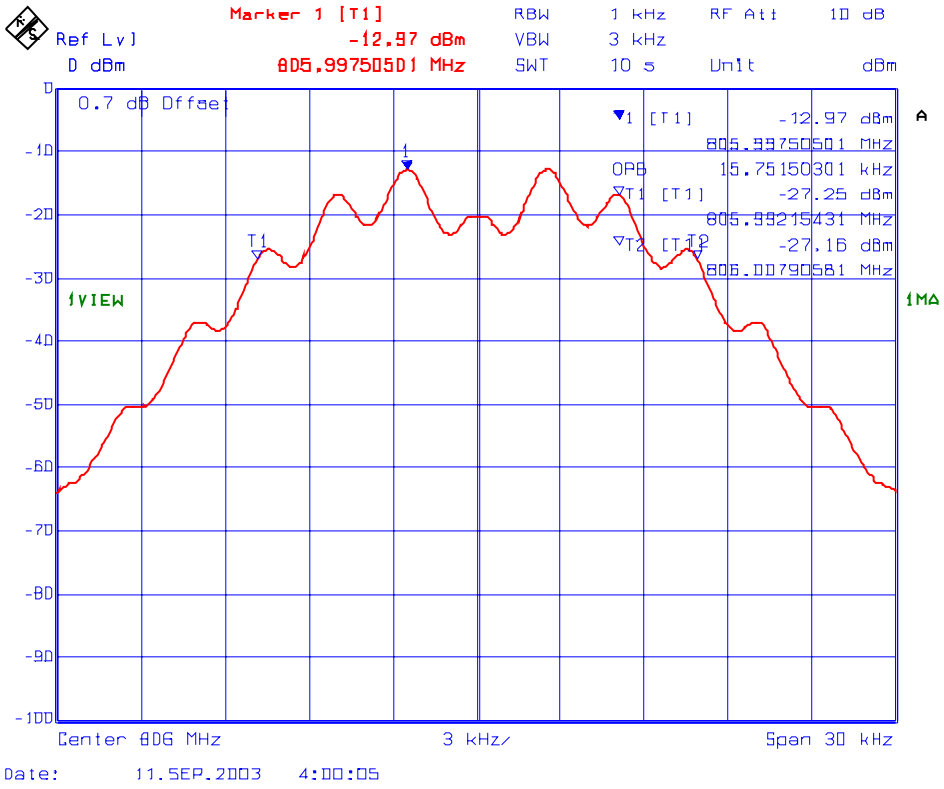
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 36 : 99% OBW, RF Output

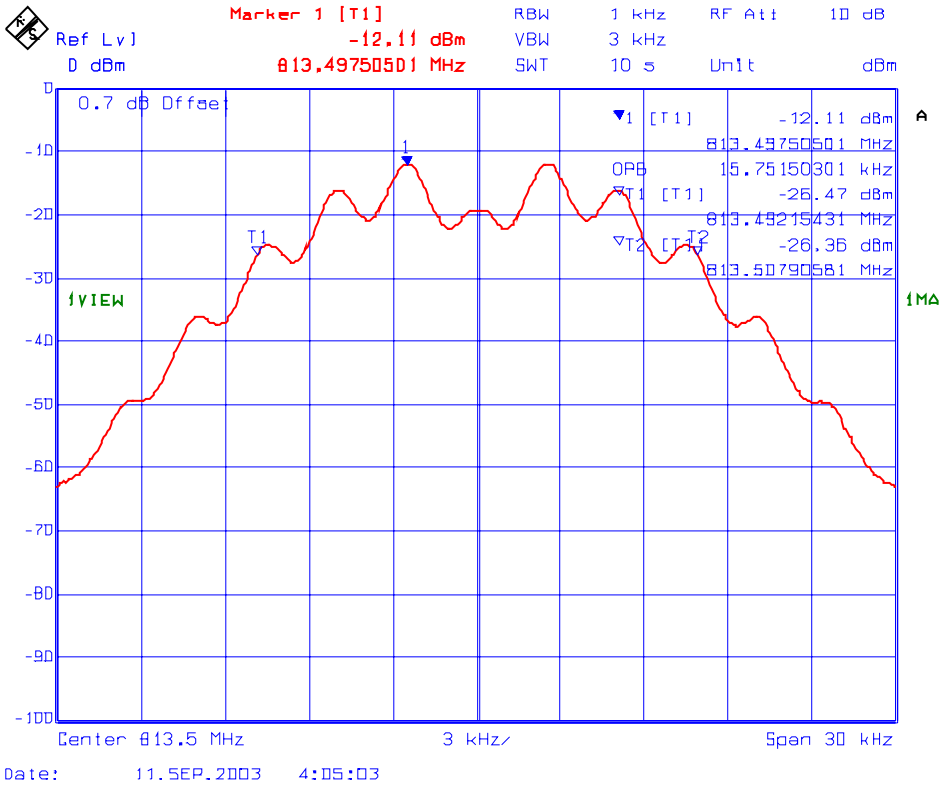
Frequency: 806 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 37 : 99% OBW, RF Output

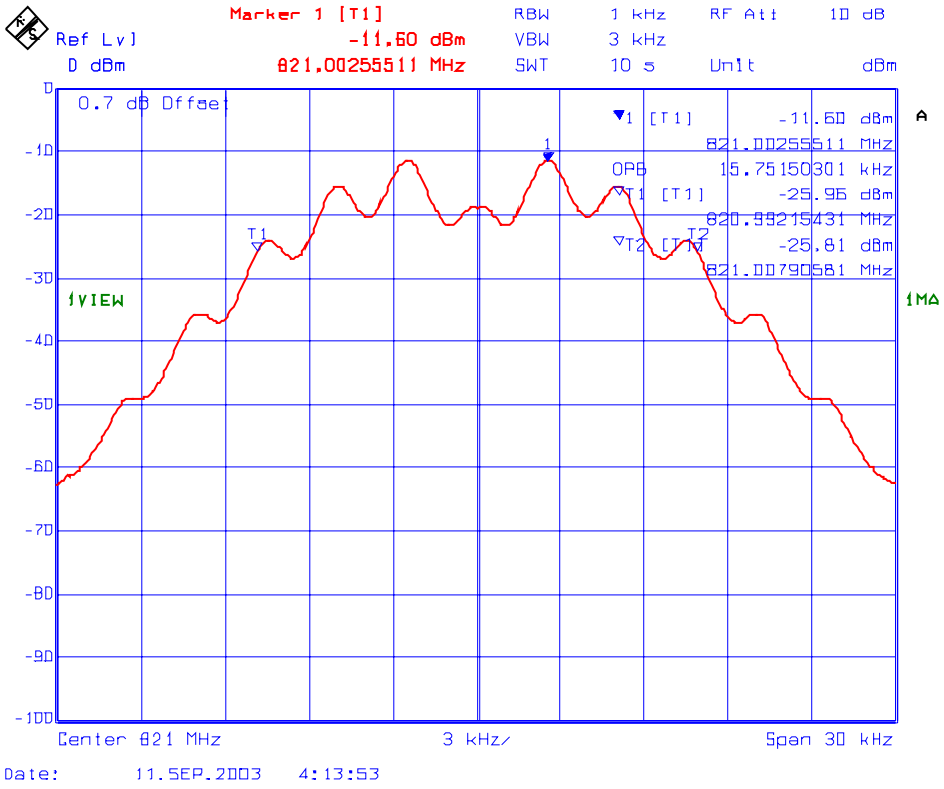
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

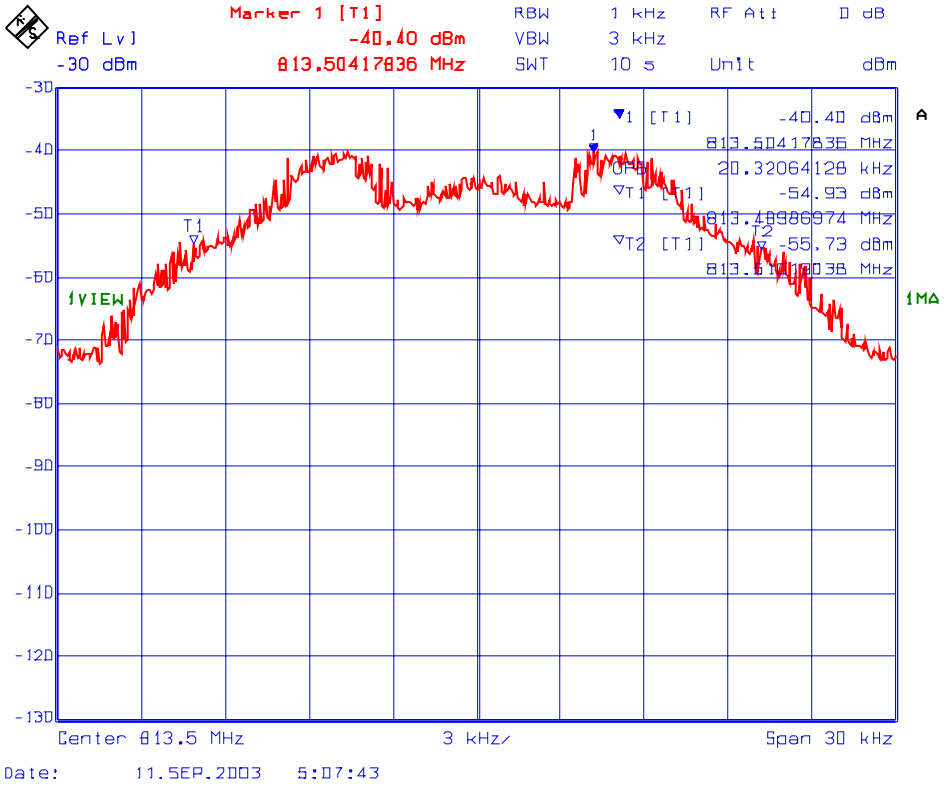
Plot # 38 : 99% OBW, RF Output

Frequency: 821 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



Plot # 39 : 99% OBW, RF Input

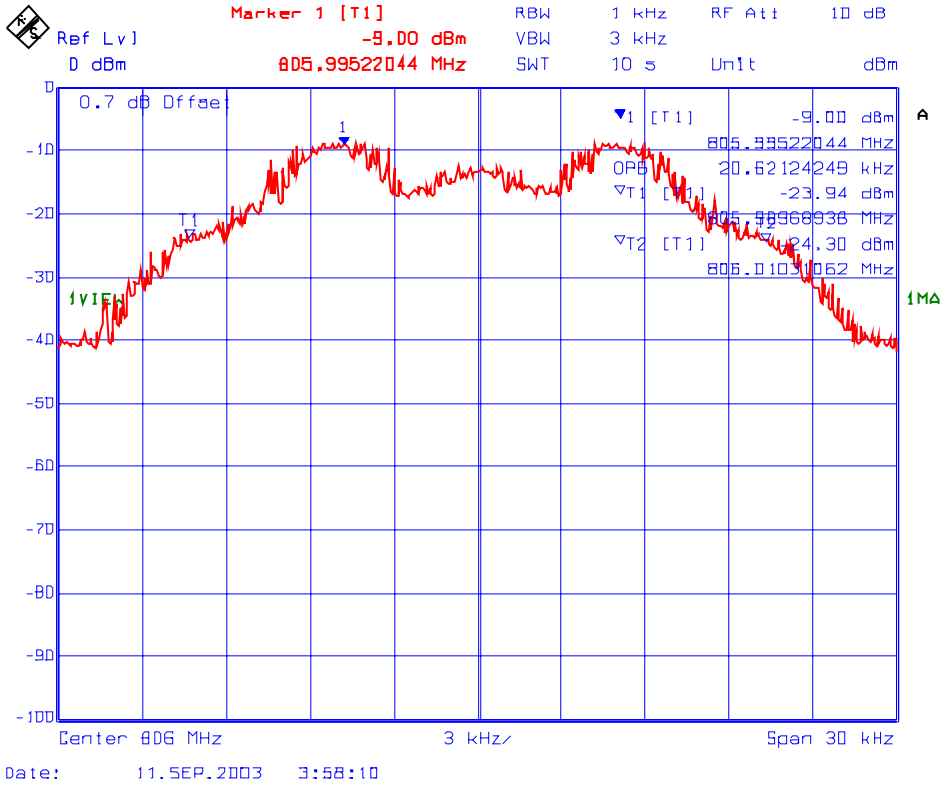
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 40 : 99% OBW, RF Output

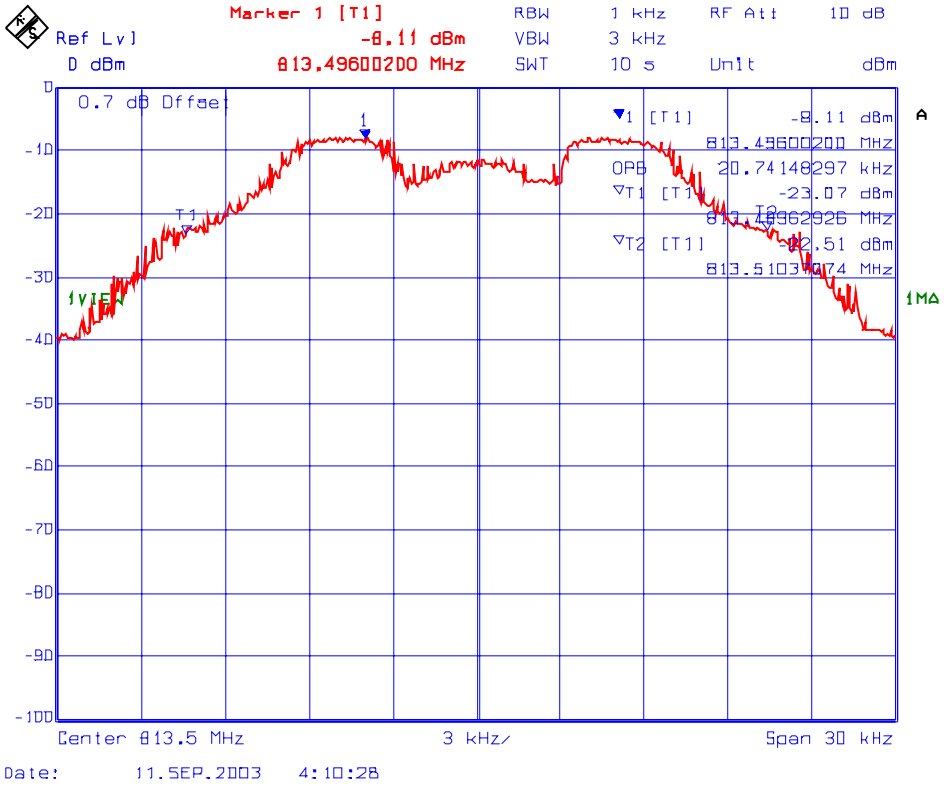
Frequency: 806 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 41 : 99% OBW, RF Output

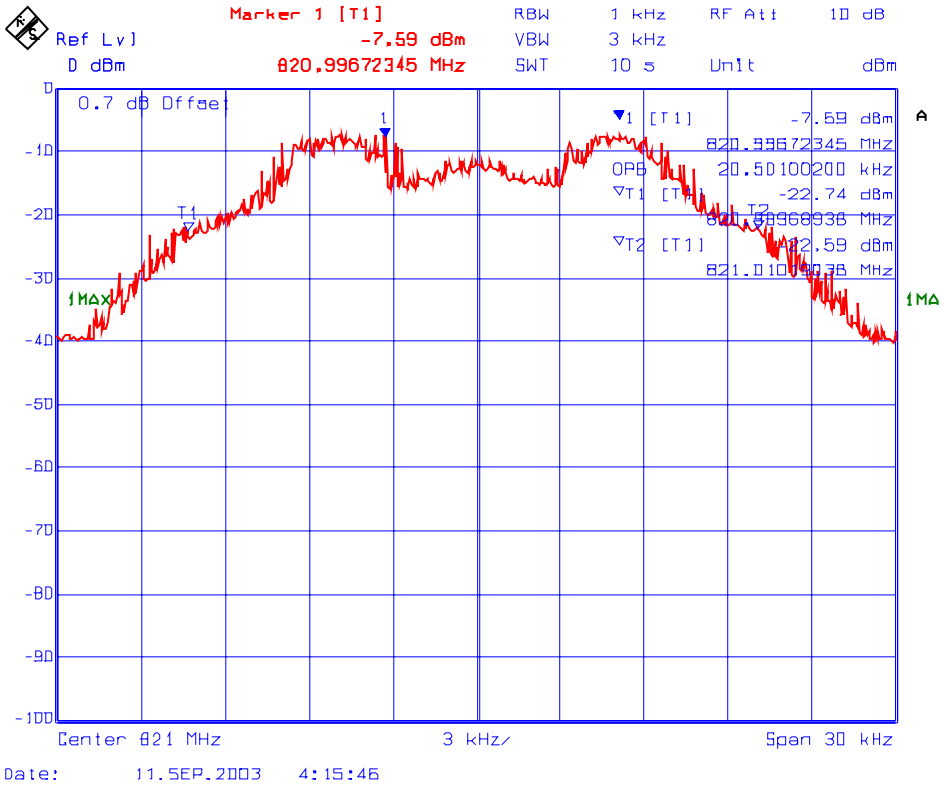
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 42 : 99% OBW, RF Output

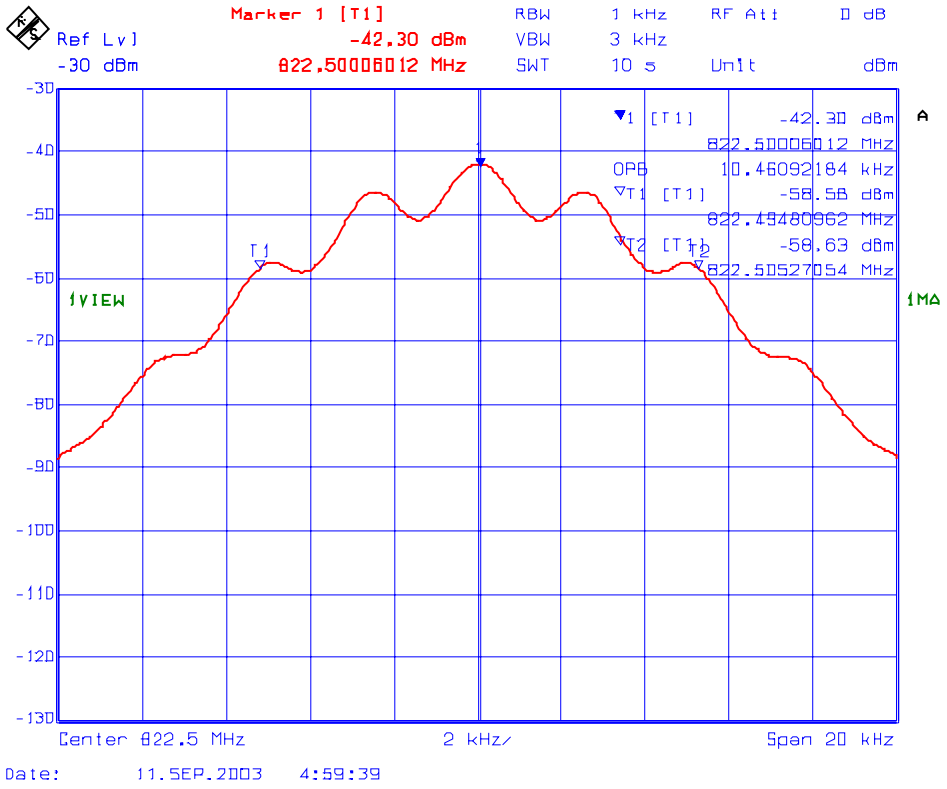
Frequency: 821 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 43 : 99% OBW, RF Input

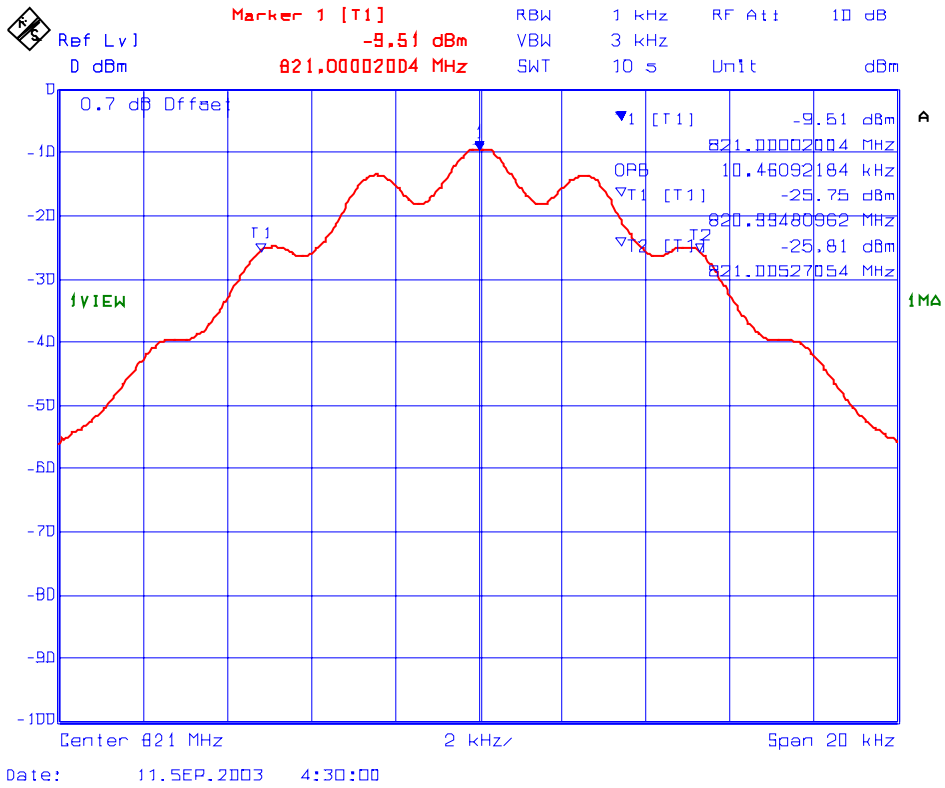
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 44 : 99% OBW, RF Output

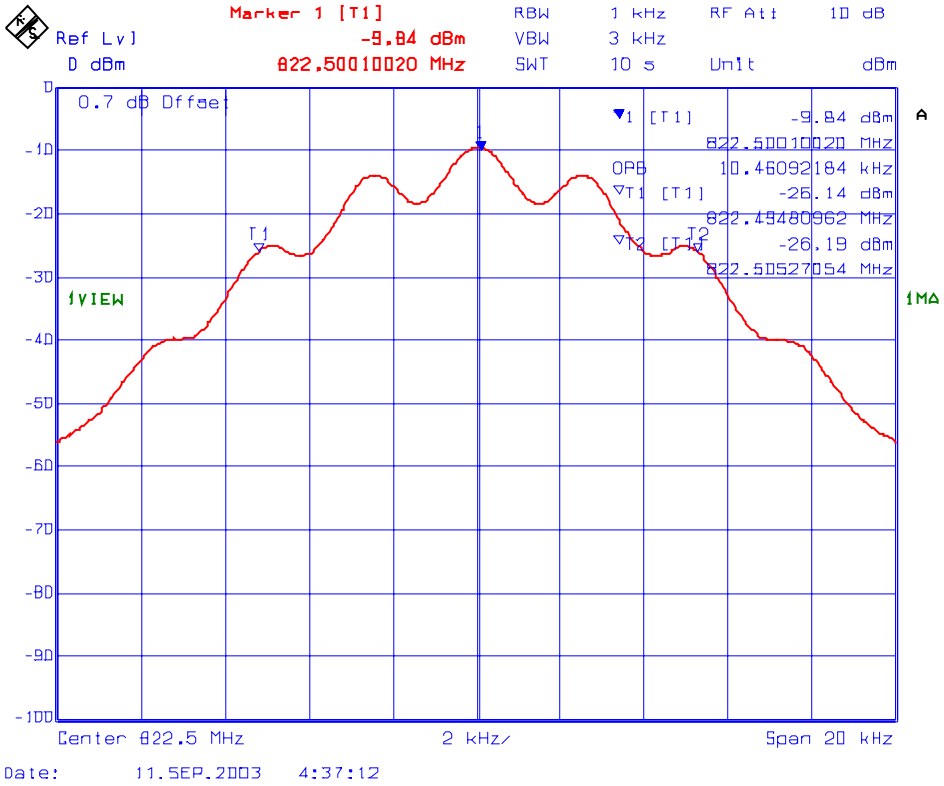
Frequency: 821 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 45 : 99% OBW, RF Output

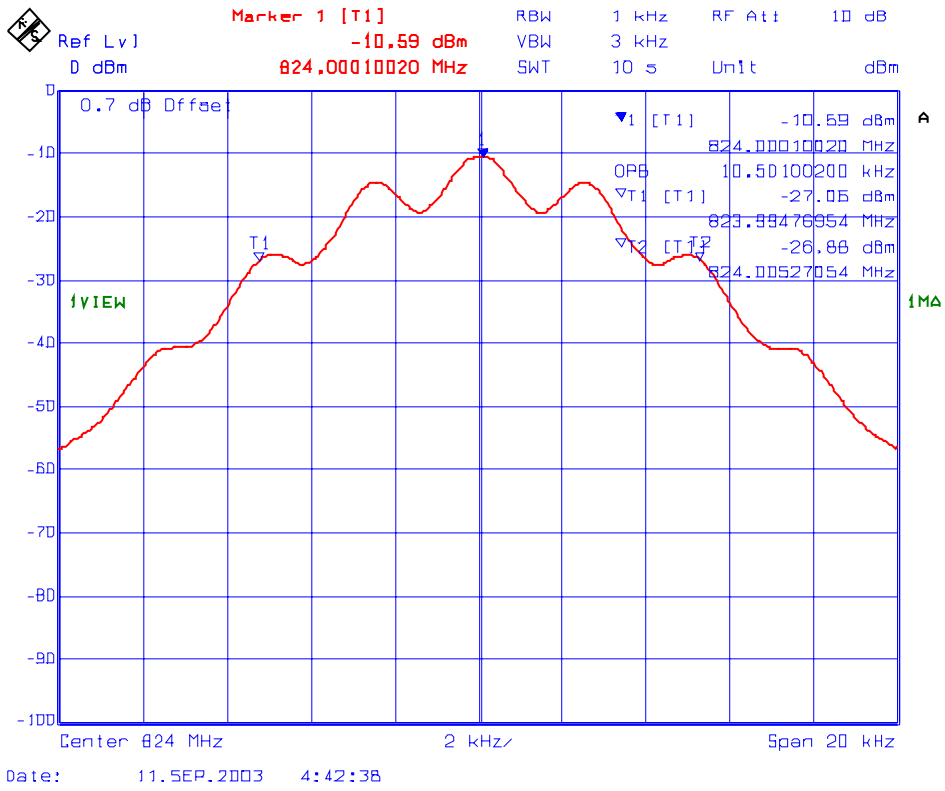
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 46 : 99% OBW, RF Output

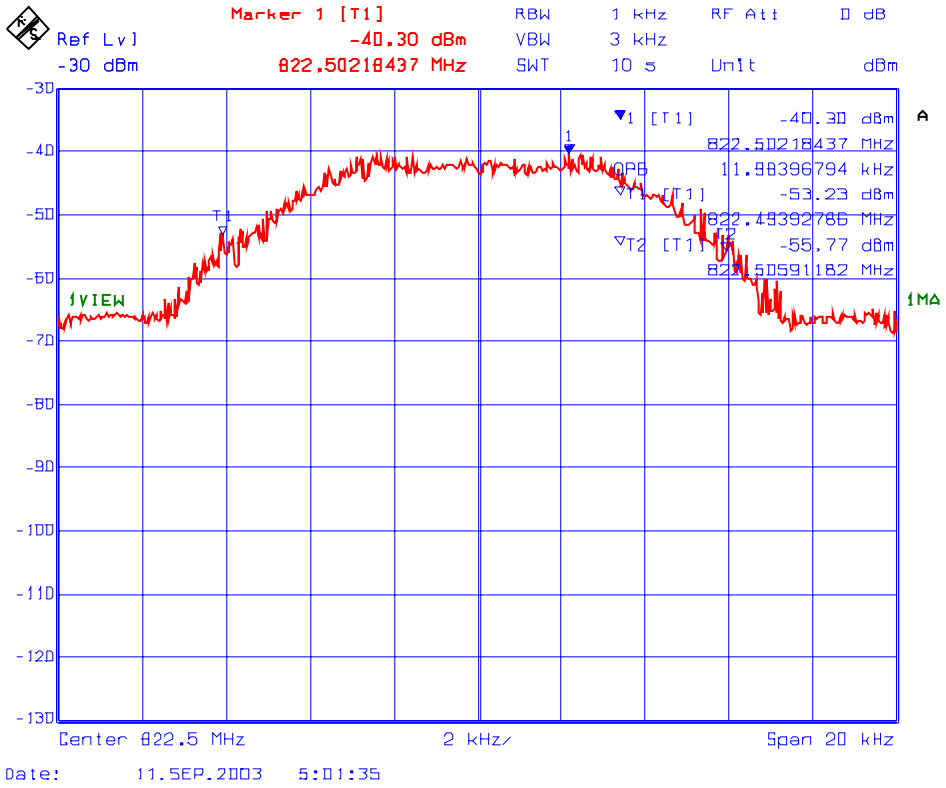
Frequency: 824 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 47 : 99% OBW, RF Input

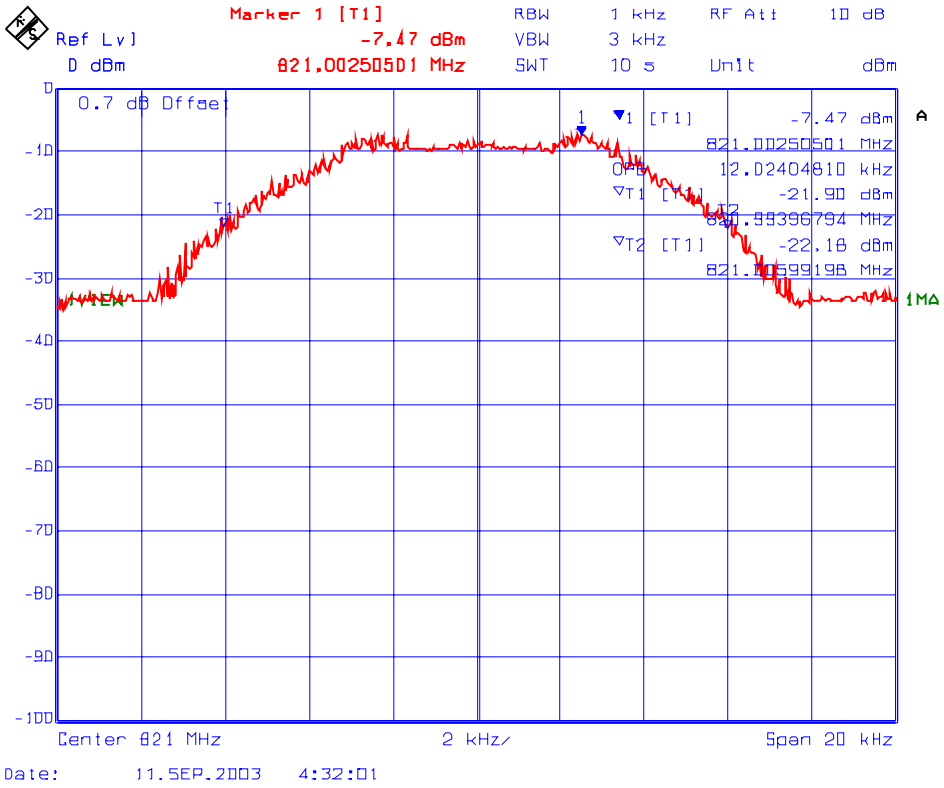
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 48 : 99% OBW, RF Output

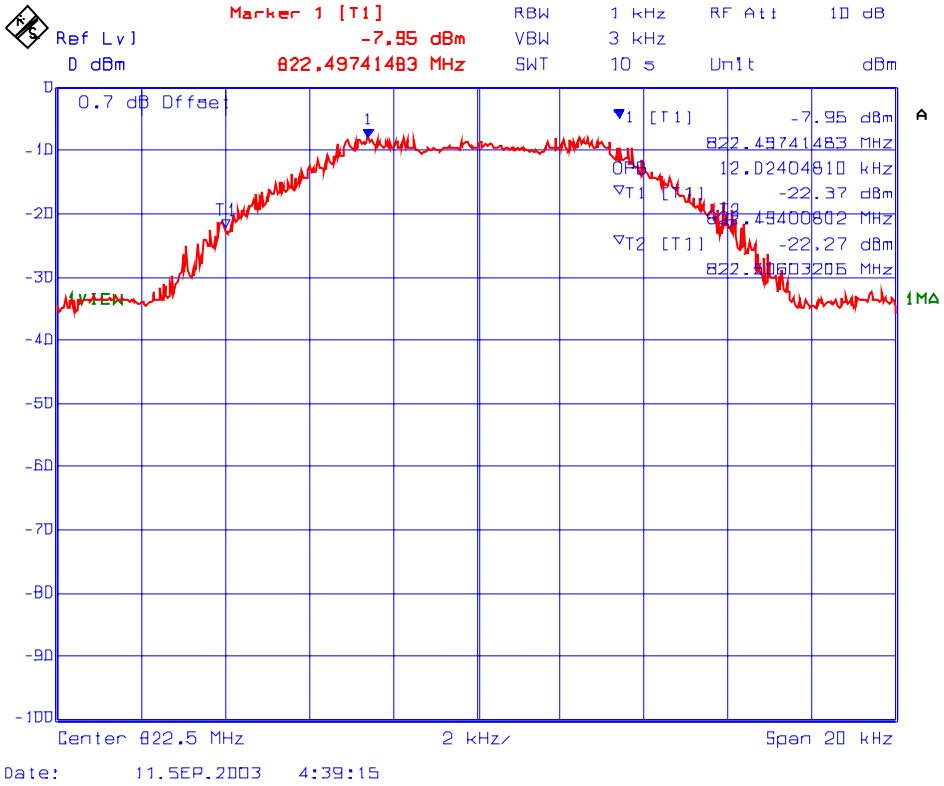
Frequency: 821 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 49 : 99% OBW, RF Output

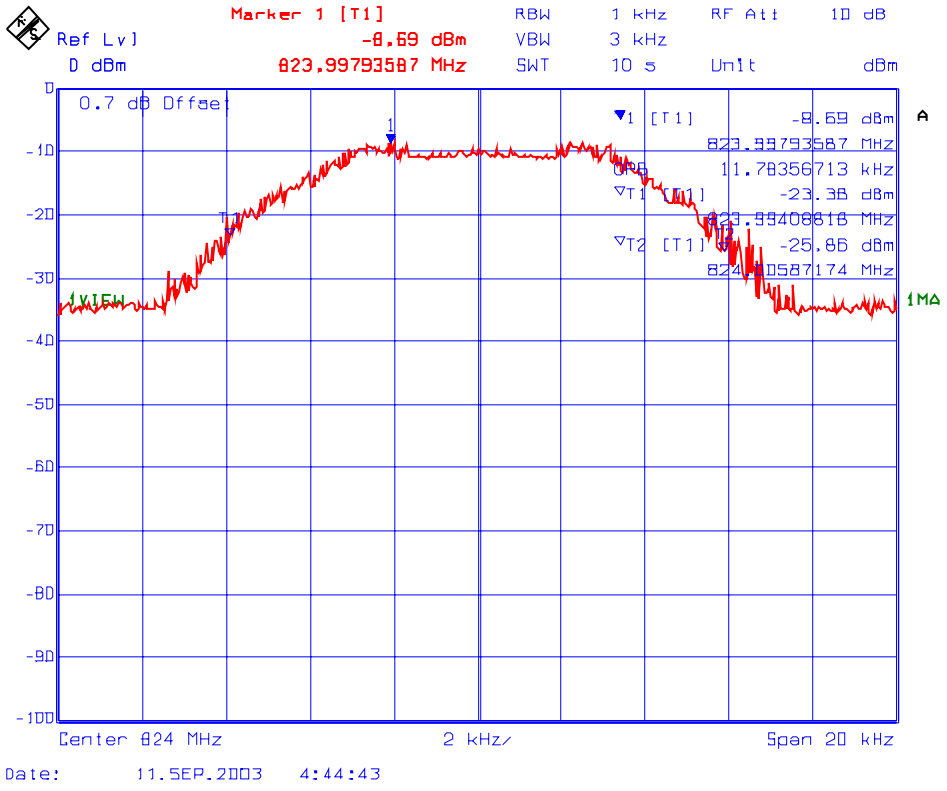
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 50 : 99% OBW, RF Output

Frequency: 824 MHz, 12.5 kHz Channel Spacing
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)*

Remark: Since the device under test is an amplifier, the comparison test of RF input and output signals are conducted for compliance with FCC Rules.

5.8.5.3. 20 dB Bandwidth and Gain of the Amplifier (824-849 MHz)

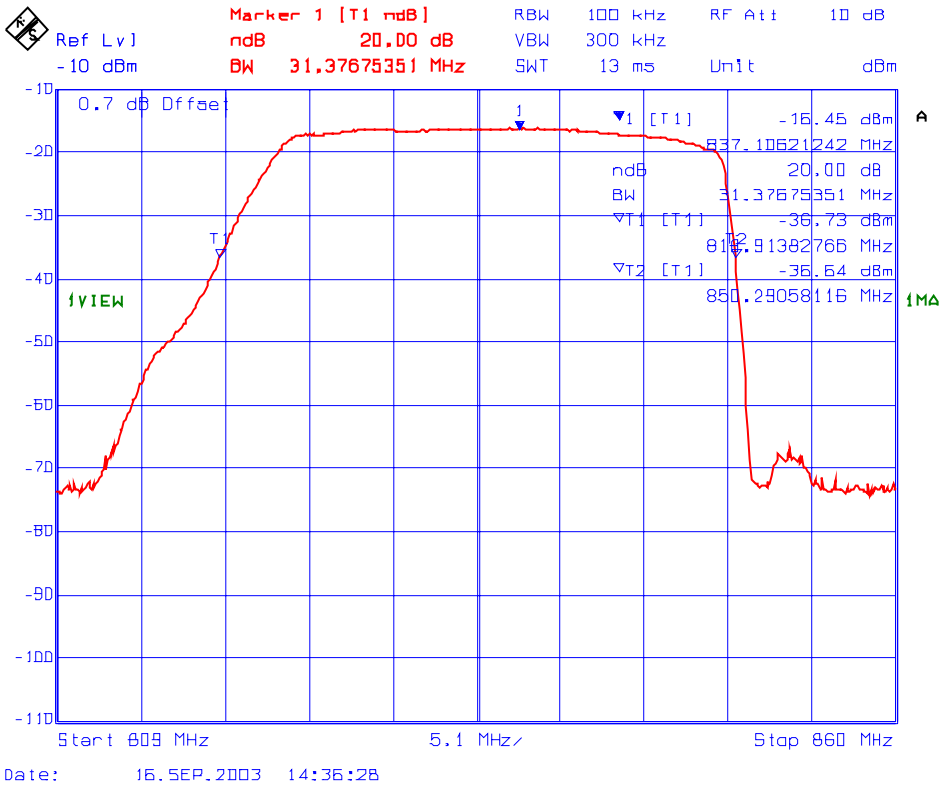
Refer to Plot # 51 for detailed measurements of 20 dB BW and maximum gain of the Amplifier

5.8.5.4. 99% Occupied Bandwidth(824-849 MHz)

Frequency (MHz)	Channel Spacing (kHz)	Modulation	Measured 99% OBW of RF Input Signal (kHz)	Measured 99% OBW of RF Output Signal (kHz)	Recommended 99% OBW (kHz)
824.0	25	FM Voice	15.78	15.78	20
836.5	25	FM Voice	15.78	15.78	20
849.0	25	FM Voice	15.78	15.78	20
▪ Refer to Plots 52 to 55 below for the details of the above measurements					
824.0	25	FM Data	20.24	19.74	20
836.5	25	FM Data	20.24	20.09	20
849.0	25	FM Data	20.24	20.24	20
▪ Refer to Plots 56 to 59 below for the details of the above measurements					
824.0	12.5	CDMA	1278	1278	--
836.5	12.5	CDMA	1278	1278	--
849.0	12.5	CDMA	1278	1262	--
▪ Refer to Plots 60 to 63 below for the details of the above measurements					
824.0	12.5	TDMA	28.37	28.37	--
836.5	12.5	TDMA	28.37	28.37	--
849.0	12.5	TDMA	28.37	28.26	--
▪ Refer to Plots 64 to 67 below for the details of the above measurements					
824.0	12.5	GSM	244.09	244.09	--
836.5	12.5	GSM	244.09	245.29	--
849.0	12.5	GSM	244.09	244.09	--
▪ Refer to Plots 68 to 71 below for the details of the above measurements					

Plot # 51 : 20 dB BW of the 824 - 849 MHz band pass gain

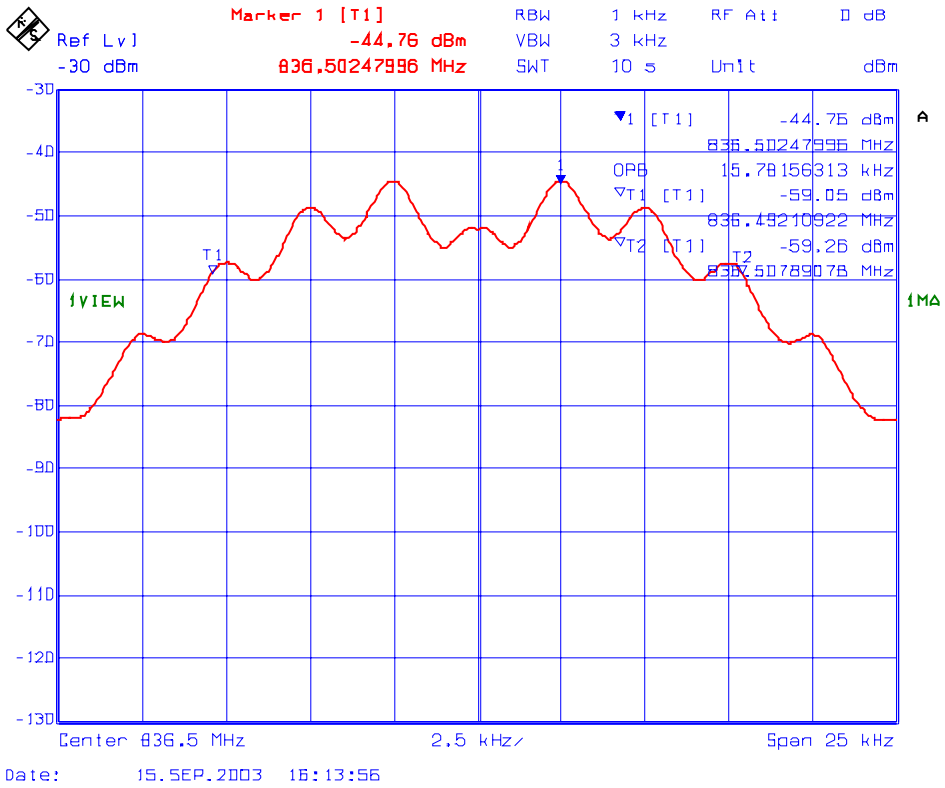
RF Input: -40 dBm from 800 –900 MHz
MAX. GAIN: 23.55 dB



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

Plot # 52 : 99% OBW, RF Input

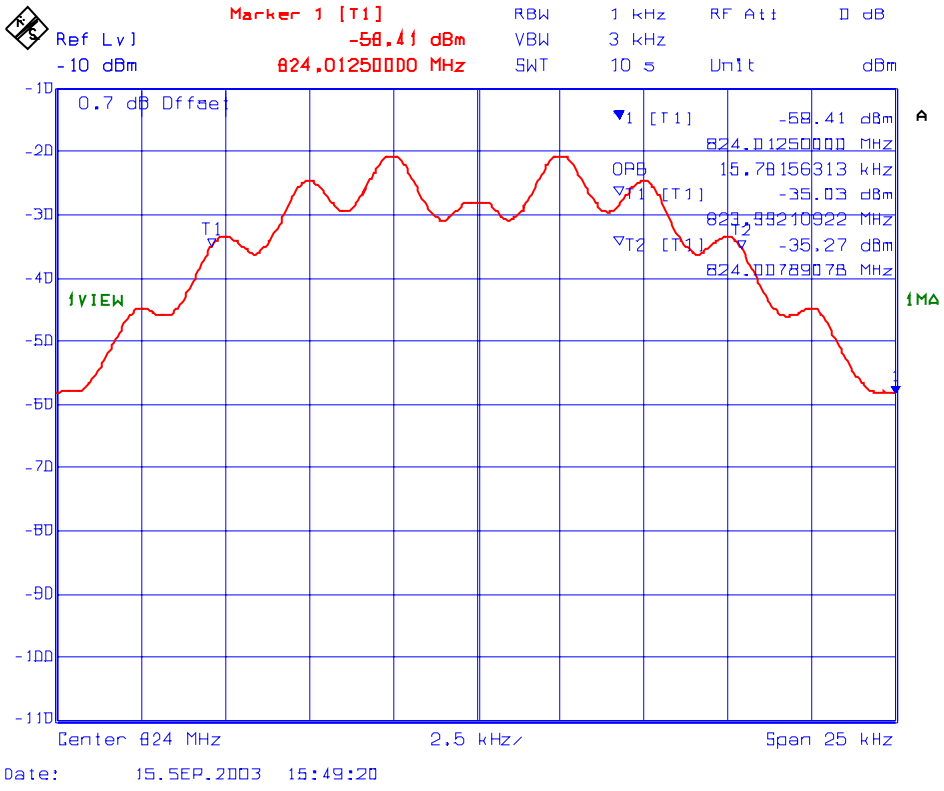
Frequency: 836.5 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 53 : 99% OBW, RF Output

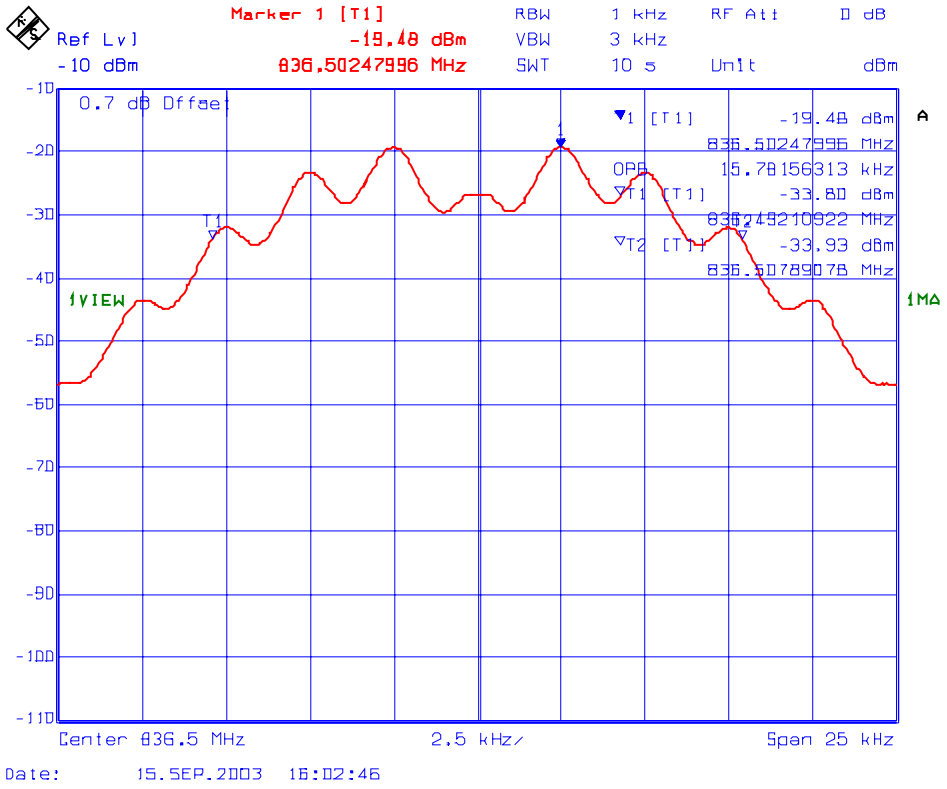
Frequency: 824 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 54 : 99% OBW, RF Output

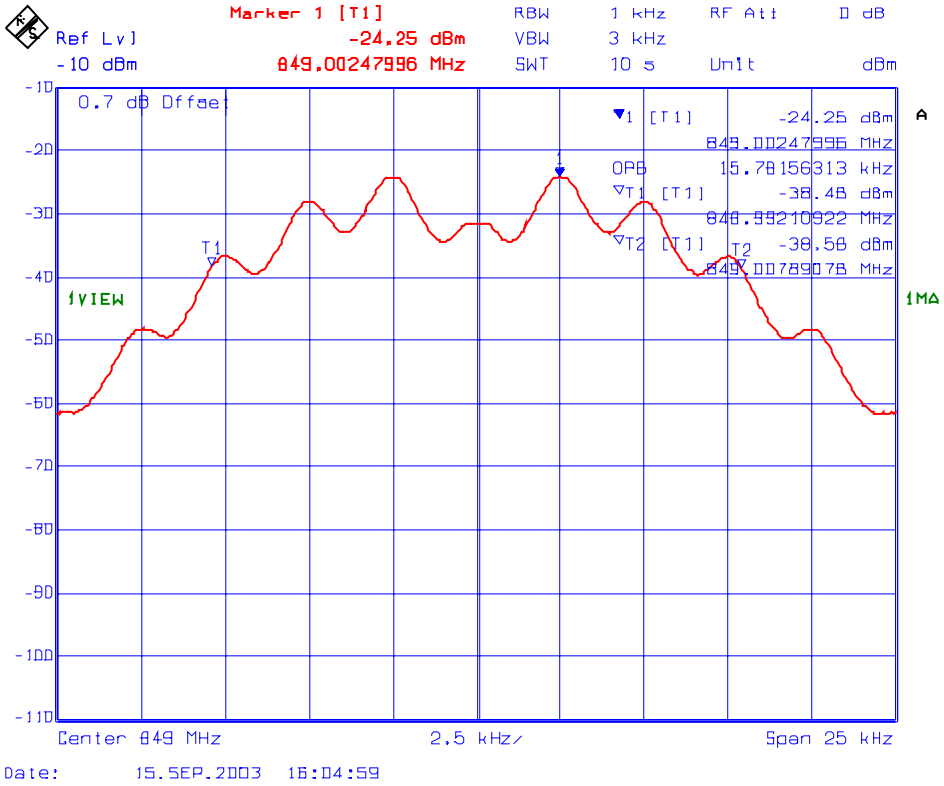
Frequency: 836.5 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 55 : 99% OBW, RF Output

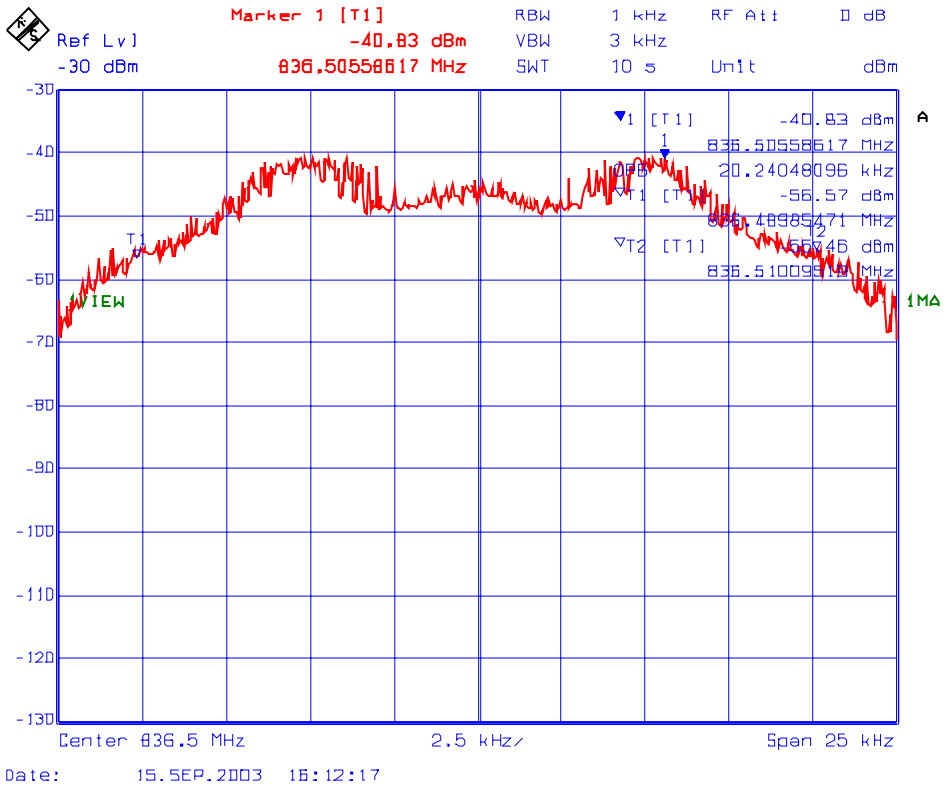
Frequency: 849 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 56 : 99% OBW, RF Input

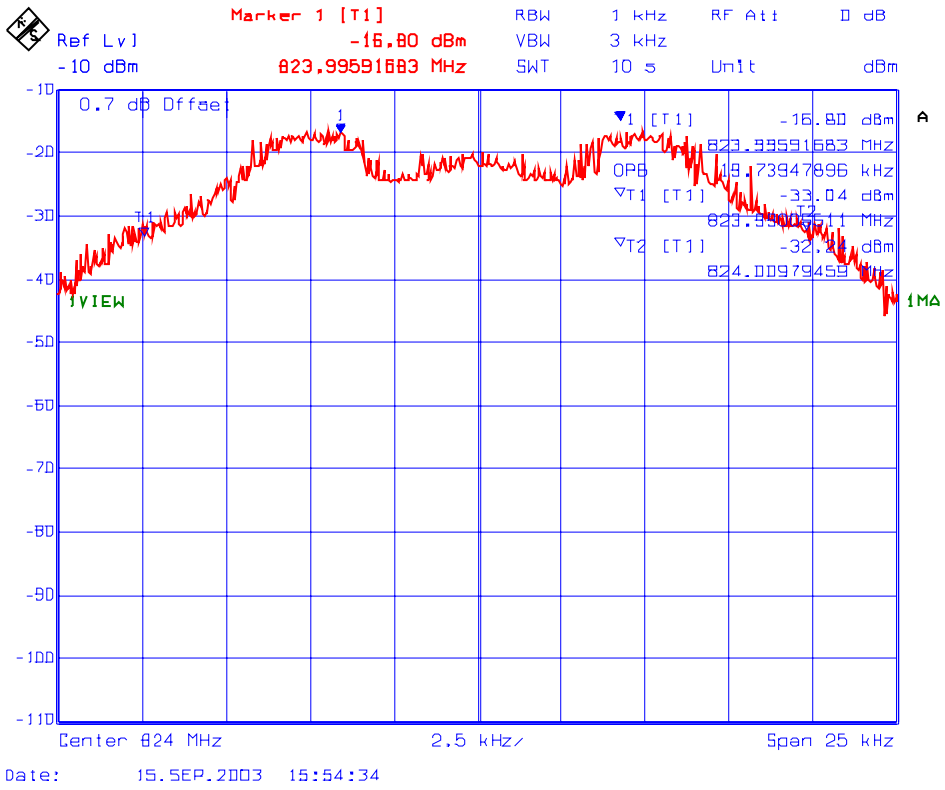
Frequency: 836.5 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

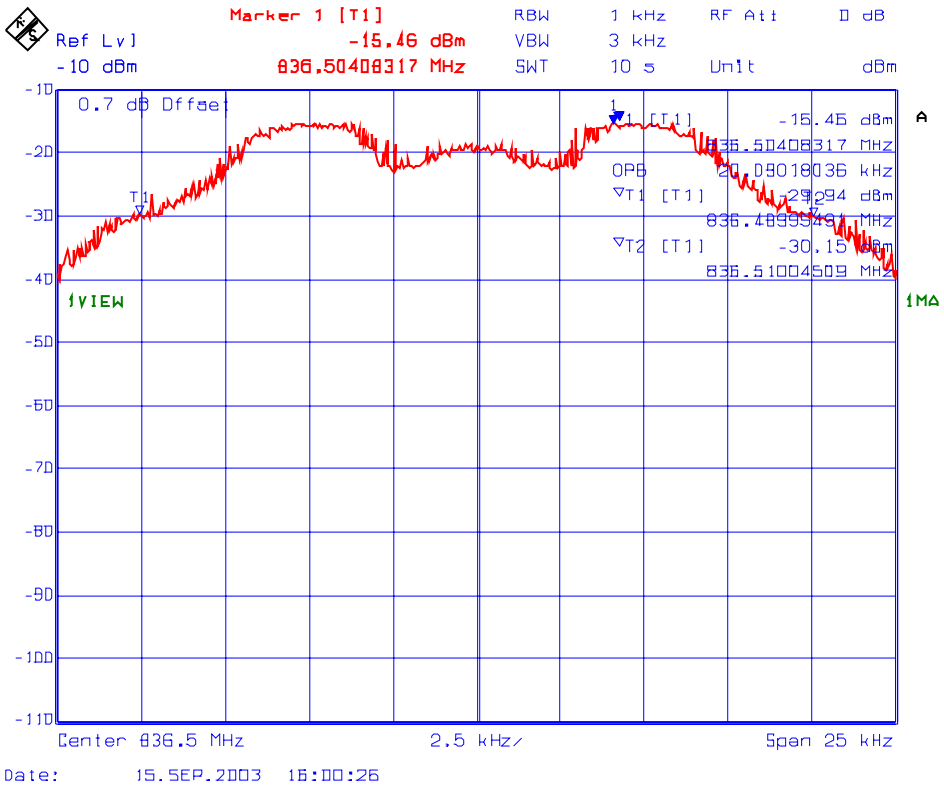
Plot # 57 : 99% OBW, RF Output

Frequency: 824 MHz
Modulation: FM modulation with an external 9600 b/s random data source



Plot # 58 : 99% OBW, RF Output

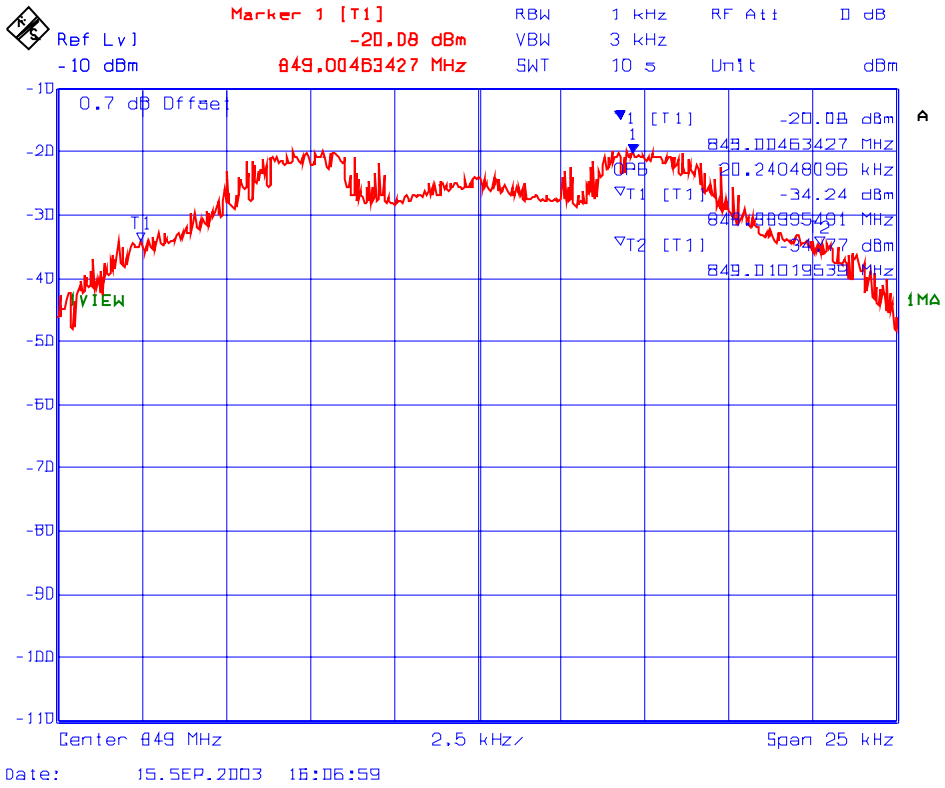
Frequency: 836.5 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 59 : 99% OBW, RF Output

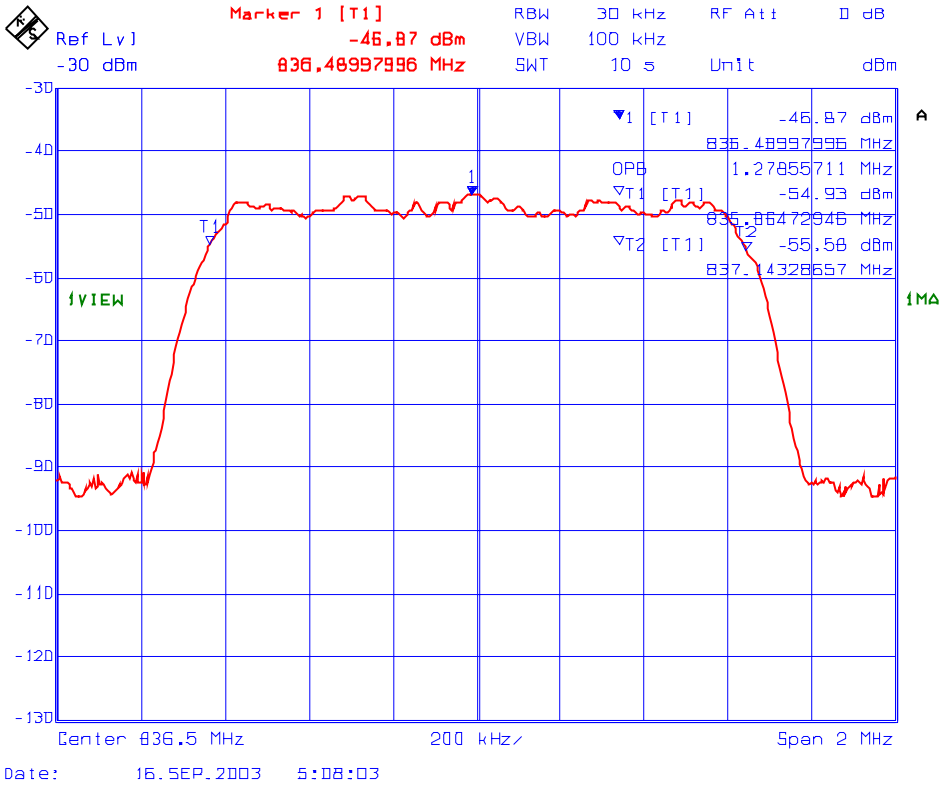
Frequency: 849 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 60 : 99% OBW, RF Input

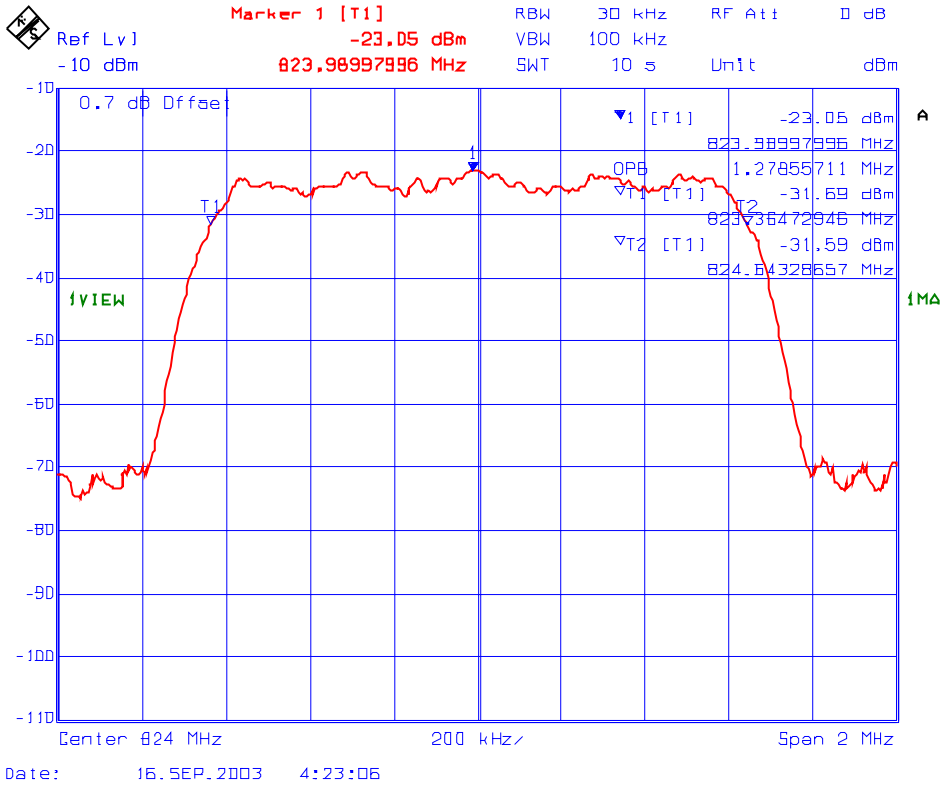
Frequency: 836.5 MHz, Modulation: CDMA



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

Plot # 61 : 99% OBW, RF Output

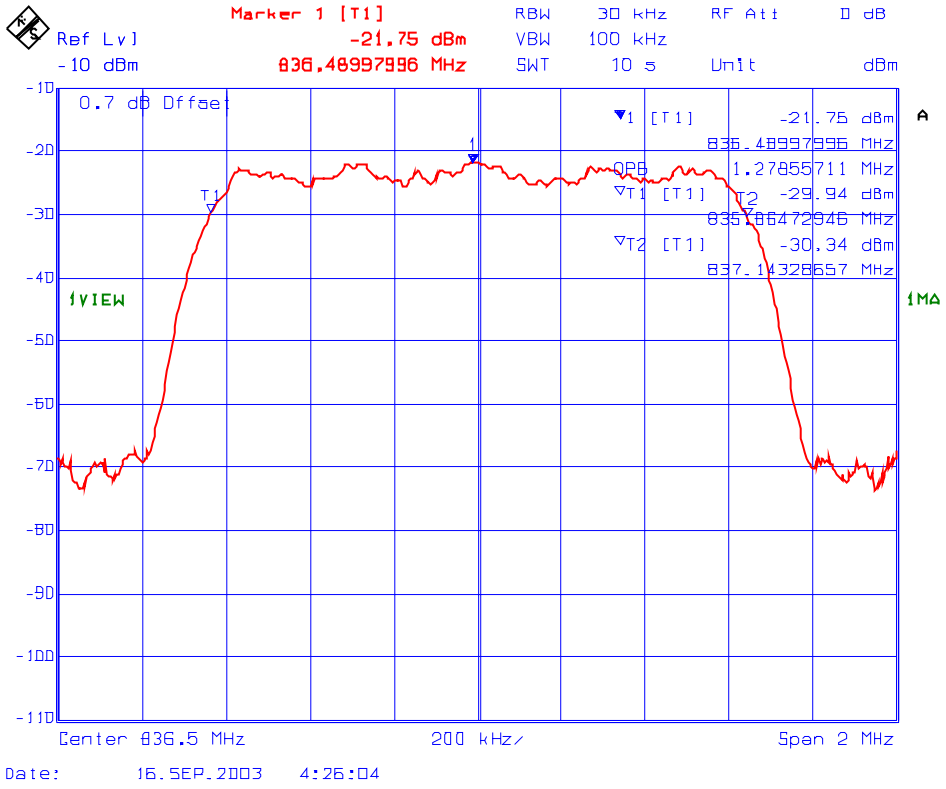
Frequency: 824 MHz, Modulation: CDMA



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

Plot # 62 : 99% OBW, RF Output

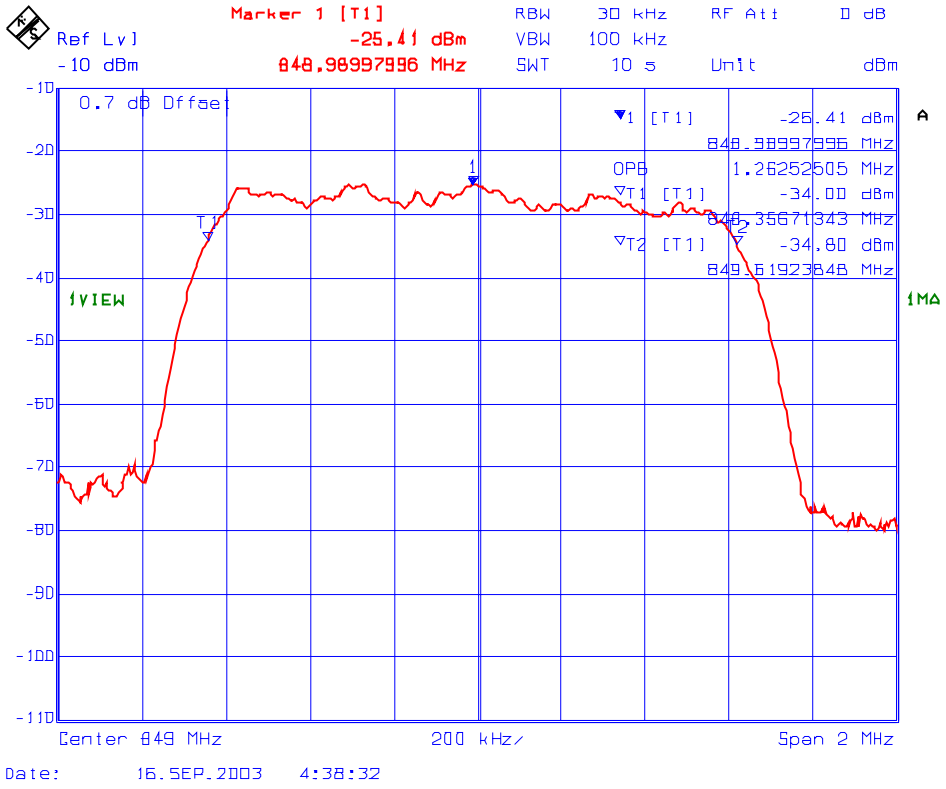
Frequency: 836.5 MHz, Modulation: CDMA



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

Plot # 63 : 99% OBW, RF Output

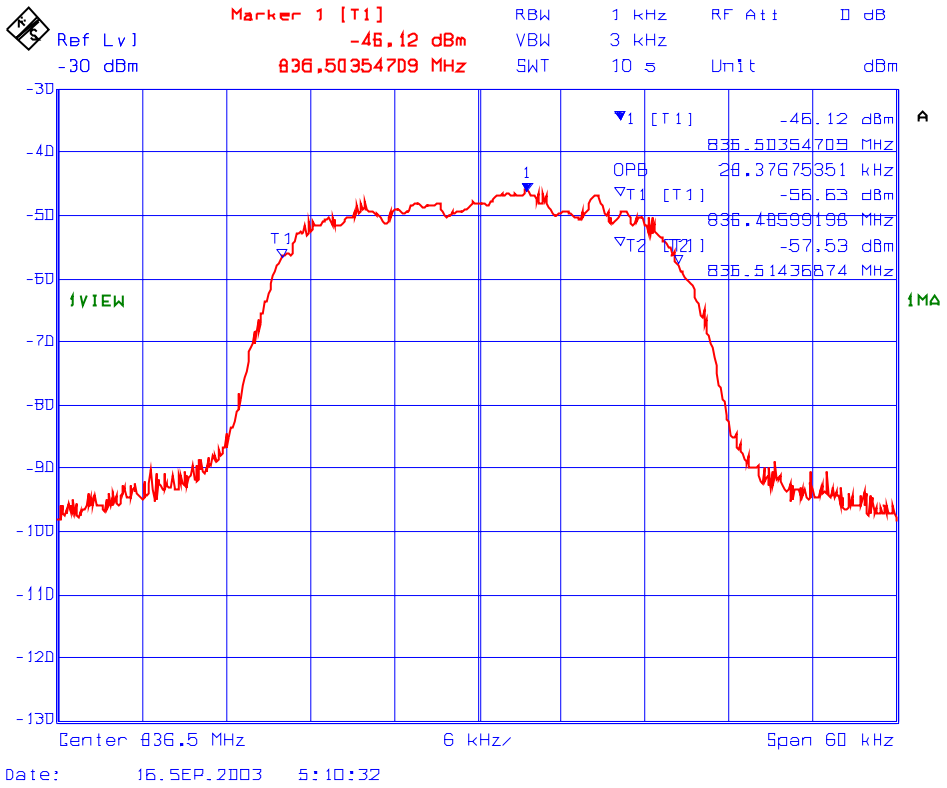
Frequency: 849 MHz, Modulation: CDMA



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

Plot # 64 : 99% OBW, RF Input

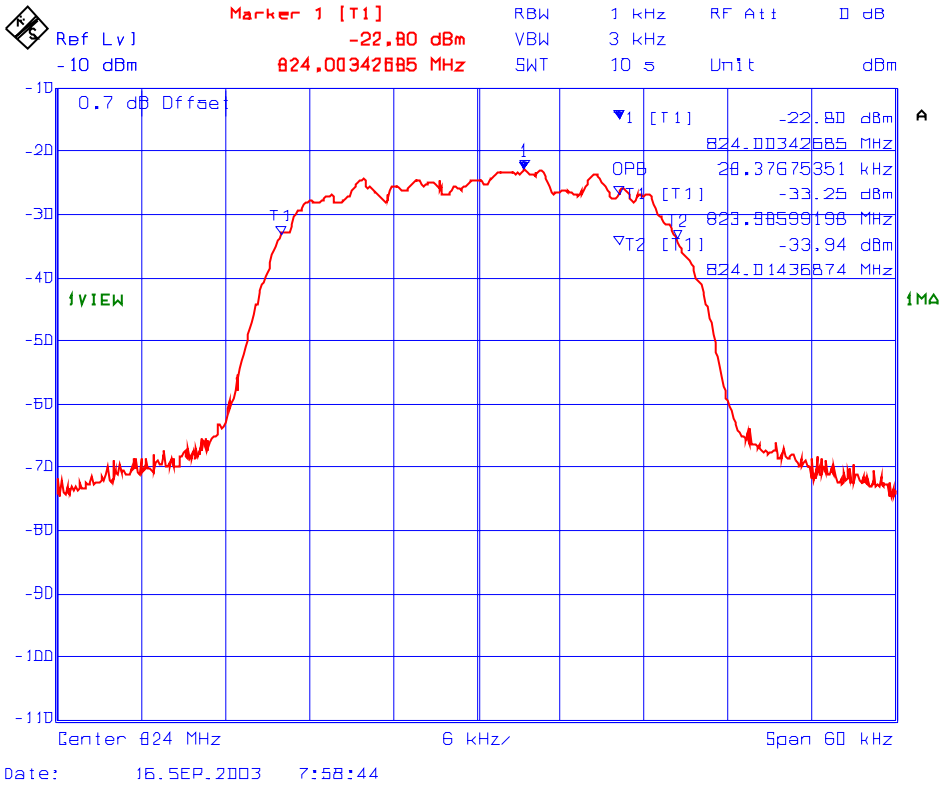
Frequency: 836.5 MHz, Modulation: TDMA



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

Plot # 65 : 99% OBW, RF Output

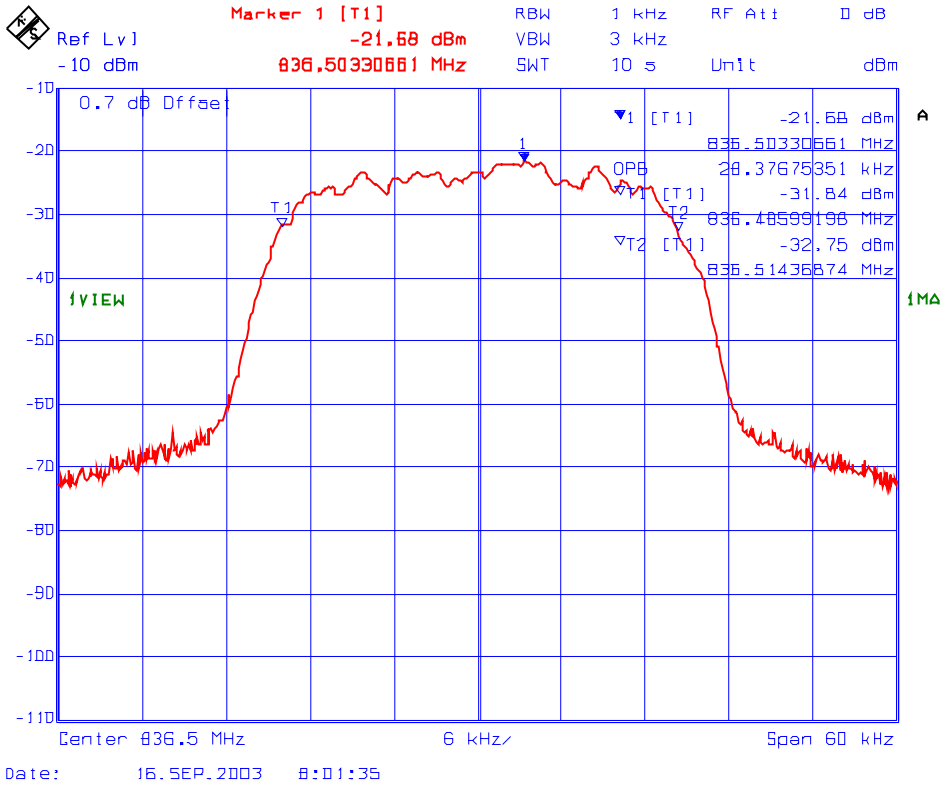
Frequency: 824 MHz, Modulation: TDMA



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

Plot # 66 : 99% OBW, RF Output

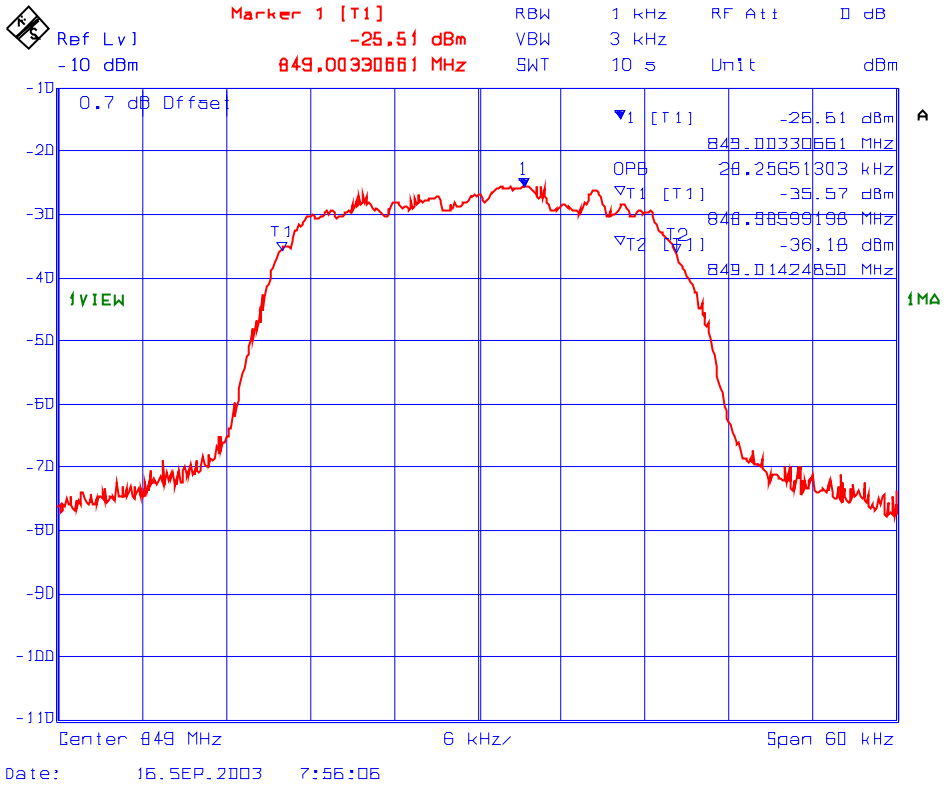
Frequency: 836.5 MHz, Modulation: TDMA



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

Plot # 67 : 99% OBW, RF Output

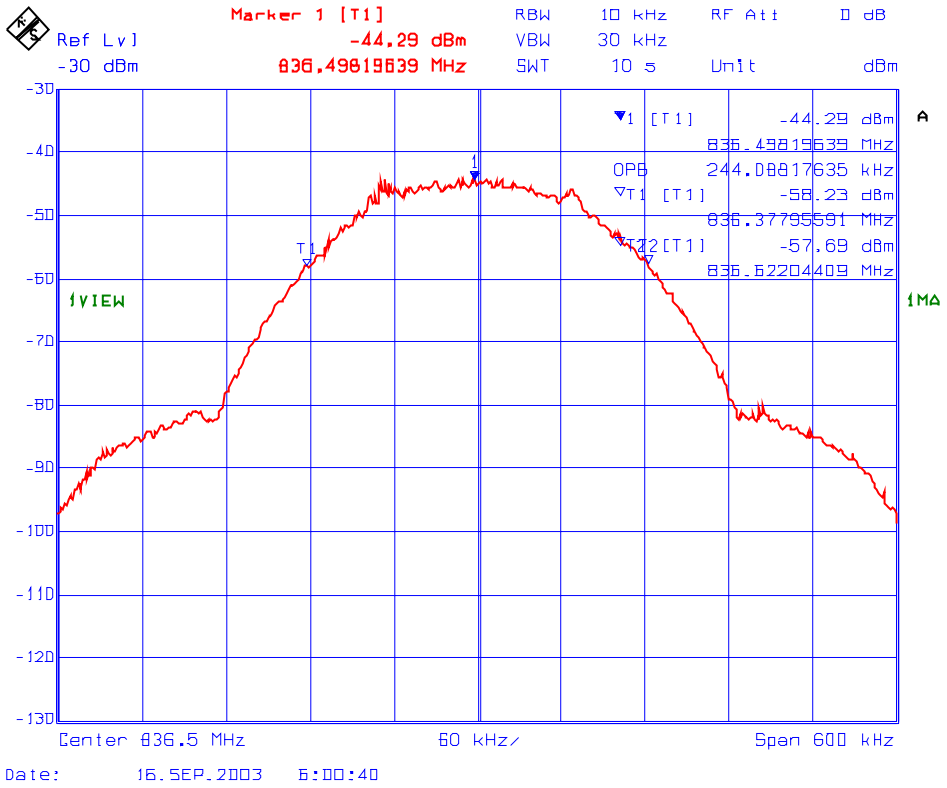
Frequency: 849 MHz, Modulation: TDMA



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

Plot # 68 : 99% OBW, RF Input

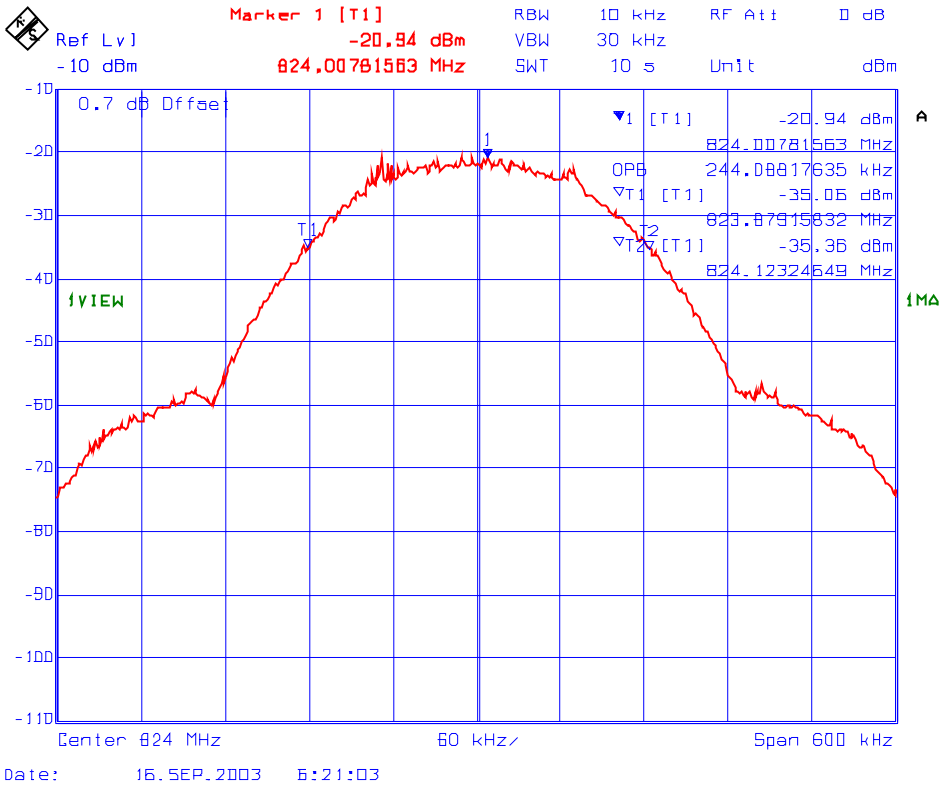
Frequency: 836.5 MHz, Modulation: GSM



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

Plot # 69 : 99% OBW, RF Output

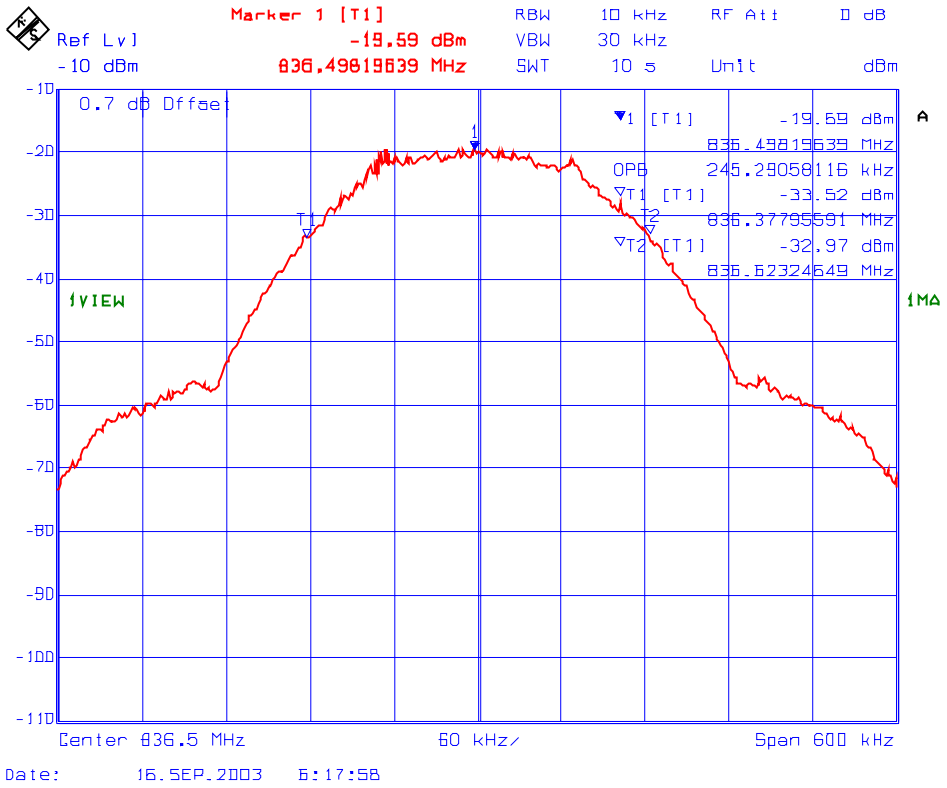
Frequency: 824 MHz, Modulation: GSM



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

Plot # 70 : 99% OBW, RF Output

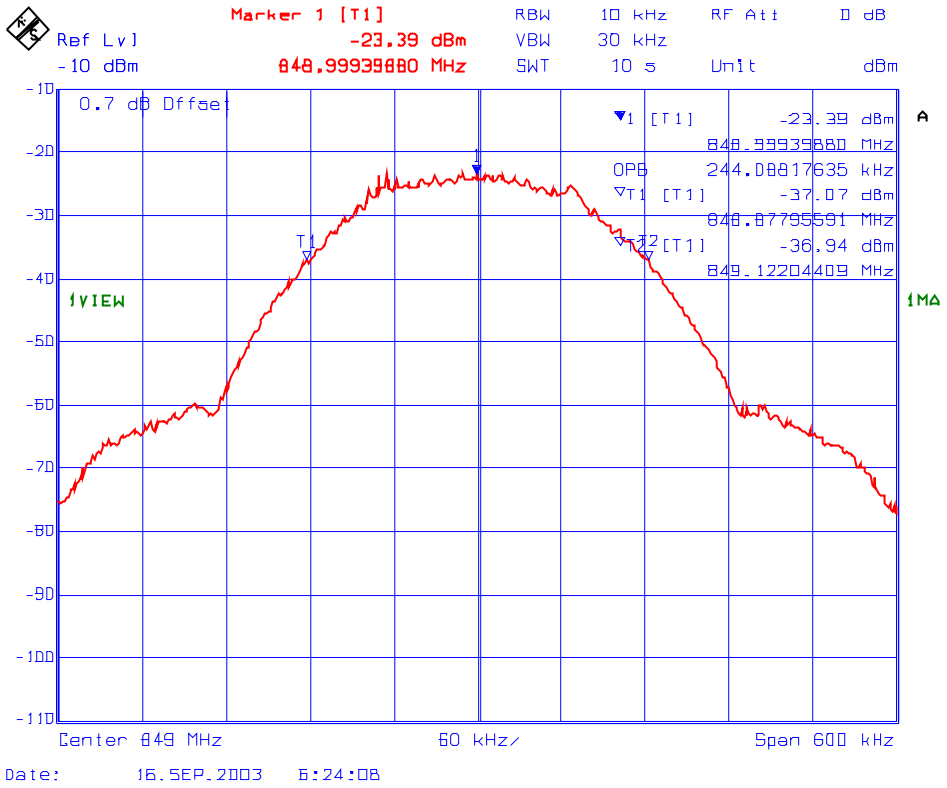
Frequency: 836.5 MHz, Modulation: GSM



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

Plot # 71 : 99% OBW, RF Output

Frequency: 849 MHz, Modulation: GSM



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

Remark: Since the device under test is an amplifier, the comparison test of RF input and output signals are conducted for compliance with FCC Rules.

5.8.5.5. 20 dB Bandwidth and Gain of the Amplifier (896-901 MHz)

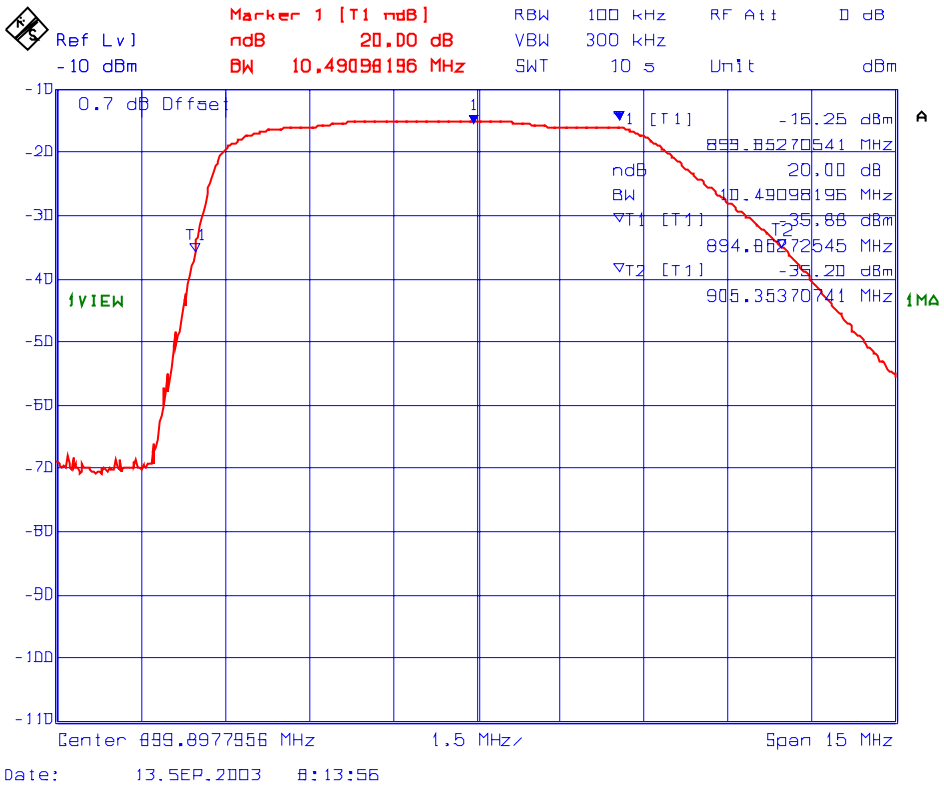
Refer to Plot # 72 for detailed measurements of 20 dB and maximum gain of the Amplifier

5.8.5.6. 99% Occupied Bandwidth (896-901 MHz)

Frequency (MHz)	Channel Spacing (kHz)	Modulation	Measured 99% OBW of RF Input Signal (kHz)	Measured 99% OBW of RF Output Signal (kHz)	Recommended 99% OBW (kHz)
896.0	12.5	FM Voice	10.5	10.5	13.6
901.0	12.5	FM Voice	10.5	10.5	13.6
▪ Refer to Plots 73 to 75 below for the details of the above measurements					
896.0	12.5	FM Data	11.7	12.1	13.6
901.0	12.5	FM Data	11.7	11.7	13.6
▪ Refer to Plots 76 to 78 below for the details of the above measurements					

Plot # 72 : 20 dB BW of the 896 - 901 MHz band pass gain

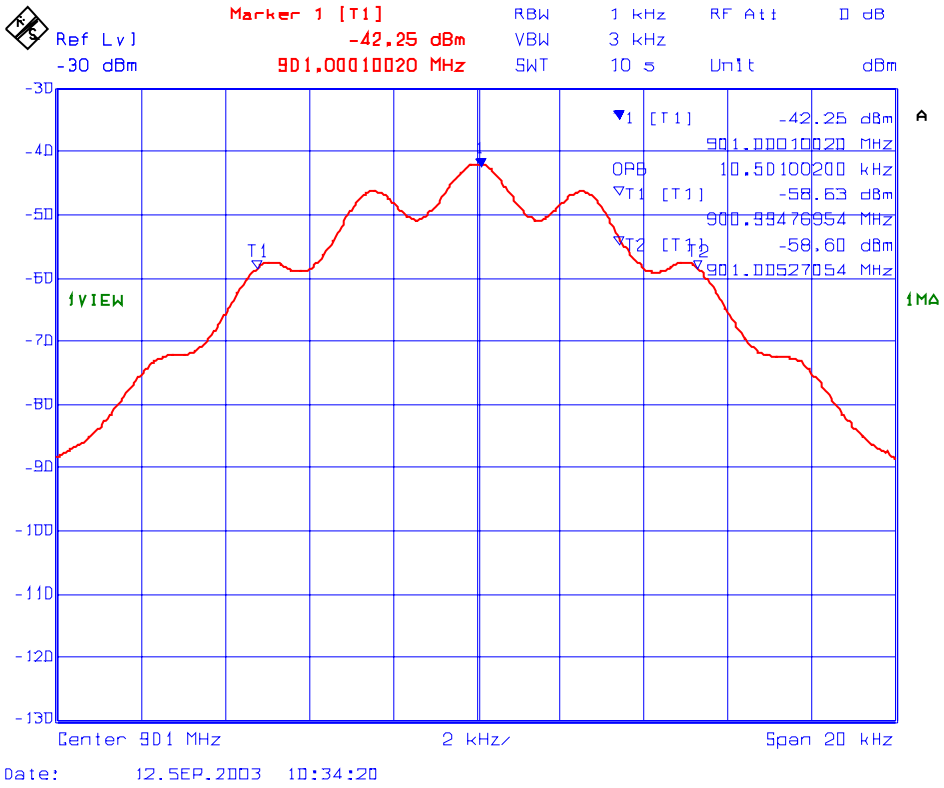
RF Input: -40 dBm from 800 –950 MHz
MAX. GAIN: 24.75 dB



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

Plot # 73 : 99% OBW, RF Input

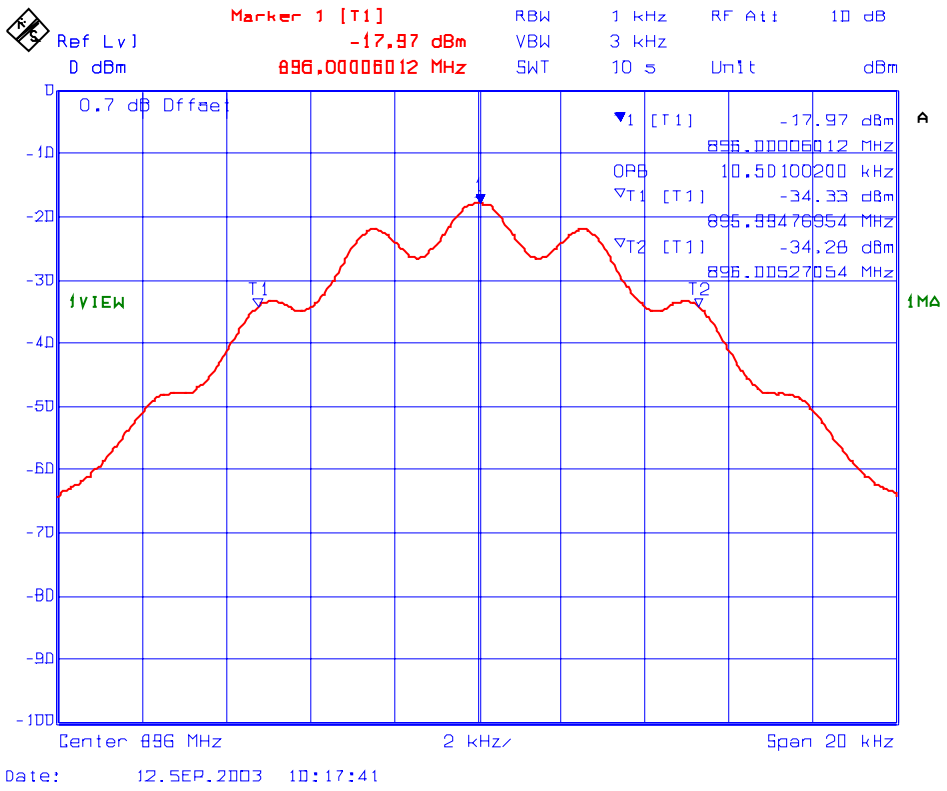
Frequency: 901 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 74 : 99% OBW, RF Output

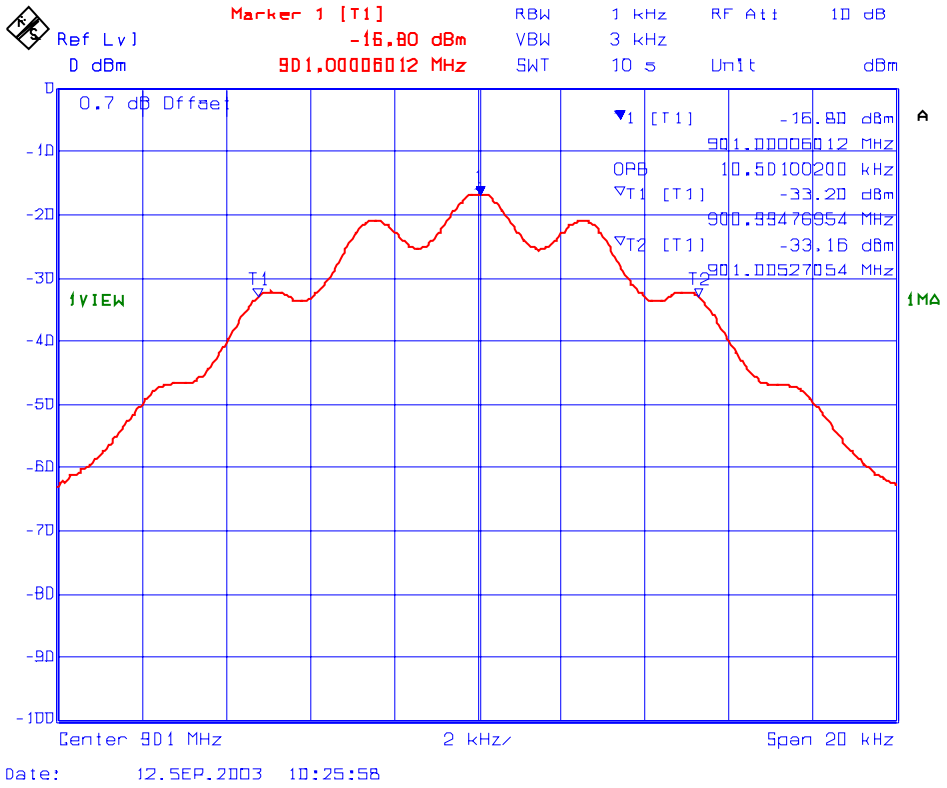
Frequency: 896 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 75 : 99% OBW, RF Output

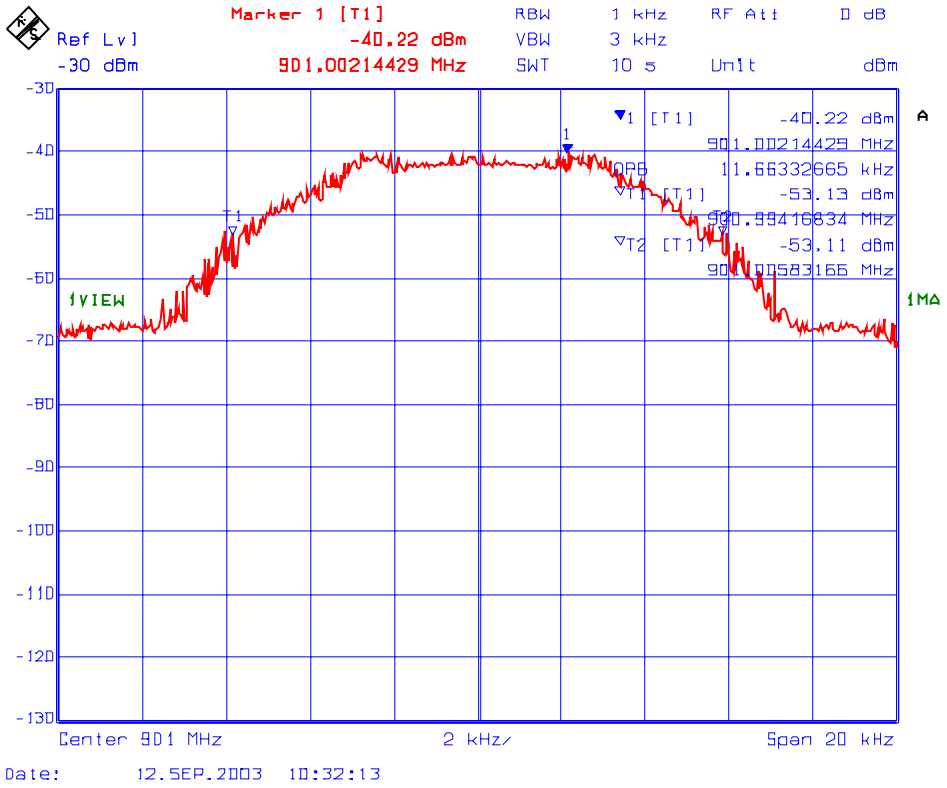
Frequency: 901 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 76 : 99% OBW, RF Input

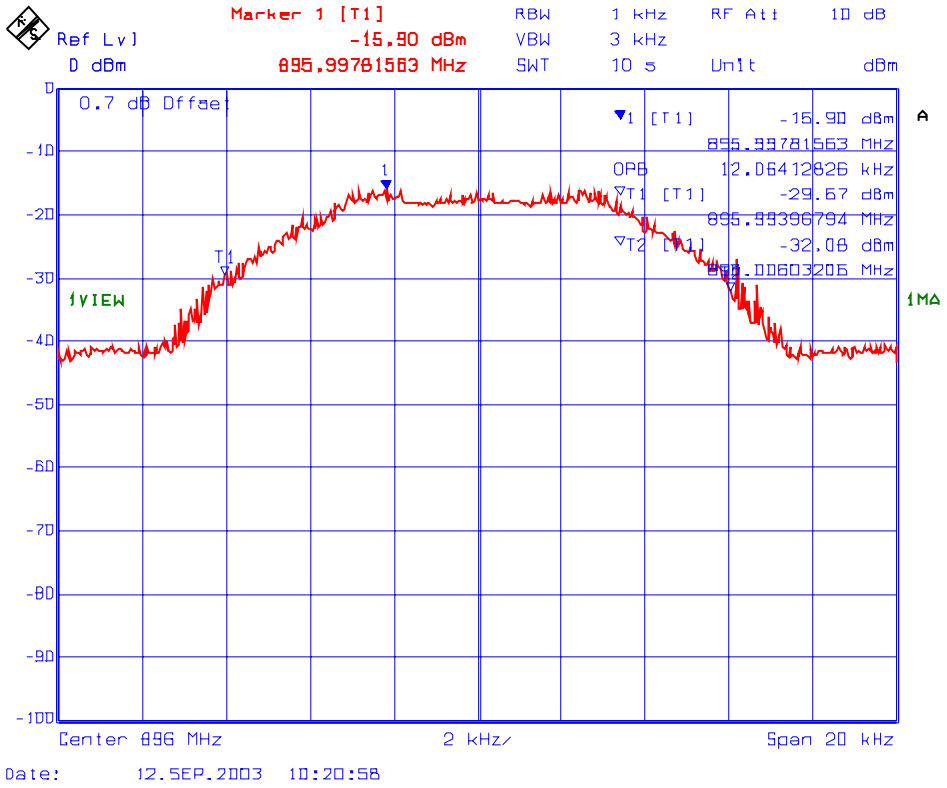
Frequency: 901 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 77 : 99% OBW, RF Output

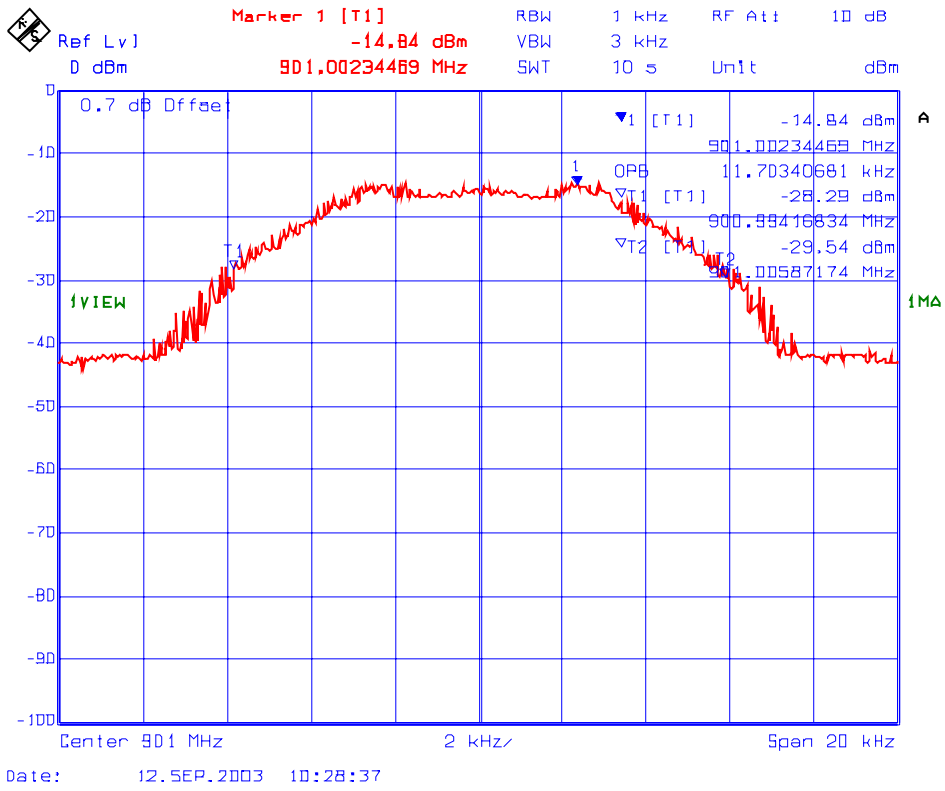
Frequency: 896 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 78 : 99% OBW, RF Output

Frequency: 901 MHz
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)*

Remark: Since the device under test is an amplifier, the comparison test of RF input and output signals are conducted for compliance with FCC Rules.

5.8.5.7. 20 dB Bandwidth and Gain of the Amplifier 1850-1910 MHz Band

Refer to Plot # 79 for detailed measurements of 20 dB and maximum gain of the Amplifier

5.8.5.8. 26dB Bandwidth - RF Output versus RF Input in 1850-1910 MHz Band

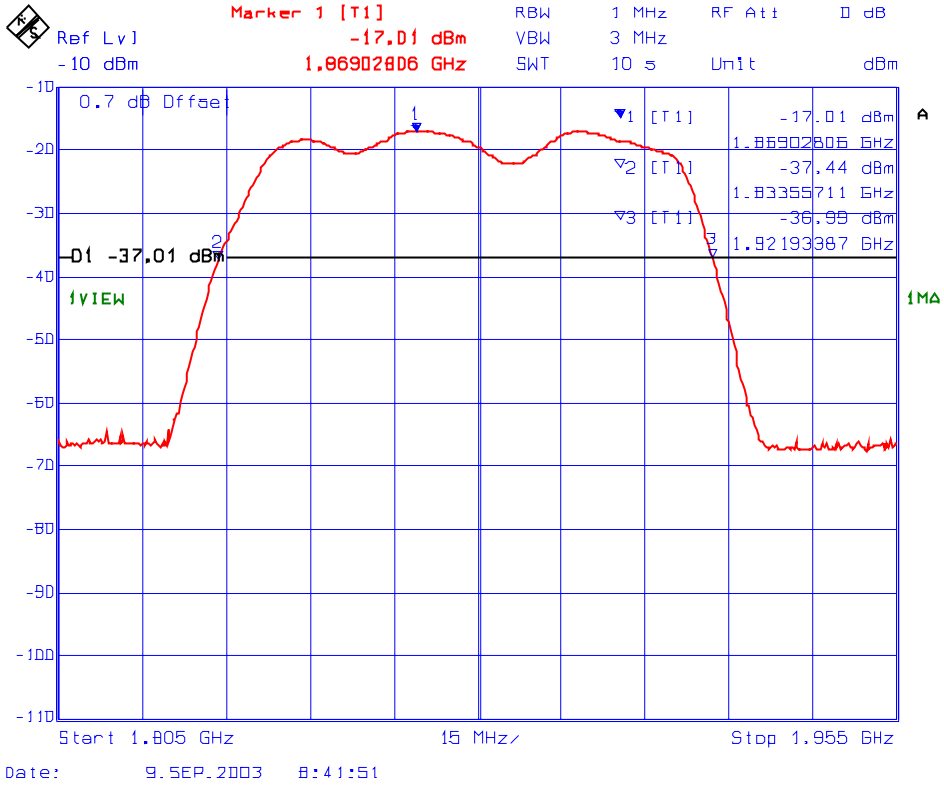
Frequency (MHz)	Modulation	26 dB Bandwidth of RF Input Signal (MHz)	26 dB Bandwidth of RF Output Signal (MHz)
1851	CDMA	1.44	1.45
1880	CDMA	1.44	1.52
1909	CDMA	1.44	1.43
Refer to Plots # 80 to 83 below for detailed measurement			
1851	TDMA	0.033	0.033
1880	TDMA	0.033	0.033
1909	TDMA	0.033	0.033
Refer to Plots # 84 to 87 below for detailed measurement			
1851	GSM	0.32	0.32
1880	GSM	0.32	0.32
1909	GSM	0.32	0.32
Refer to Plots # 88 to 91 below for detailed measurement			

5.8.5.9. Band-edge

Since the carrier signal level was too low, we have not plotted the test result for 6 band-edge.

Plot # 79 : 20 dB BW of the 1850 - 1910 MHz band pass gain

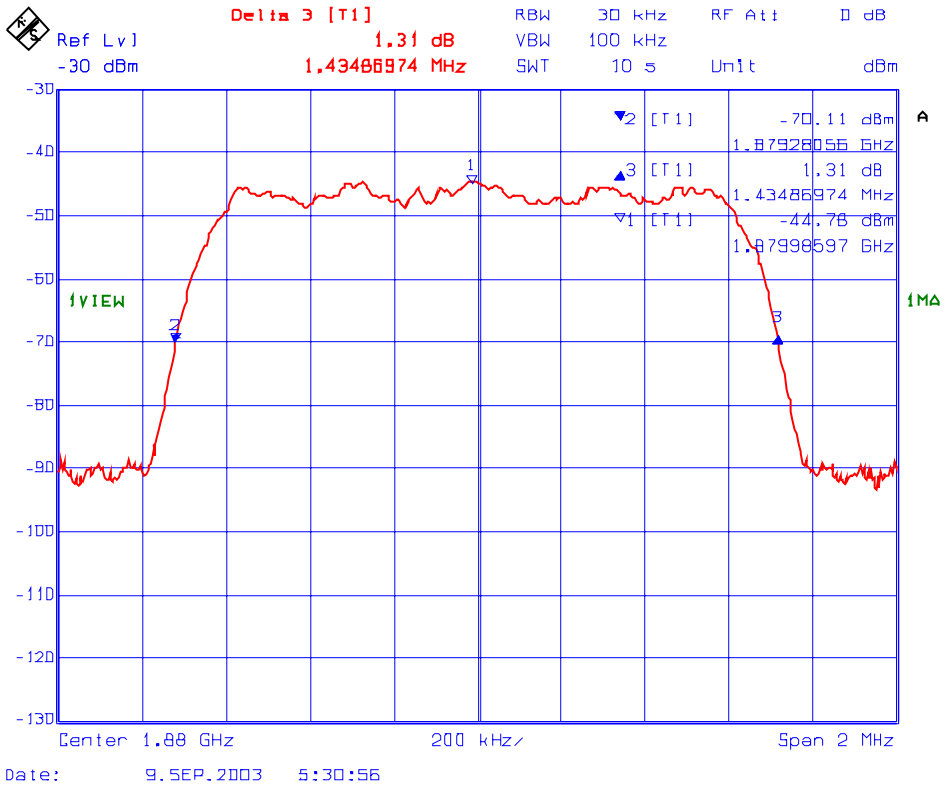
RF Input: -40 dBm from 1800 –1960 MHz
MAX. GAIN: 23 dB



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

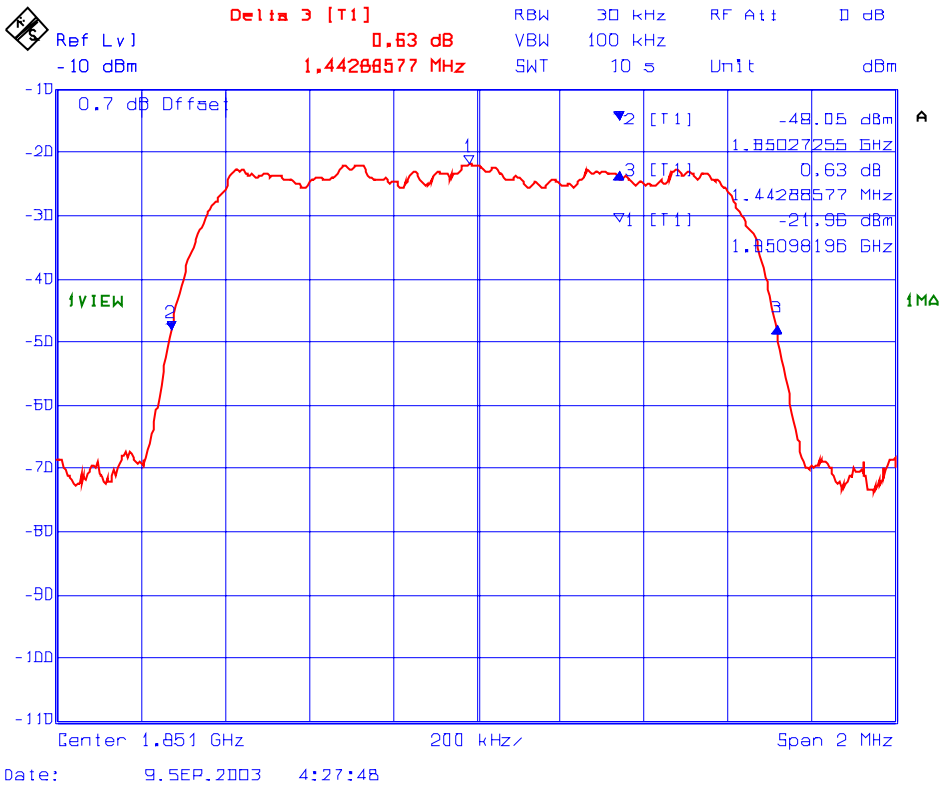
Plot # 80 : 26 dB BW of the 1850 – 1910 MHz, RF Input

Frequency: 1880 MHz, Modulation: CDMA



Plot # 81 : 26 dB BW of the 1850 – 1910 MHz, RF Output

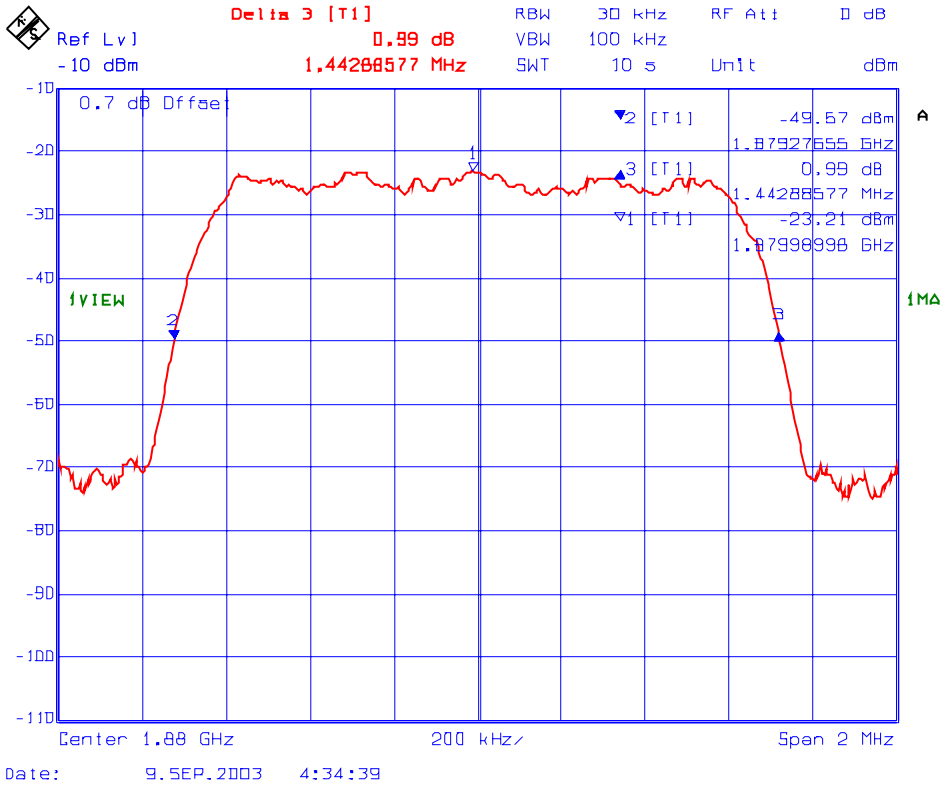
Frequency: 1851 MHz, Modulation: CDMA



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

Plot # 82: 26 dB BW of the 1850 – 1910 MHz, RF Output

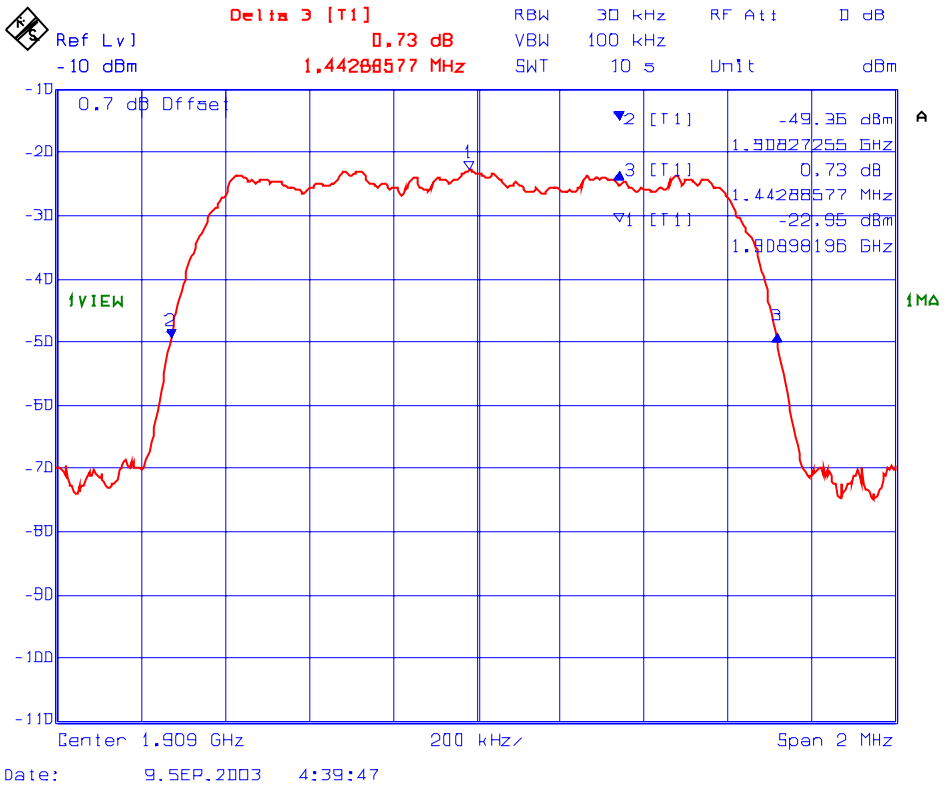
Frequency: 1880 MHz, Modulation: CDMA



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

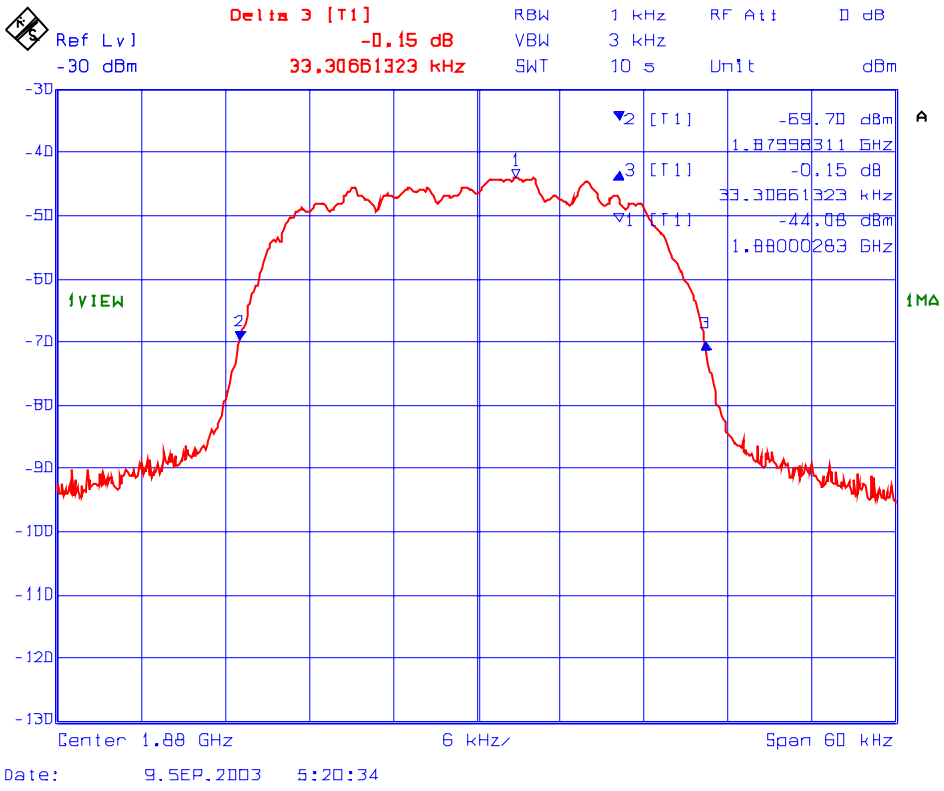
Plot # 83 : 26 dB BW of the 1850 – 1910 MHz, RF Output

Frequency: 1909 MHz, Modulation: CDMA



Plot # 84 : 26 dB BW of the 1850 – 1910 MHz, RF Input

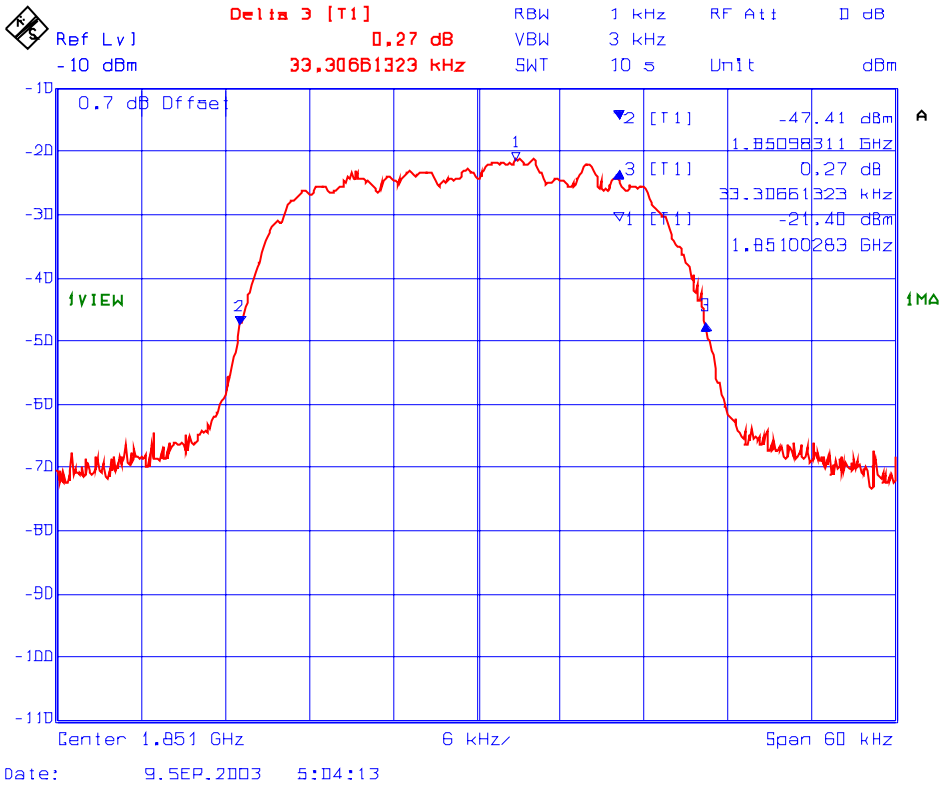
Frequency: 1880 MHz, Modulation: TDMA



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

Plot # 85 : 26 dB BW of the 1850 – 1910 MHz, RF Output

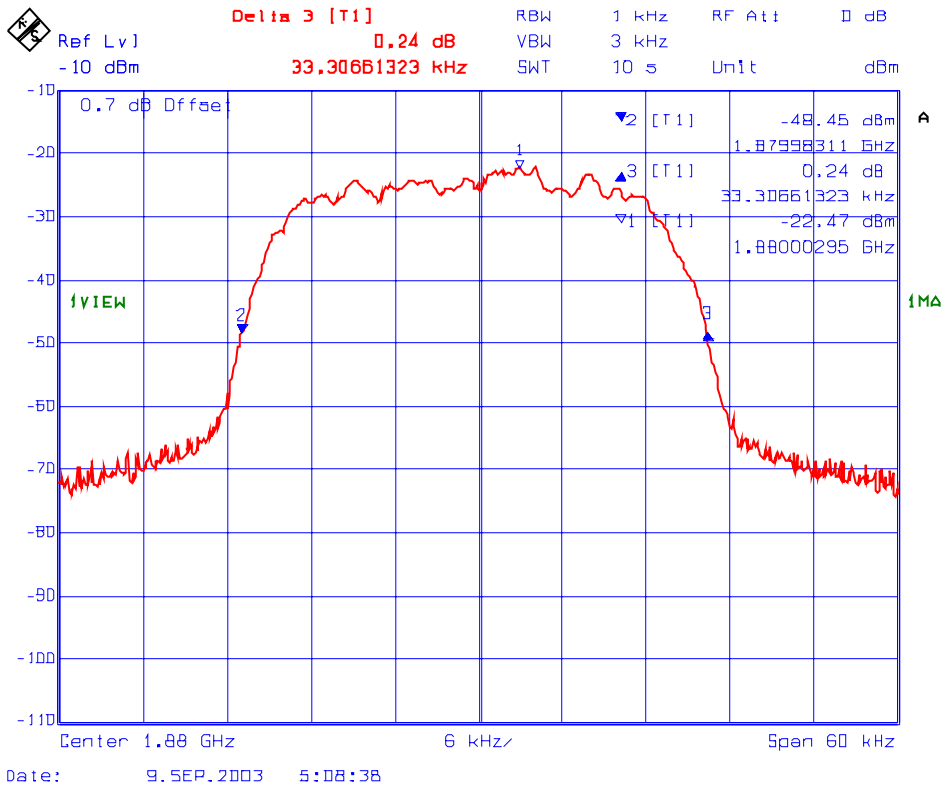
Frequency: 1851 MHz, Modulation: TDMA



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

Plot # 86 : 26 dB BW of the 1850 – 1910 MHz, RF Output

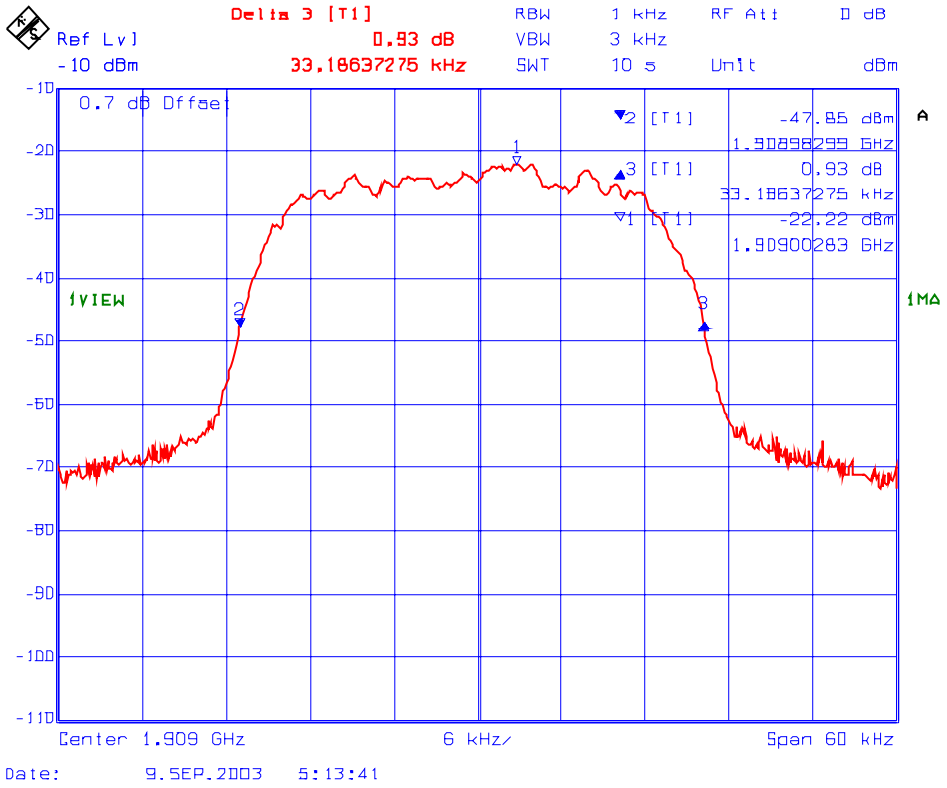
Frequency: 1880 MHz, Modulation: TDMA



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

Plot # 87: 26 dB BW of the 1850 – 1910 MHz, RF Output

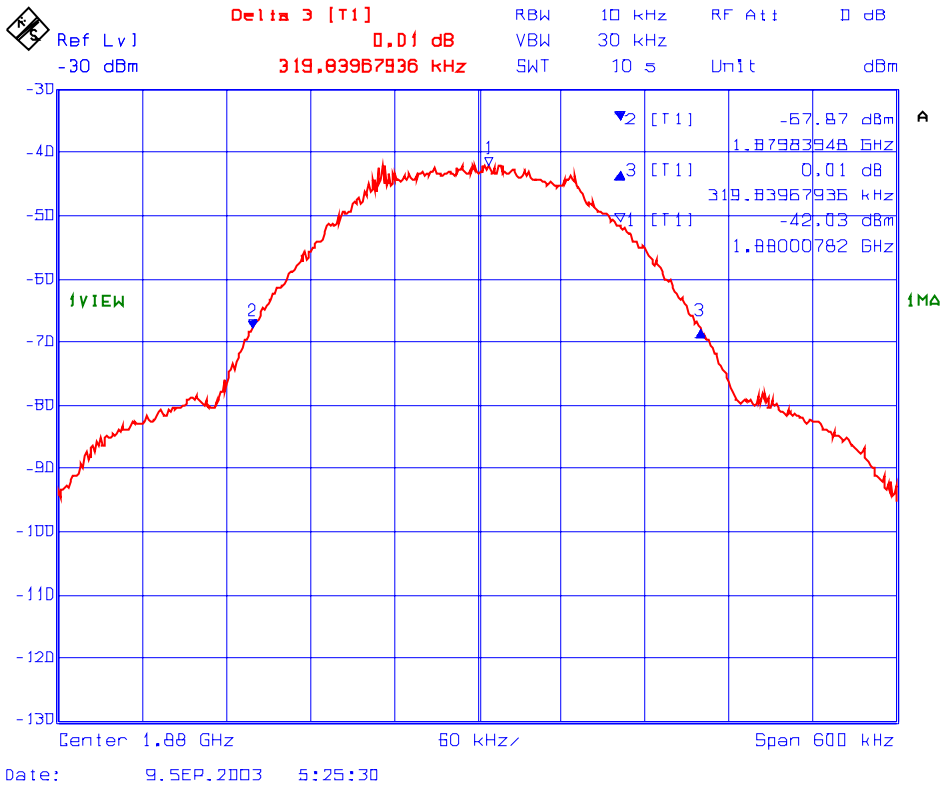
Frequency: 1909 MHz, Modulation: TDMA



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

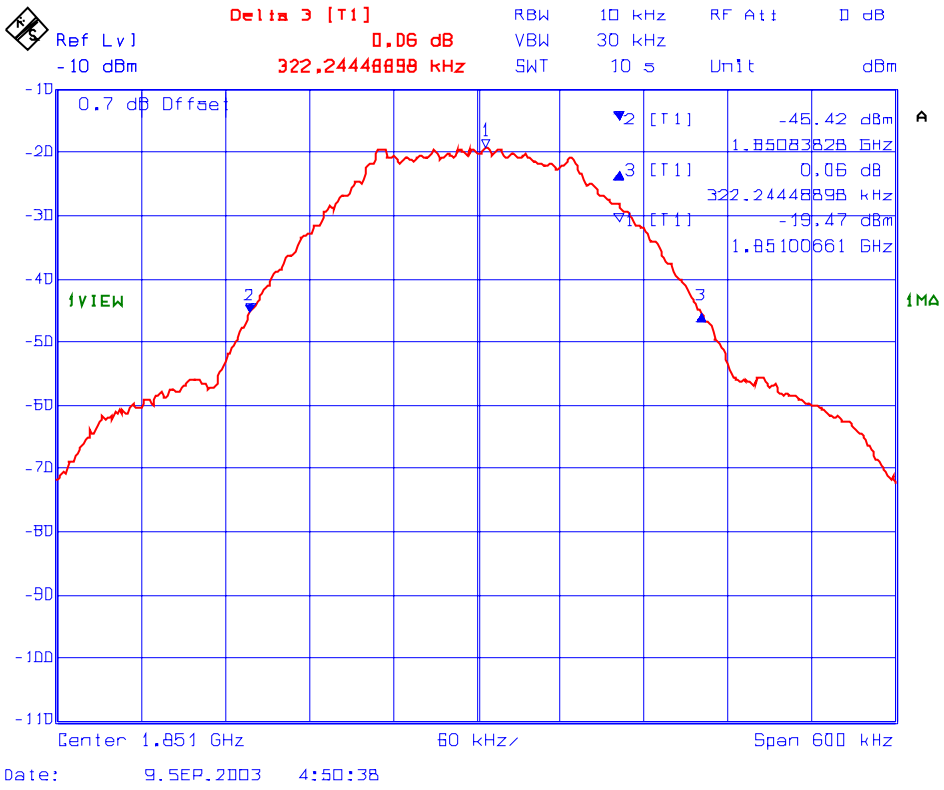
Plot # 88 : 26 dB BW of the 1850 – 1910 MHz, RF Input

Frequency: 1880 MHz, Modulation: GSM



Plot # 89 : 26 dB BW of the 1850 – 1910 MHz, RF Output

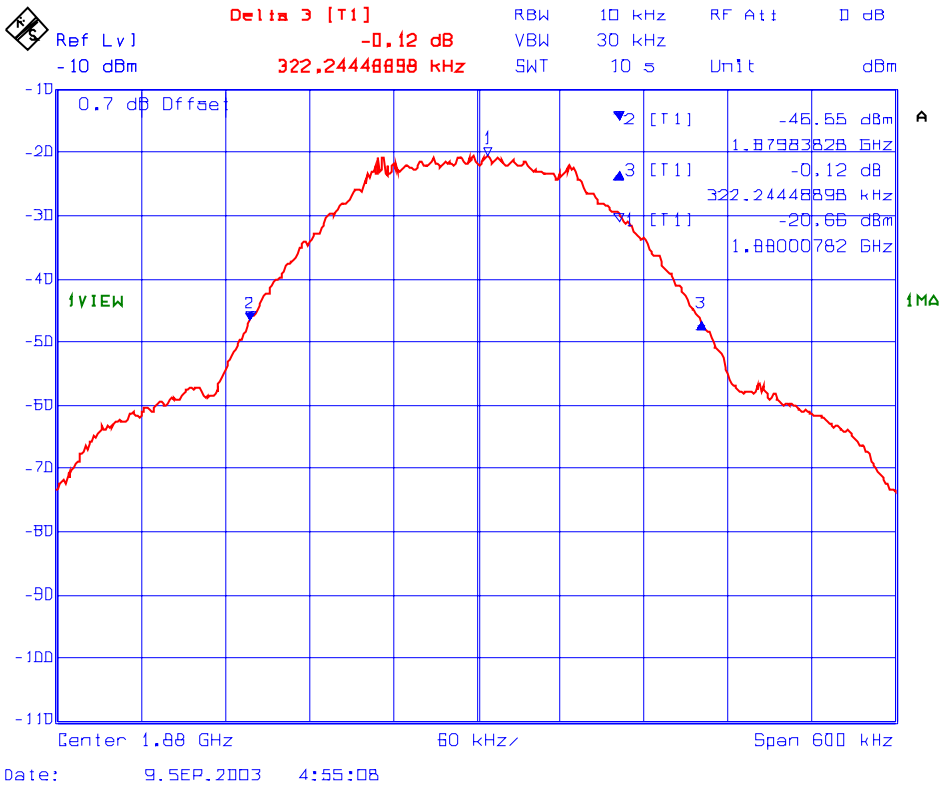
Frequency: 1851 MHz, Modulation: GSM



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

Plot # 90 : 26 dB BW of the 1850 – 1910 MHz, RF Output

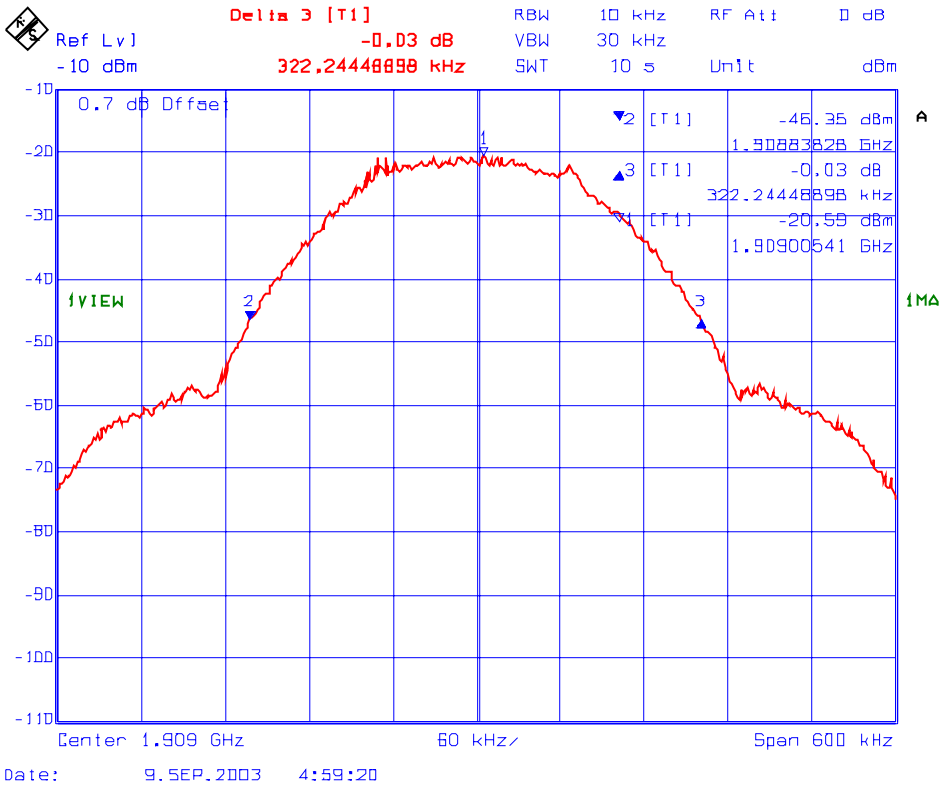
Frequency: 1880 MHz, Modulation: GSM



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

Plot # 91 : 26 dB BW of the 1850 – 1910 MHz, RF Output

Frequency: 1909 MHz, Modulation: GSM



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

5.9. EMISSION MASK @ 22.917 & 90.210

5.9.1. Limits

FCC 22.917:

- Mobile station in AMPS:

EMISISON MASK @ FCC 22.917		
EMISSION TYPE	Frequency removed from the carrier frequency	Attenuation wrt Carrier Level
F3E (radiotelephony) & F3D (SAT) - with audio filter	▪ 20 kHz to 45 kHz ▪ 45 kHz to 2*Fc	▪ 26 dBc ▪ 60 dBc or 43+10*log(P) dBc (P in Watts) whichever is less
Alternative - F3E (radiotelephony) & F3D (SAT) - with audio filter	▪ 12 kHz to 20 kHz ▪ 20 kHz to 2*Fc	▪ 117*log(f_d/12) dBc ▪ 100*log(f_d/11) dBc or 60 dBc or 43+10*log(P) dBc (P in Watts) whichever is less

- Mobile station in Wideband Digital Mode:

EMISISON MASK @ FCC 22.917		
EMISSION TYPE	Frequency removed from the carrier frequency	Attenuation wrt Carrier Level
F1D (Wideband Data Mode) / F3D (Signaling Tone)	▪ 20 kHz to 45 kHz ▪ 45 kHz to 90 kHz ▪ 90 kHz to 2*Fc	▪ 26 dBc ▪ 45 dBc ▪ 60 dBc or 43+10*log(P) dBc (P in Watts) whichever is less

- Mobile station in CDMA mode:

	Centre frequency offset by greater than 900 kHz for 30 kHz bandwidth or greater than 1.385 MHz for 1 MHz bandwidth	Center frequency offset by greater than 1.98 MHz for 30 kHz bandwidth or greater than 2.465 MHz for 1 MHz bandwidth
Spurious emissions not to exceed (a), or , or both (b) and (c), whichever is less stringent	(a) -42 dBc/30 kHz (b) -60 dBm / 30 kHz (c) -55 dBm/ 1 MHz	(a) -54 dBc/30 kHz (b) -60 dBm / 30 kHz (c) -55 dBm/ 1 MHz

- Base station in CDMA mode shall not exceed the following limits:

(a) For all offset frequencies greater than 750 kHz from the CDMA centre frequency, at least 45 dBc
(b) For all offset frequencies greater than 1,.98 MHz from the CDMA centre frequency, at least 60 dBc
(c) for all offset frequencies not allocated to the same operator system, at least 60 dB or –13 dBm, whichever is less stringent.

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	20	25	5	MASK B (Voice) & MASK G (Data)
821-824	20	12.5	5	MASK B (Voice) & MASK H (Data)
896-901	13.6	12.5	2.5	MASK I (Voice) & MASK J (Data)

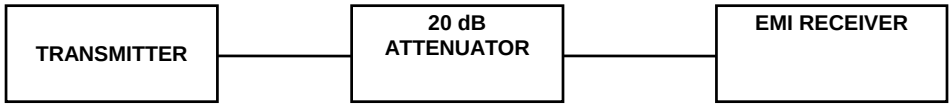
5.9.2. Method of Measurements

Refer to Exhibit 7, § 7.4 of this report for measurement details

5.9.3. 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

5.9.4. Test Arrangement



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

5.9.5. Test Data

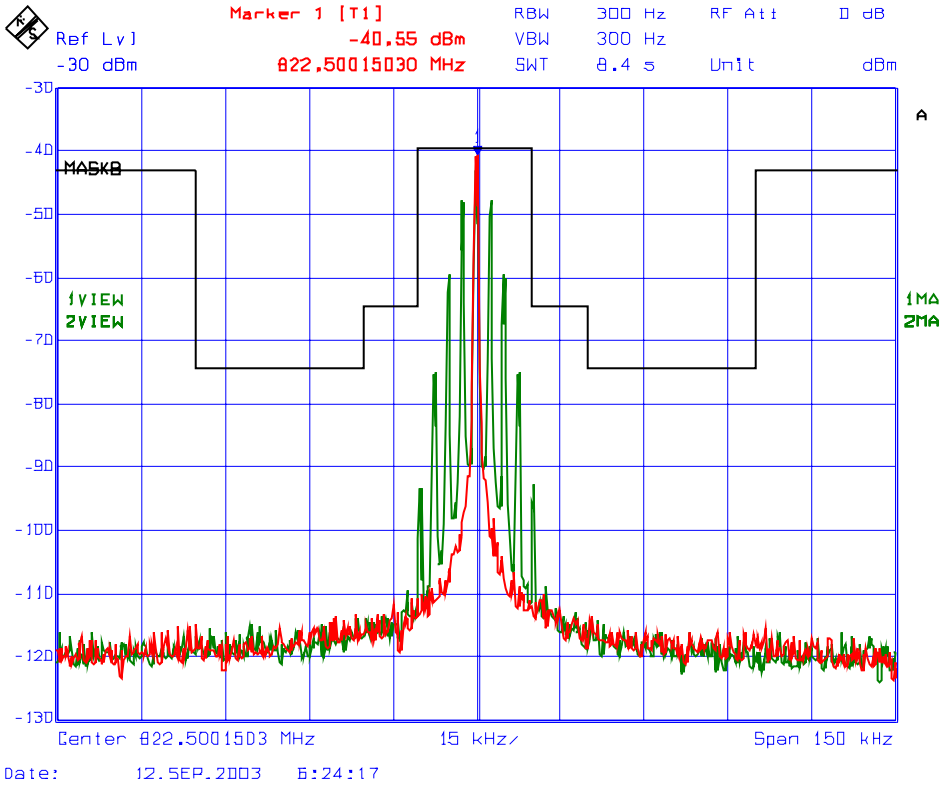
5.9.5.1. Emissions Mask (806-824 MHz)

Conform.

- Refer to Plots 92 to 95 for Emissions Mask B with FM Voice modulation, 12.5 kHz Channel Spacing
- Refer to Plots 96 to 99 for Emissions Mask H with FM Data modulation, 12.5 kHz Channel Spacing
- Refer to Plots 100 to 103 for Emissions Mask B with FM Voice modulation, 25 kHz Channel Spacing
- Refer to Plots 104 to 107 for Emissions Mask G with FM Data modulation, 25 kHz Channel Spacing

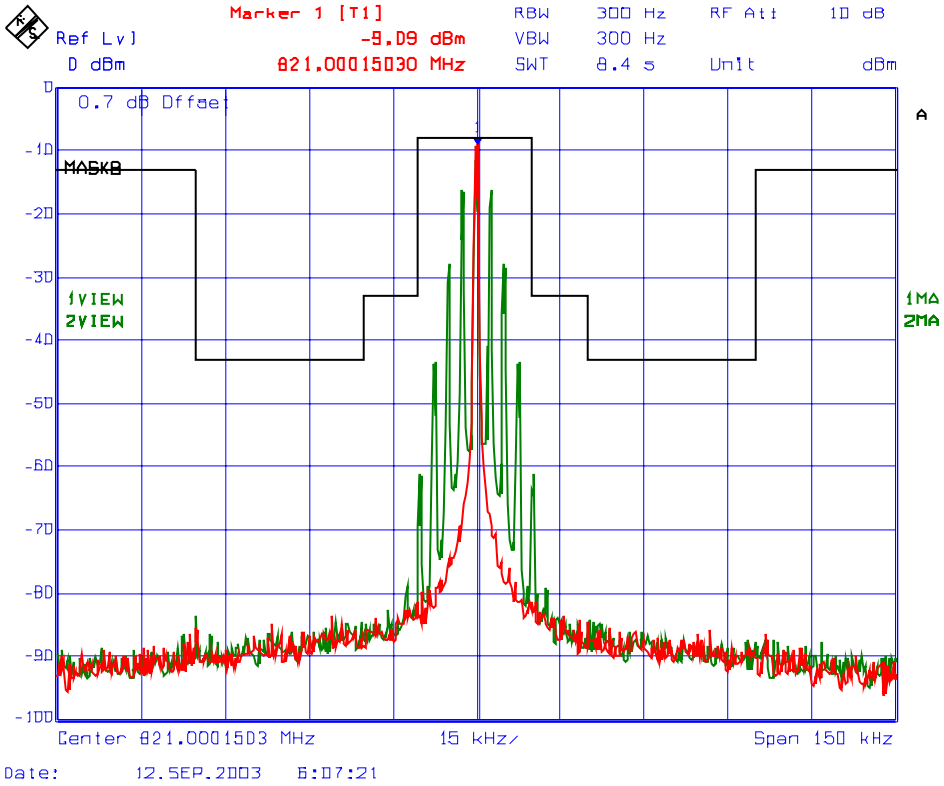
Plot # 92 : Emission Mask B, RF Input Signal

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



Plot # 93 : Emission Mask B, RF Output Signal

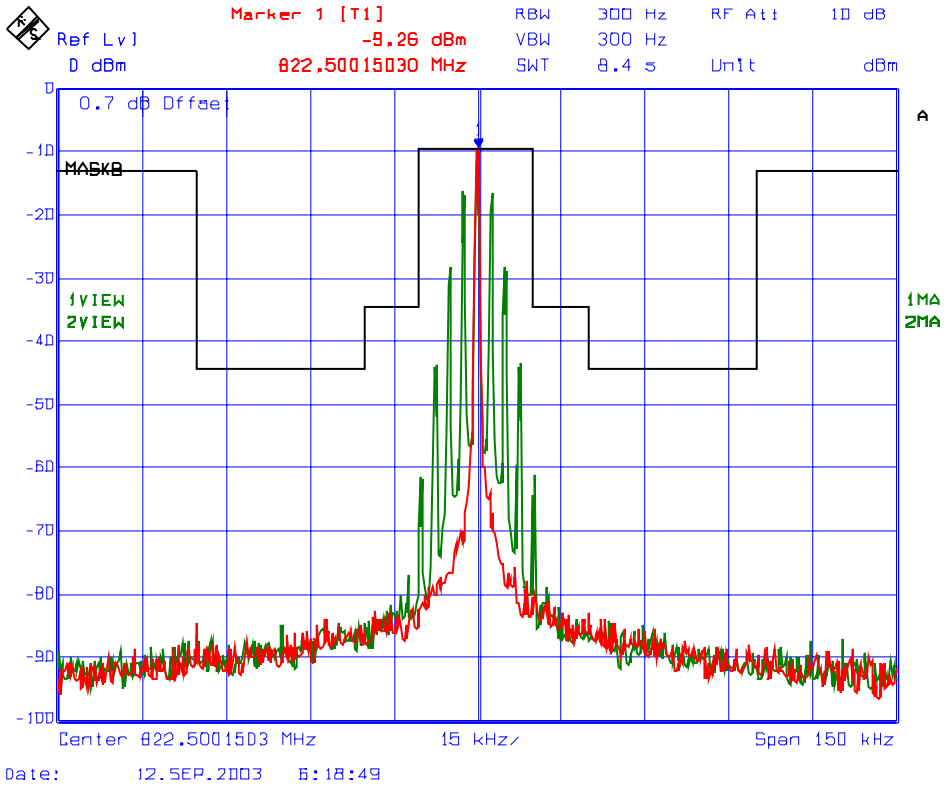
Frequency: 821 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 94 : Emission Mask B, RF Output Signal

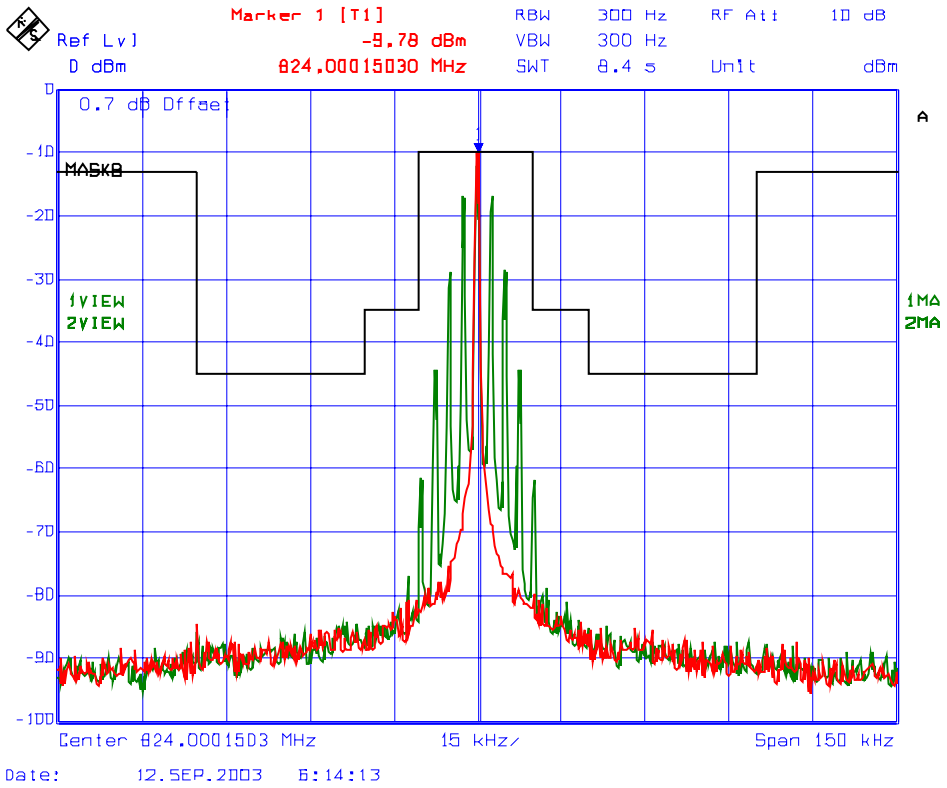
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 95 : Emission Mask B B, RF Output Signal

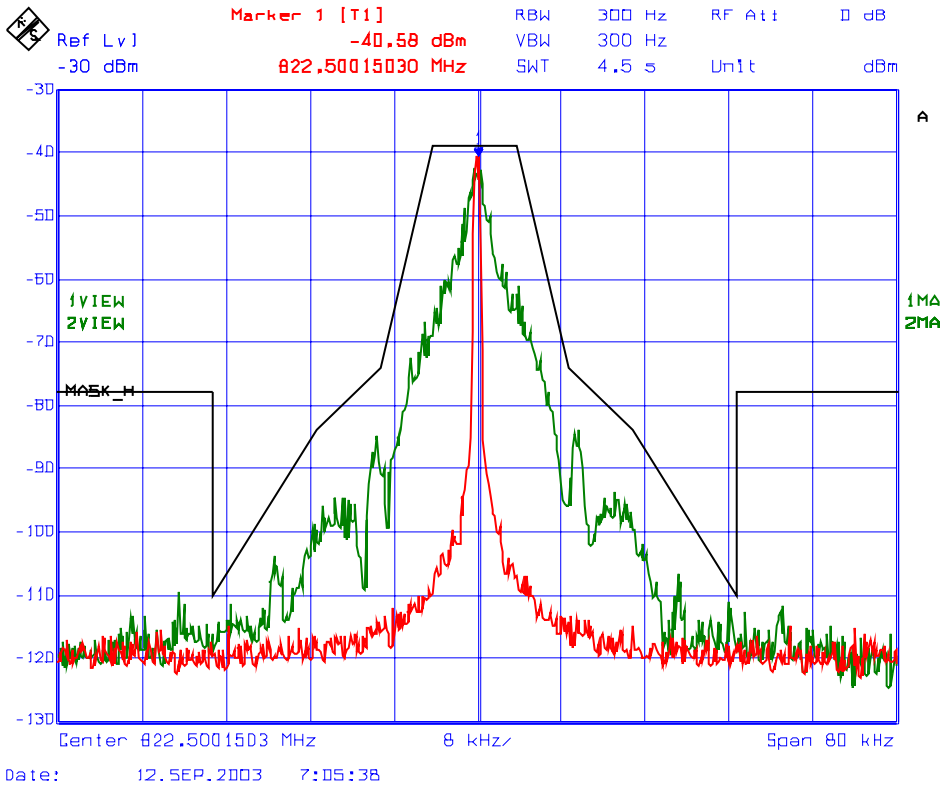
Frequency: 824 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 96 : Emission Mask H, RF Input

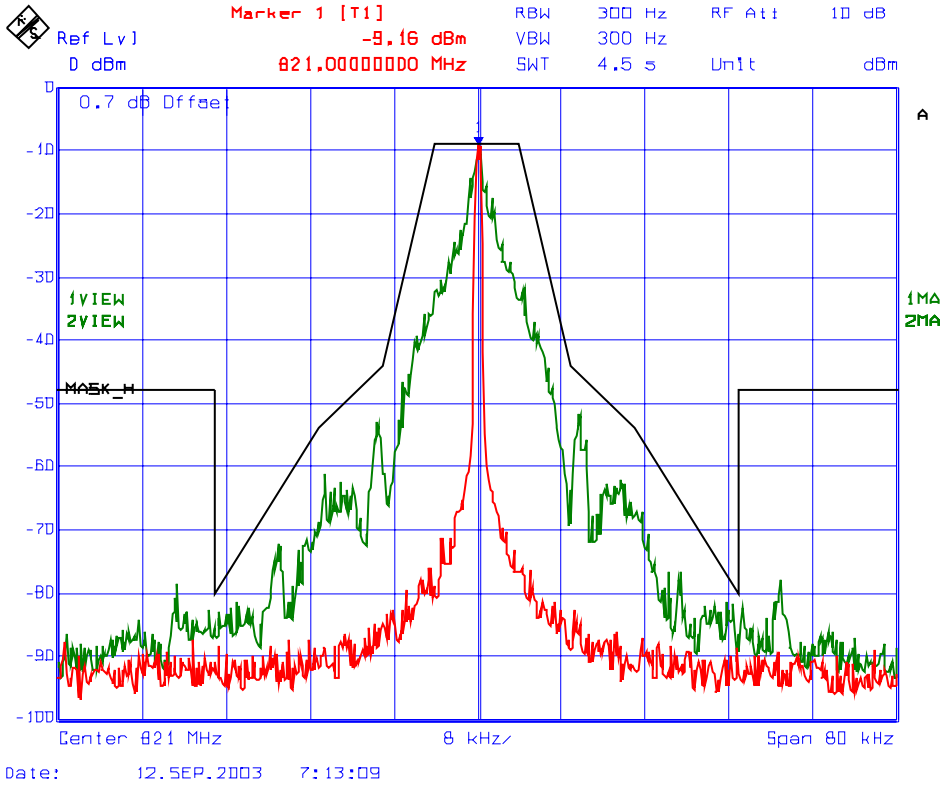
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 97 : Emission Mask H, RF Output

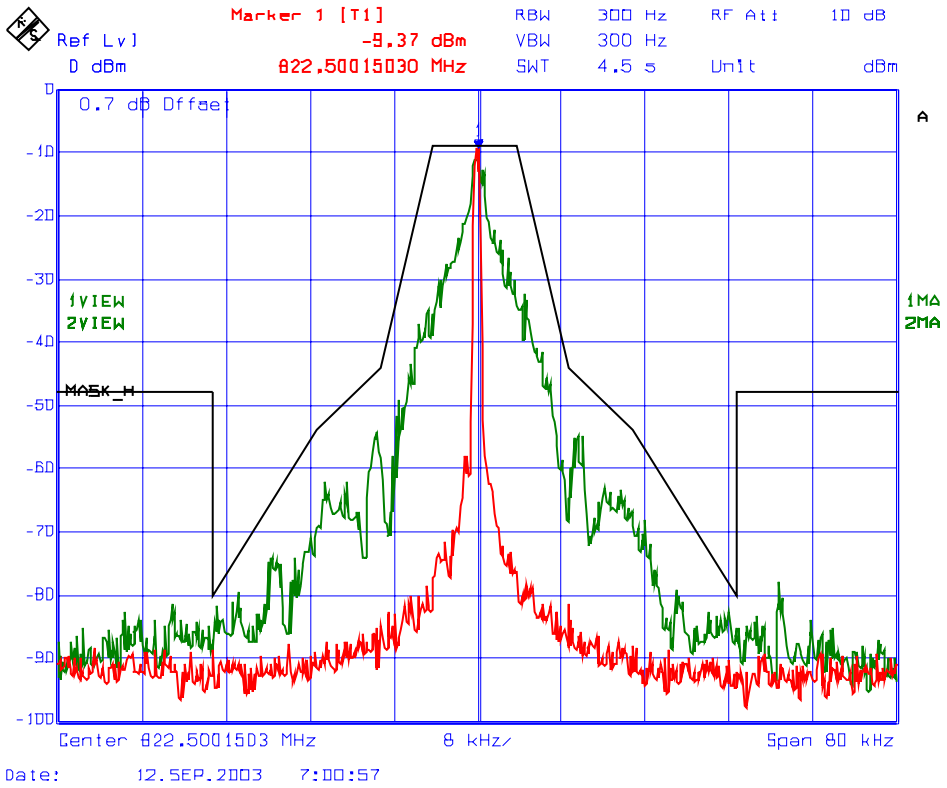
Frequency: 821 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 98 : Emission Mask H, RF Output

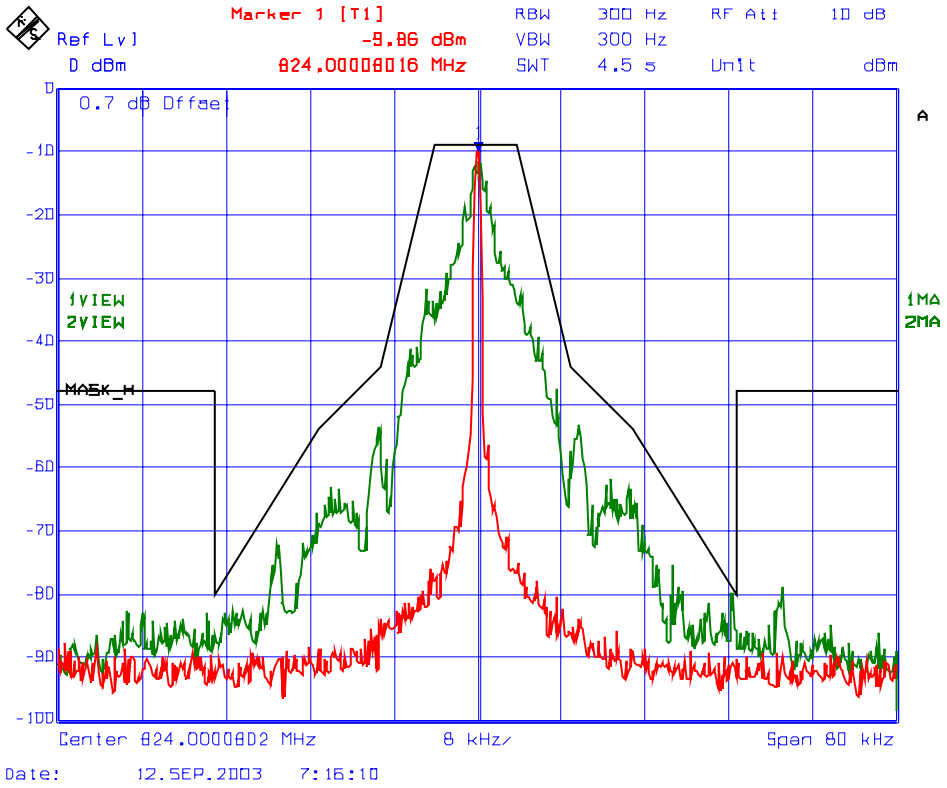
Frequency: 822.5 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 99 : Emission Mask H, RF Output

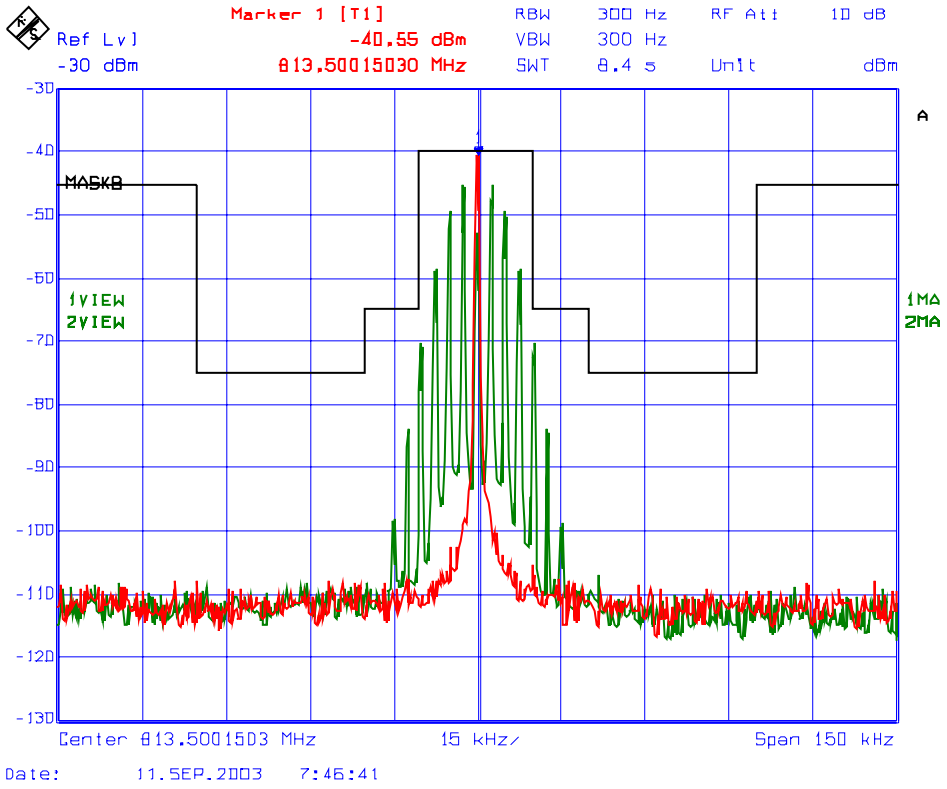
Frequency: 824 MHz, 12.5 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 100 : Emission Mask B, RF Input

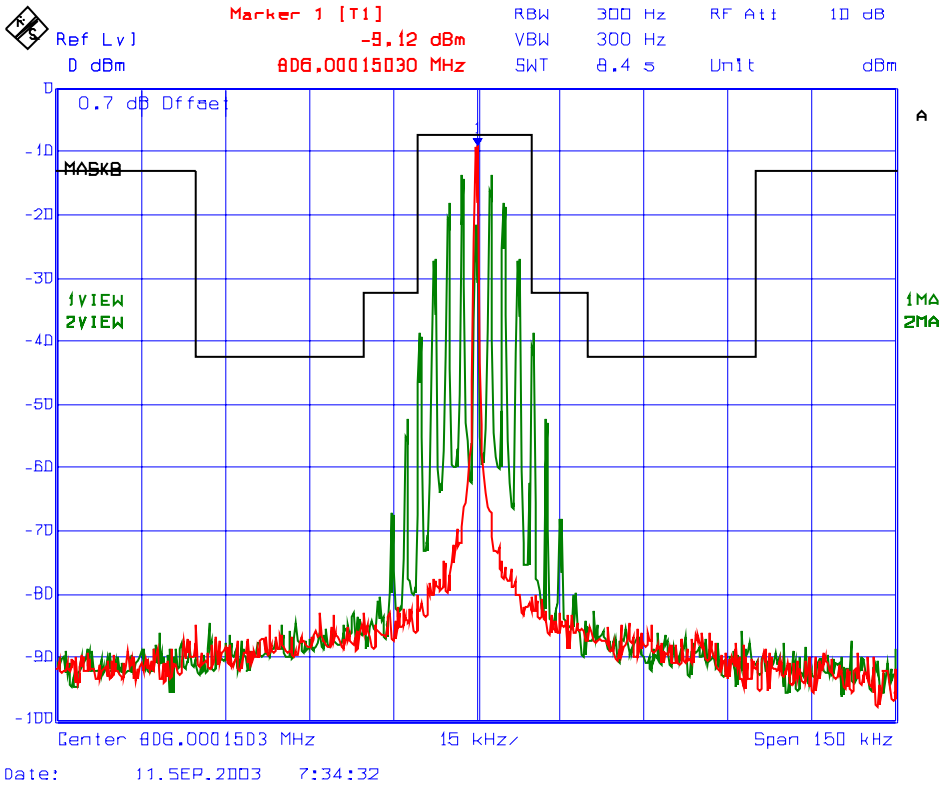
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 101 : Emission Mask B, RF Output

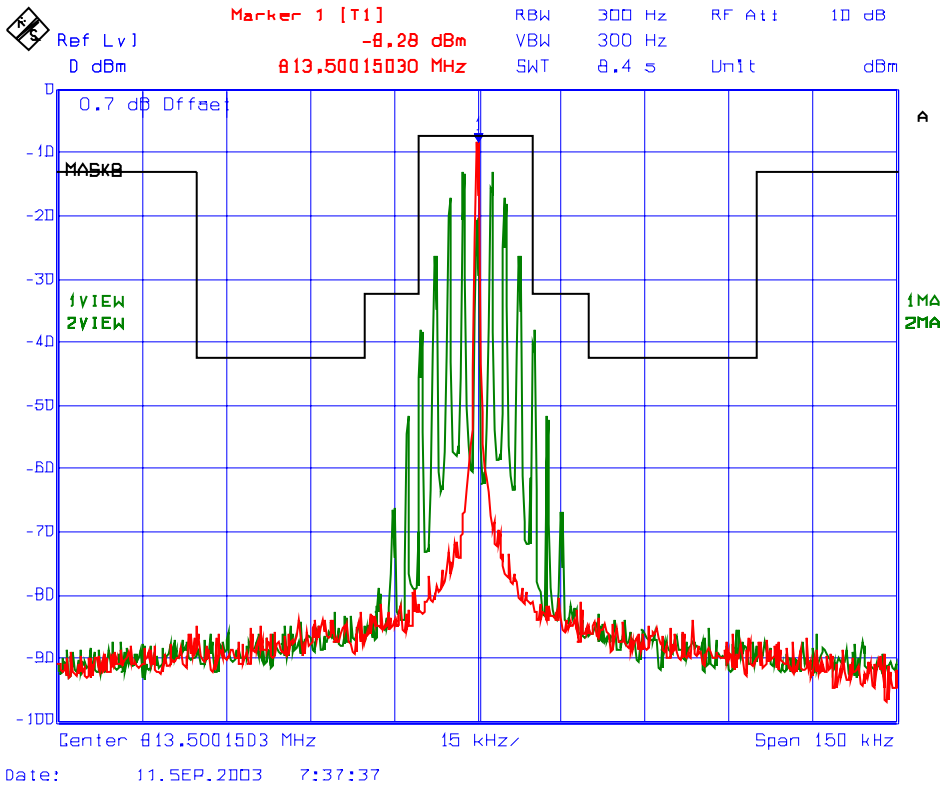
Frequency: 806 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 102 : Emission Mask B, RF Output

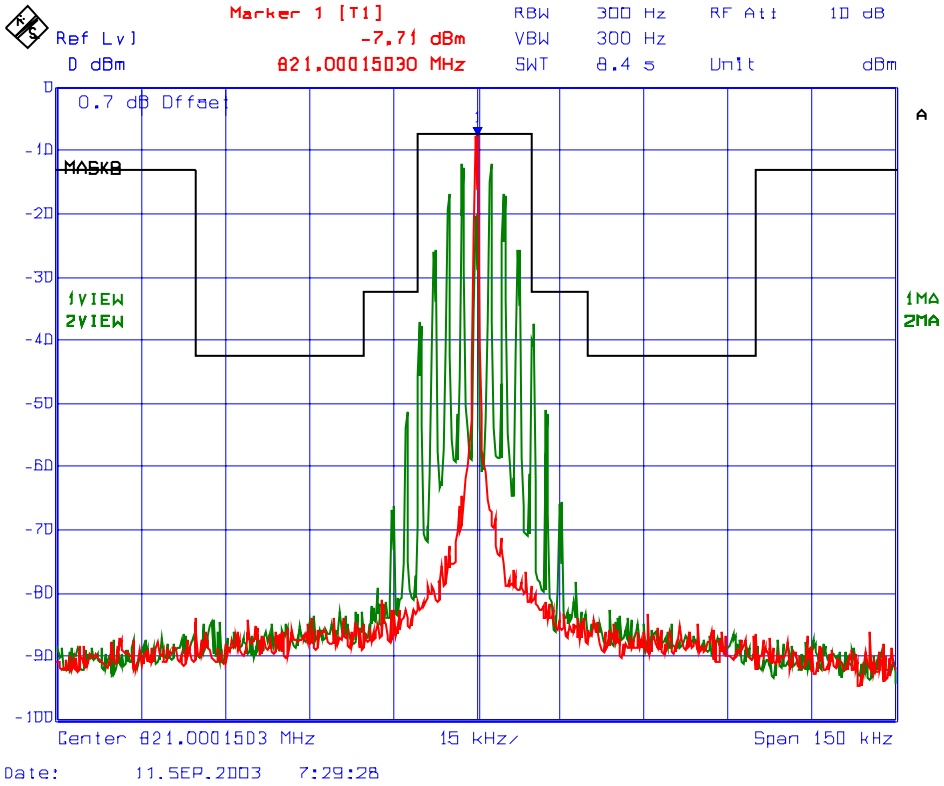
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 103 : Emission Mask B, RF Output

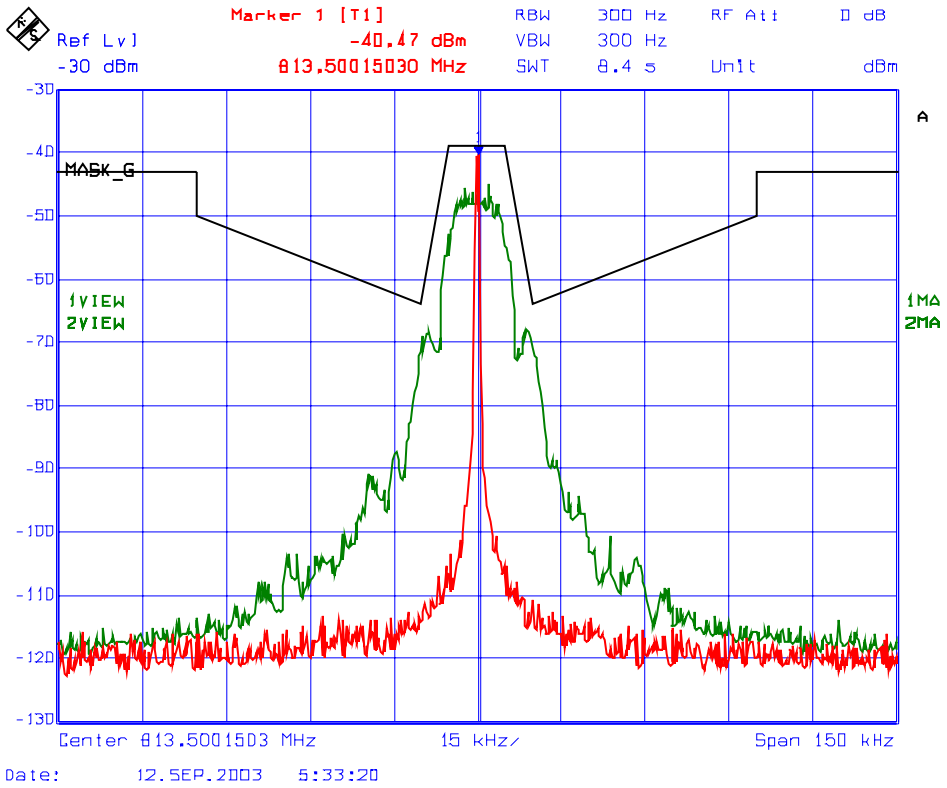
Frequency: 821 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 104 : Emission Mask G, RF Input

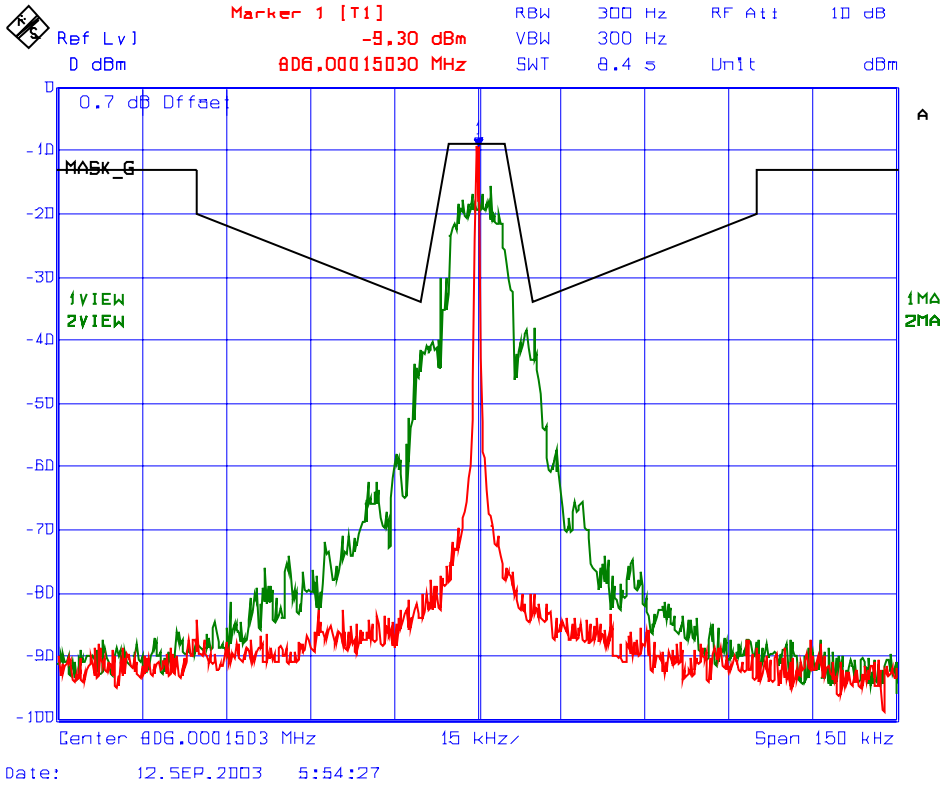
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 105 : Emission Mask G, RF Output

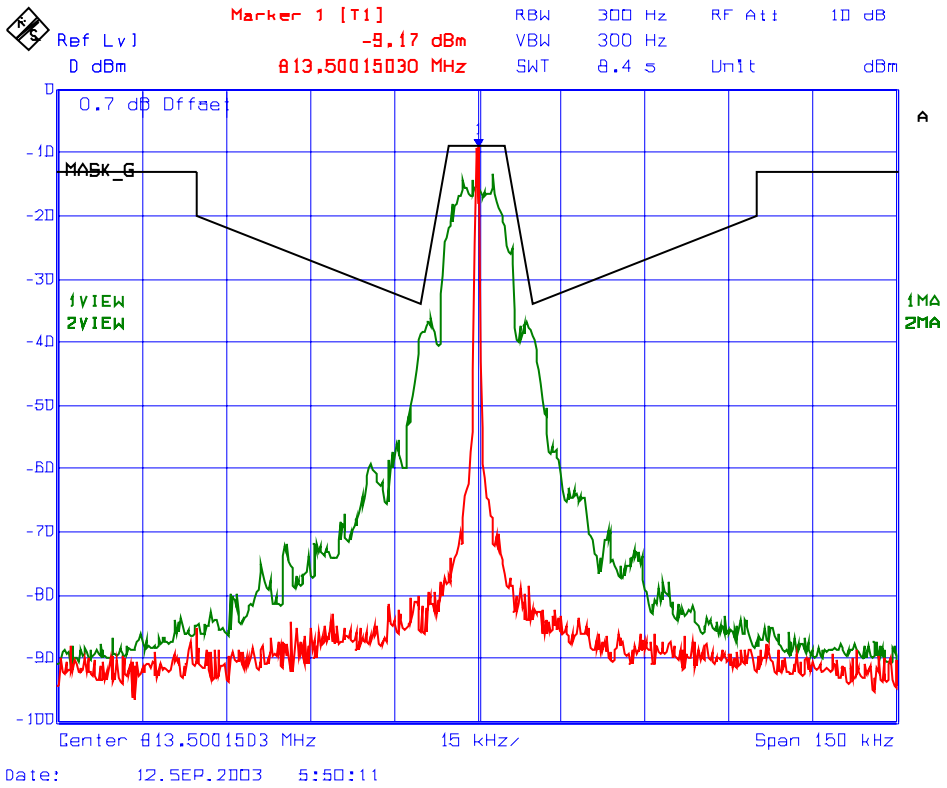
Frequency: 806 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 106 : Emission Mask G, RF Output

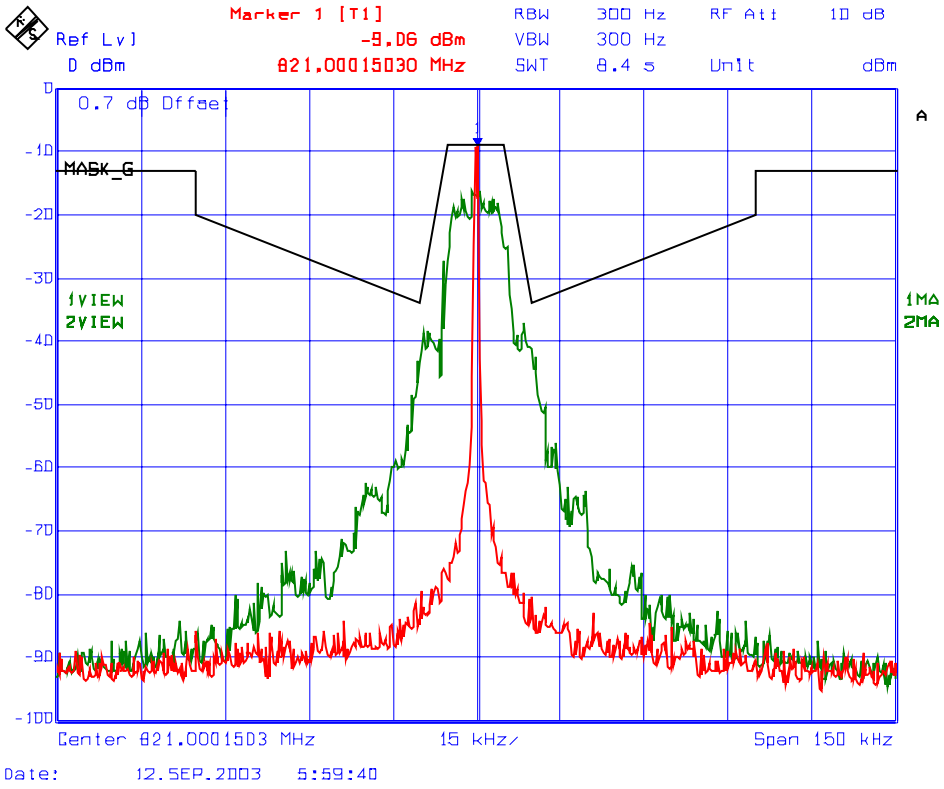
Frequency: 813.5 MHz, 25 kHz Channel Spacing
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 107 : Emission Mask G, RF Output

Frequency: 821MHz, 25 kHz Channel Spacing
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)*

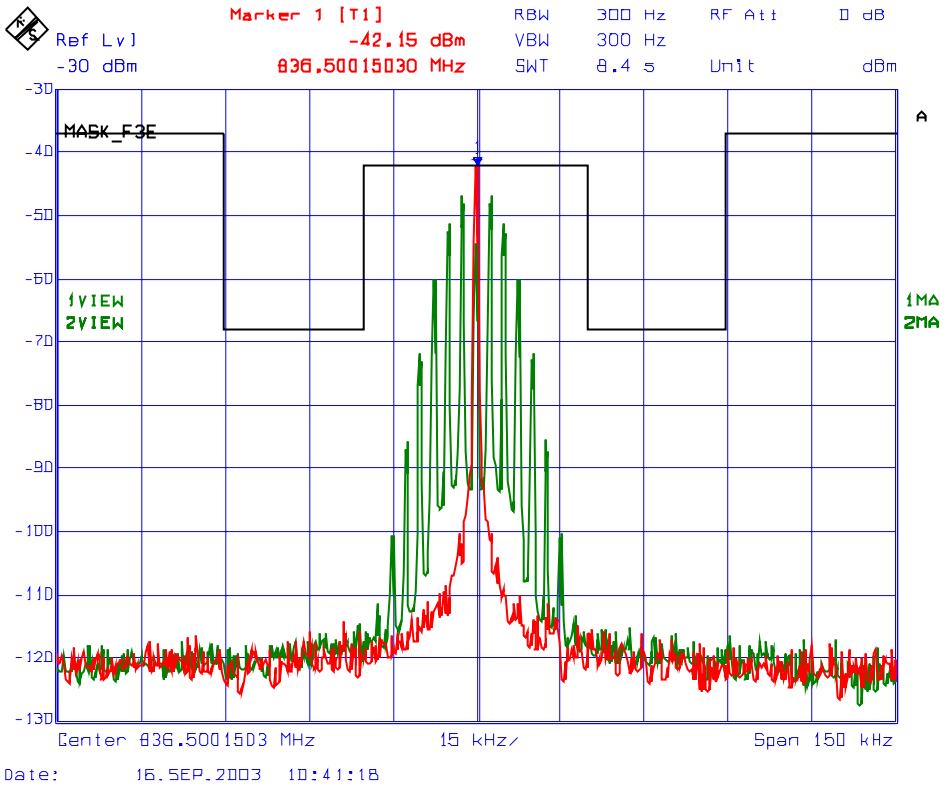
5.9.5.2. Emission Masks / Band-Edge Emissions (824-849 MHz)

Conform.

- Refer to Plots 108 to 111 for Emissions Mask F3E with FM Voice modulation
- Refer to Plots 112 to 115 for Emissions Mask F1D with FM Data modulation
- Refer to Plots 116 to 119 for Emissions Mask CDMA with CDMA modulation
- Refer to Plots 120 to 123 for Band-Edge Emissions with TDMA and GSM modulations.

Plot # 108 : Emission Mask F3E, RF Input

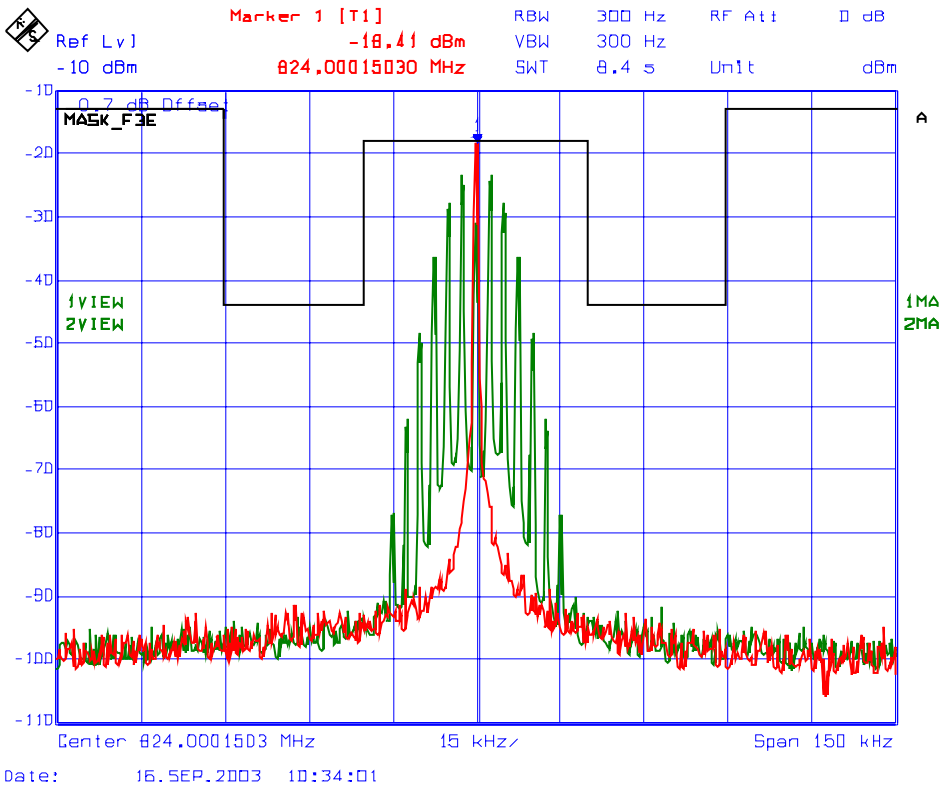
Frequency: 836.5 MHz
Modulation: FM Modulation with 2.5 kHz Sine wave signal



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

Plot # 109 : Emission Mask F3E, RF Output

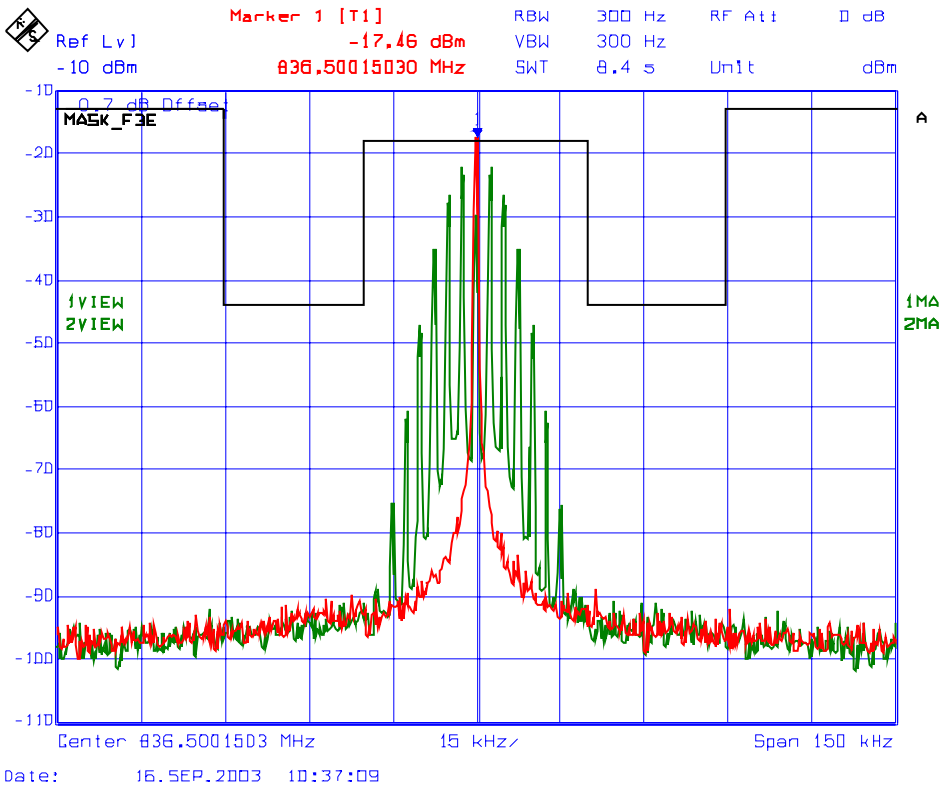
Frequency: 824 MHz
Modulation: FM Modulation with 2.5 kHz Sine wave signal



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

Plot # 110 : Emission Mask F3E, RF Output

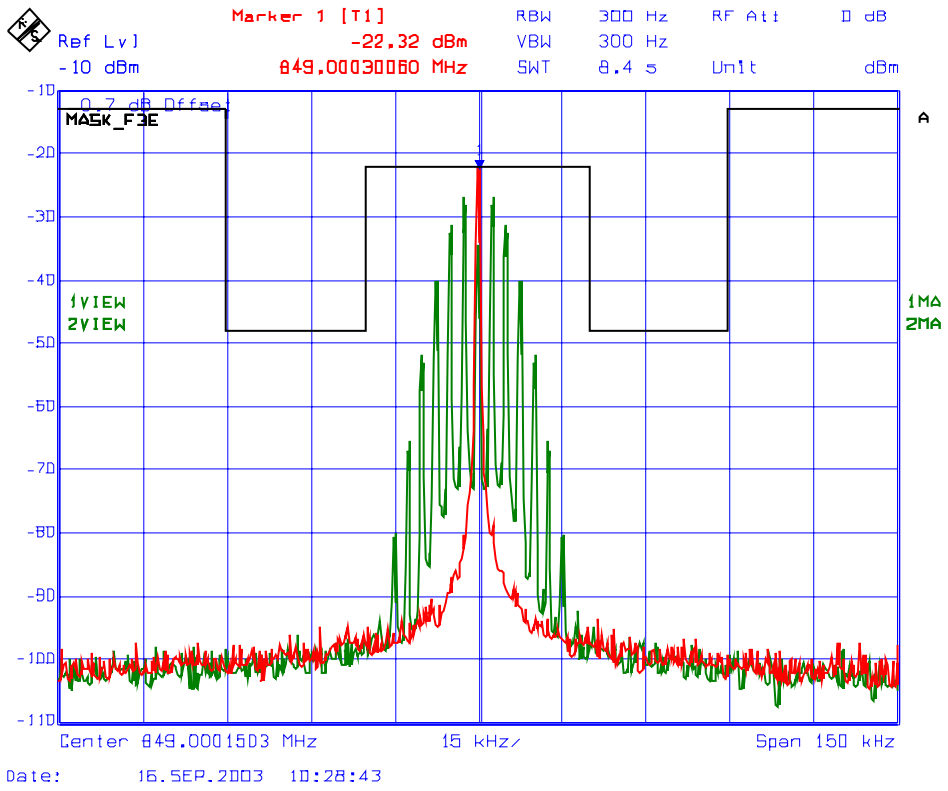
Frequency: 836.5 MHz
Modulation: FM Modulation with 2.5 kHz Sine wave signal



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

Plot # 111 : Emission Mask F3E, RF Output

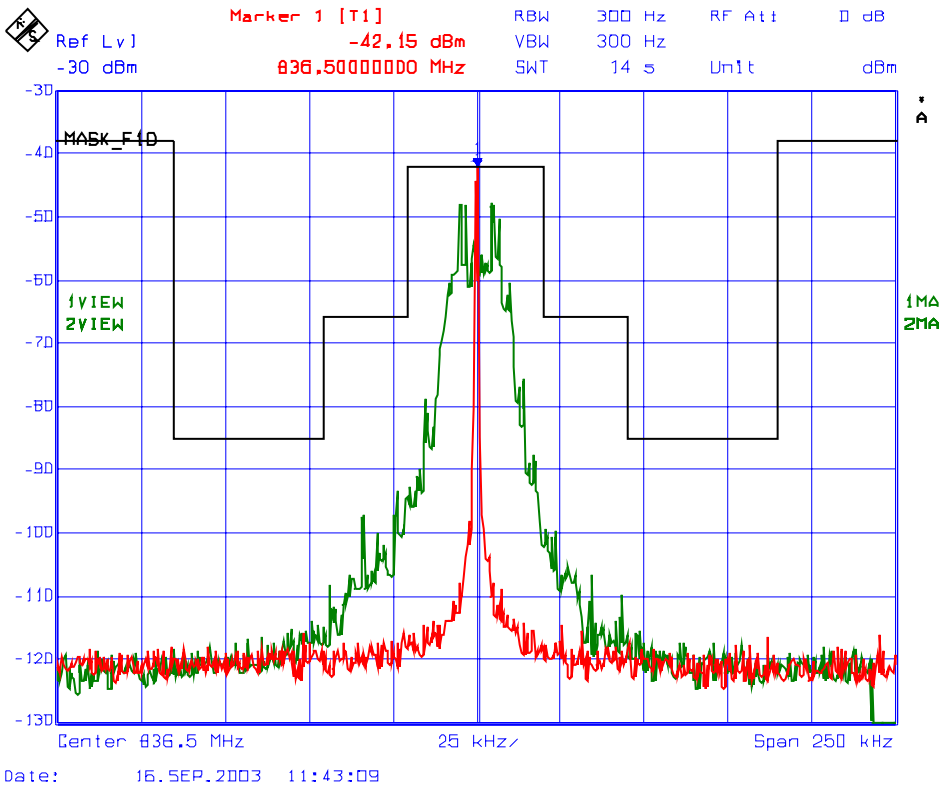
Frequency: 849 MHz
Modulation: FM Modulation with 2.5 kHz Sine wave signal



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

Plot # 112 : Emission Mask F1D, RF Input

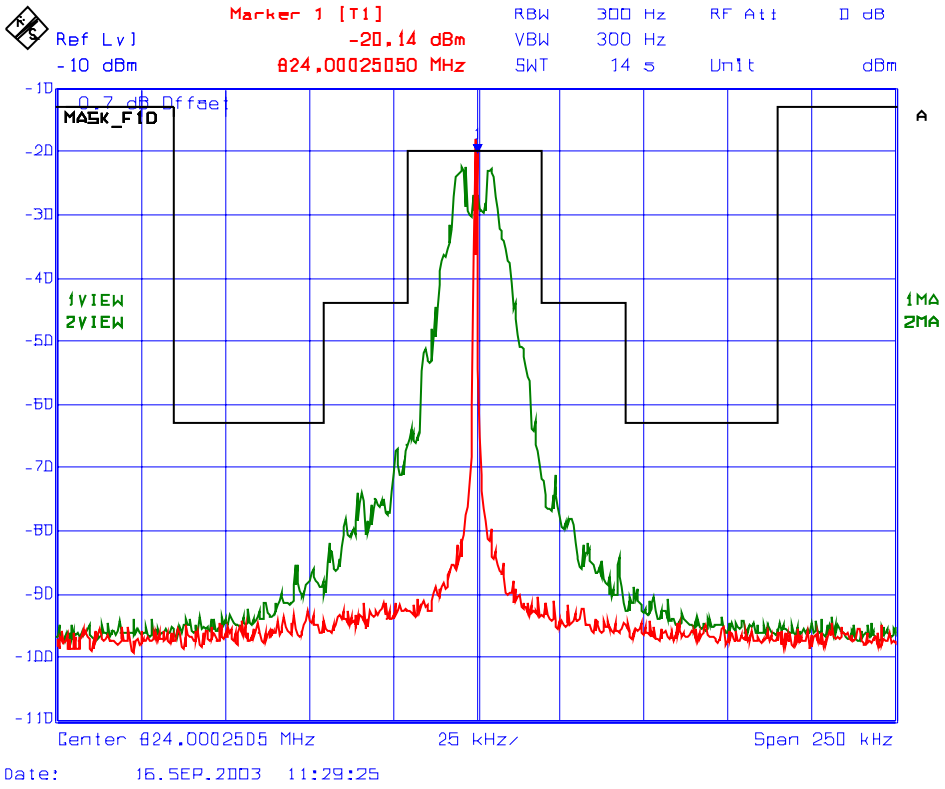
Frequency: 836.5 MHz
Modulation: FM Modulation with an external 9600 b/s random data source



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

Plot # 113 : Emission Mask F1D, RF Output

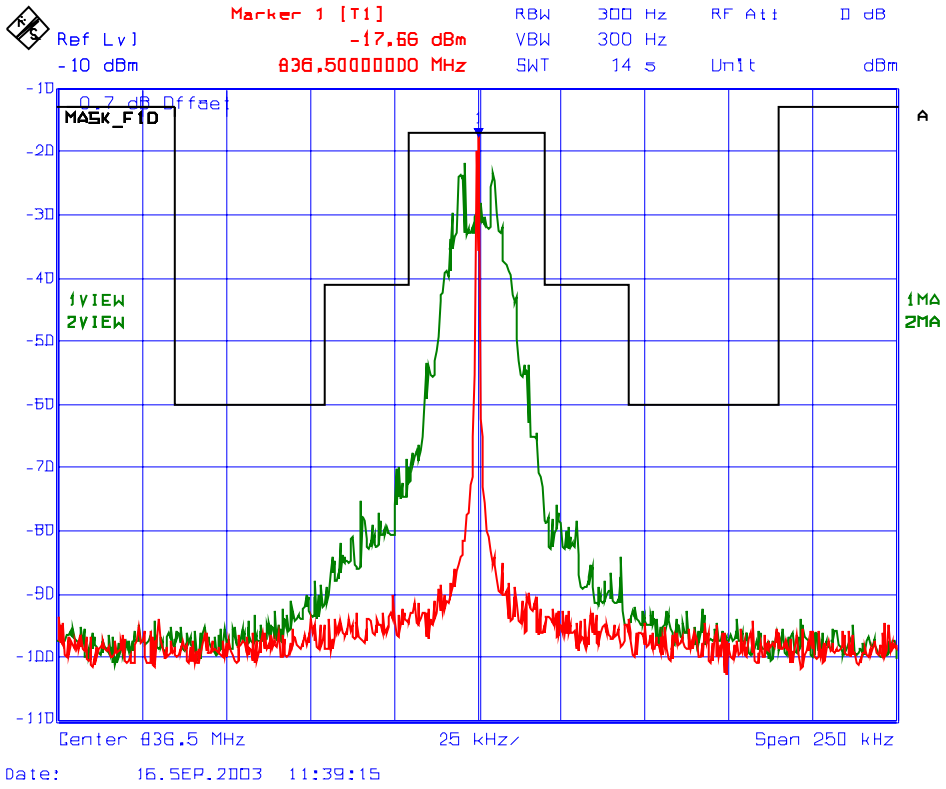
Frequency: 824 MHz
Modulation: FM Modulation with an external 9600 b/s random data source



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

Plot # 114 : Emission Mask F1D, RF Output

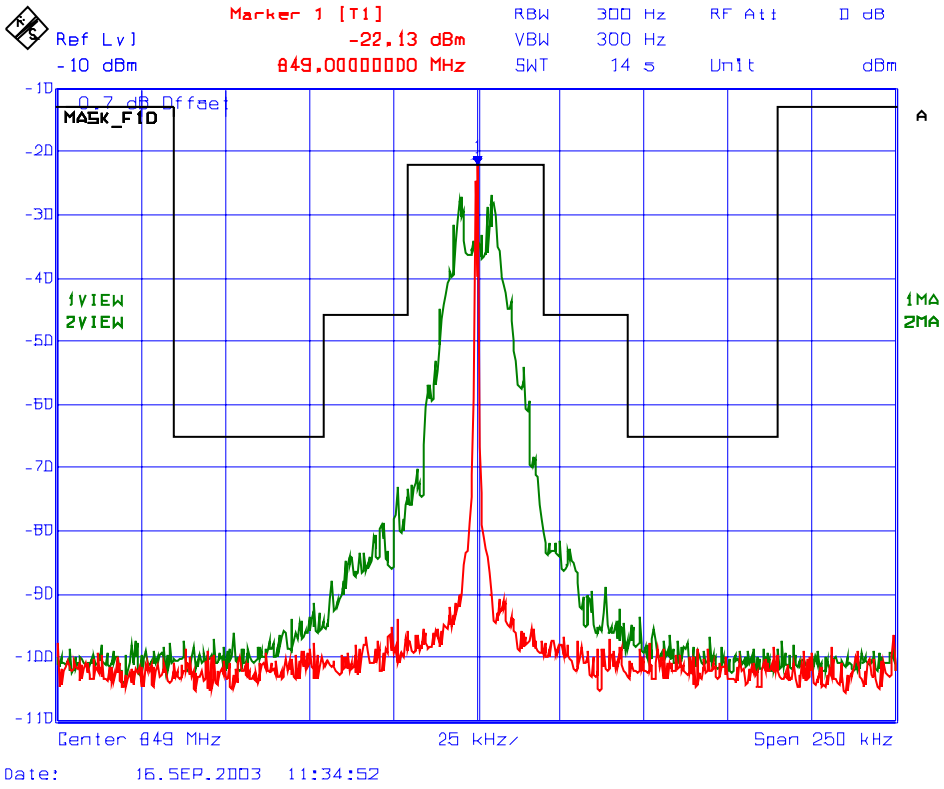
Frequency: 836.5 MHz
Modulation: FM Modulation with an external 9600 b/s random data source



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

Plot # 115 : Emission Mask F1D, RF Output

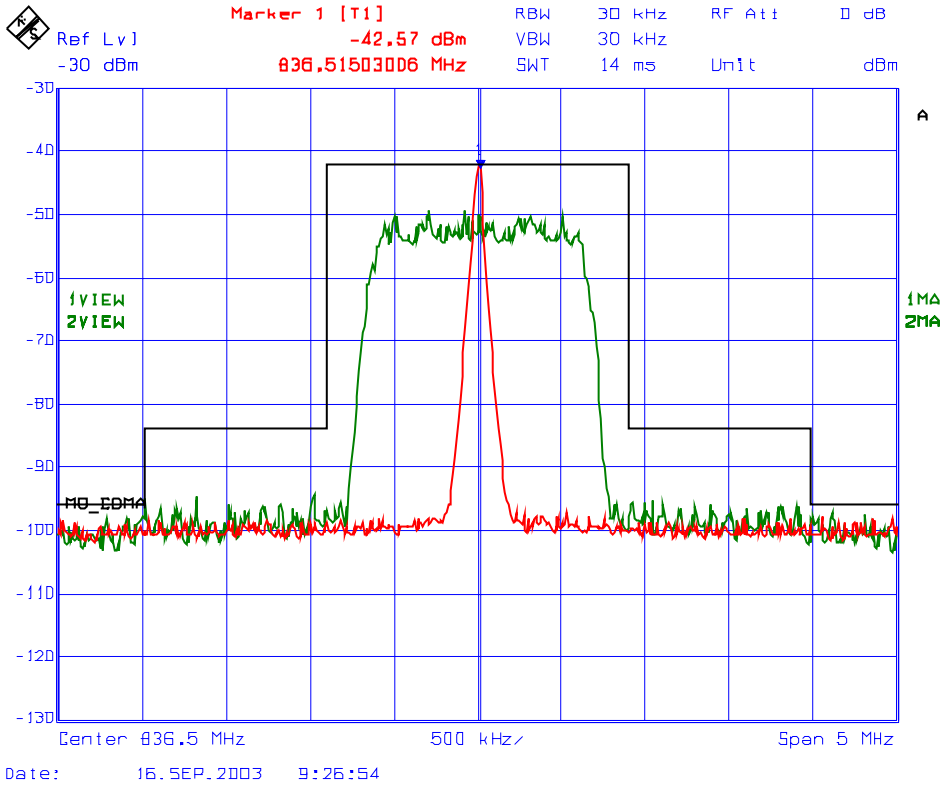
Frequency: 849 MHz
Modulation: FM Modulation with an external 9600 b/s random data source



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

Plot # 116 : Emission Mask CDMA, RF Input

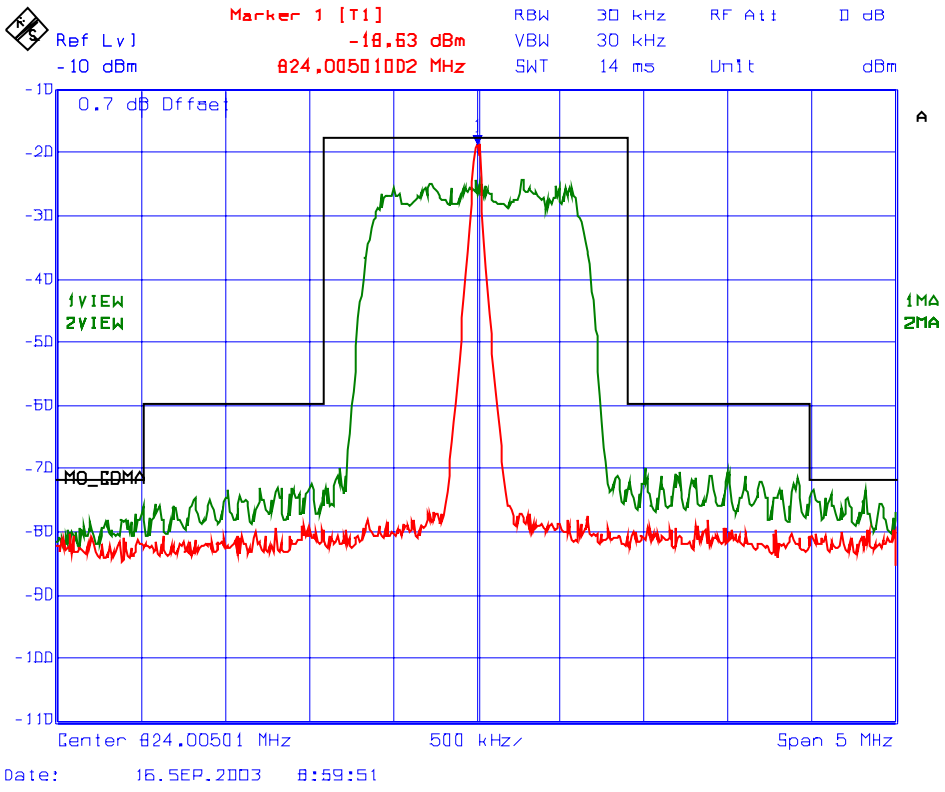
Frequency: 836.5 MHz, Modulation: CDMA



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

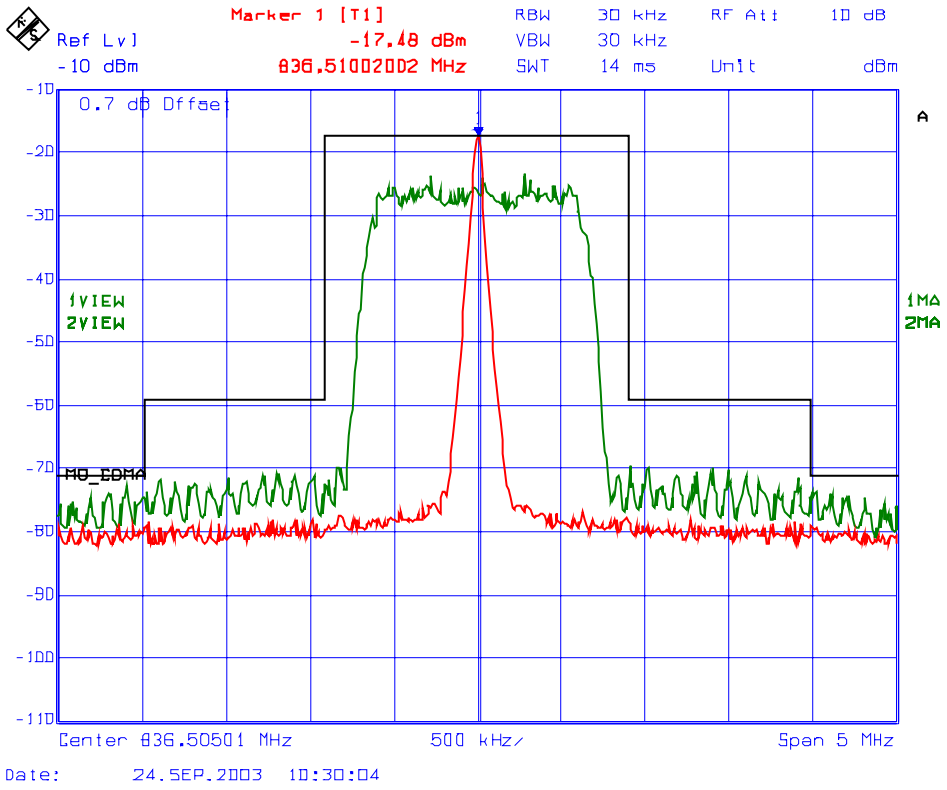
Plot # 117 : Emission Mask CDMA, RF Output

Frequency: 824 MHz, Modulation: CDMA



Plot # 118 : Emission Mask CDMA, RF Output

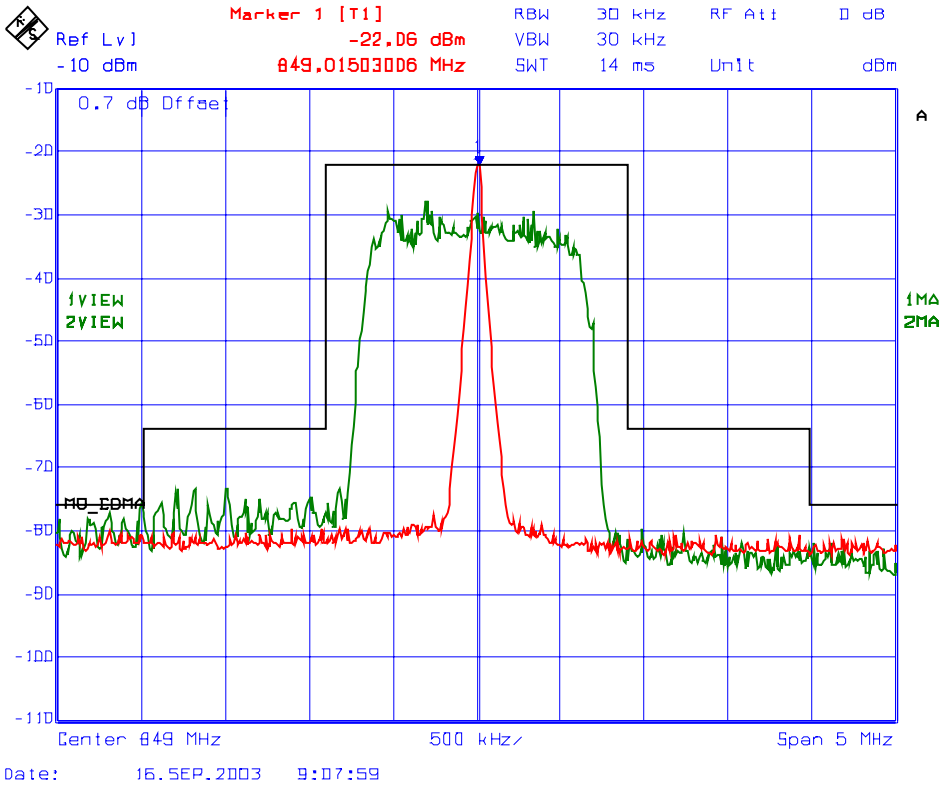
Frequency: 836.5 MHz, Modulation: CDMA



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

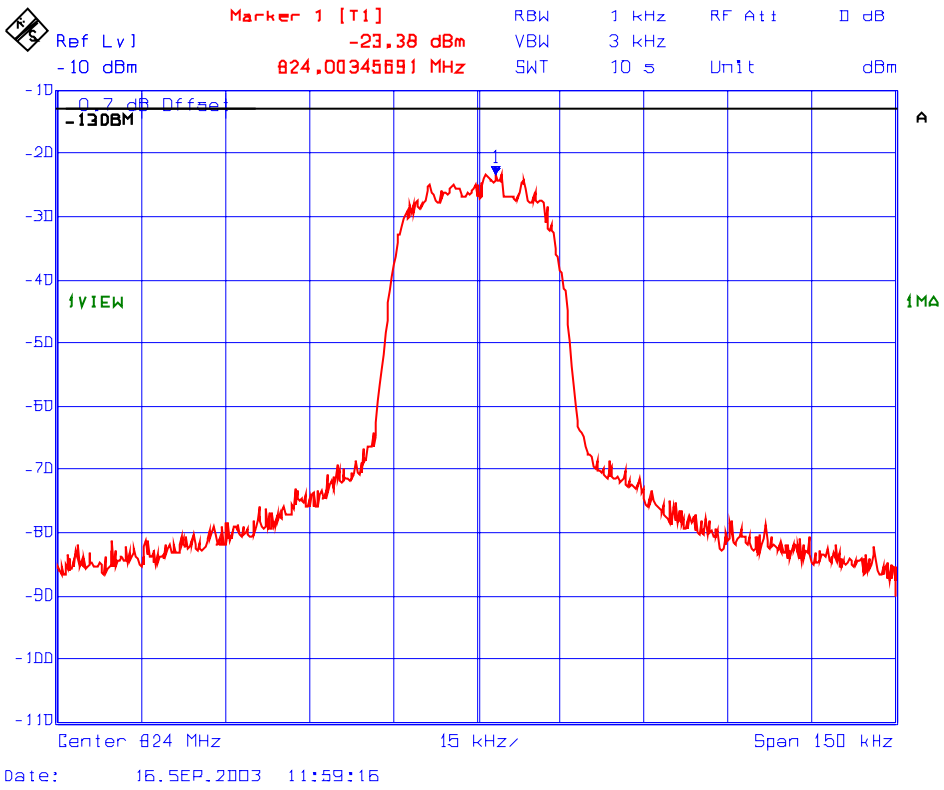
Plot # 119 : Emission Mask CDMA, RF Output

Frequency: 849 MHz, Modulation: CDMA



Plot # 120 : Lower Band-Edge, RF Output

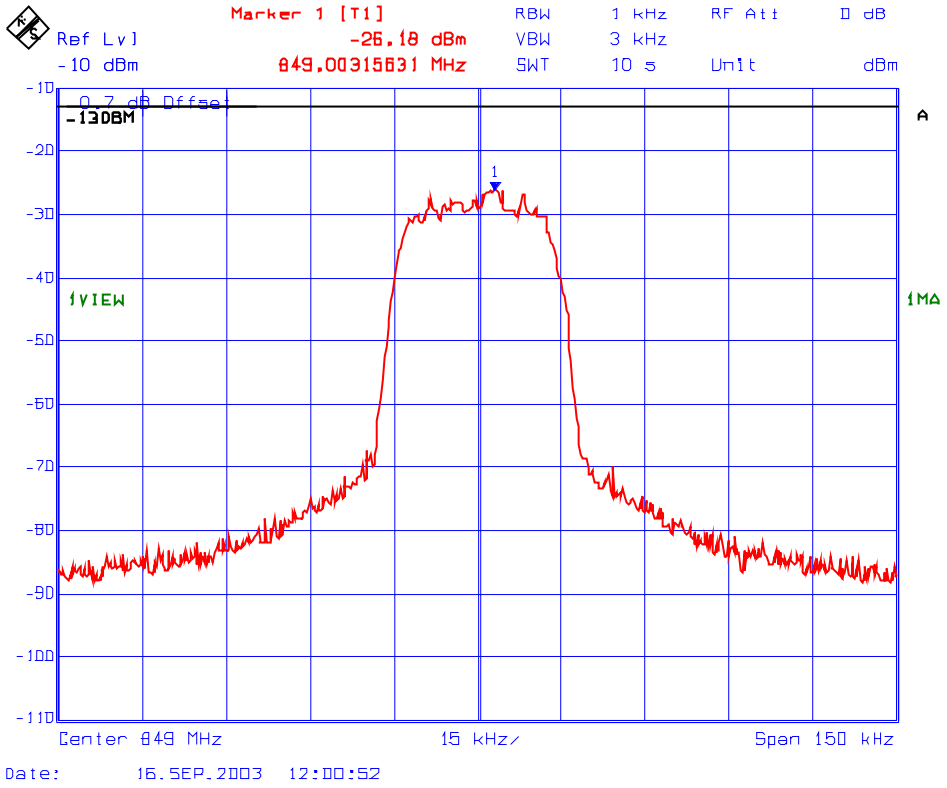
Frequency: 824 MHz, Modulation: TDMA



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

Plot # 121 : Upper Band-Edge, RF Output

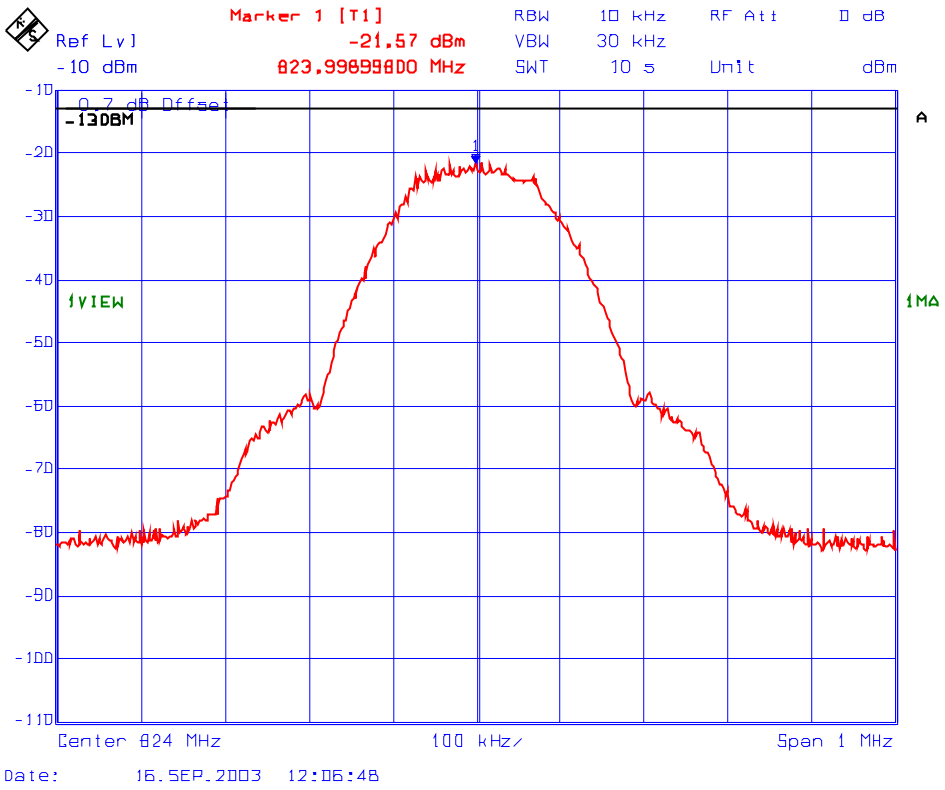
Frequency: 849 MHz, Modulation: TDMA



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

Plot # 122 : Lower Band-Edge, RF Output

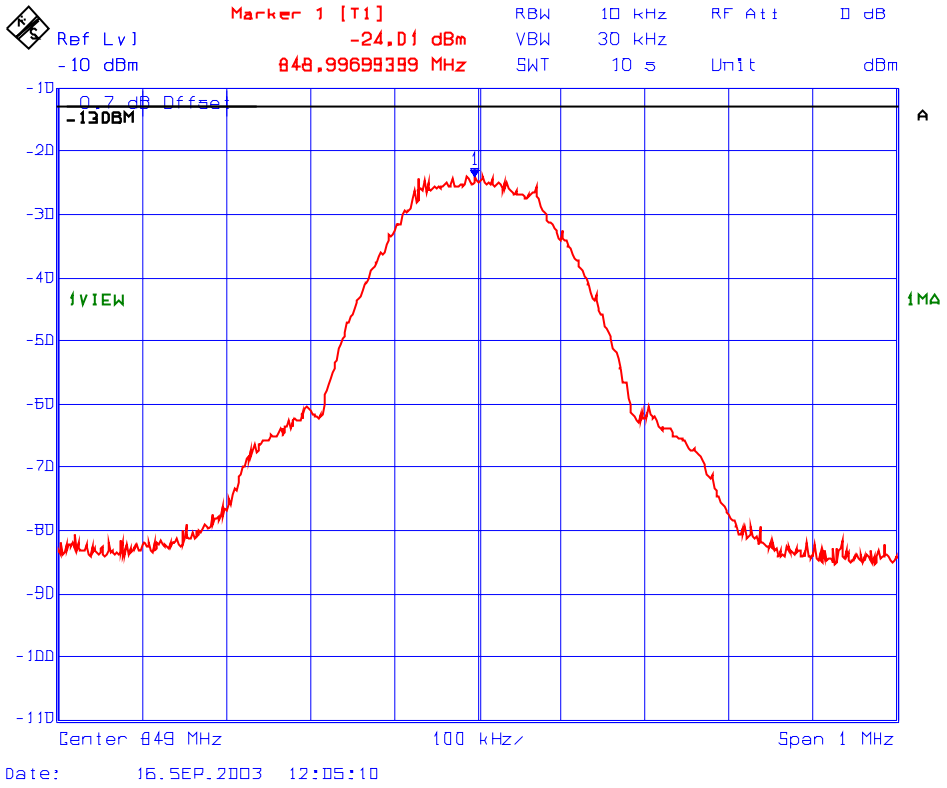
Frequency: 824 MHz, Modulation: GSM



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

Plot # 123 : Upper Band-Edge, RF Output

Frequency: 849 MHz, Modulation: GSM



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

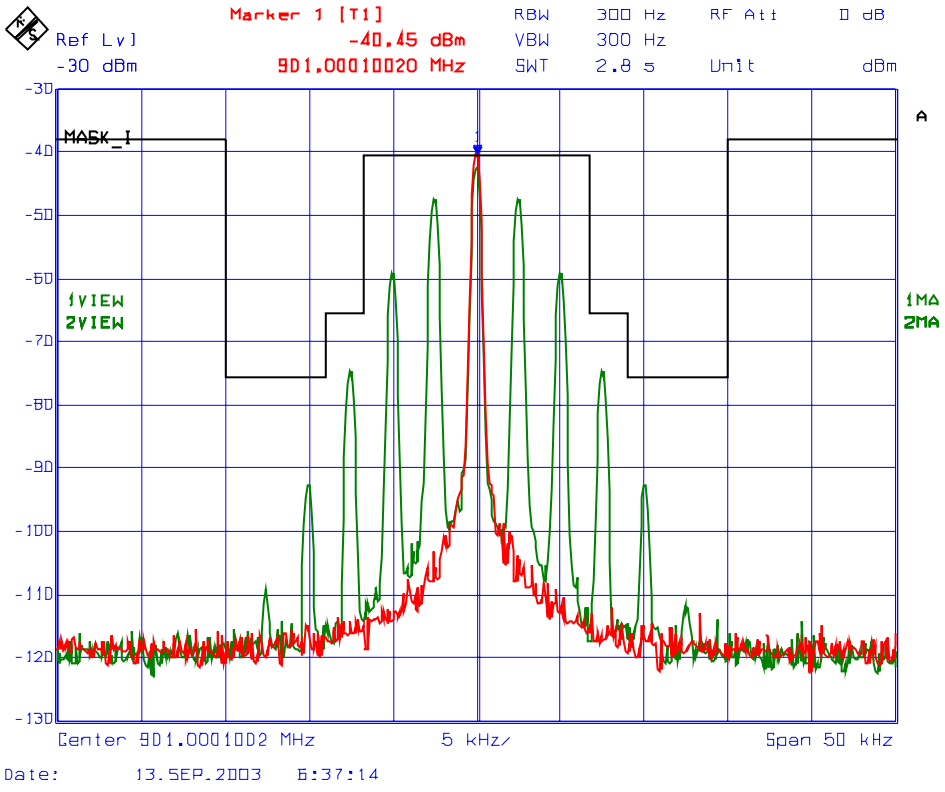
5.9.5.3. Emission Masks (896-901 MHz)

Conform.

- Refer to Plots 124 to 126 for Emissions Mask I with FM Voice modulation, 12.5 kHz Channel Spacing
- Refer to Plots 127 to 129 for Emissions Mask J with FM Data modulation, 12.5 kHz Channel Spacing

Plot # 124 : Emission Mask I, RF Input

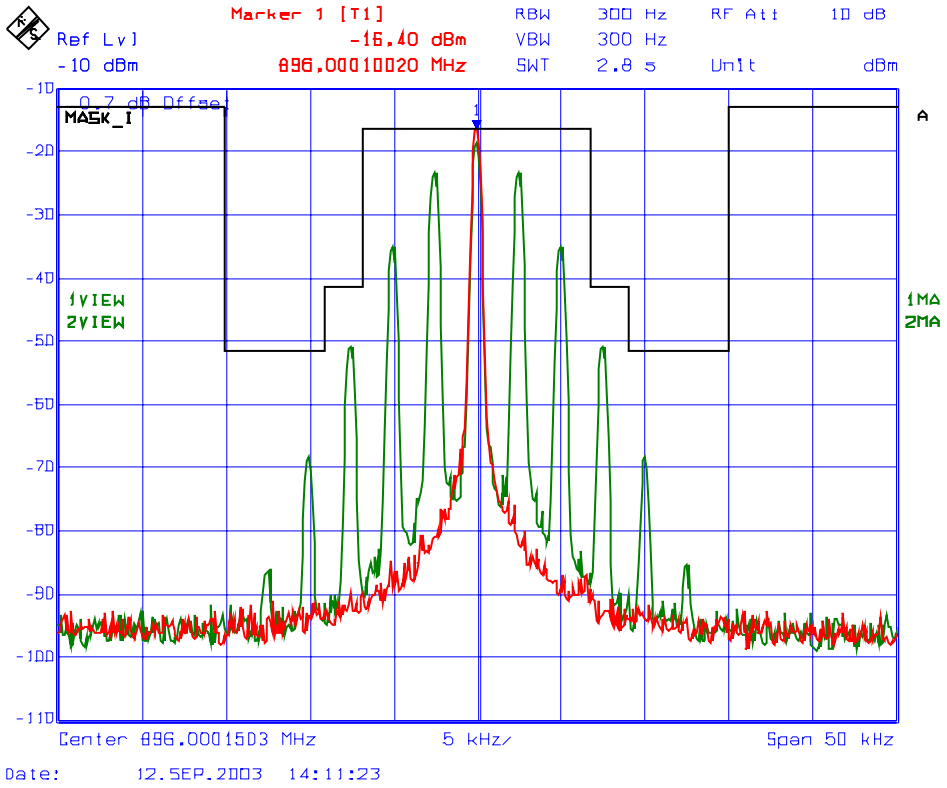
Frequency: 901 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 125 : Emission Mask I, RF Output

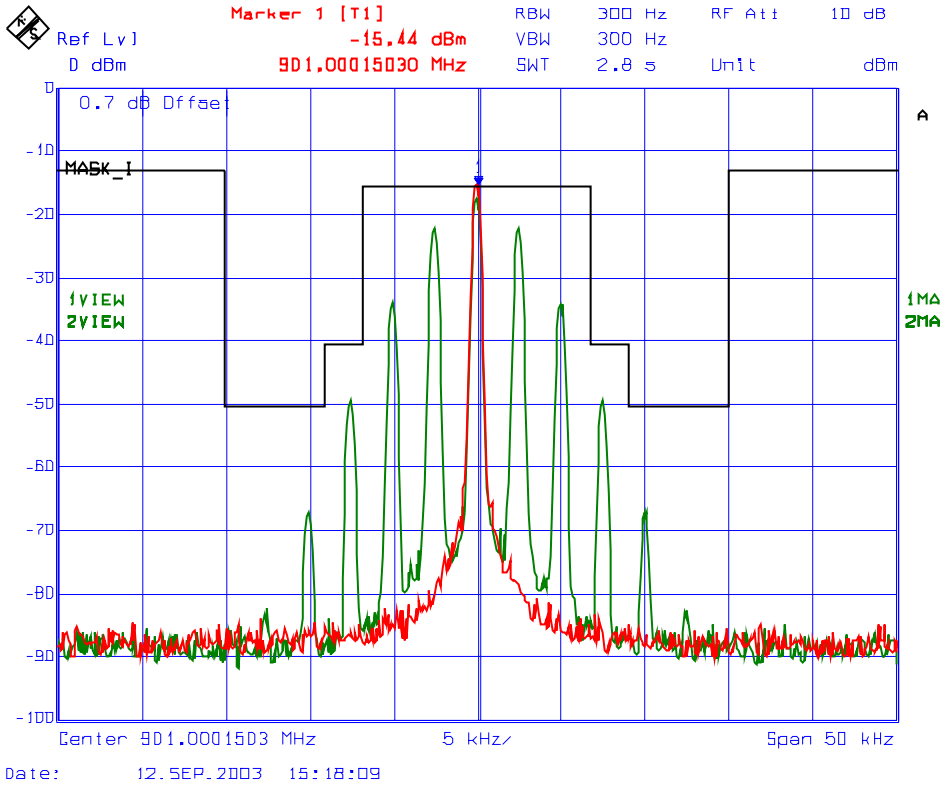
Frequency: 896 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 126 : Emission Mask I, , RF Output

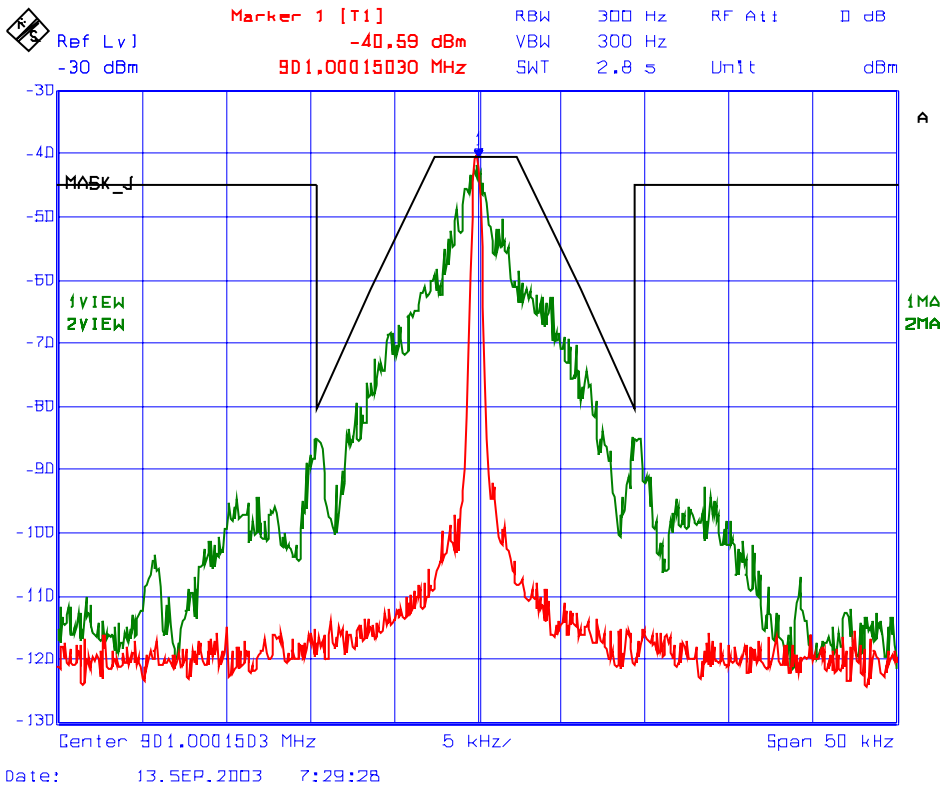
Frequency: 901 MHz
Modulation: FM modulation with 2.5 kHz Sine wave signal



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

Plot # 127 : Emission Mask J, RF Input

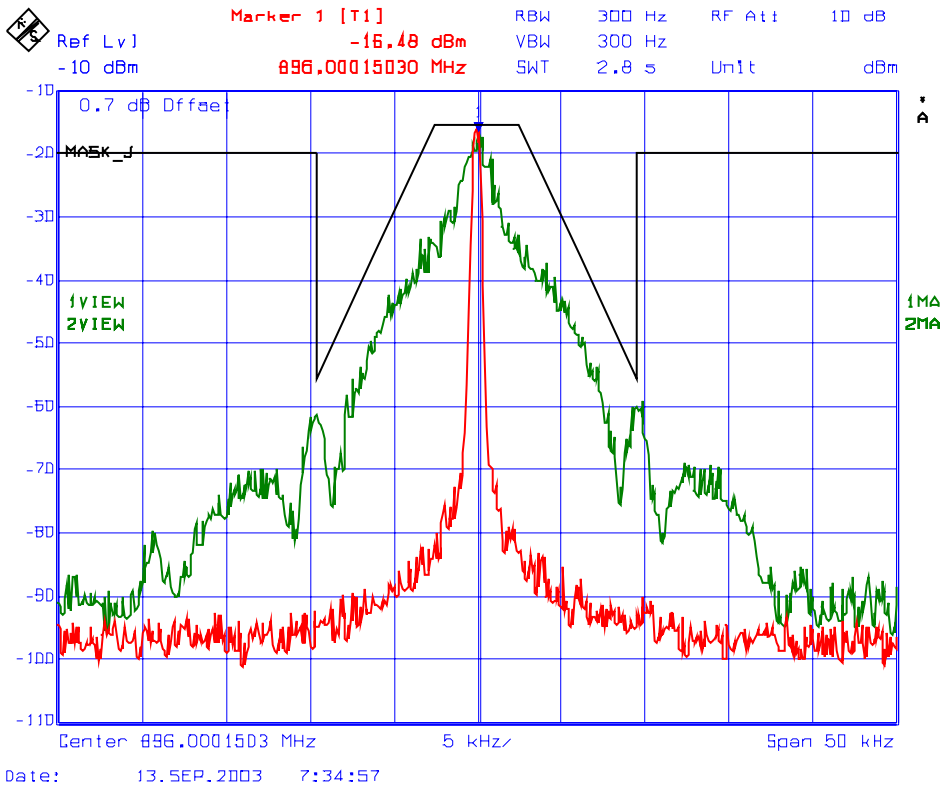
Frequency: 901 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 128 : Emission Mask J, , RF Output

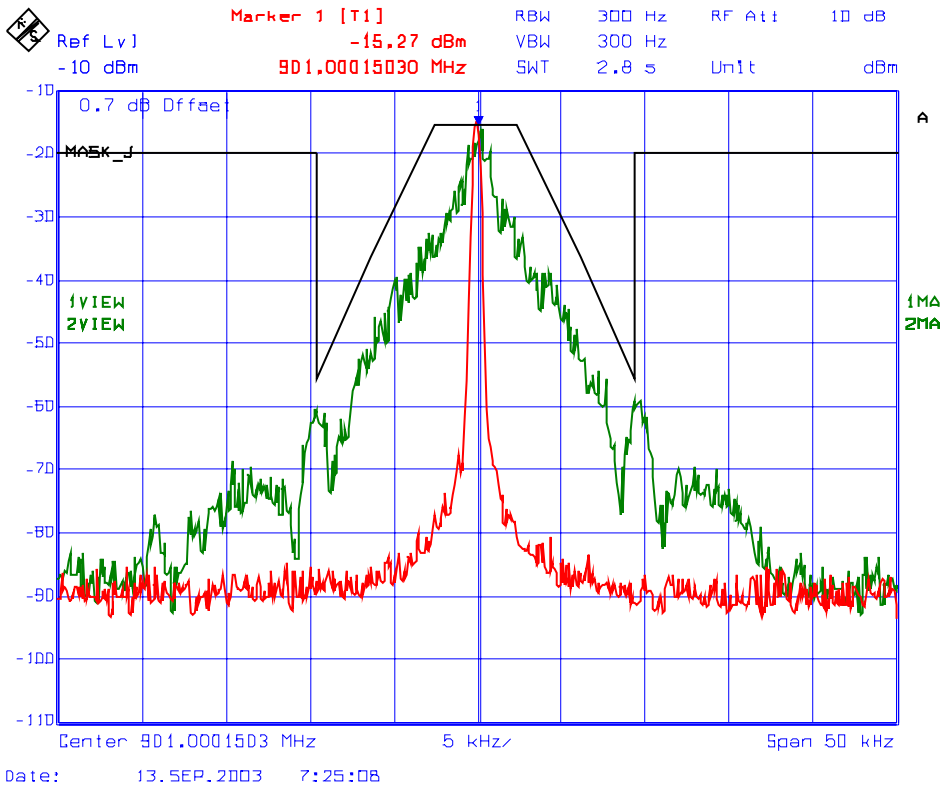
Frequency: 896 MHz
Modulation: FM modulation with an external 9600 b/s random data source



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

Plot # 129 : Emission Mask J, , RF Output

Frequency: 901 MHz
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)*

5.10. TRANSMITTER ANTENNA POWER SPURIOUS/HARMONIC CONDUCTED EMISSIONS @ FCC 2.1049, 22.217, 24.238 & 90.210

5.10.1. Limits

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

Frequency Range (MHz)	FCC Rules	FCC Applicable Mask
806-821 MHz (Trunking) 821-824 MHz	90.210(b), (g) 90.210(b), (h)	• 43+10*log(P) dBc, P is power in watts or –13 dBm
824-849 MHz (Base Cellular)	22.917(e)	• 43+10*log(P) dBc, P is power in watts or –13 dBm
896-901MHz (Paging)	90.210(i), (j)	• 50+10*log(P) dBc, P is power in watts or –20 dBm
1850-1910 MHz (PCS)	24.238 (a)	• 43+10*log(P) dBc, P is power in watts or –13 dBm,

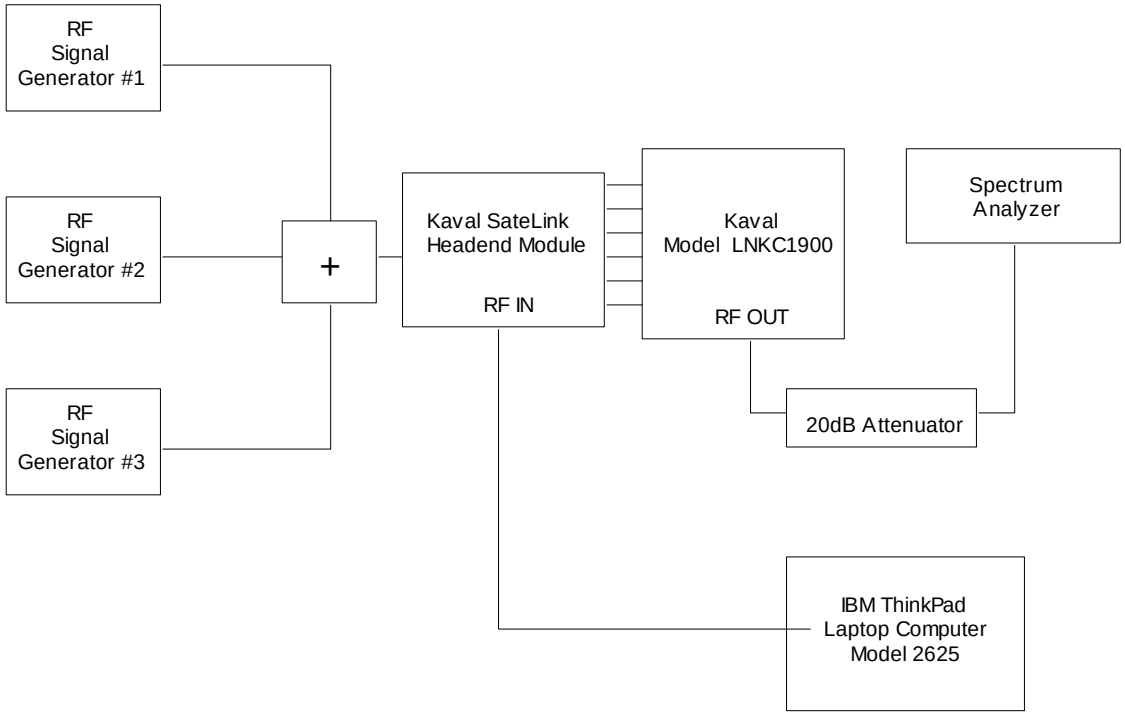
5.10.2. Method of Measurements

Refer to Exhibit 7 § 7.1 of this report for measurement details

5.10.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ 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

5.10.4. Test Arrangement



5.10.5. Test Data

Remarks: Based on our prescans, the unmodulated signal operation was the worst case of rf interference; since the un-modulated rf output power is higher than the FM analog, FM data, CDMA, TDMA and GSM modulation, the unmodulated rf input and output signals will be operated during tests for the wost case of spurious/harmonic emissions.

5.10.5.1. 806 – 824 MHz (Trunking)

5.10.5.1.1. Lowest Frequencies

Fundamental Frequency: 806 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.79 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
847.23	-46.4	4.2	-50.6	PASS
894.84	-38.9	4.2	-43.1	PASS
1595.20	-47.7	4.2	-51.9	PASS
2406.81	-54.1	4.2	-58.3	PASS
3633.26	-57.9	4.2	-62.1	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 130 –131 for spurious conducted emissions.

Fundamental Frequency: 806 & 806.025 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.5 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
847.23	-46.5	3.5	-50.0	PASS
896.83	-38.2	3.5	-41.7	PASS
1613.22	-48.2	3.5	-51.7	PASS
2406.81	-56.7	3.5	-60.2	PASS
3633.26	-57.7	3.5	-61.2	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 132 –133 for spurious conducted emissions.

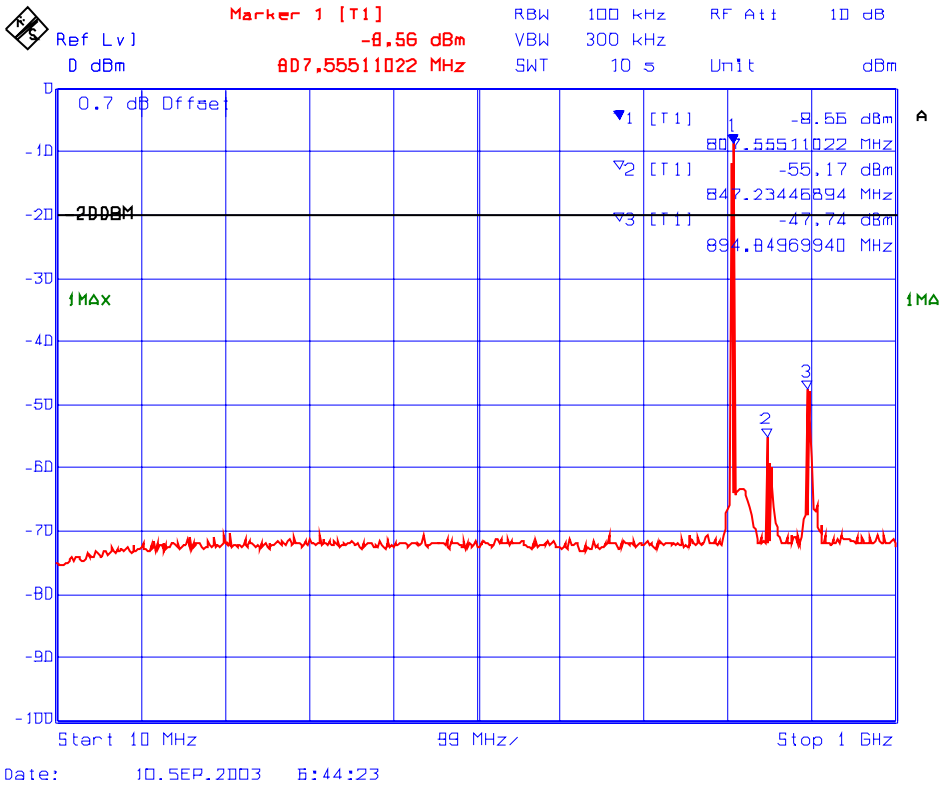
Fundamental Frequency: 806, 806.025 & 806.50 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.9 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
851.20	-50.5	4.1	-54.6	PASS
896.83	-38.4	4.1	-42.5	PASS
1613.22	-49.7	4.1	-53.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 134 –135 for spurious conducted emissions.

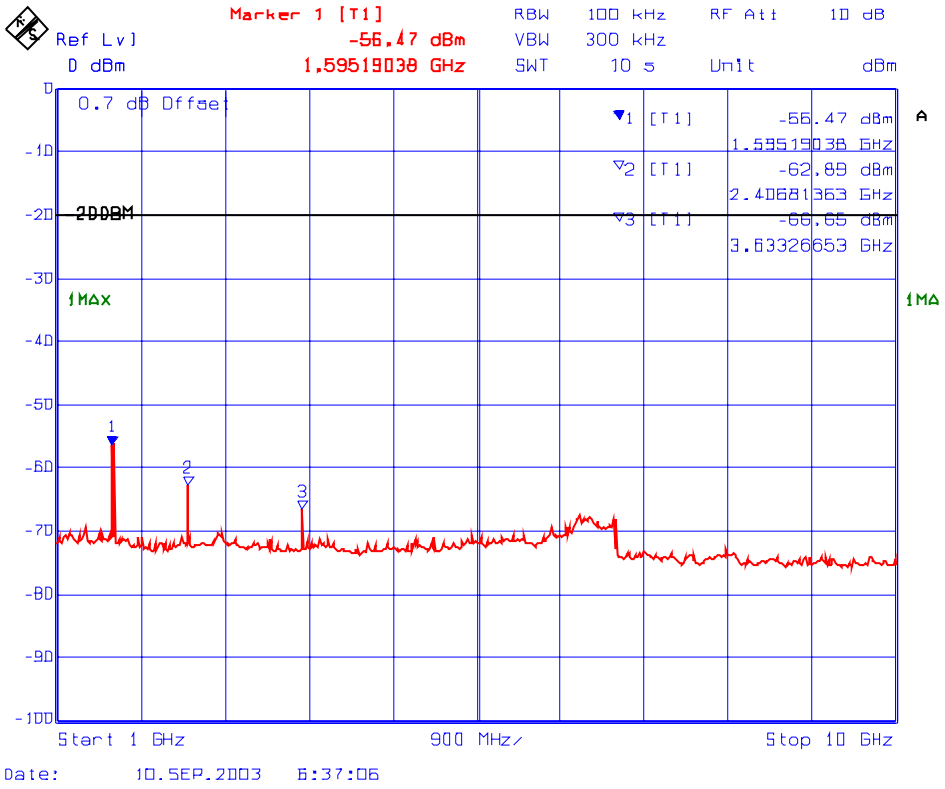
Plot # 130 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

Fc: 806 MHz



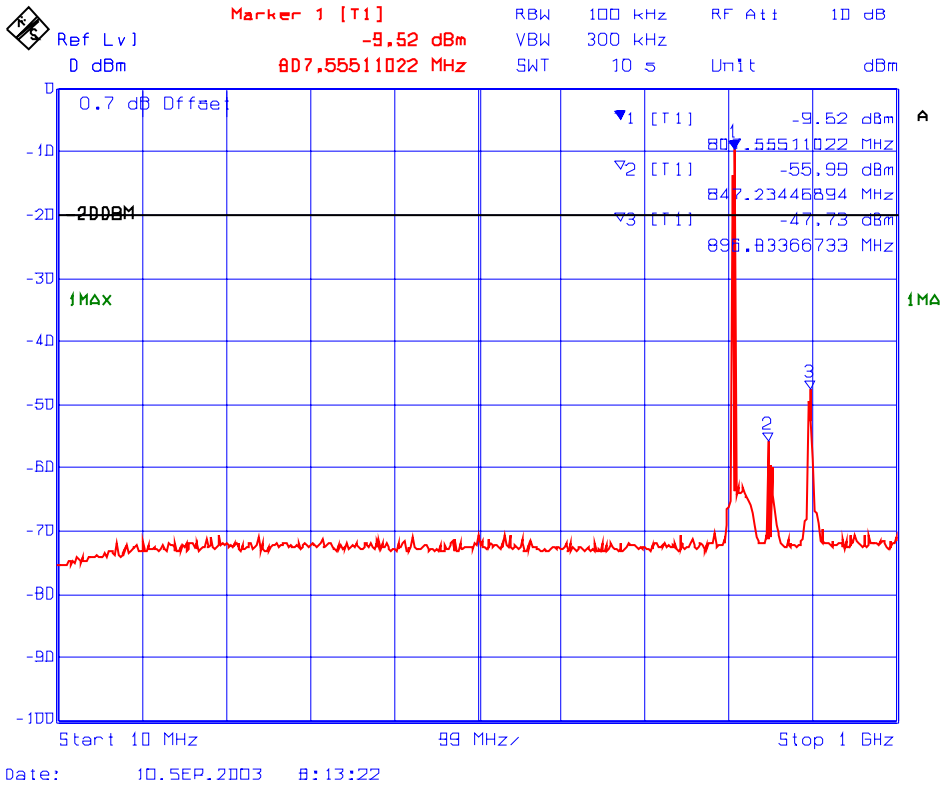
Plot # 131 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

Fc: 806 MHz



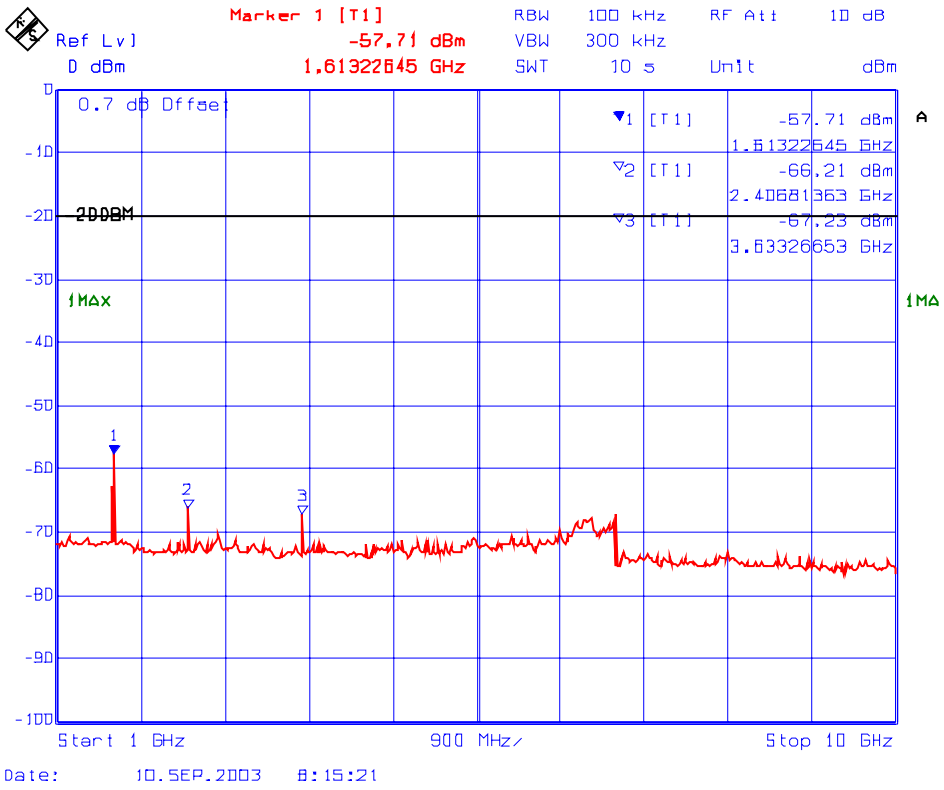
Plot # 132 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

Fc: 806 MHz, Fc + 25 kHz



Plot # 133 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

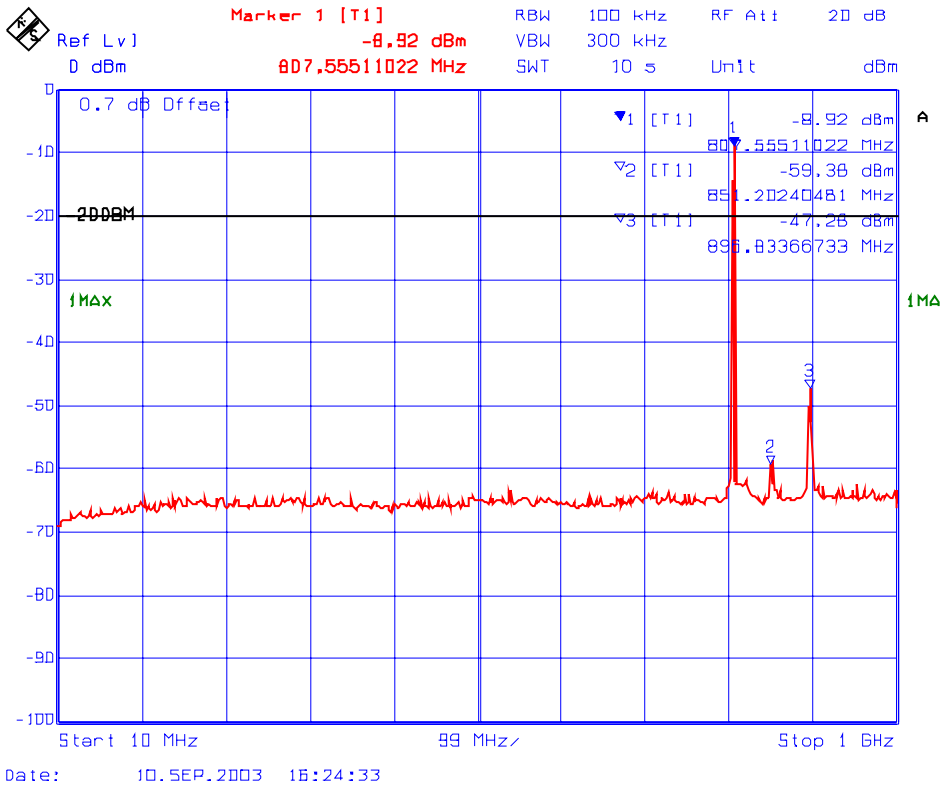
Fc: 806 MHz, Fc + 25 kHz



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

Plot # 134 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

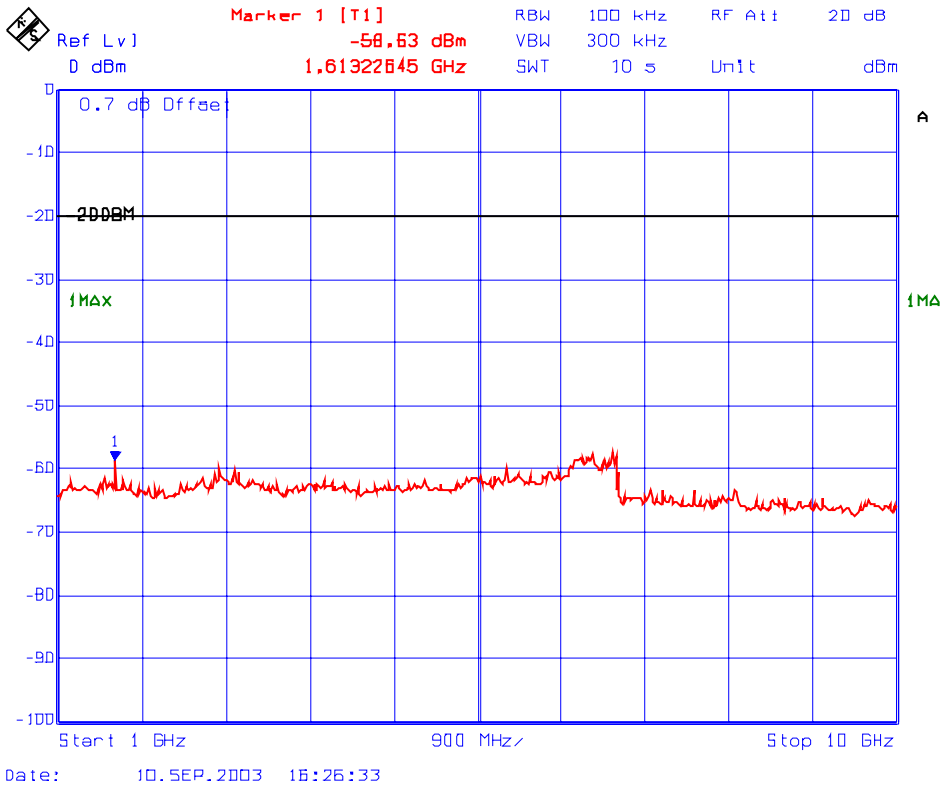
Fc: 806 MHz, Fc – 25 kHz, Fc - 50 kHz



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

Plot # 135 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

Fc: 806 MHz, Fc – 25 kHz, Fc - 50 kHz



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

5.10.5.1.2. Middle Frequencies

Fundamental Frequency: 815 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 7.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
851.20	-50.9	5.3	-56.2	PASS
896.84	-38.9	5.3	-44.2	PASS
1613.22	-50.1	5.3	-55.4	PASS
2444.88	-55.6	5.3	-60.9	PASS
3633.26	-59.0	5.3	-64.3	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 136 –137 for spurious conducted emissions.

Fundamental Frequency: 815 & 815.025 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
851.20	-51.4	4.7	-56.1	PASS
896.84	-39.9	4.7	-44.6	PASS
1631.26	-50.1	4.7	-54.8	PASS
2442.88	-56.9	4.7	-61.6	PASS
3633.26	-59.3	4.7	-64.0	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 138 –139 for spurious conducted emissions.

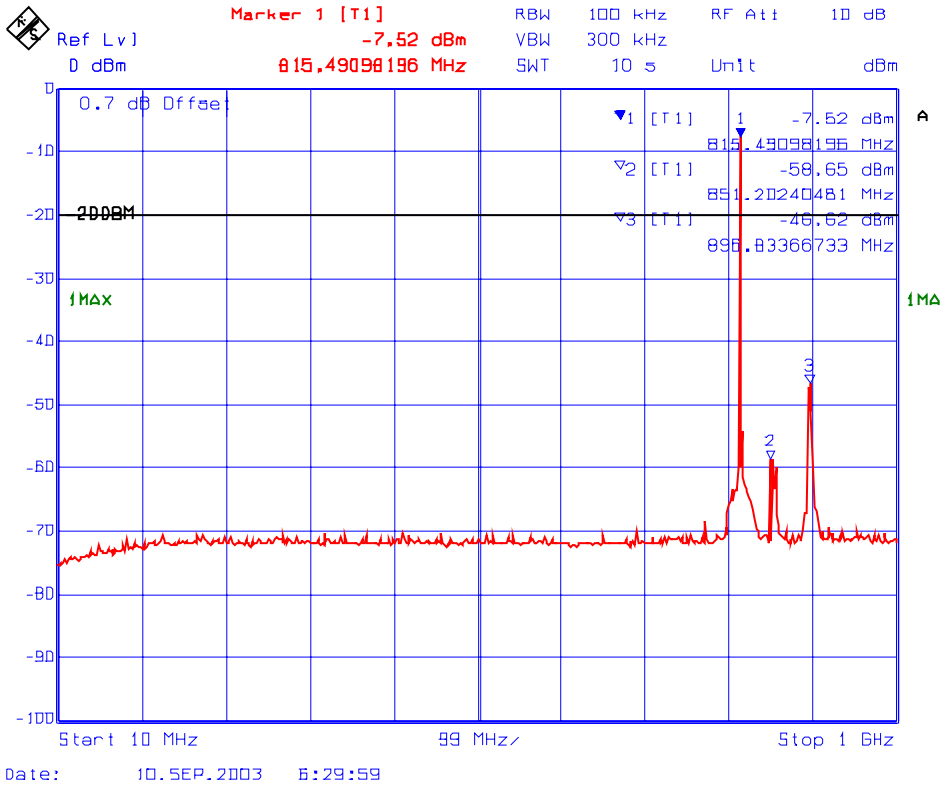
Fundamental Frequency: 815, 815.025 & 814.975 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
853.20	-48.9	4.3	-53.2	PASS
896.84	-39.5	4.3	-43.8	PASS
1631.26	-50.6	4.3	-54.9	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 140 –141 for spurious conducted emissions.

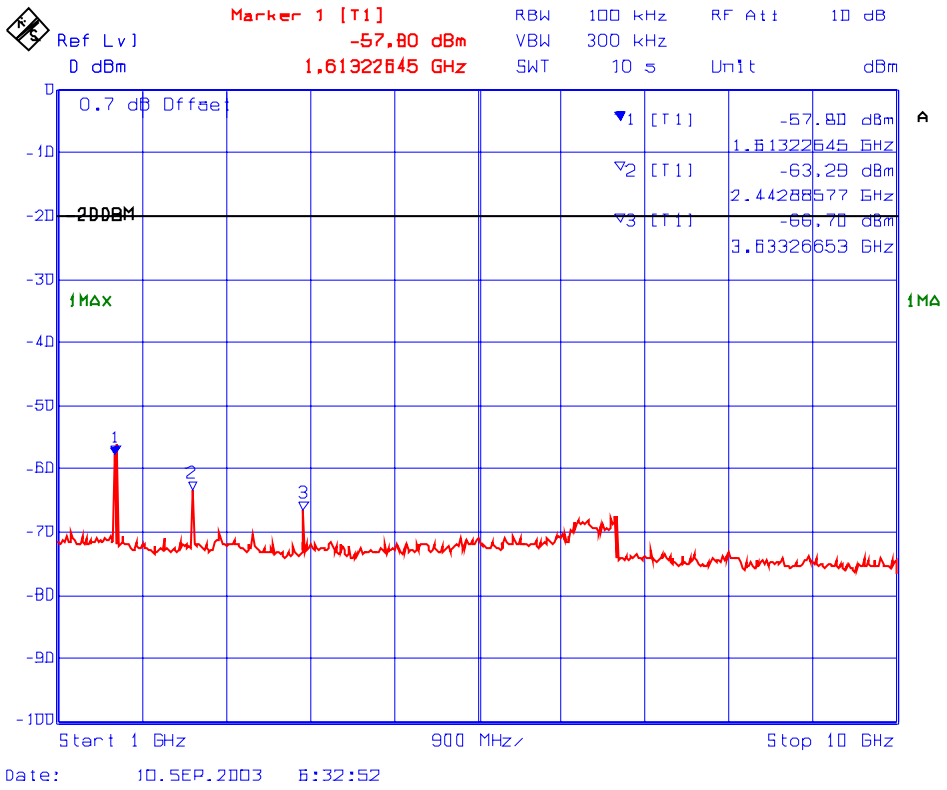
Plot # 136 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

Fc: 815 MHz



Plot # 137: Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

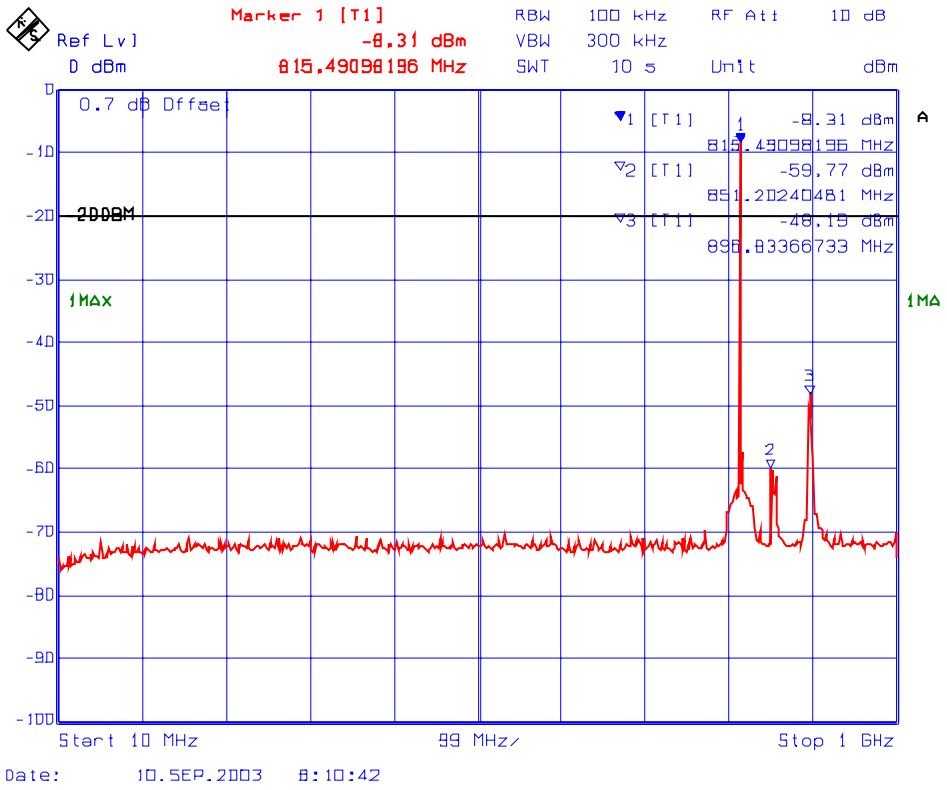
Fc: 815 MHz



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

Plot # 138 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

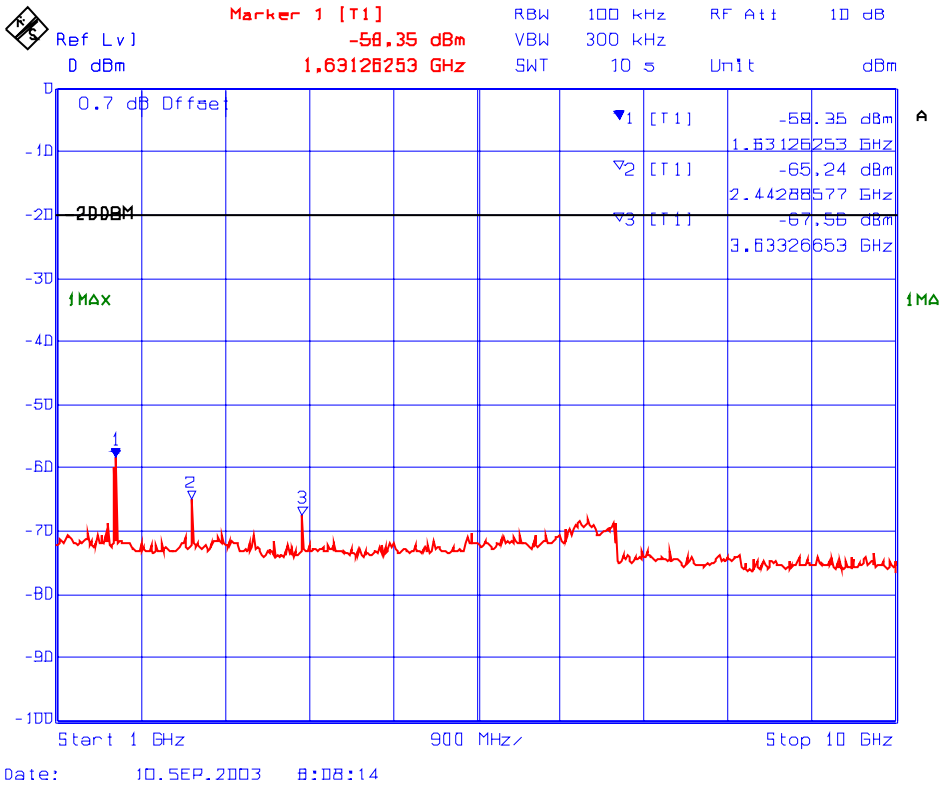
Fc: 815 MHz, Fc + 25 kHz



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

Plot # 139 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

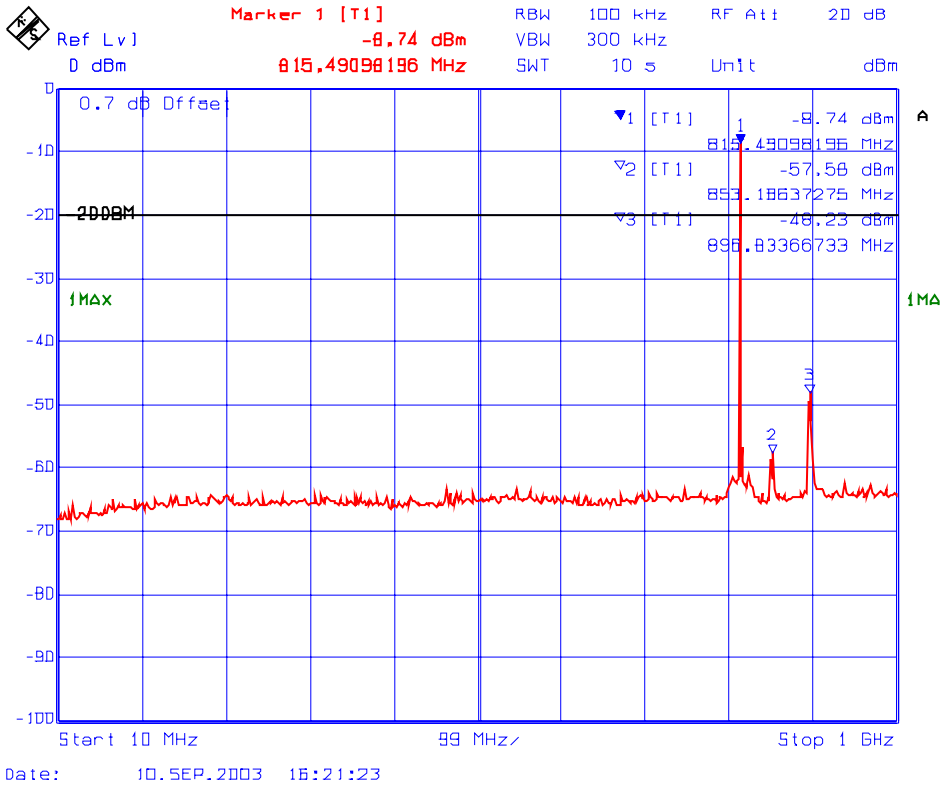
Fc: 815 MHz, Fc + 25 kHz



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

Plot # 140 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

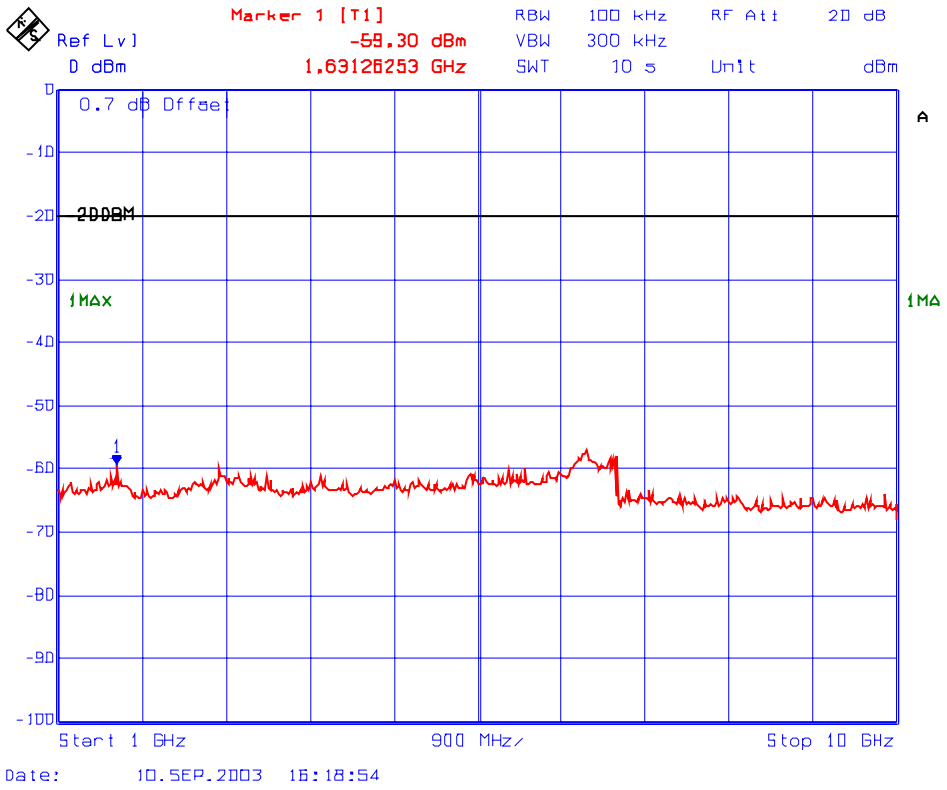
Fc: 815 MHz, Fc – 25 kHz, Fc + 25 kHz



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

Plot # 141 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

Fc: 815 MHz, Fc – 25 kHz, Fc + 25 kHz



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

5.10.5.1.3. Highest Frequencies

Fundamental Frequency: 824 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.4 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
853.18	-51.3	4.6	-55.9	PASS
894.85	-38.4	4.6	-43.0	PASS
1649.29	-47.6	4.6	-52.2	PASS
2460.92	-58.1	4.6	-62.7	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 142 –143 for spurious conducted emissions.

Fundamental Frequency: 824 & 823.975 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
851.20	-50.7	3.9	-54.6	PASS
896.83	-38.9	3.9	-42.8	PASS
1649.30	-49.6	3.9	-53.5	PASS
2460.92	-59.6	3.9	-63.5	PASS
3633.26	-58.1	3.9	-62.0	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 144 –145 for spurious conducted emissions.

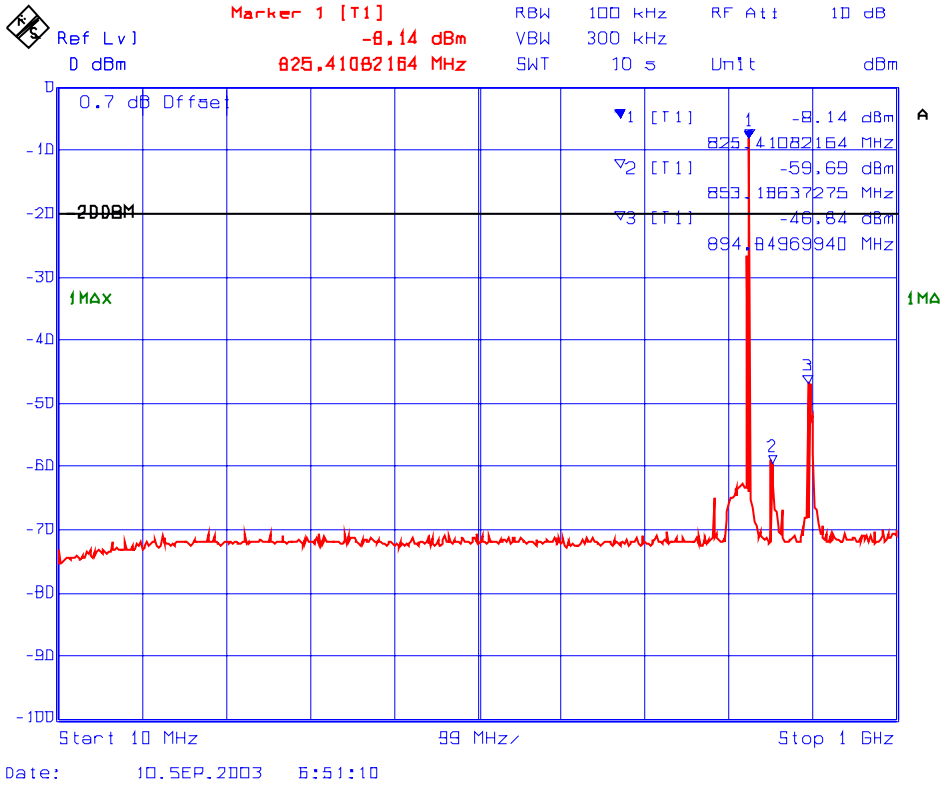
Fundamental Frequency: 824, 823.975 & 823.95 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
851.20	-48.5	3.7	-52.4	PASS
894.84	-39.9	3.7	-43.8	PASS
1631.26	-50.0	3.7	-53.9	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 146 –147 for spurious conducted emissions.

Plot # 142 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

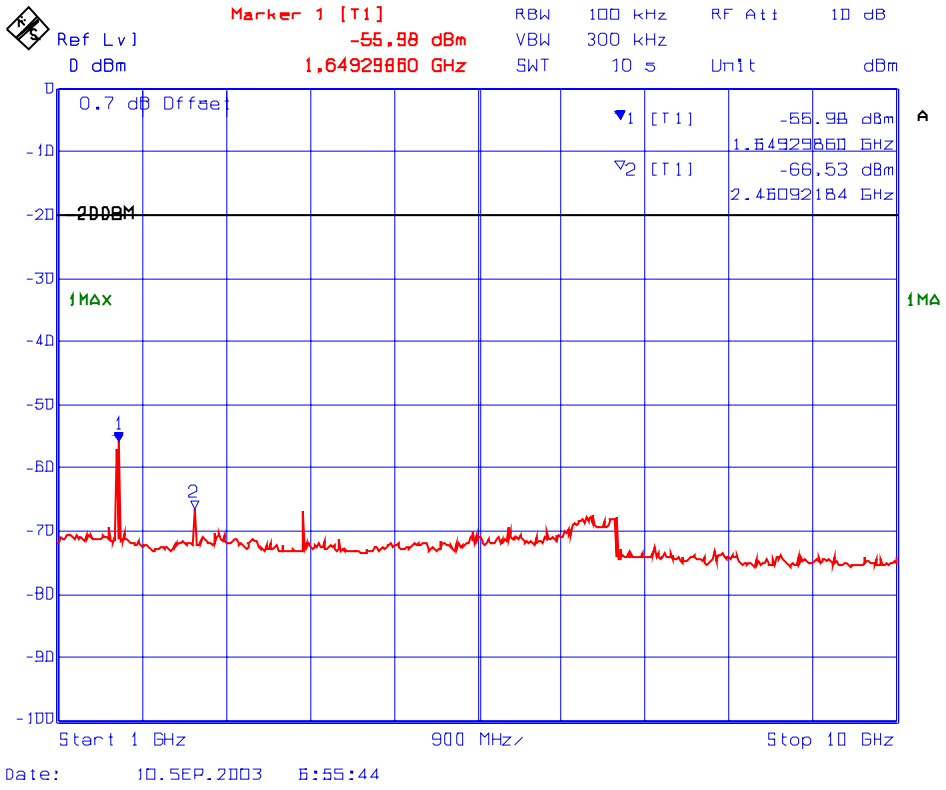
Fc: 824 MHz



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

Plot # 143 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 806 – 824 MHz

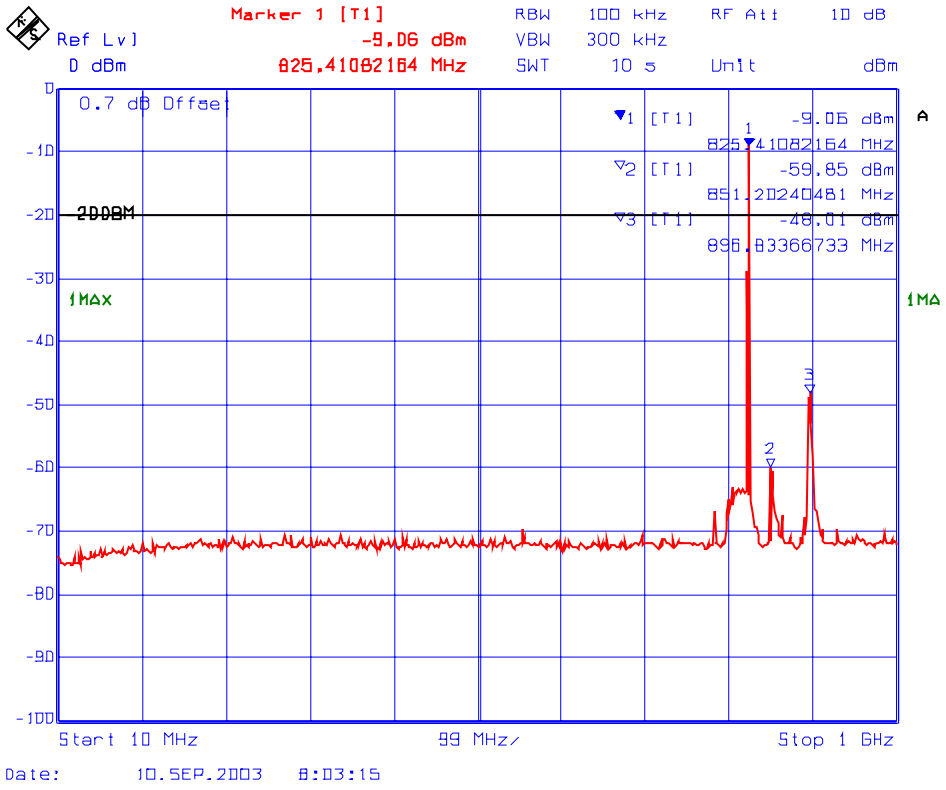
Fc: 824 MHz



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

Plot # 144 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

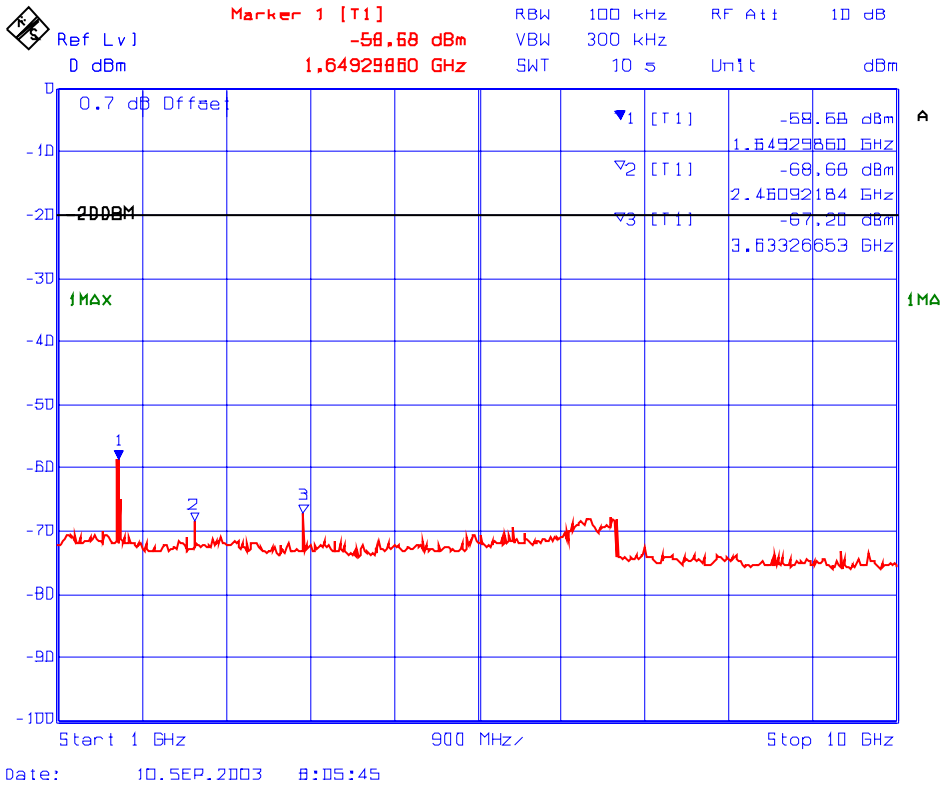
Fc: 824 MHz, Fc – 25 kHz



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

Plot # 145 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 806 – 824 MHz

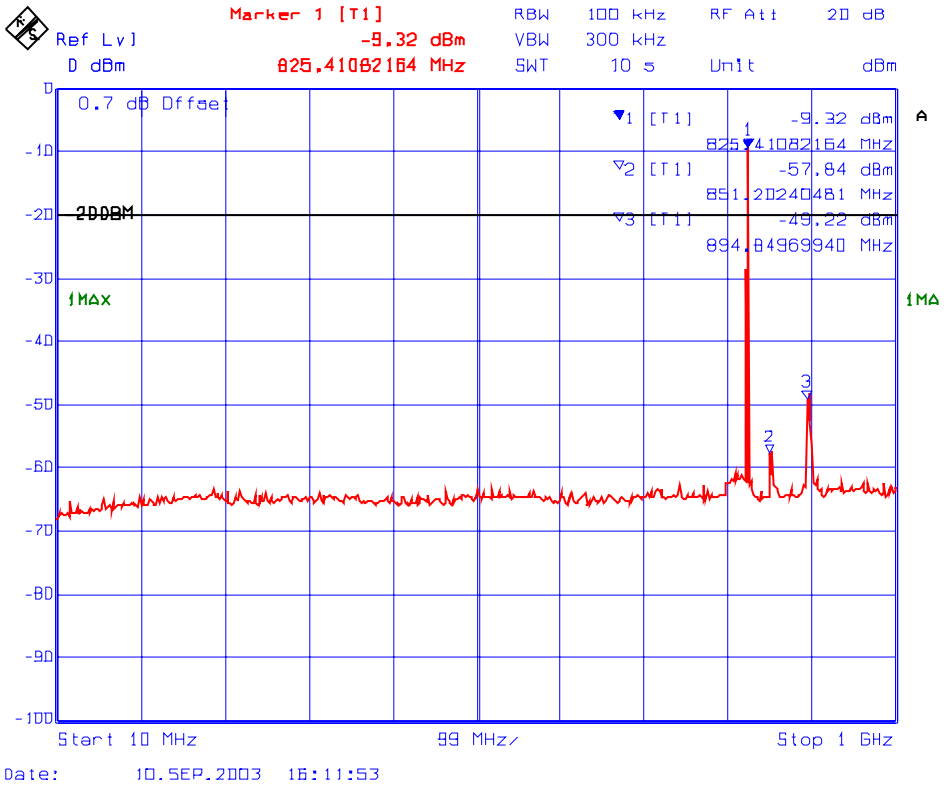
Fc: 824 MHz, Fc – 25 kHz



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

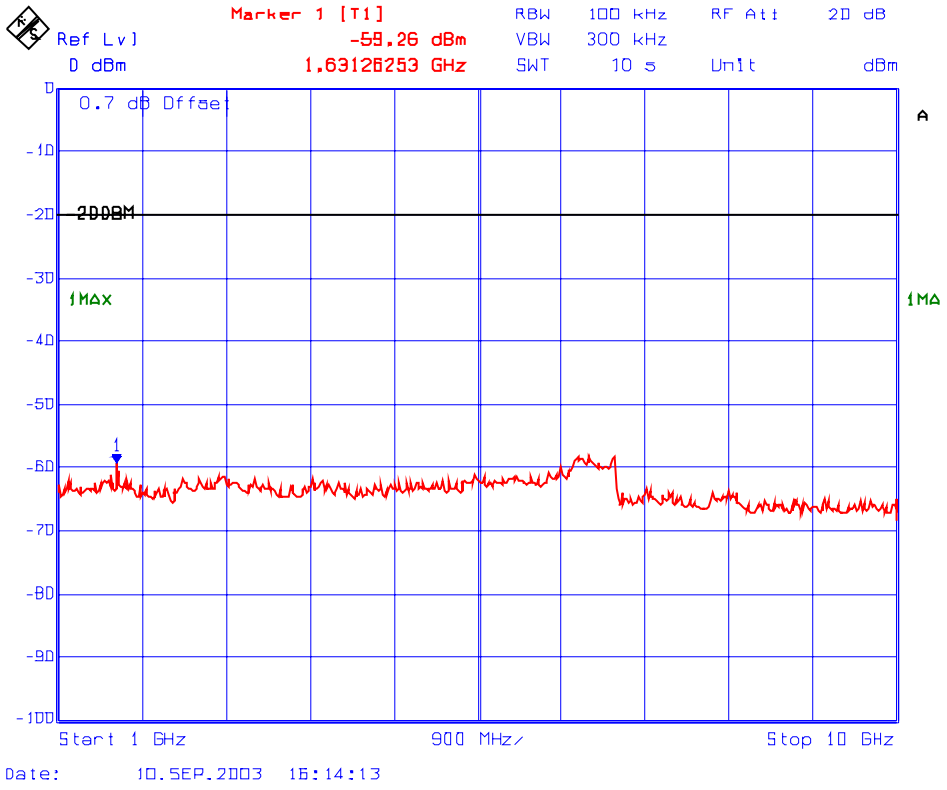
Plot # 146 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

Fc: 824 MHz, Fc – 25 kHz, Fc – 50 kHz



Plot # 147 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 806 – 824 MHz

Fc: 824 MHz, Fc – 25 kHz, Fc – 50 kHz



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

5.10.5.2. 824 – 849 (Cellular)

5.10.5.2.1. Lowest Frequencies

Fundamental Frequency: 824 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -17.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1649.29	-42.3	-4.8	-37.5	PASS
2444.88	-41.1	-4.8	-36.3	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 148 –149 for spurious conducted emissions.

Fundamental Frequency: 824 & 824.03 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 17.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1649.29	-45.6	-4.1	-41.5	PASS
3633.26	-41.0	-4.1	-36.9	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 150 –151 for spurious conducted emissions.

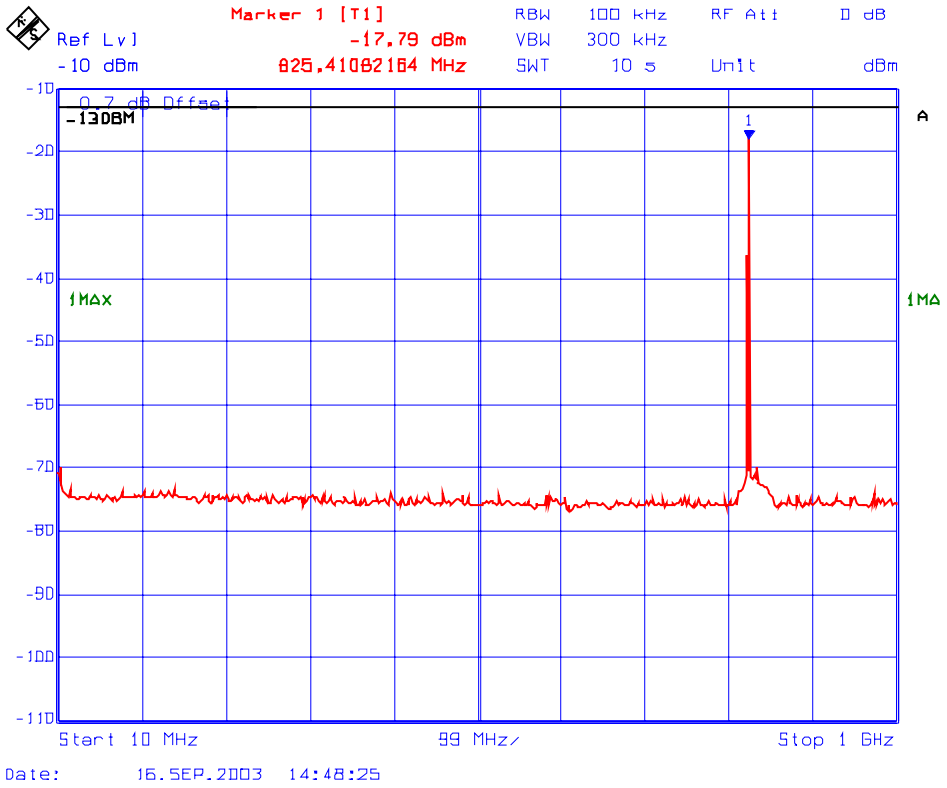
Fundamental Frequency: 824, 824.030 & 824.060 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 17.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
1649.29	-46.4	-4.6	-41.8	PASS
3633.26	-41.0	-4.6	-36.4	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 152 –153 for spurious conducted emissions.

Plot # 148 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

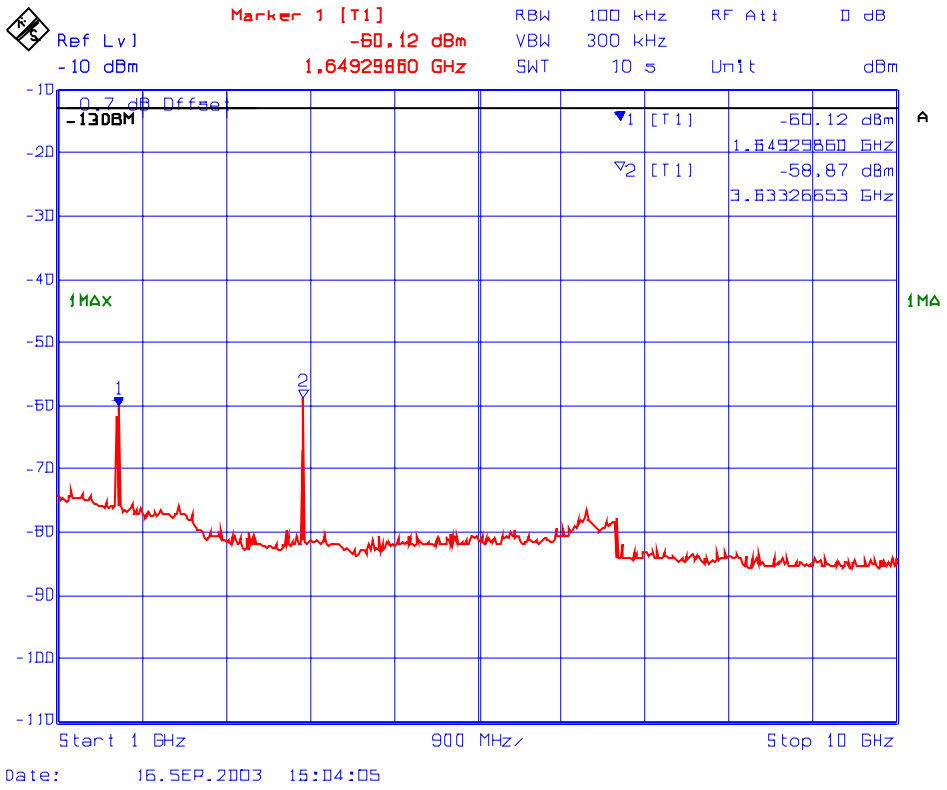
Fc: 824 MHz



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

Plot # 149 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

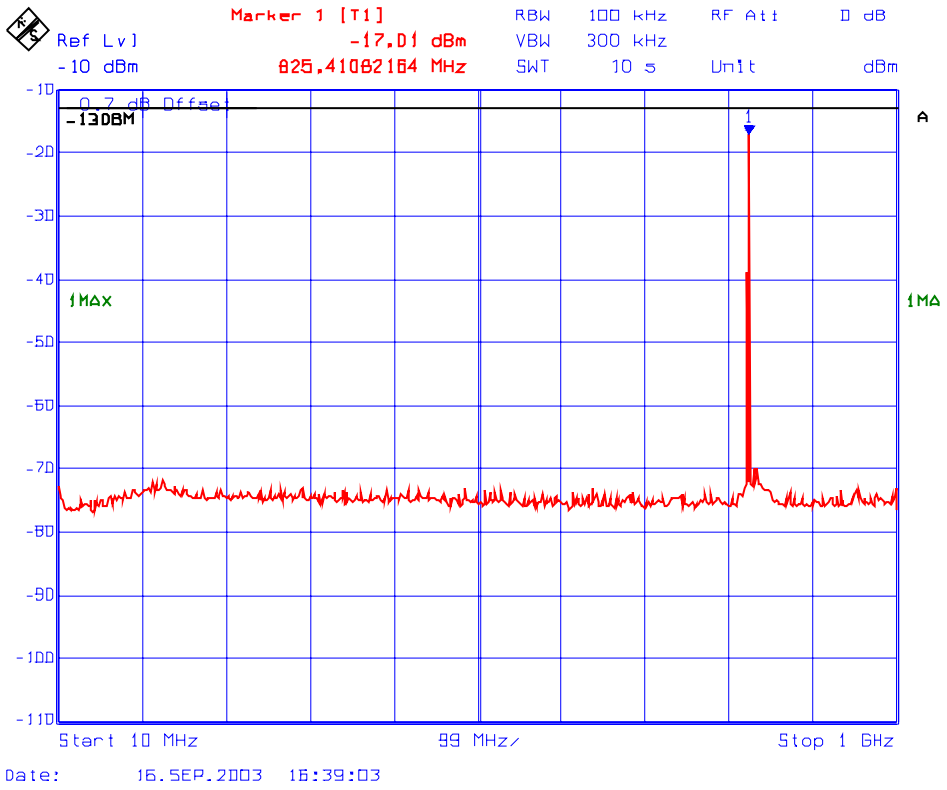
Fc: 824 MHz



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

Plot # 150 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

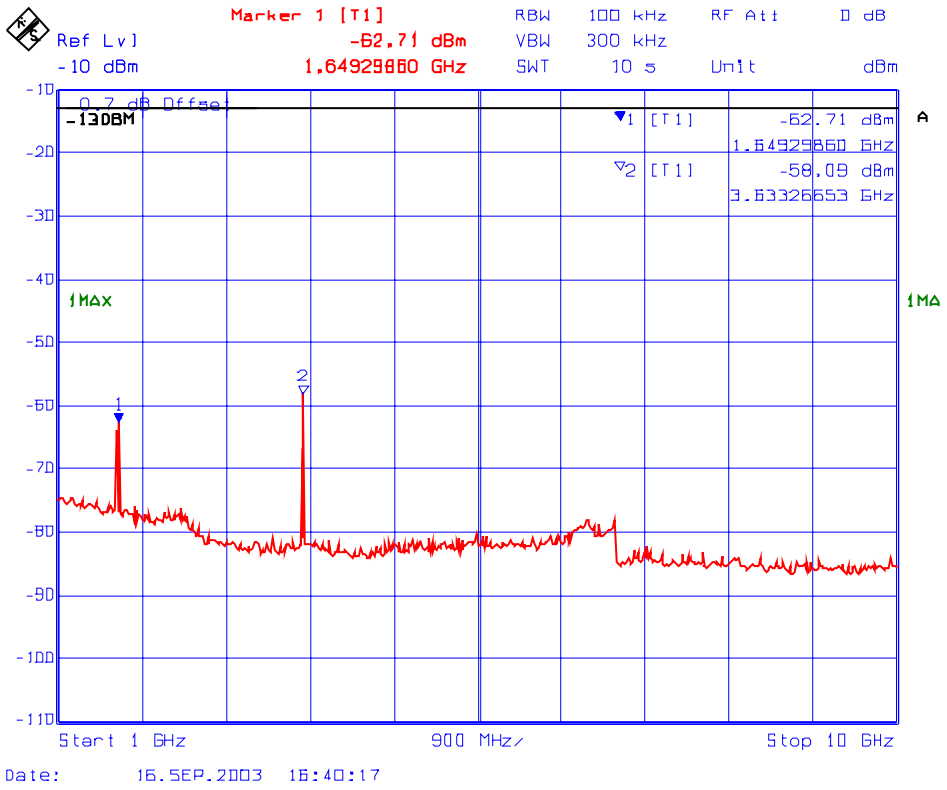
Fc: 824 MHz, Fc + 30 kHz



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

Plot # 151 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

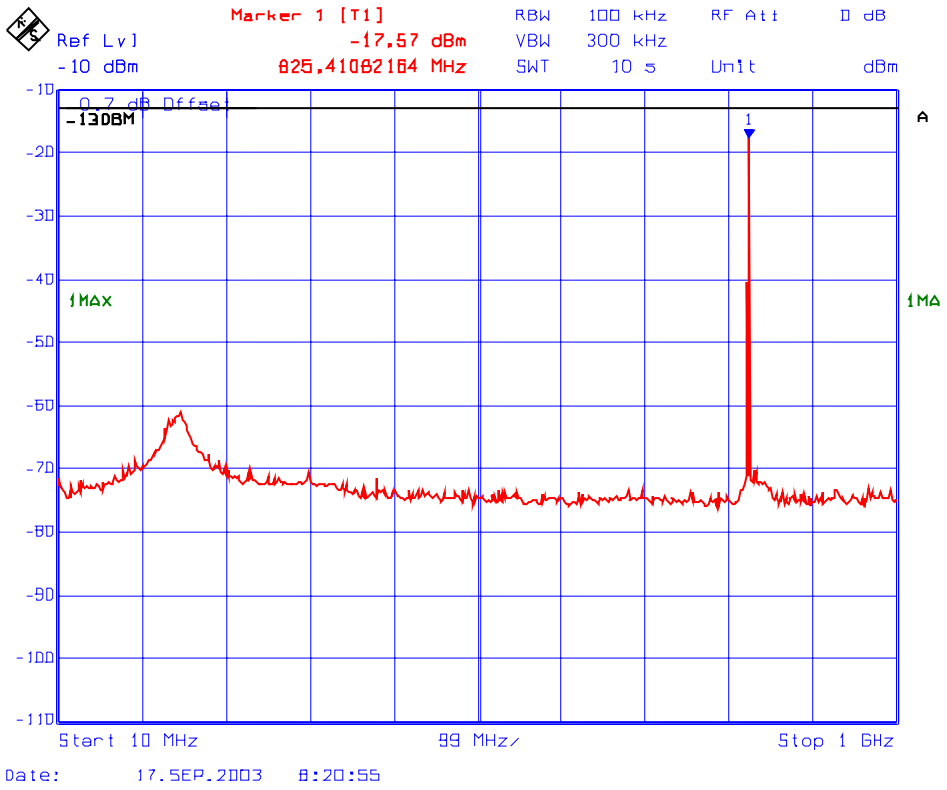
Fc: 824 MHz, Fc + 30 kHz



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

Plot # 152 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

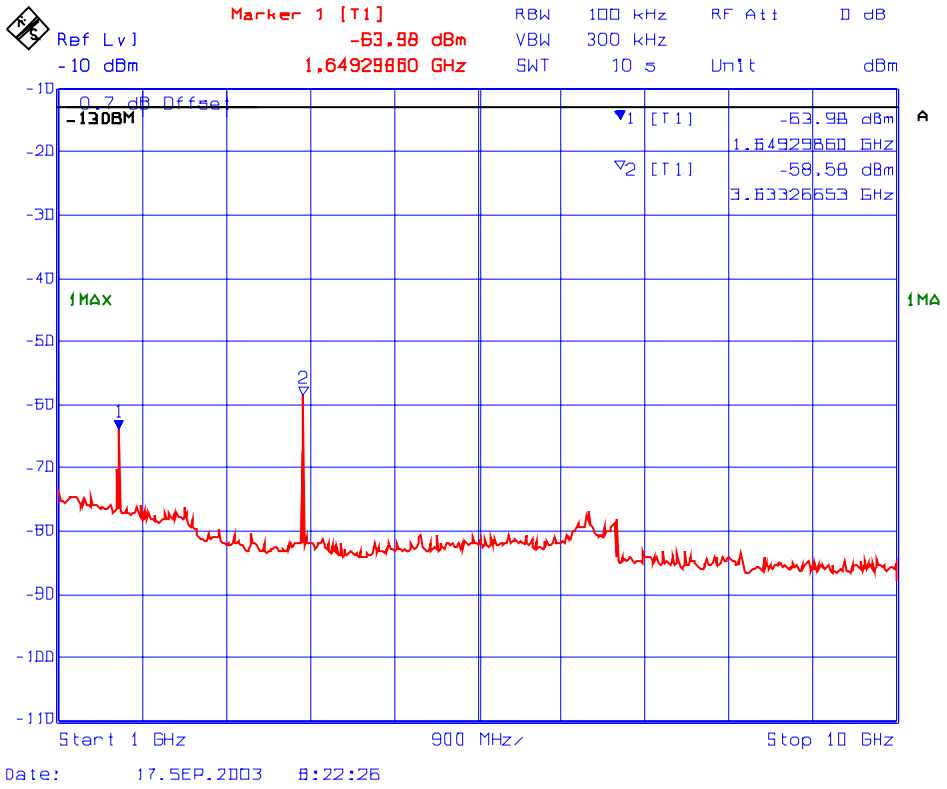
Fc: 824 MHz, Fc + 30 kHz, Fc + 60 kHz



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

Plot # 153 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

Fc: 824 MHz, Fc + 30 kHz, Fc + 60 kHz



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

5.10.5.2.2. Middle Frequencies

Fundamental Frequency: 836.5 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 14.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1667.33	-43.7	-1.7	-42.0	PASS
3633.26	-44.5	-1.7	-42.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 154 –155 for spurious conducted emissions.

Fundamental Frequency: 836.5 & 836.530 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 16.2 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1667.33	-45.7	-3.2	-42.5	PASS
3633.26	-42.0	-3.2	-38.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 156 –157 for spurious conducted emissions.

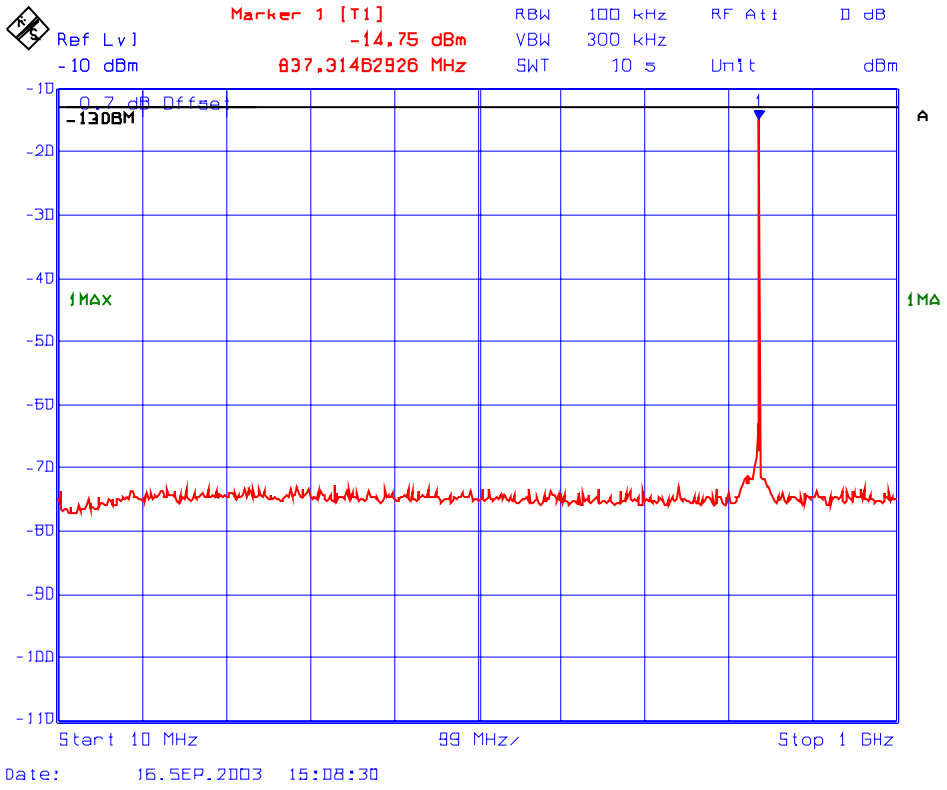
Fundamental Frequency: 836.5, 836.530 & 836.470 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -16.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
1667.33	-46.1	-3.8	-42.3	PASS
3633.26	-42.0	-3.8	-38.2	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 158 –159 for spurious conducted emissions.

Plot # 154 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

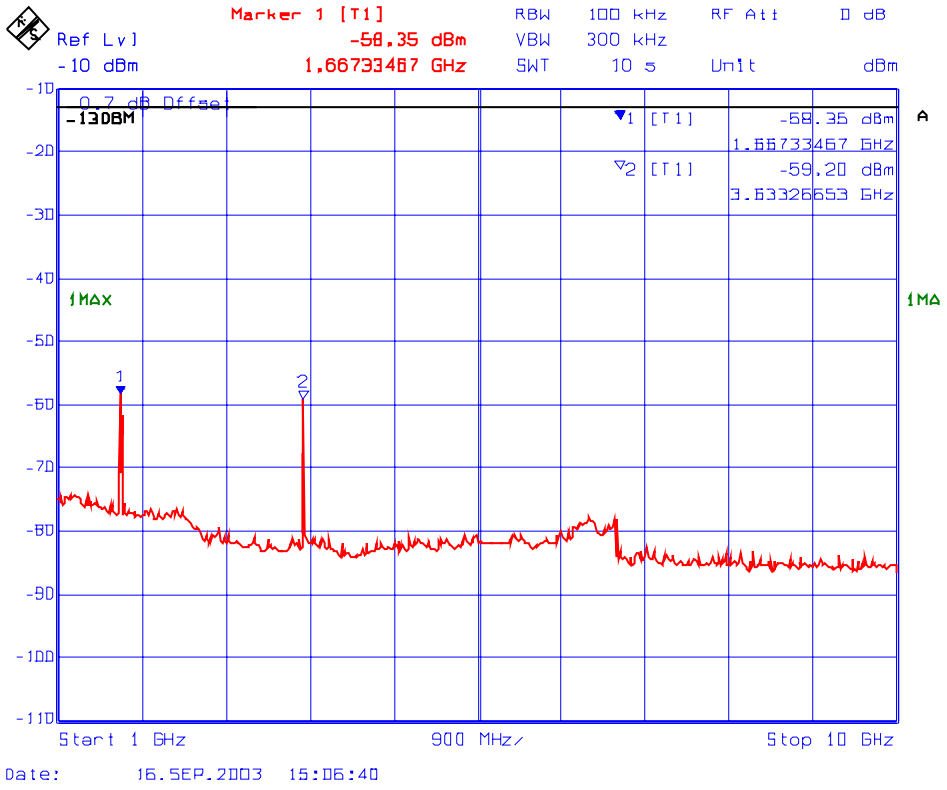
Fc: 836.5 MHz



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

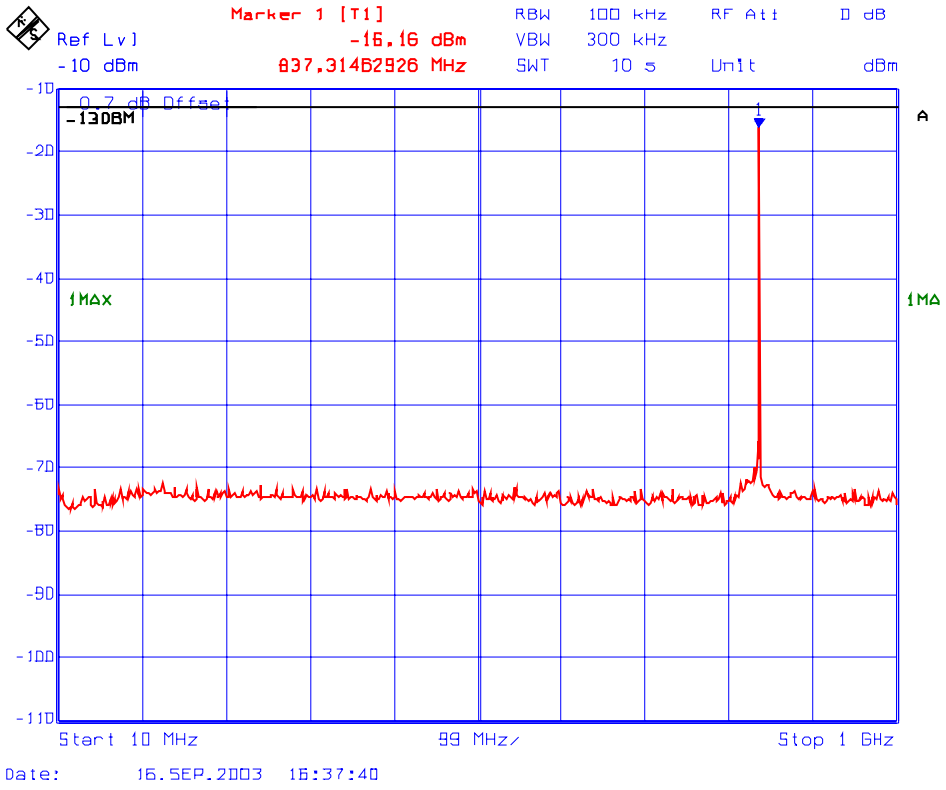
Plot # 155 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

Fc: 836.5 MHz



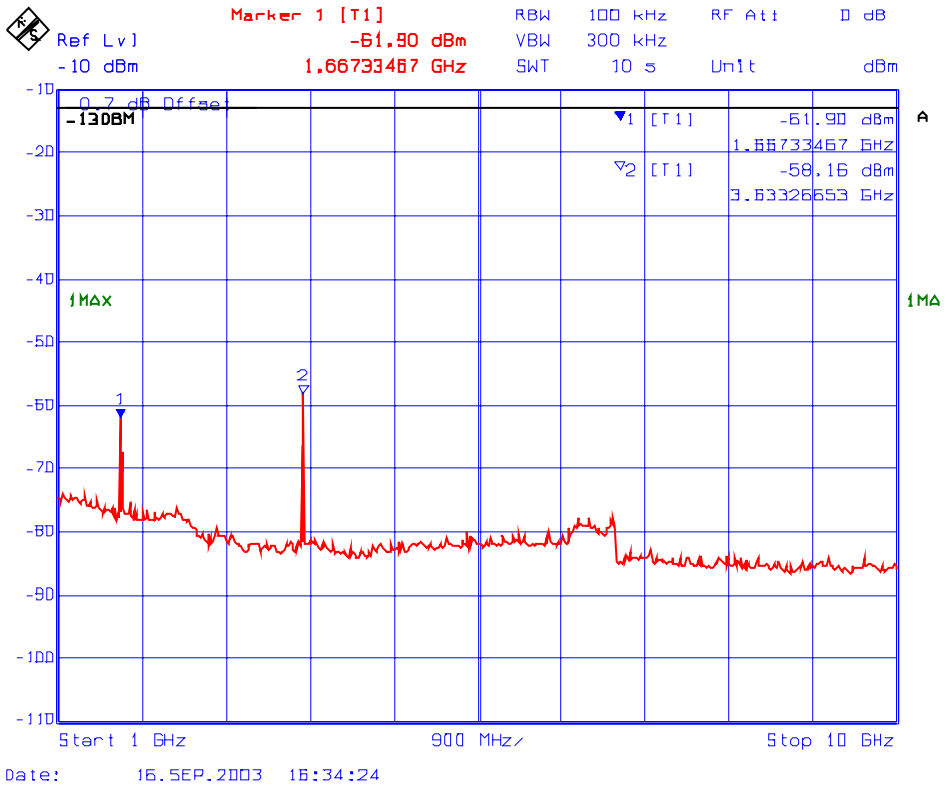
Plot # 156 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

Fc: 836.5 MHz, Fc + 30 kHz



Plot # 157 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

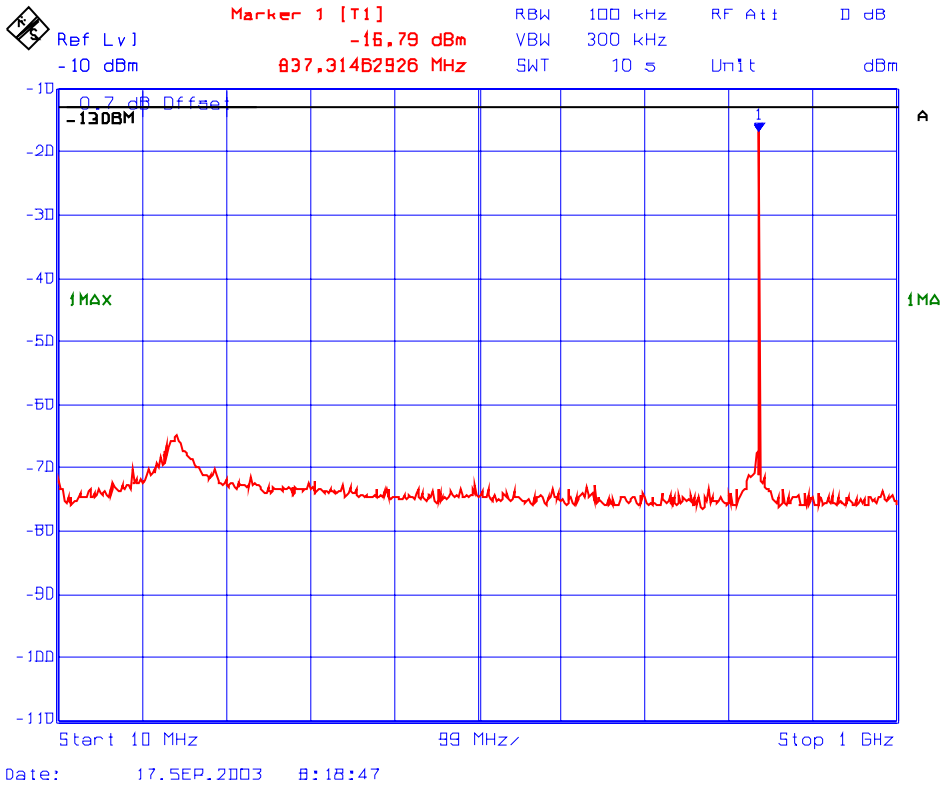
Fc: 836.5 MHz, Fc + 30 kHz



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

Plot # 158 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

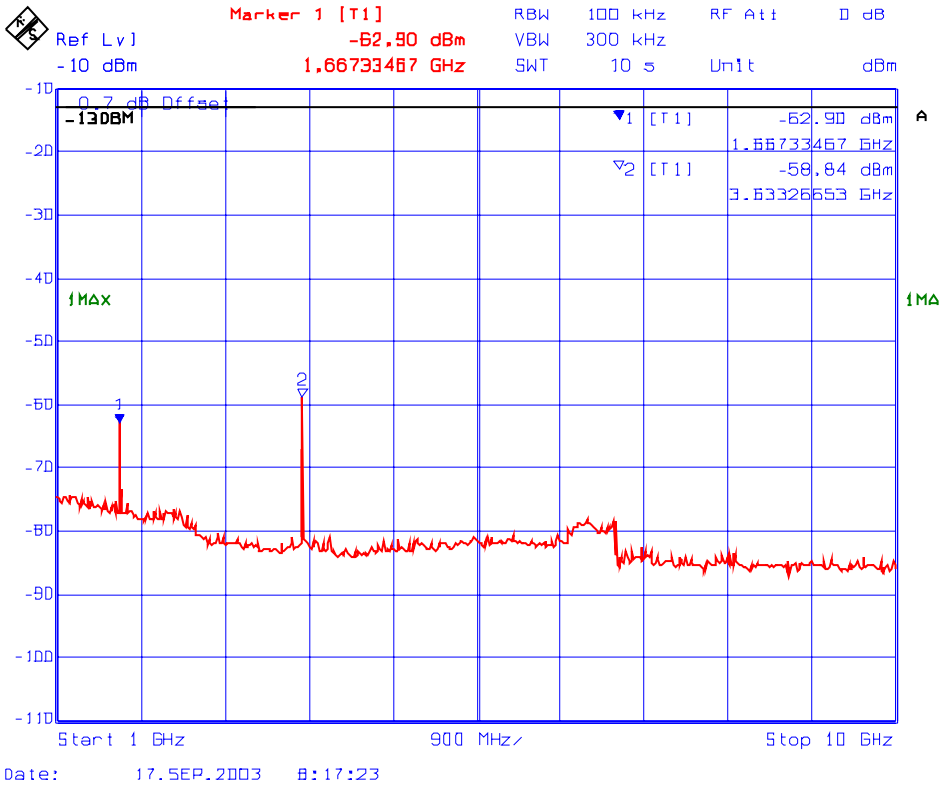
Fc: 836.5 MHz, Fc - 30 kHz, Fc + 30 kHz



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

Plot # 159 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

Fc: 836.5 MHz, Fc - 30 kHz, Fc + 30 kHz



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

5.10.5.2.3. Highest Frequencies

Fundamental Frequency: 849 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -19.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1685.37	-46.3	-6.3	-40.0	PASS
3633.26	-39.3	-6.3	-33.0	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 160 –161 for spurious conducted emissions.

Fundamental Frequency: 849 & 848.970 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -20.5 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1685.37	-47.7	-7.5	-40.2	PASS
3633.26	-37.7	-7.5	-30.2	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 162 –163 for spurious conducted emissions.

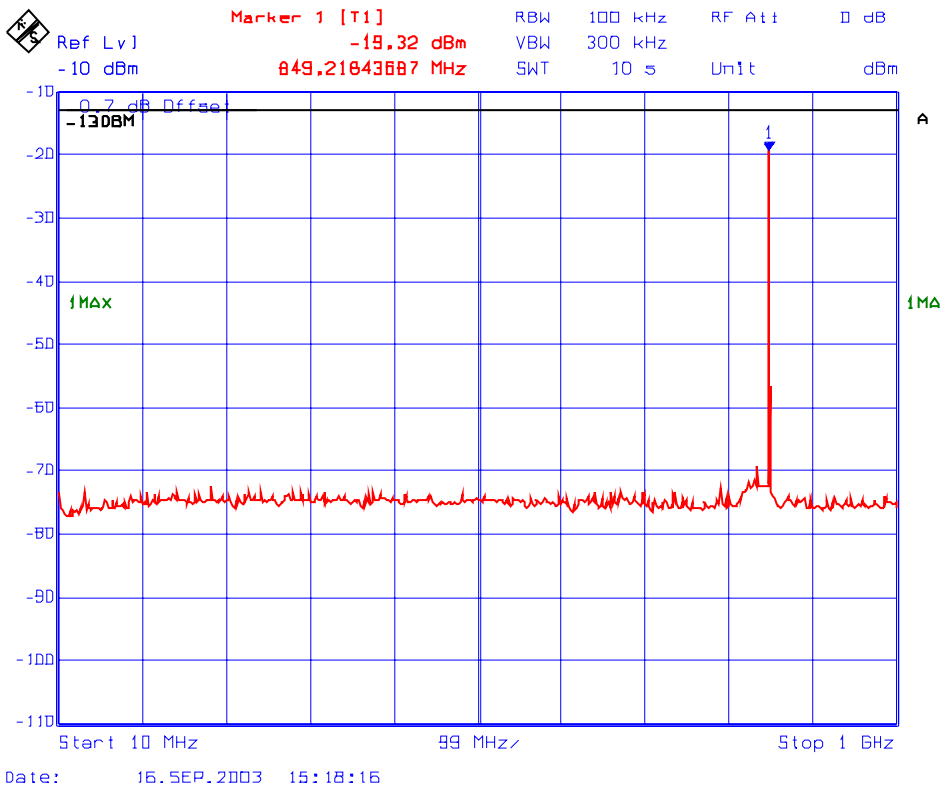
Fundamental Frequency: 849 , 848.970 & 848.940 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -21.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
1685.37	-35.5	-8.1	-27.4	PASS
3633.26	-37.7	-8.1	-29.6	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 164 –165 for spurious conducted emissions.

Plot # 160 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

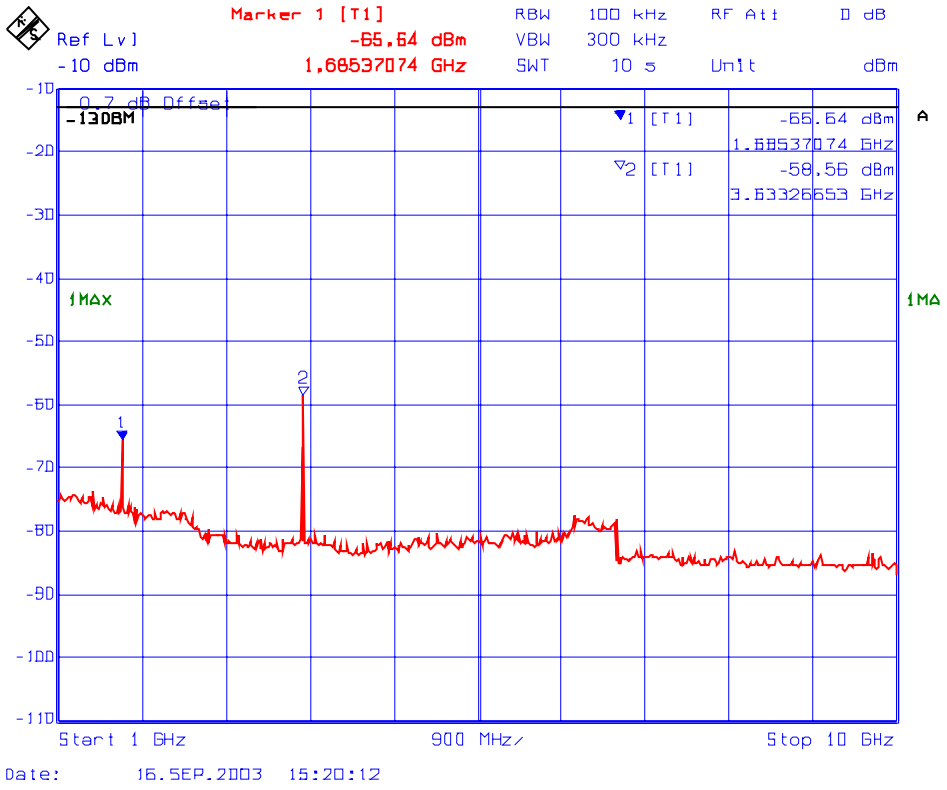
Fc: 849 MHz



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

Plot # 161 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 824 – 849 MHz

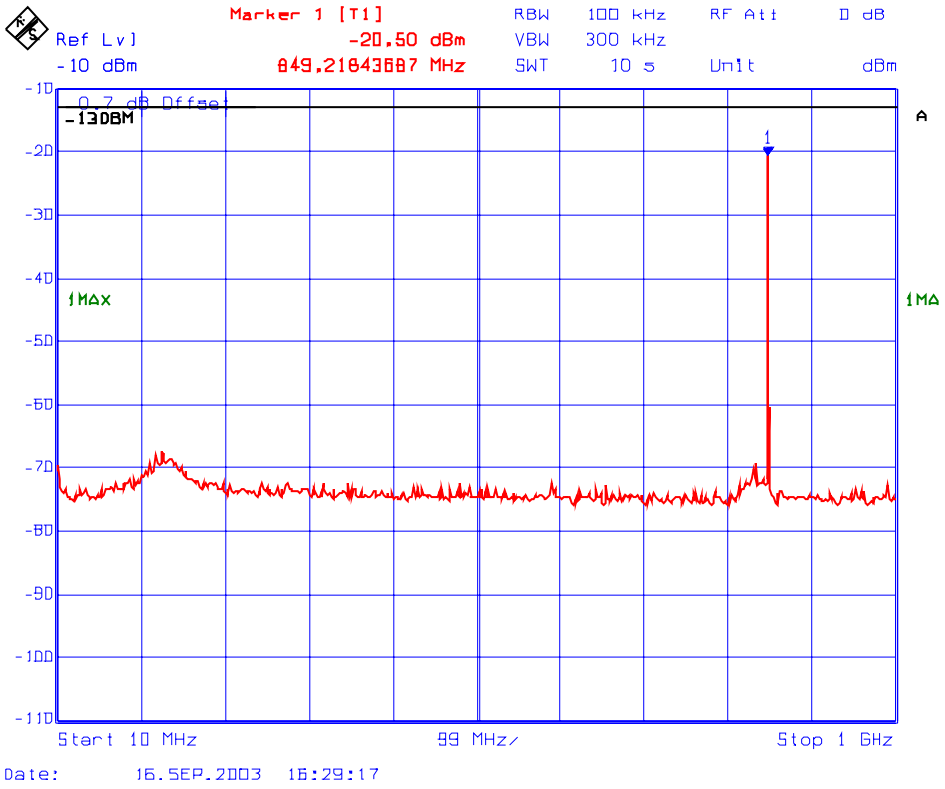
Fc: 849 MHz



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

Plot # 162 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

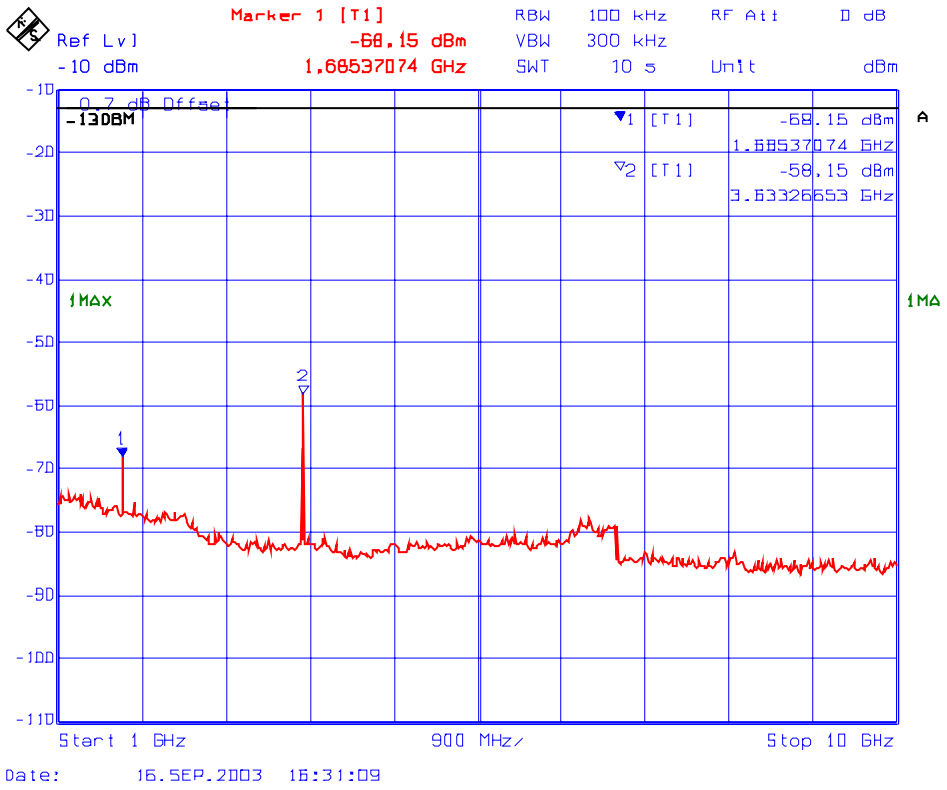
Fc: 849 MHz, Fc - 30 kHz



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

Plot # 163: Transmitter Spurious Emissions Conducted with 2 RF signal input in 824 – 849 MHz

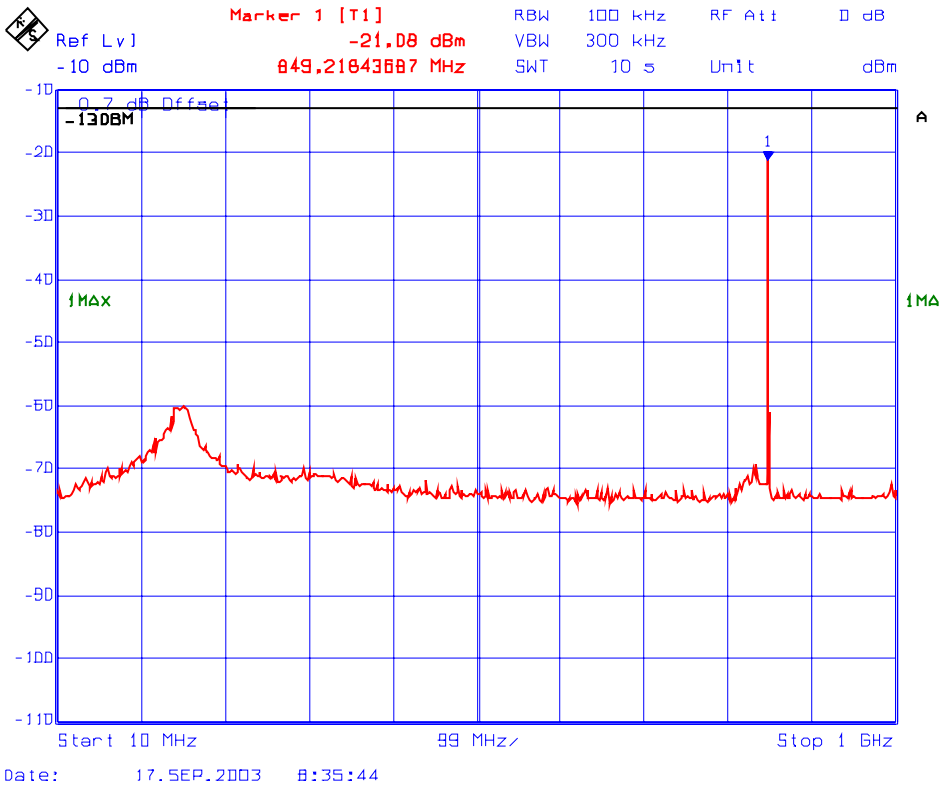
Fc: 849 MHz, Fc - 30 kHz



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

Plot # 164: Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

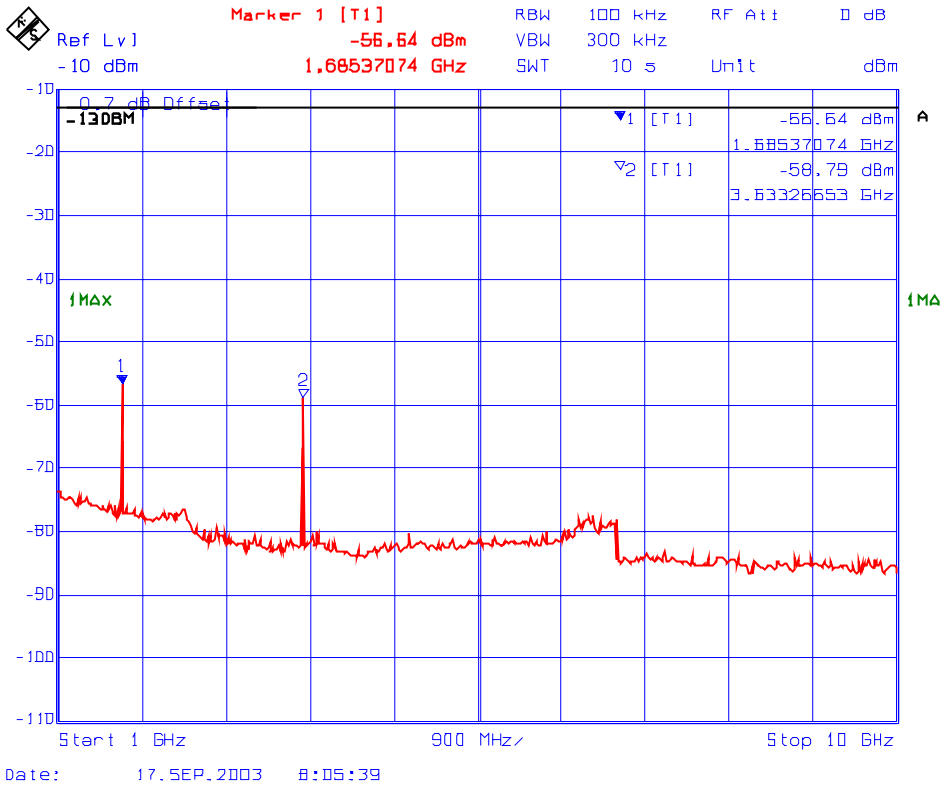
Fc: 849 MHz, Fc - 30 kHz, Fc - 60 kHz



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

Plot # 165: Transmitter Spurious Emissions Conducted with 3 RF signal input in 824 – 849 MHz

Fc: 849 MHz, Fc - 30 kHz, Fc - 60 kHz



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

5.10.5.3. 896 – 901 MHz (Paging)

Remarks: The most stringent limit –20 dBm is used for compliance for the worst case operations in FCC permitted band 896-901 MHz (Limit = -20 dBm).

5.10.5.3.1. Lowest Frequencies

Fundamental Frequency: 896 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -15.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
799.61	-47.0	4.2	-51.2	PASS
851.20	-44.4	4.2	-48.6	PASS
1793.60	-55.1	4.2	-59.3	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 166 –167 for spurious conducted emissions.

Fundamental Frequency: 896 & 896.0125 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -17.0 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
801.60	-45.6	3.0	-48.6	PASS
853.18	-43.6	3.0	-46.6	PASS
1793.58	-55.8	3.0	-58.8	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 168 –169 for spurious conducted emissions.

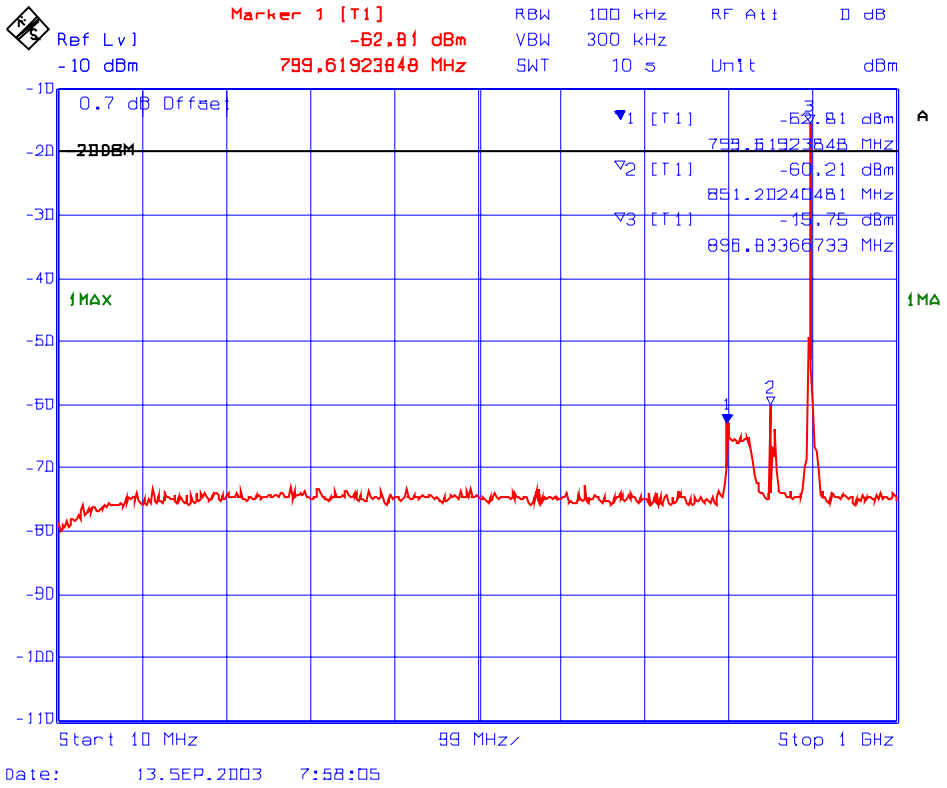
Fundamental Frequency: 896 ,896.0125 & 896.025 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -16.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
801.60	-46.3	3.2	-49.5	PASS
851.20	-44.2	3.2	-47.4	PASS
1793.58	-55.8	3.2	-59.0	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 170 –171 for spurious conducted emissions.

Plot # 166 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 896 – 901 MHz

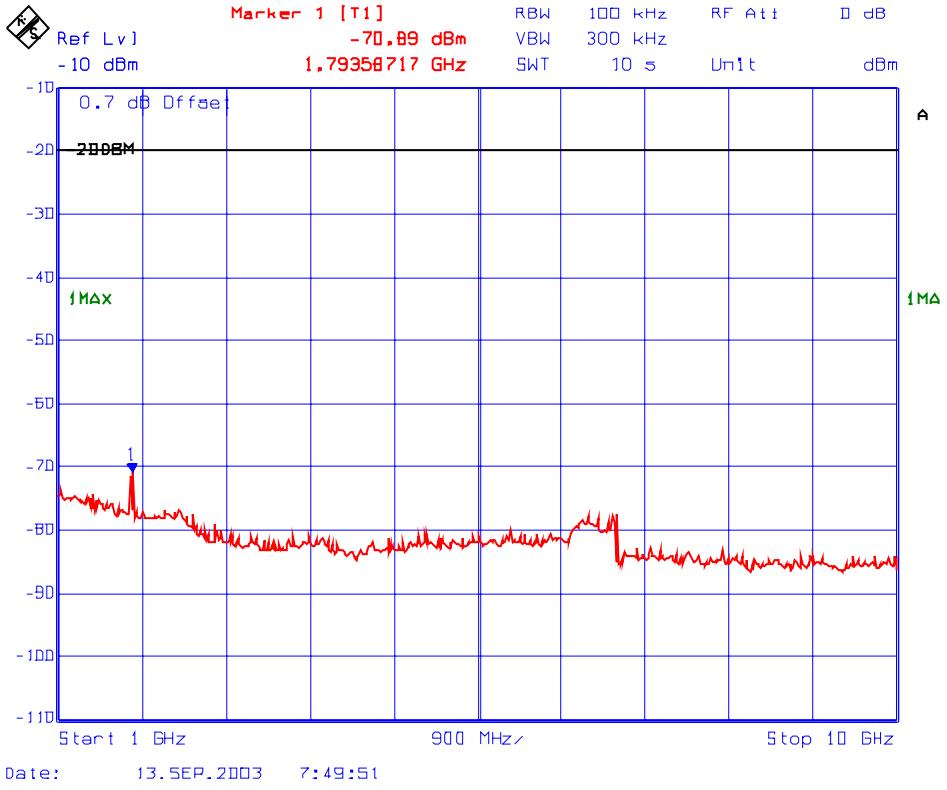
Fc: 896 MHz



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

Plot # 167: Transmitter Spurious Emissions Conducted with 1 RF signal input in 896 – 901 MHz

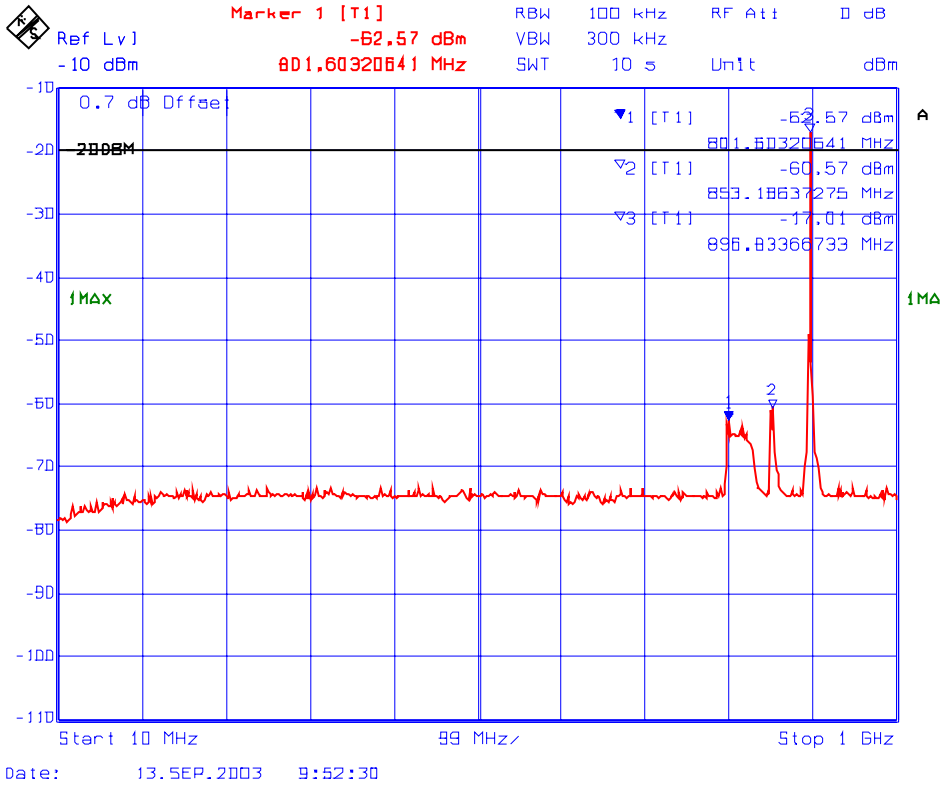
Fc: 896 MHz



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

Plot # 168: Transmitter Spurious Emissions Conducted with 2 RF signal input in 896 – 901 MHz

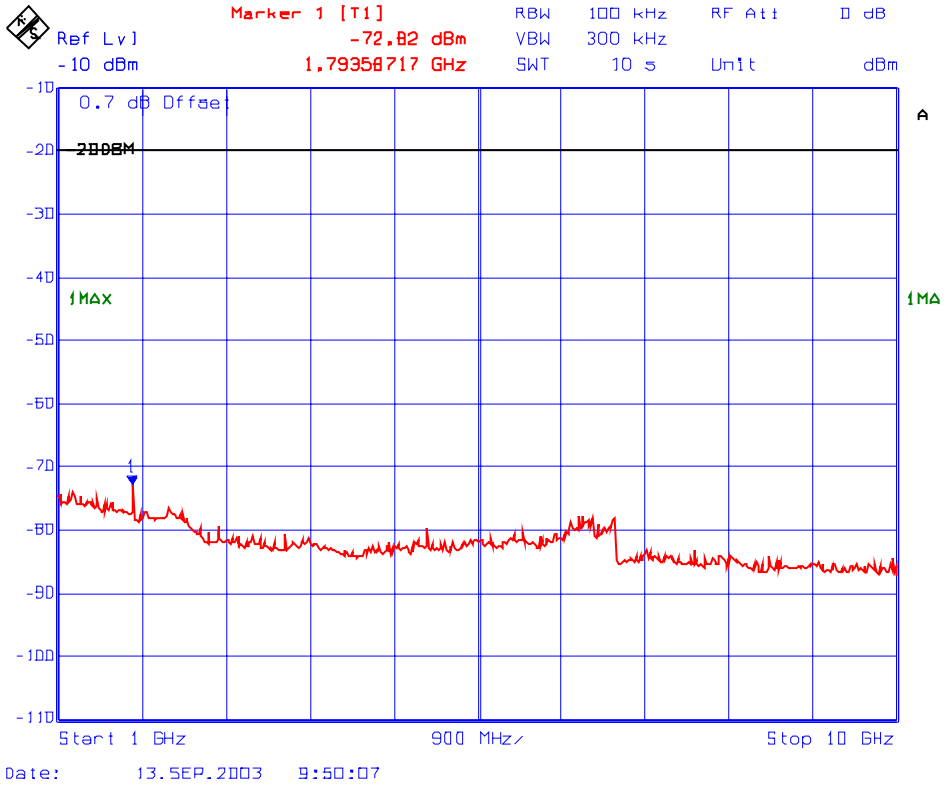
Fc: 896 MHz, Fc + 12.5 kHz



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

Plot # 169: Transmitter Spurious Emissions Conducted with 2 RF signal input in 896 – 901 MHz

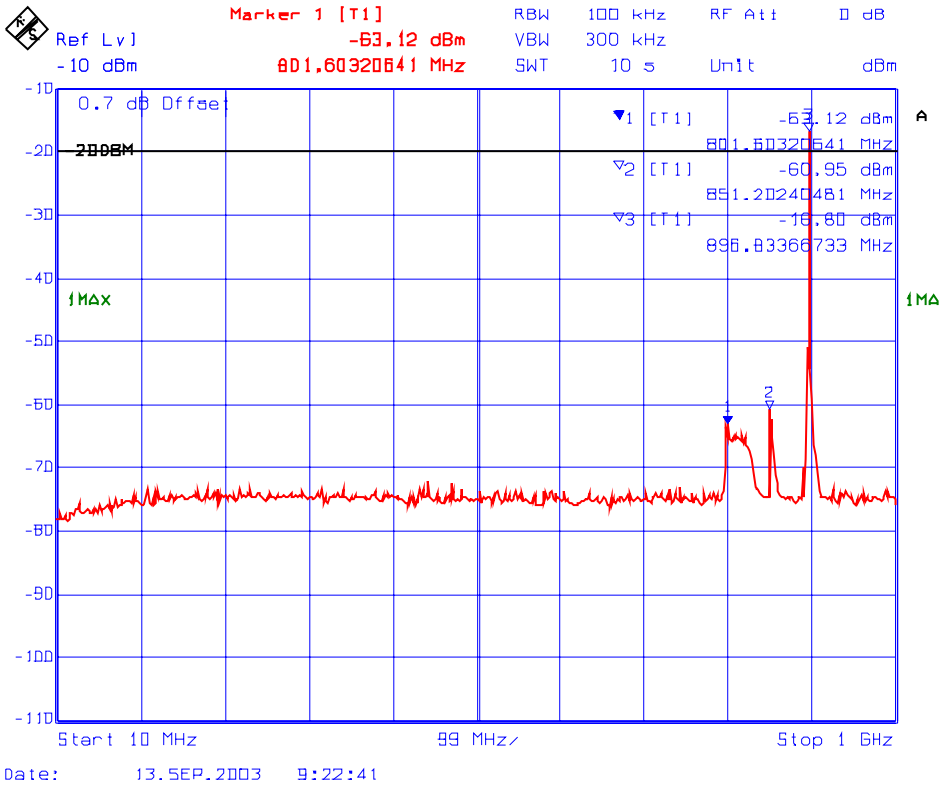
Fc: 896 MHz, Fc + 12.5 kHz



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

Plot # 170: Transmitter Spurious Emissions Conducted with 3 RF signal input in 896 – 901 MHz

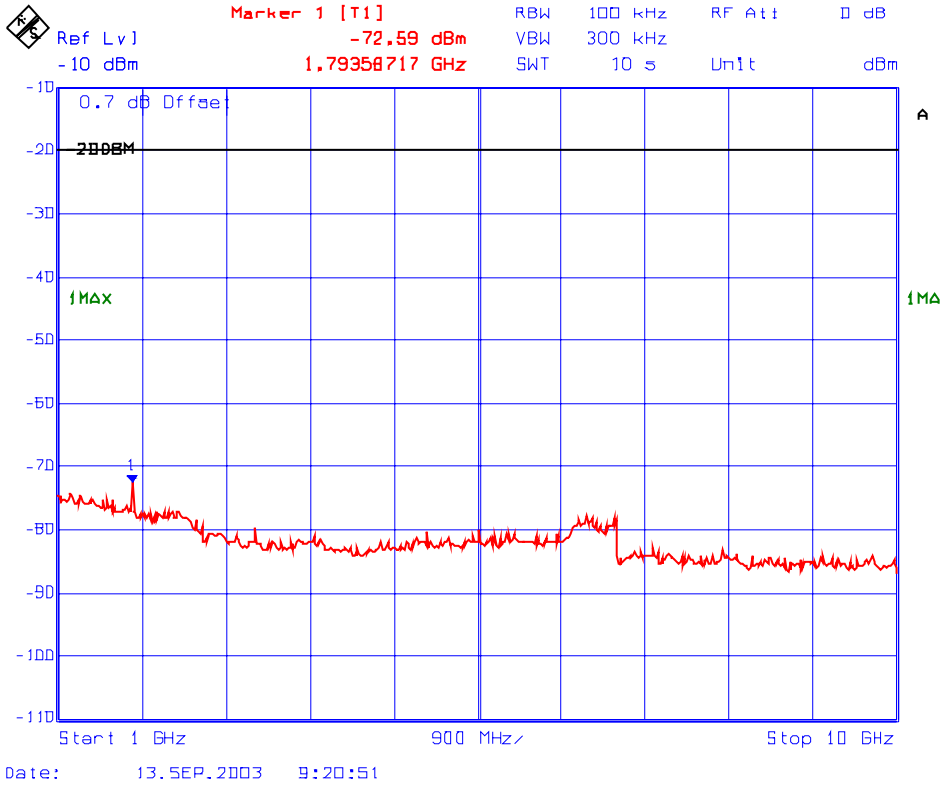
Fc: 896 MHz, Fc + 12.5 kHz, Fc + 25 kHz



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

Plot # 171: Transmitter Spurious Emissions Conducted with 3 RF signal input in 896 – 901 MHz

Fc: 896 MHz, Fc + 12.5 kHz, Fc + 25 kHz



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

5.10.5.3.2. Highest Frequencies

Fundamental Frequency: 901 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -14.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
801.60	-47.7	5.4	-53.1	PASS
851.20	-45.3	5.4	-50.7	PASS
1793.58	-53.5	5.4	-58.9	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 172 –173 for spurious conducted emissions.

Fundamental Frequency: 901 & 900.9875 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -15.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
801.60	-45.7	4.2	-49.9	PASS
853.18	-44.1	4.2	-48.3	PASS
1793.58	-55.5	4.2	-59.7	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 174 –175 for spurious conducted emissions.

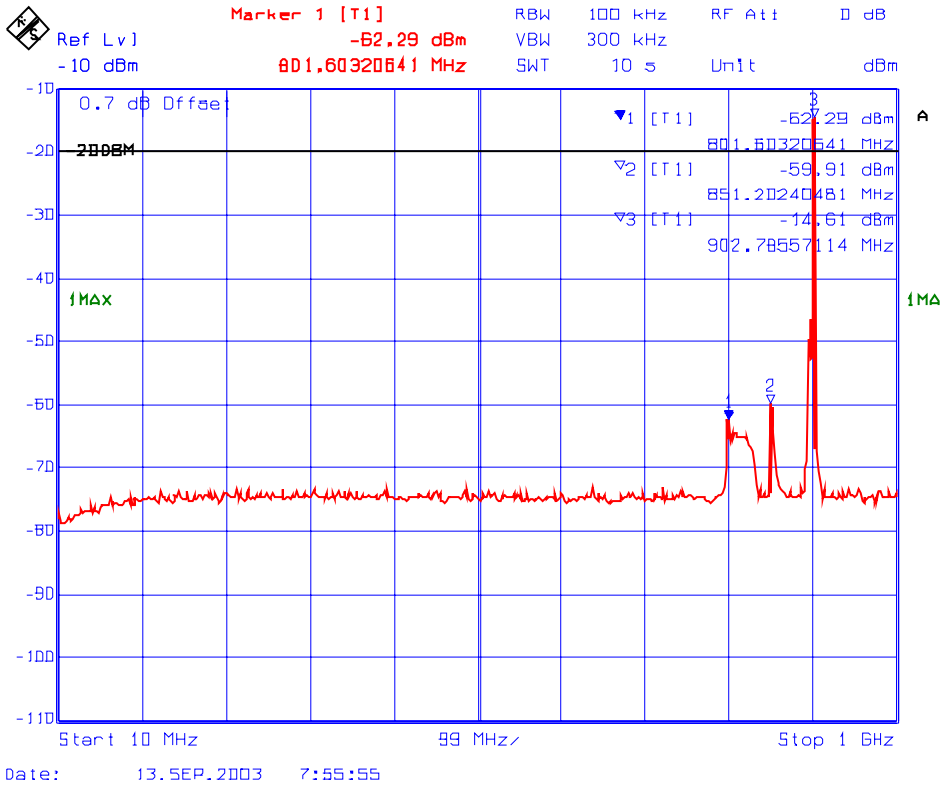
Fundamental Frequency: 901, 900.9875 & 900.975 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -15.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
801.60	-46.5	4.4	-50.9	PASS
853.18	-44.6	4.4	-49.0	PASS
1793.58	-53.9	4.4	-58.3	PASS

- The emissions were scanned from 10 MHz to 10 GHz and all emissions were recorded.
- Refer to plots # 176 –177 for spurious conducted emissions.

Plot # 172 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 896 – 901 MHz

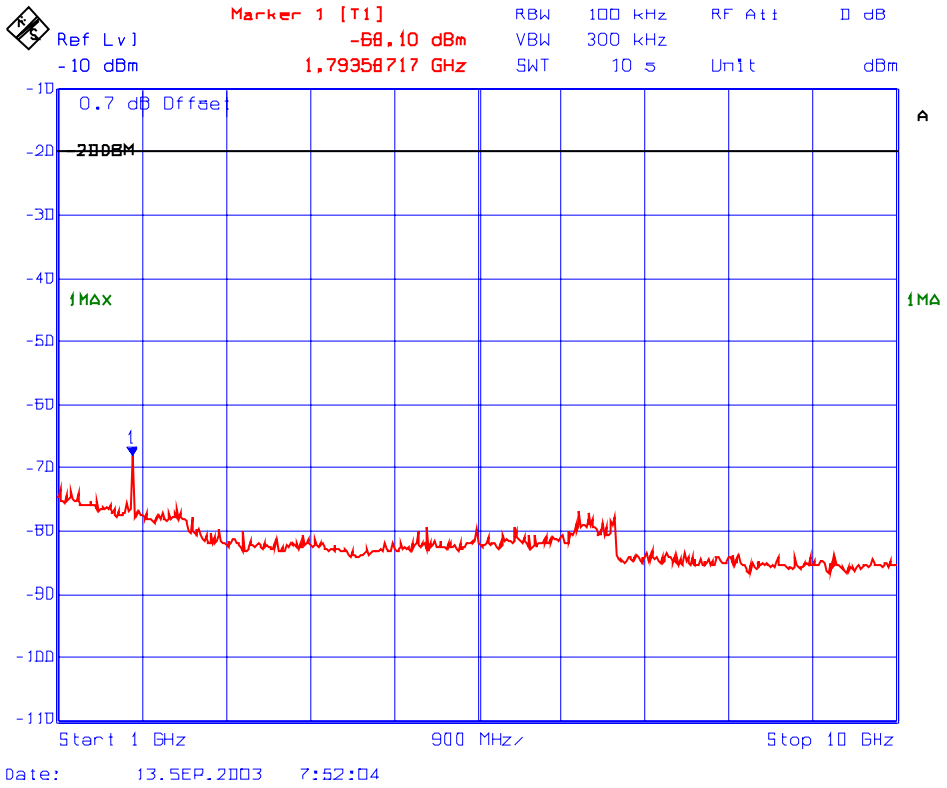
Fc: 901 MHz



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

Plot # 173 : Transmitter Spurious Emissions Conducted with 1 RF signal input in 896 – 901 MHz

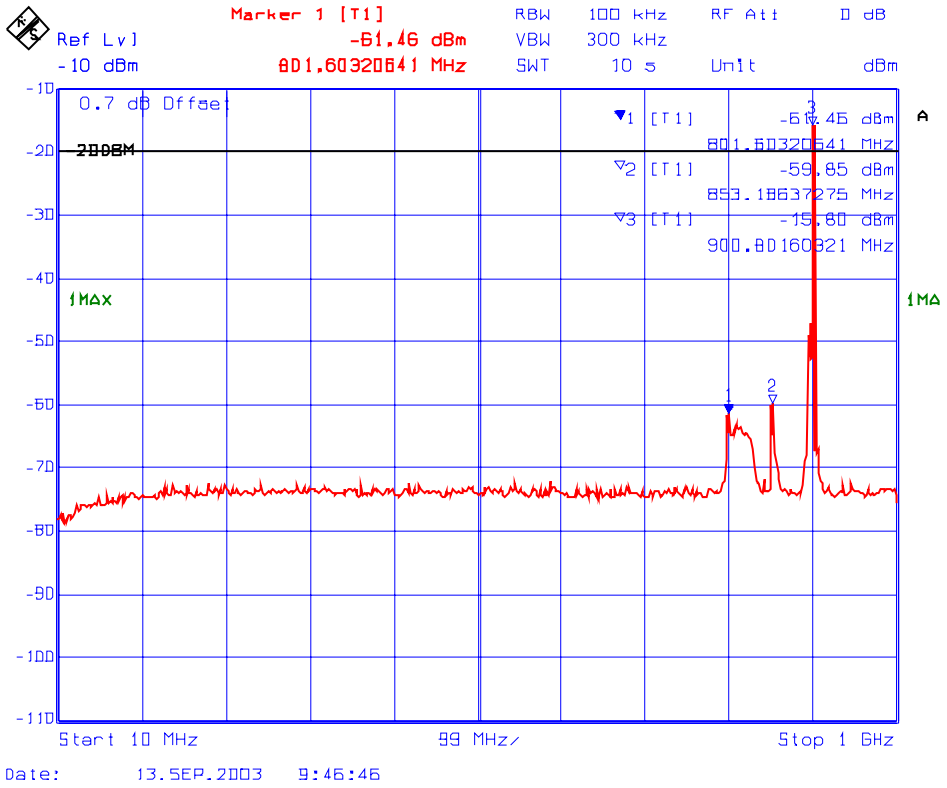
Fc: 901 MHz



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

Plot # 174 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 896 – 901 MHz

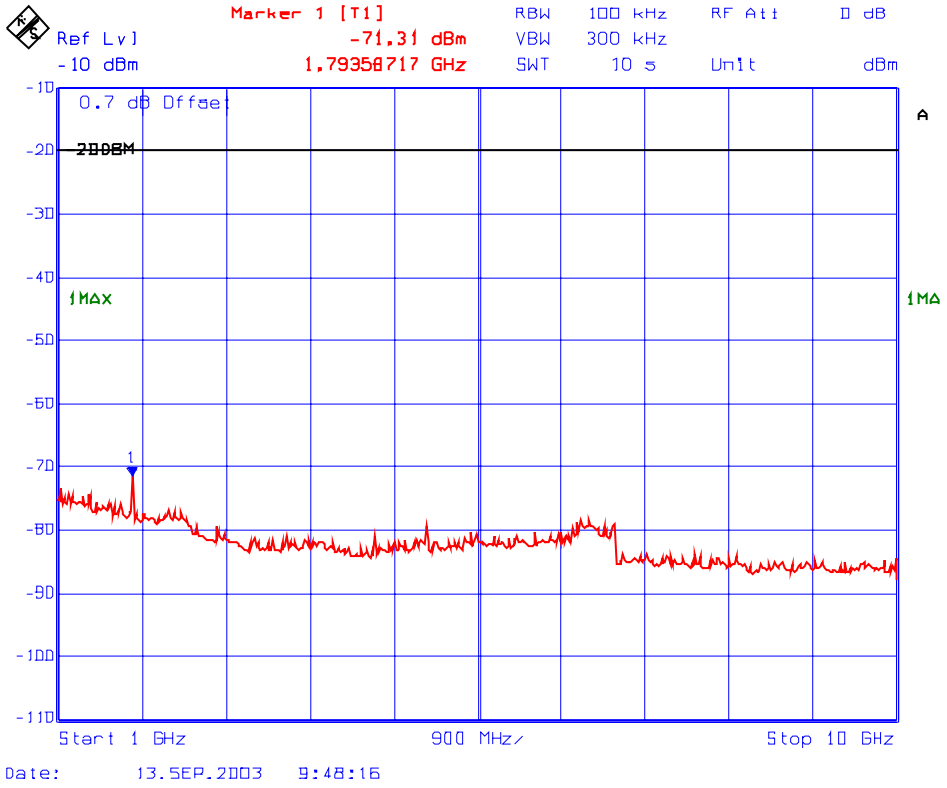
Fc: 901 MHz, Fc - 12.5 kHz



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

Plot # 175 : Transmitter Spurious Emissions Conducted with 2 RF signal input in 896 – 901 MHz

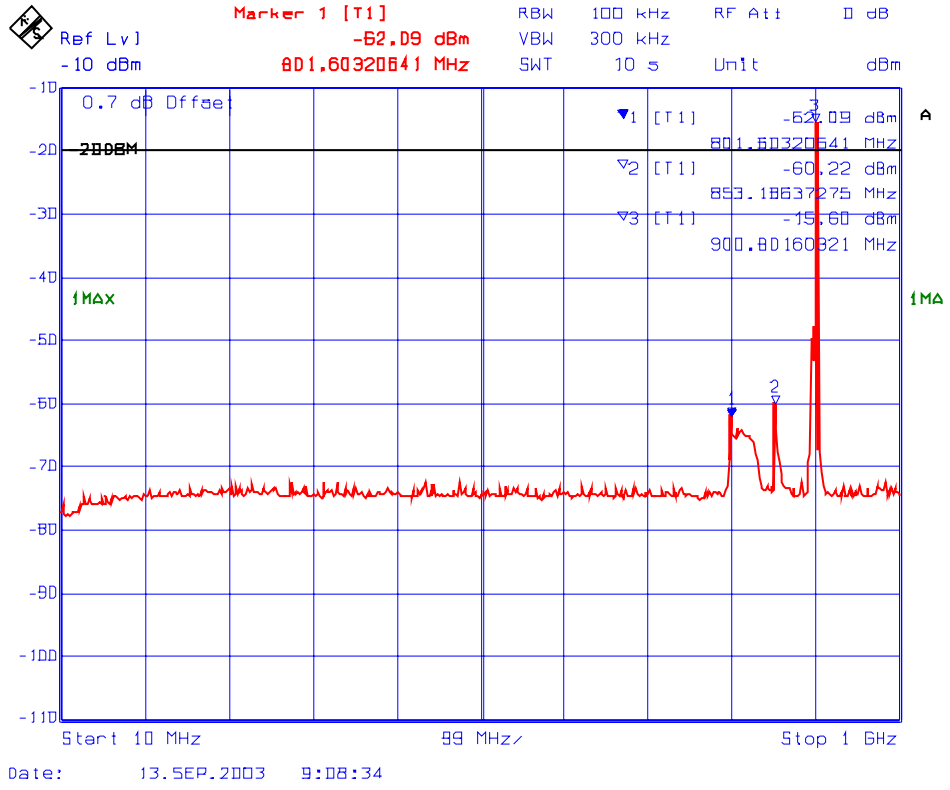
Fc: 901 MHz, Fc - 12.5 kHz



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

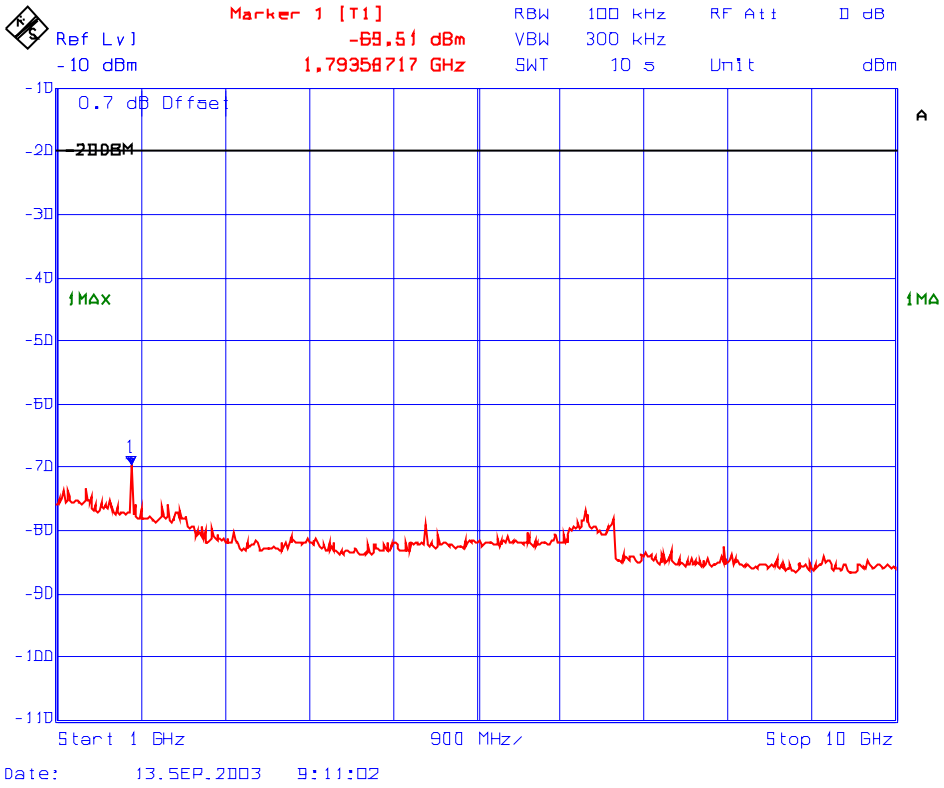
Plot # 176 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 896 – 901 MHz

Fc: 901 MHz, Fc - 12.5 kHz, Fc – 25 kHz



Plot # 177 : Transmitter Spurious Emissions Conducted with 3 RF signal input in 896 – 901 MHz

Fc: 901 MHz, Fc - 12.5 kHz, Fc – 25 kHz



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

5.10.5.4. Transmitter RF Conducted Spurious Emissions at the Antenna Port

5.10.5.4.1. Uplink Band 1850 - 1910 MHz: Test Frequency: 1851 MHz, Modulation: CDMA

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-56.4	-38.8	-4.6	-34.2	PASS
3687.27	-61.8	-44.2	-4.6	-39.6	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 178-179 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.2. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: CDMA

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacture
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-59.8	-41.1	-5.7	-35.4	PASS
3759.77	-60.7	-42.0	-5.7	-36.3	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 180-181 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.3. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: CDMA

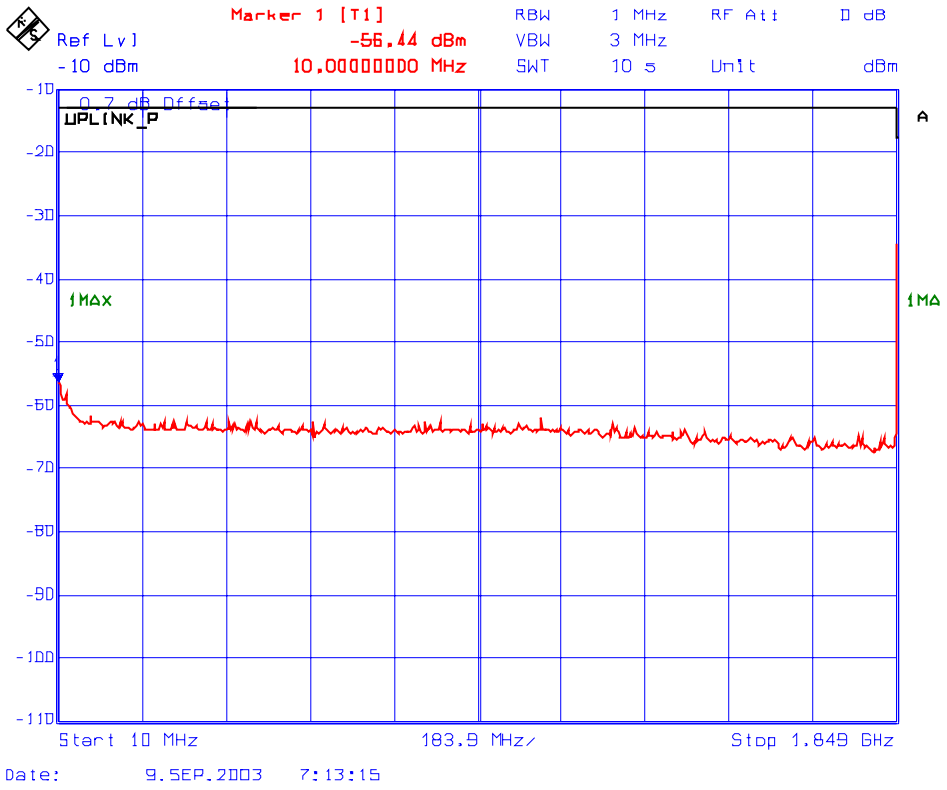
Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-55.7	-37.2	-5.5	-31.7	PASS
3796.02	-65.4	-46.9	-5.5	-41.4	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 182-183 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

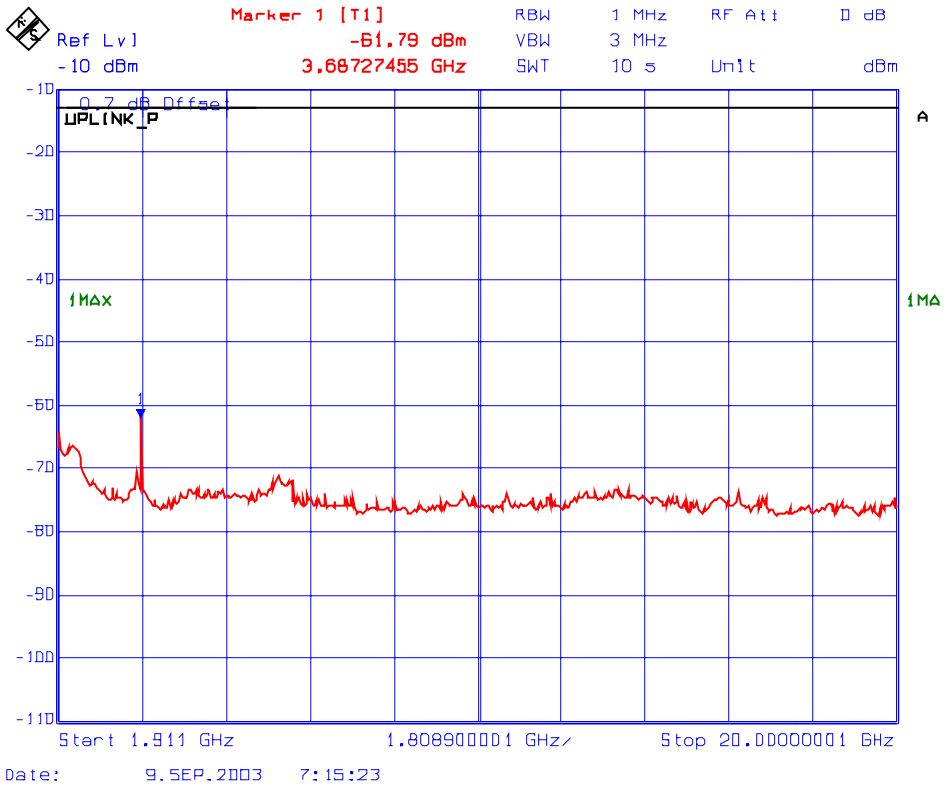
Plot # 178 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1851 MHz, Modulation: CDMA



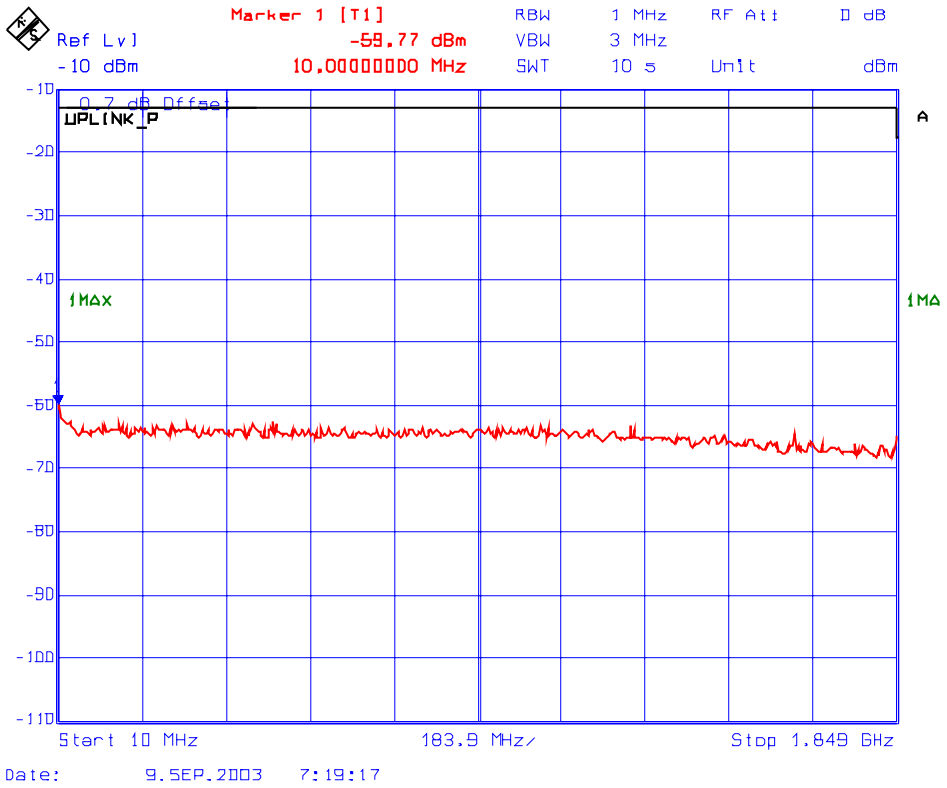
Plot # 179 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1851 MHz, Modulation: CDMA



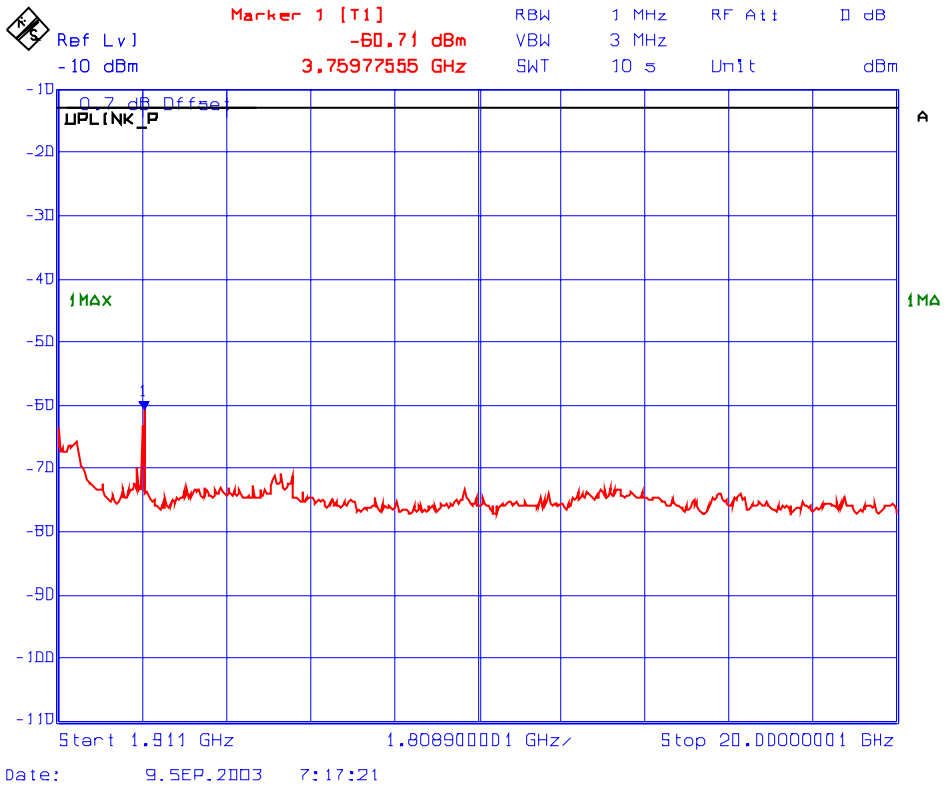
Plot # 180 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1880 MHz, Modulation: CDMA



Plot # 181 : Transmitter Conducted Emissions Outside the Permitted Band

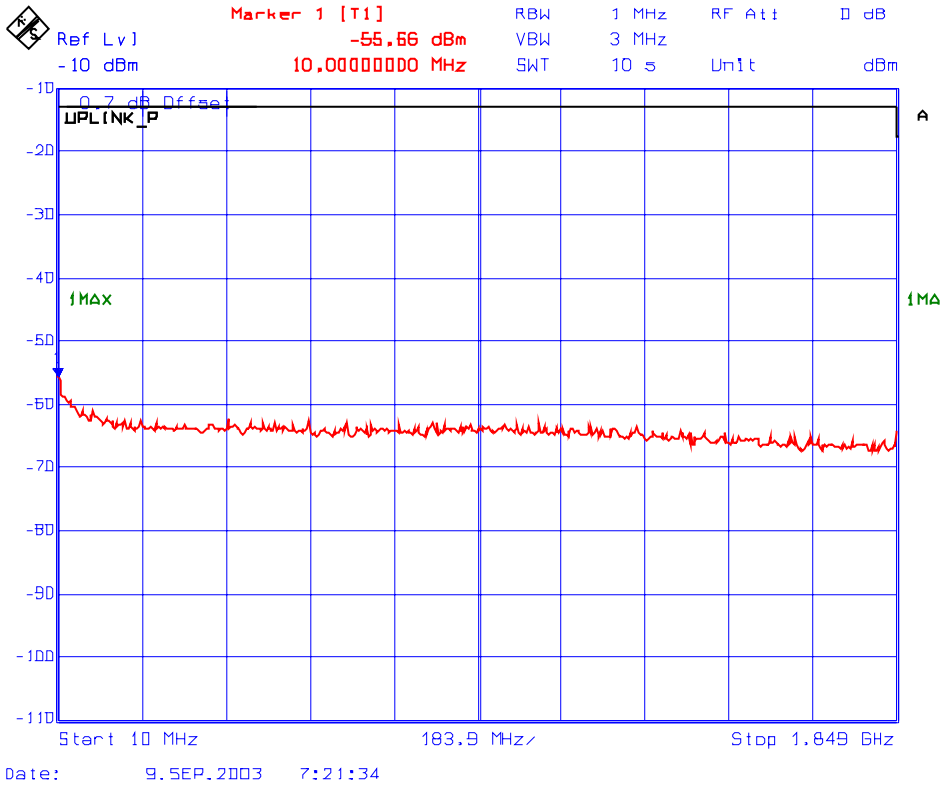
Frequency: 1880 MHz, Modulation: CDMA



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

Plot # 182 : Transmitter Conducted Emissions Outside the Permitted Band

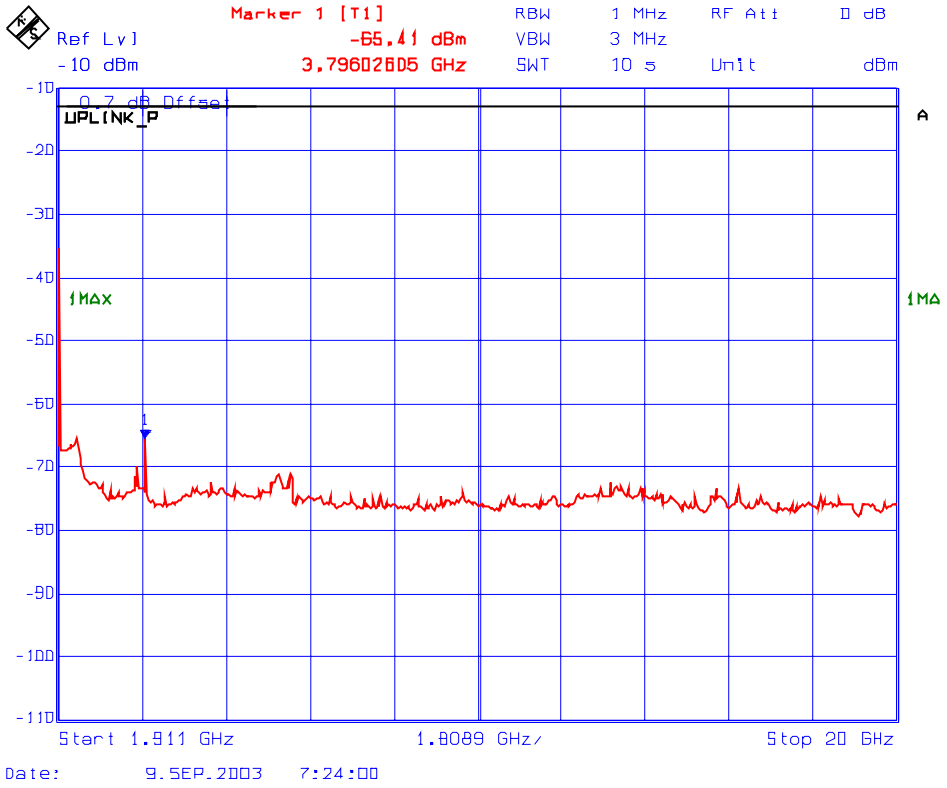
Frequency: 1909 MHz, Modulation: CDMA



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

Plot # 183 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1909 MHz, Modulation: CDMA



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

5.10.5.4.4. Uplink Band 1850 - 1910 MHz: Test Frequency: 1851 MHz, Modulation: TDMA

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-57.0	-39.4	-4.6	-34.8	PASS
3687.27	-62.9	-45.3	-4.6	-40.7	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 184-185 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.5. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: TDMA

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-55.6	-36.9	-5.7	-31.2	PASS
3759.77	-63.4	-44.7	-5.7	-39.0	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 186-187 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.6. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: TDMA

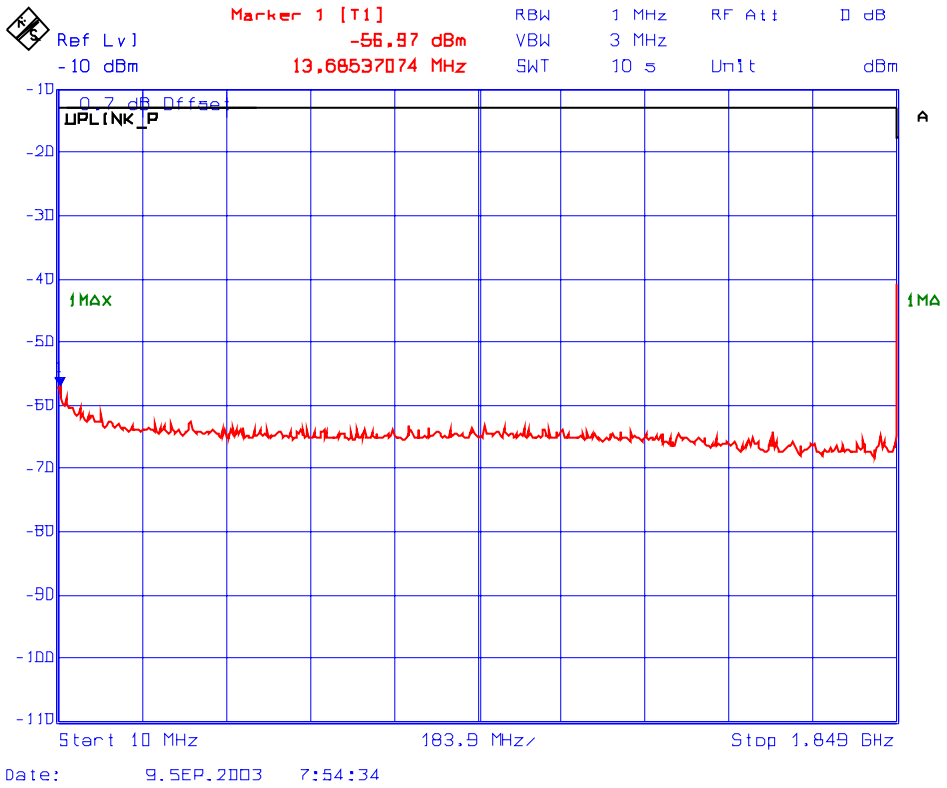
Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-56.7	-38.2	-5.5	-32.7	PASS
3796.02	-67.4	-48.9	-5.5	-43.4	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 188-189 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

Plot # 184 : Transmitter Conducted Emissions Outside the Permitted Band

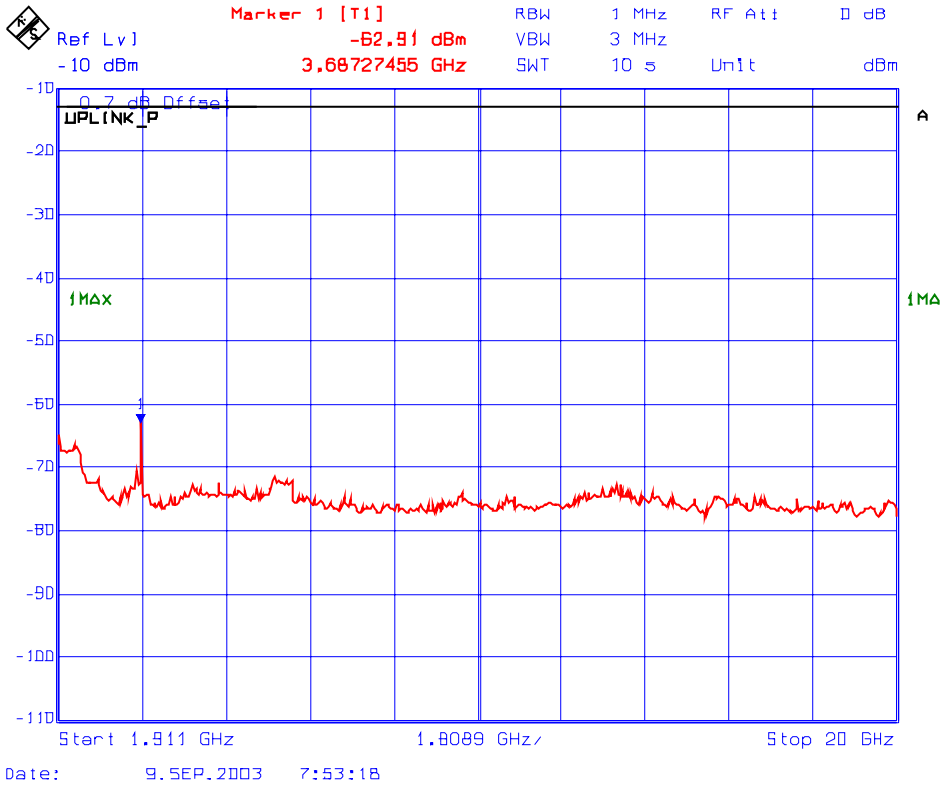
Frequency: 1851 MHz, Modulation: TDMA



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

Plot # 185 : Transmitter Conducted Emissions Outside the Permitted Band

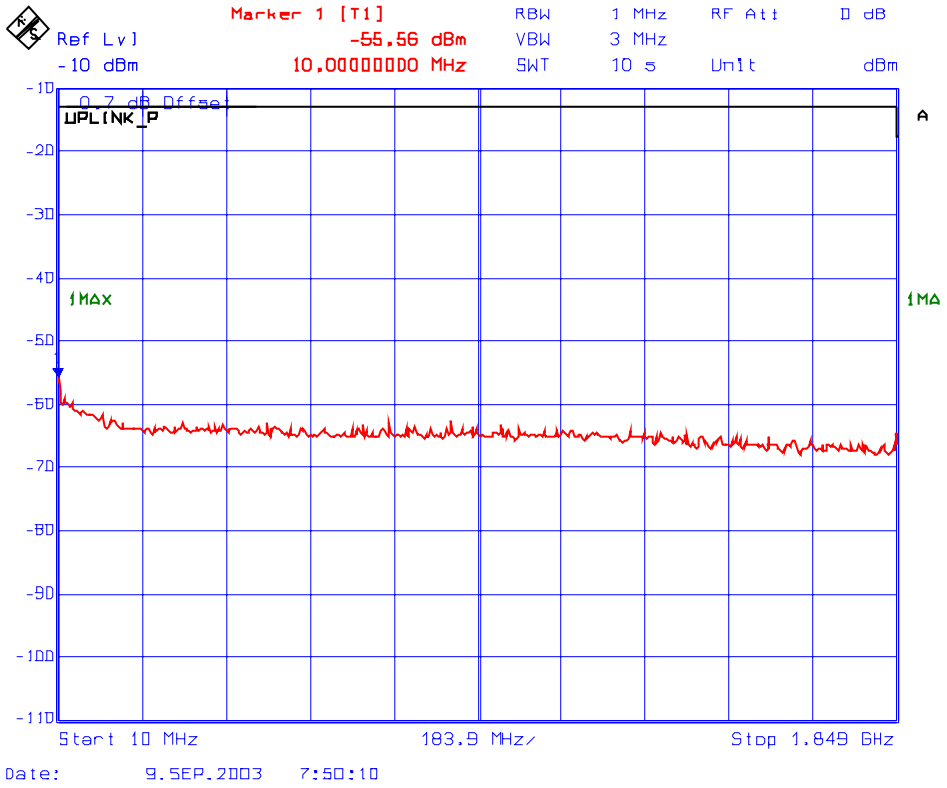
Frequency: 1851 MHz, Modulation: TDMA



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

Plot # 186 : Transmitter Conducted Emissions Outside the Permitted Band

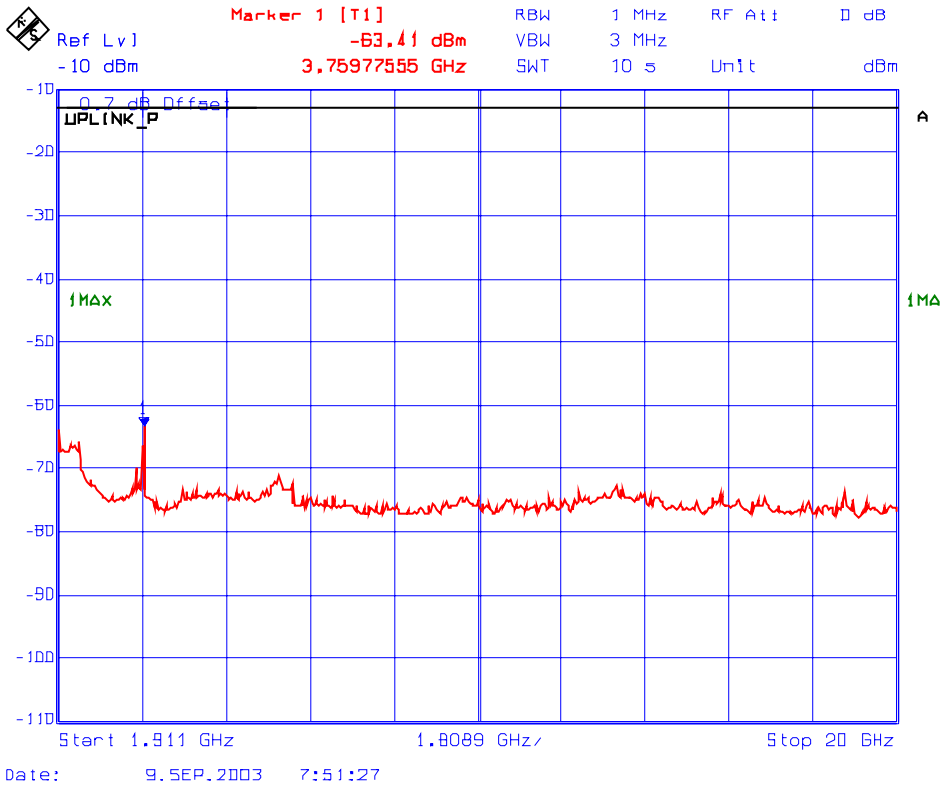
Frequency: 1880 MHz, Modulation: TDMA



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

Plot # 187 : Transmitter Conducted Emissions Outside the Permitted Band

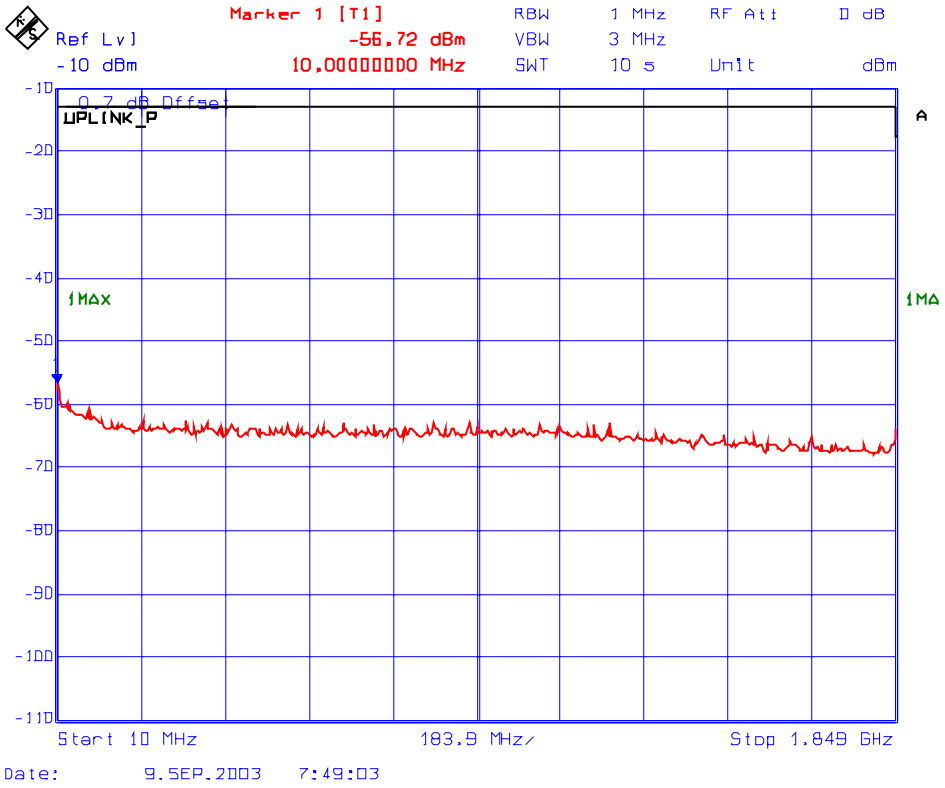
Frequency: 1880 MHz, Modulation: TDMA



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

Plot # 188 : Transmitter Conducted Emissions Outside the Permitted Band

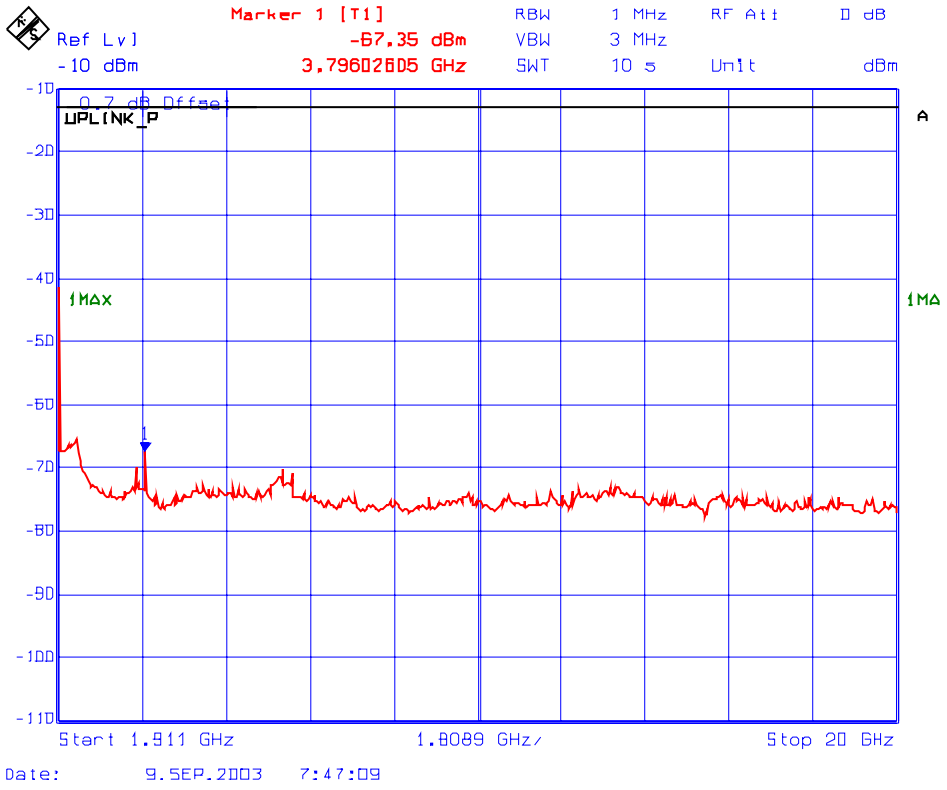
Frequency: 1909 MHz, Modulation: TDMA



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

Plot # 189 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1909 MHz, Modulation: TDMA



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

5.10.5.4.7. Uplink Band 1850 - 1910 MHz: Test Frequency: 1851 MHz, Modulation: GSM

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-55.2	-37.6	-4.6	-33.0	PASS
1911.00	-64.3	-46.7	-4.6	-42.5	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 190-191 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.8. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: GSM

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10.00	-57.1	-38.4	-5.7	-32.7	PASS
1911.00	-64.2	-45.5	-5.7	-39.8	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 192-193 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.9. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: GSM

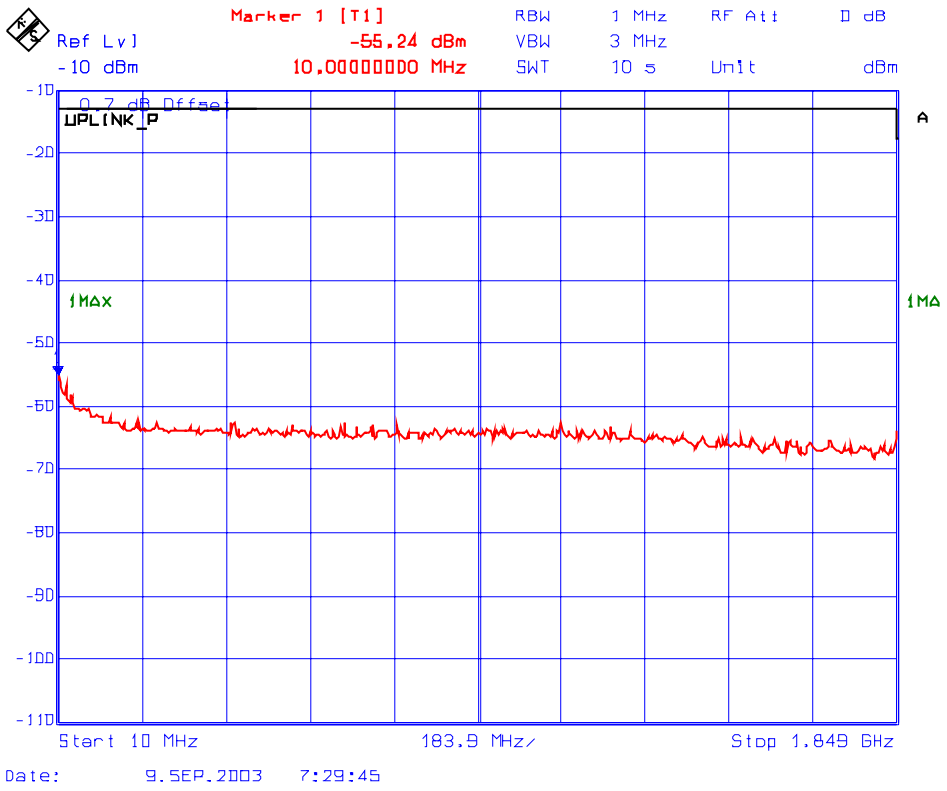
Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
13.68	-56.3	-37.8	-5.5	-32.3	PASS
1911.00	-63.8	-45.3	-5.5	-39.8	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all spurious emissions within 40 dB below the limits were recorded.
- Refer to Plots # 194-195 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

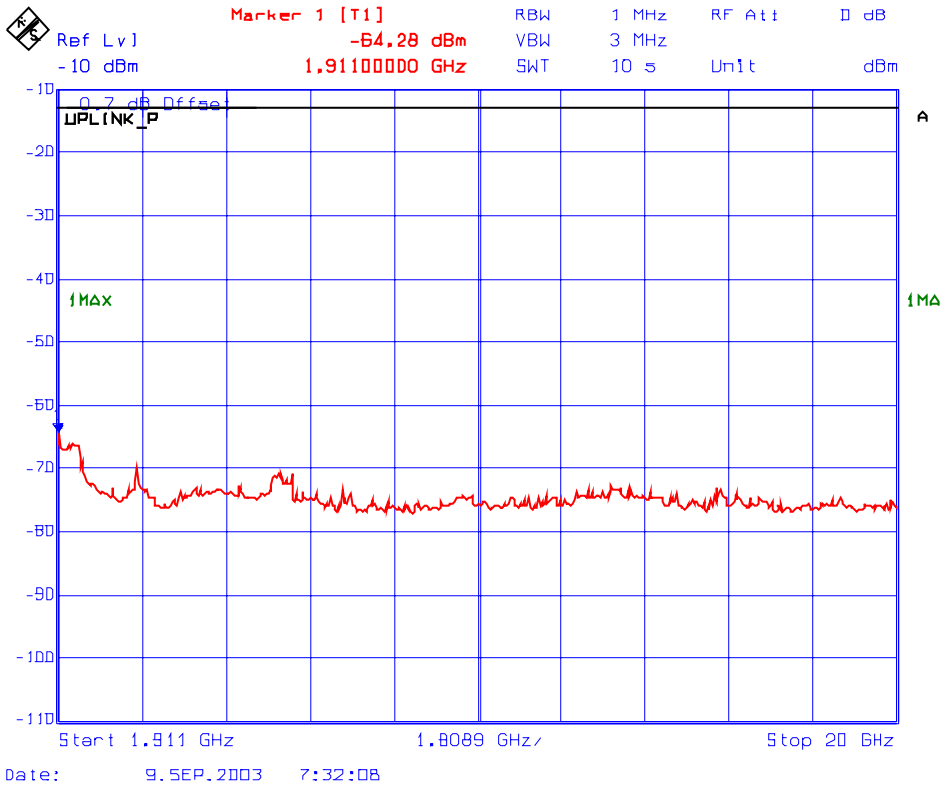
Plot # 190 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1851 MHz, Modulation: GSM



Plot # 191 : Transmitter Conducted Emissions Outside the Permitted Band

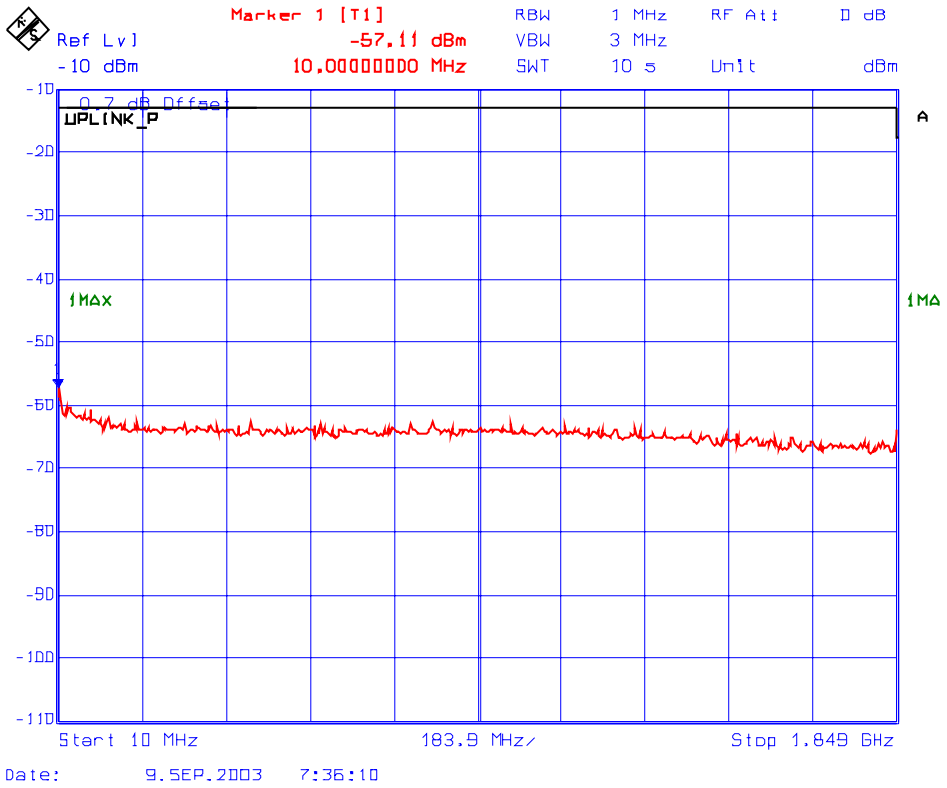
Frequency: 1851 MHz, Modulation: GSM



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

Plot # 192 : Transmitter Conducted Emissions Outside the Permitted Band

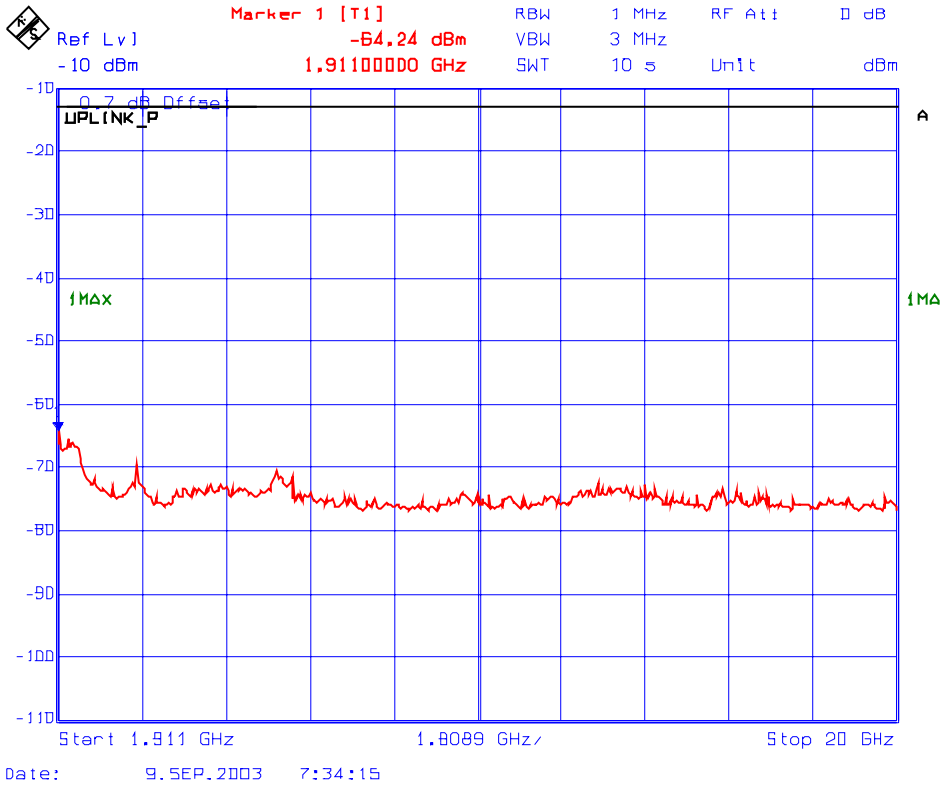
Frequency: 1880 MHz, Modulation: GSM



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

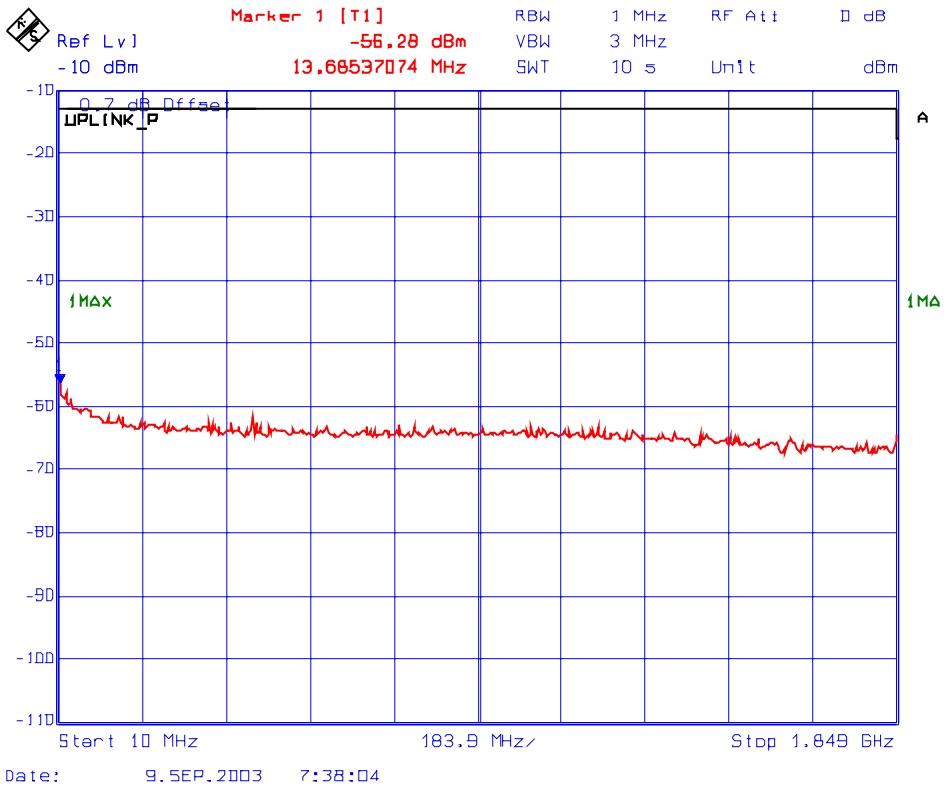
Plot # 193 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1880 MHz, Modulation: GSM



Plot # 194 : Transmitter Conducted Emissions Outside the Permitted Band

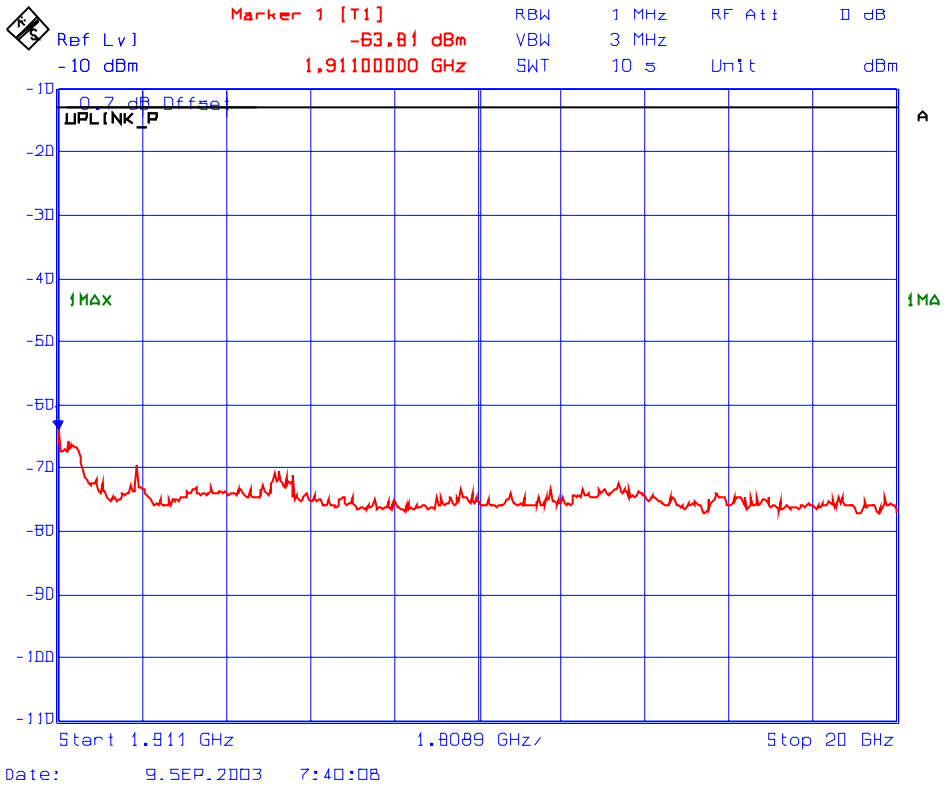
Frequency: 1909 MHz, Modulation: GSM



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

Plot # 195 : Transmitter Conducted Emissions Outside the Permitted Band

Frequency: 1909 MHz, Modulation: GSM



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

5.10.5.4.10. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1851 & 1851.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1851 & 1851.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -22.0 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1851 & 1851.2	-22.0	--	--	--	--
3623.24	-72.3	-50.3	-9.0	-41.3	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 196 – 197 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.11. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1851, 1851.2 & 1851.4 MHz, Modulation: unmodulated (for worst case)

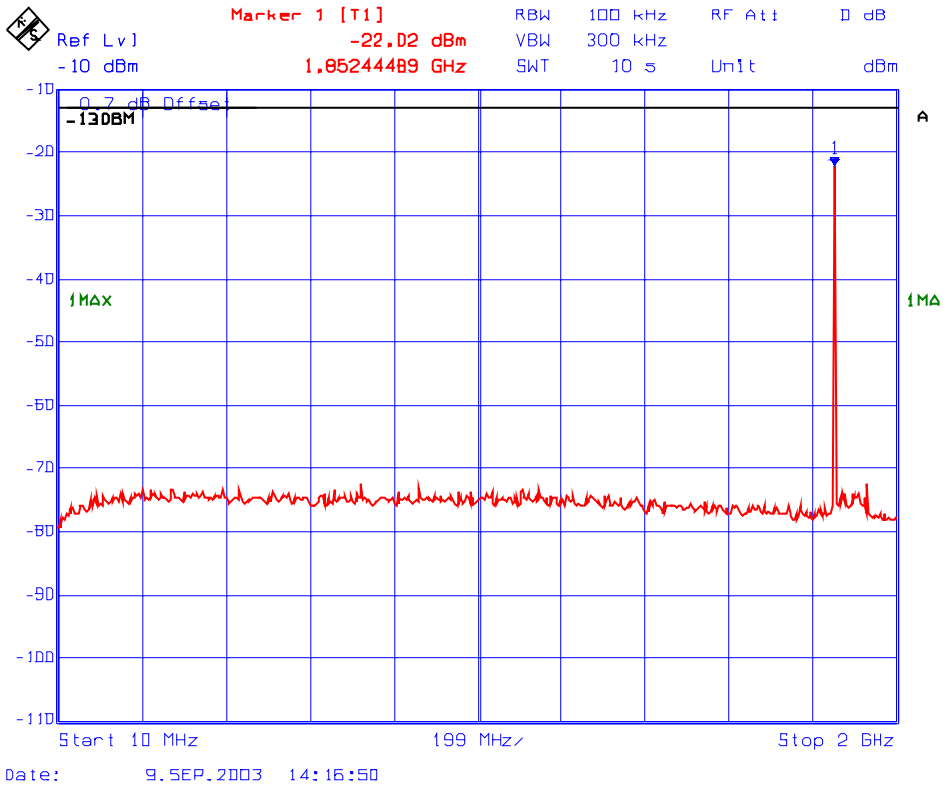
Fundamental Frequencies: 1851, 1851.2 & 1851.4 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -26.2 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1851, 1851.2 & 1851.4	-26.2	--	--	--	--
3623.24	-71.7	-45.5	-13.2	-32.3	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 198–199 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

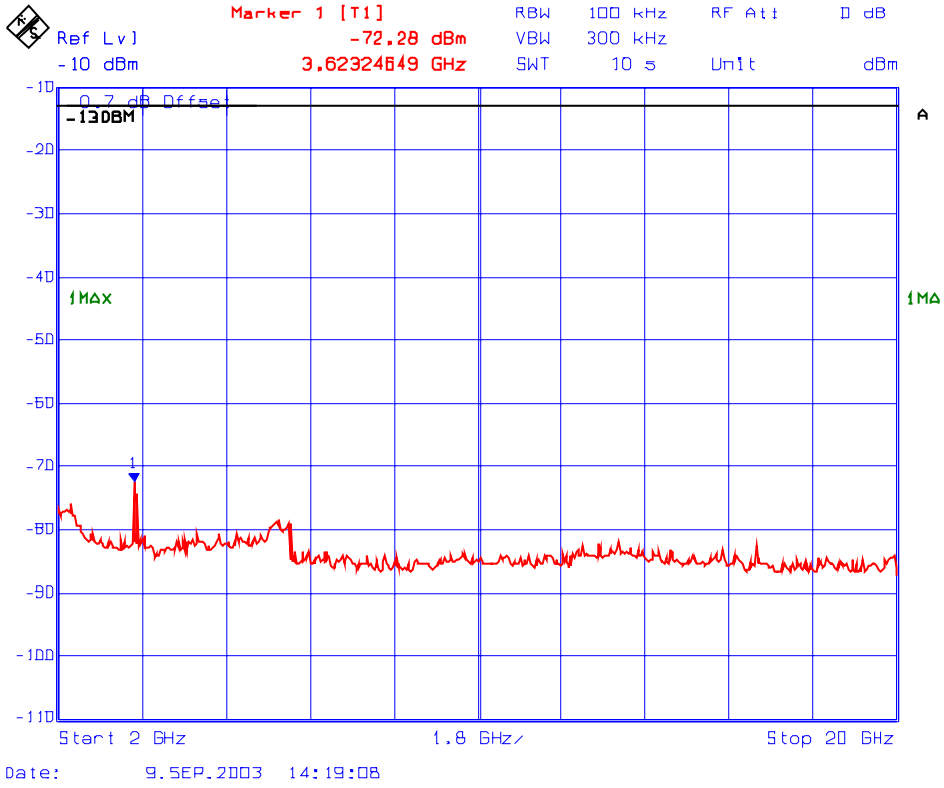
Plot # 196 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

Fc: 1851 MHz, Fc + 200 kHz, Unmodulated



Plot # 197 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

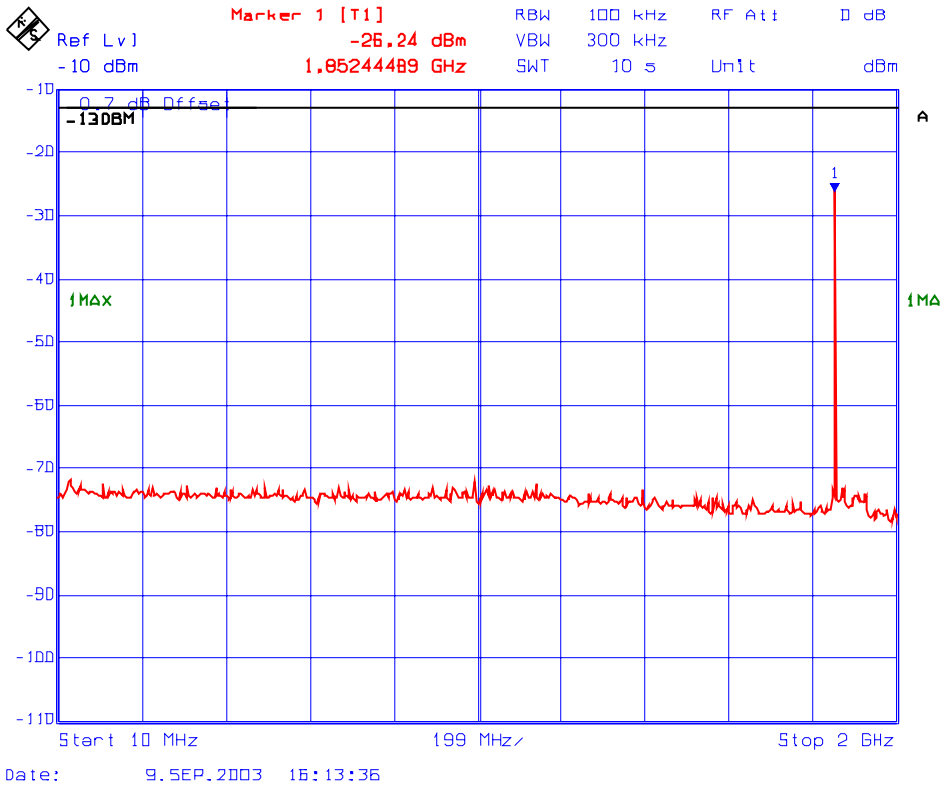
Fc: 1851 MHz, Fc + 200 kHz, Unmodulated



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

Plot # 198 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

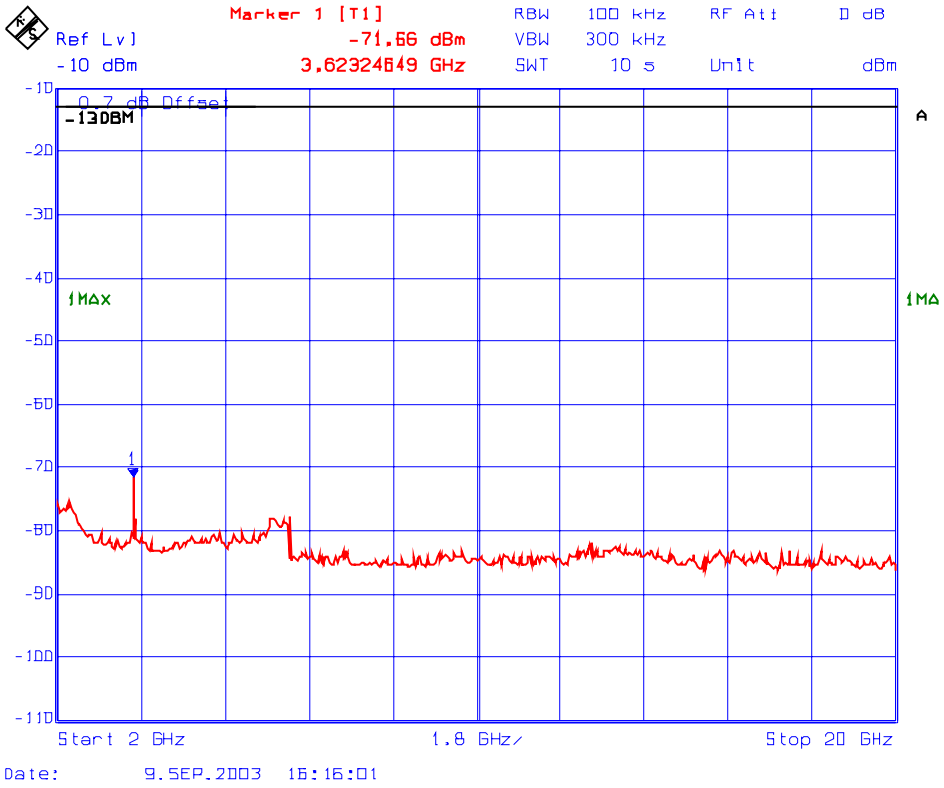
Fc: 1851 MHz, Fc + 200 kHz, Fc + 400 kHz, Unmodulated



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

Plot # 199 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

Fc: 1851 MHz, Fc + 200 kHz, Fc + 400 kHz, Unmodulated



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

5.10.5.4.12. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1880 & 1880.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1880 & 1880.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -23.5 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1880 & 1880.2	-23.5	--	--	--	--
3623.24	-72.6	-49.1	-10.5	-38.6	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 200–201 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.13. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1879.8, 1880 & 1880.2 MHz, Modulation: unmodulated (for worst case)

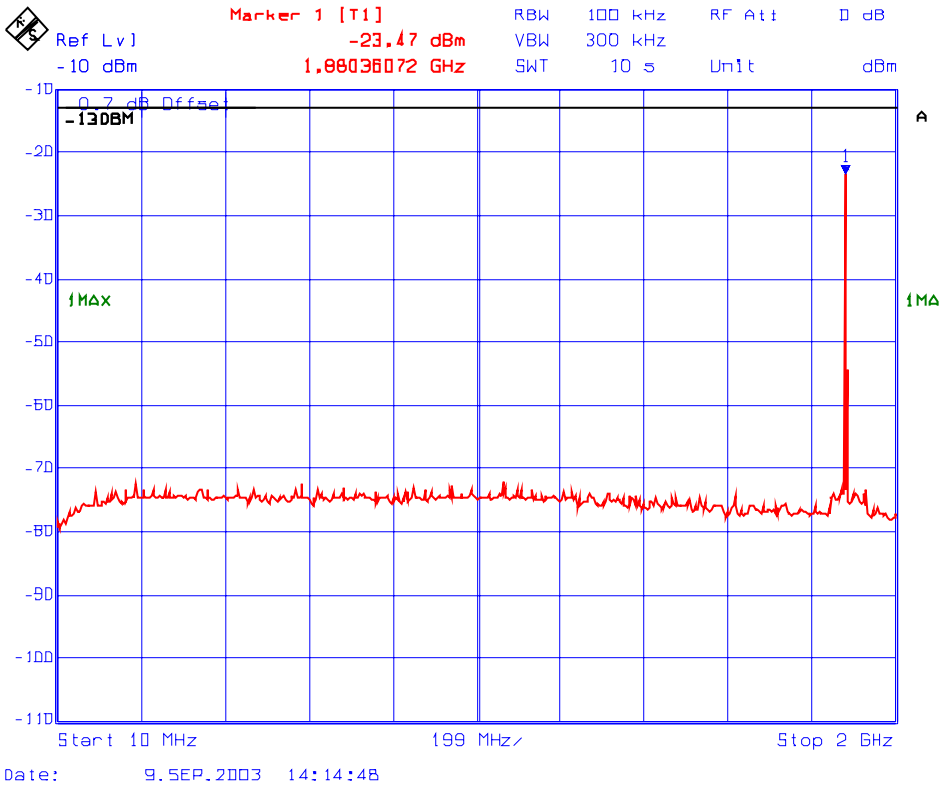
Fundamental Frequencies: 1879.8, 1880 & 1880.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -27.3 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1879.8, 1880 & 1880.2	-27.3	--	--	--	--
3623.24	-71.4	-44.1	-14.3	-29.8	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 202-203 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

Plot # 200 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

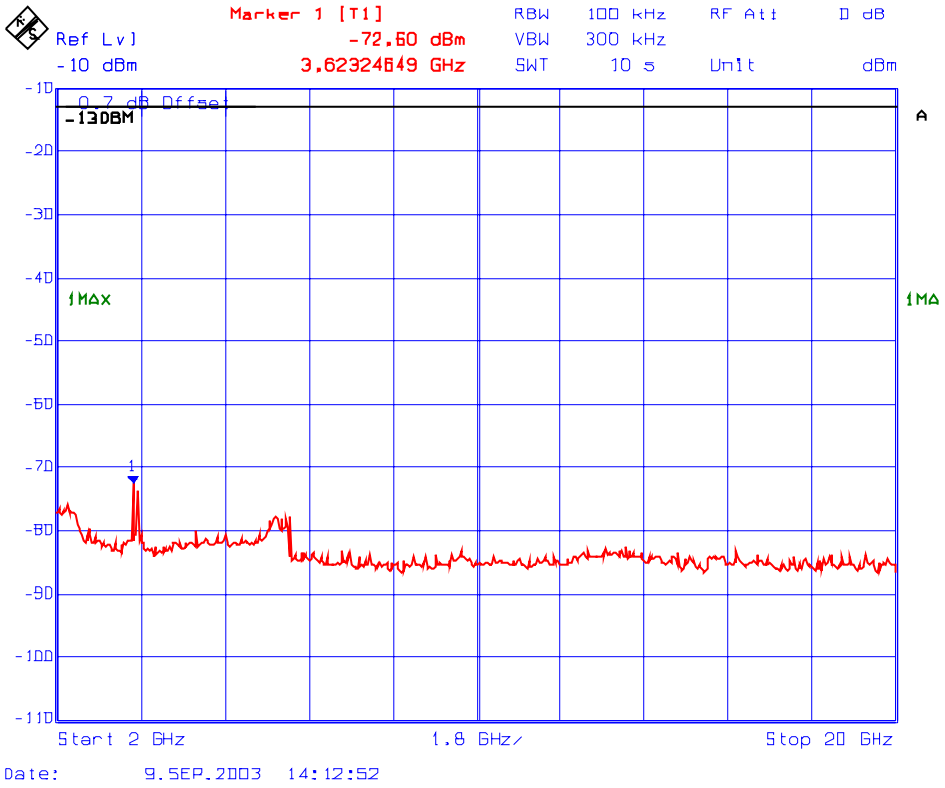
Fc: 1880 MHz, Fc + 200 kHz, Unmodulated



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

Plot # 201 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

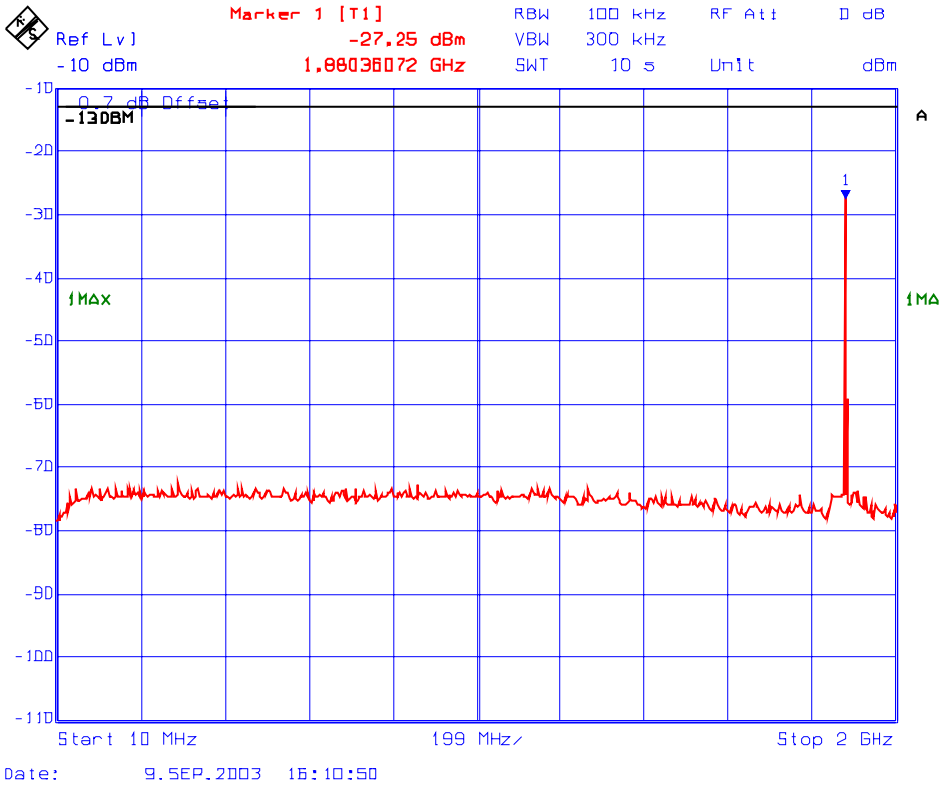
Fc: 1880 MHz, Fc + 200 kHz, Unmodulated



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

Plot # 202 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

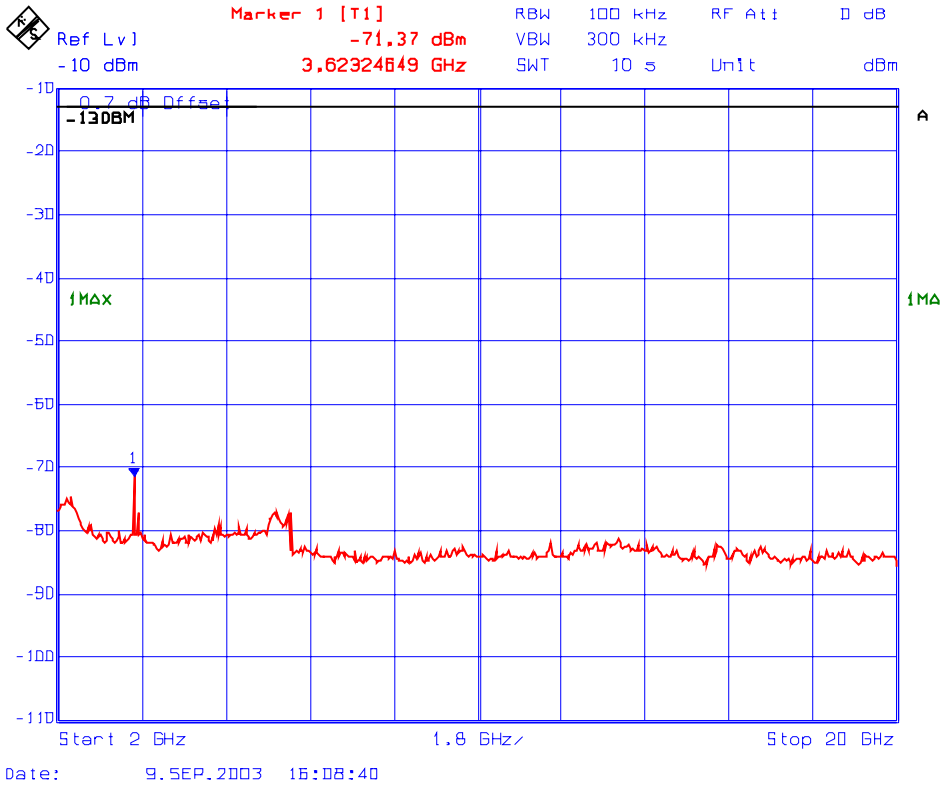
Fc: 1880 MHz, Fc - 200 kHz, Fc + 200 kHz, Unmodulated



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

Plot # 203 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

Fc: 1880 MHz, Fc - 200 kHz, Fc + 200 kHz, Unmodulated



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

5.10.5.4.14. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1908.8 & 1909 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1908.8 & 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -22.7 dBm as maximum rated by the manufacturer
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1908.8 & 1909	-22.7	--	--	--	--
3623.24	-72.4	-49.7	-9.7	-40.0	PASS

- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 204 –205 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.15. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1908.6, 1908.8 & 1909.0 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1908.6, 1908.8 & 1909.0 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -27.4 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER CONDUCTED ANTENNA EMISSIONS		LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
1908.6, 1908.8 & 1909.0	-27.4	--	--	--	--
3623.24	-72.1	-44.7	-14.4	-30.3	PASS

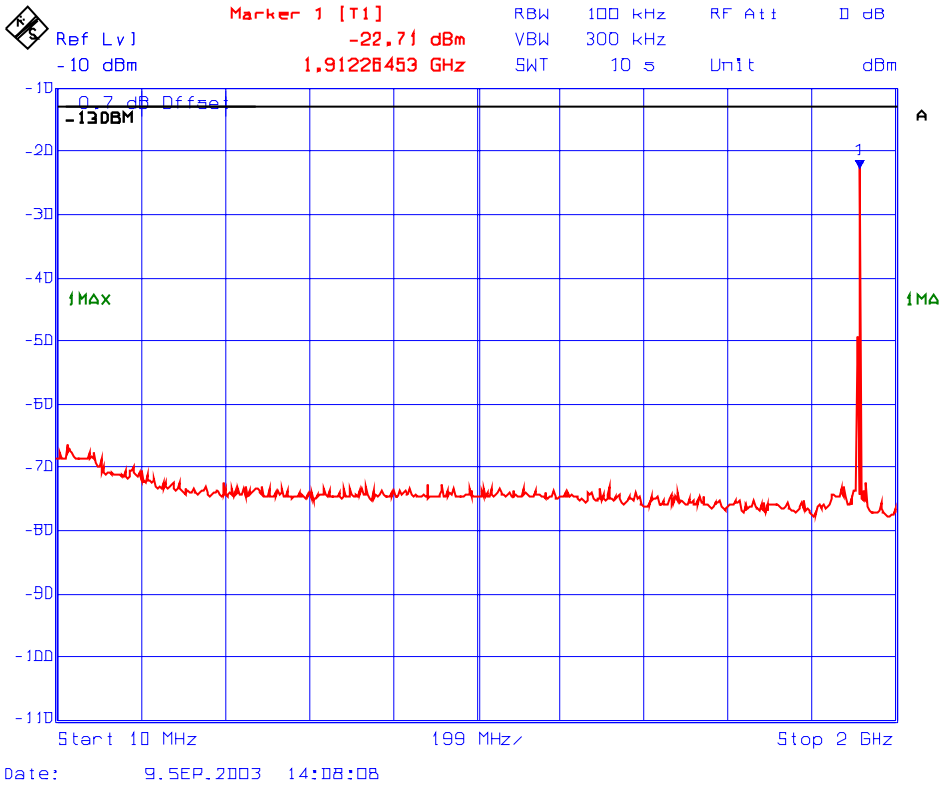
- The emissions were scanned from 10 MHz to 20 GHz and all RF spurious emissions less than 50 dB below the limits were recorded.
- Refer to Plots # 206 –207 for Spurious emissions outside the Permitted Band 1850-1910 MHz.

5.10.5.4.16. Band Edge Emissions :

Confirms. Refer to plot # 208 – 213 for detailed measurement of band edge emissions.

Plot # 204 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

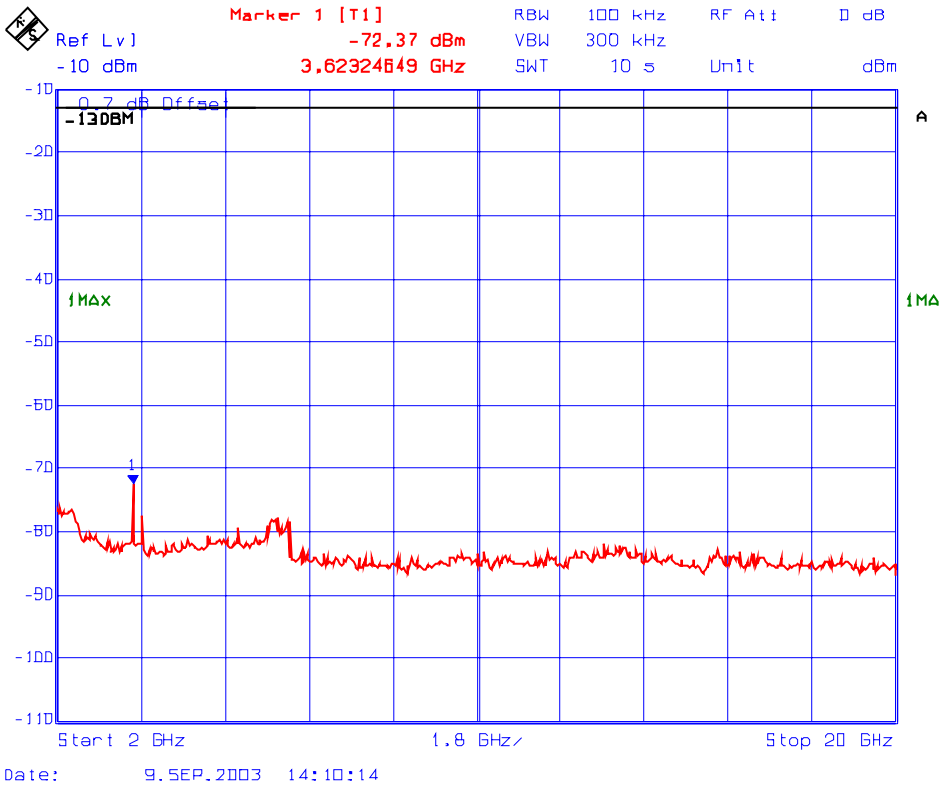
Fc: 1909 MHz, Fc - 200 kHz, Unmodulated



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

Plot # 205 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

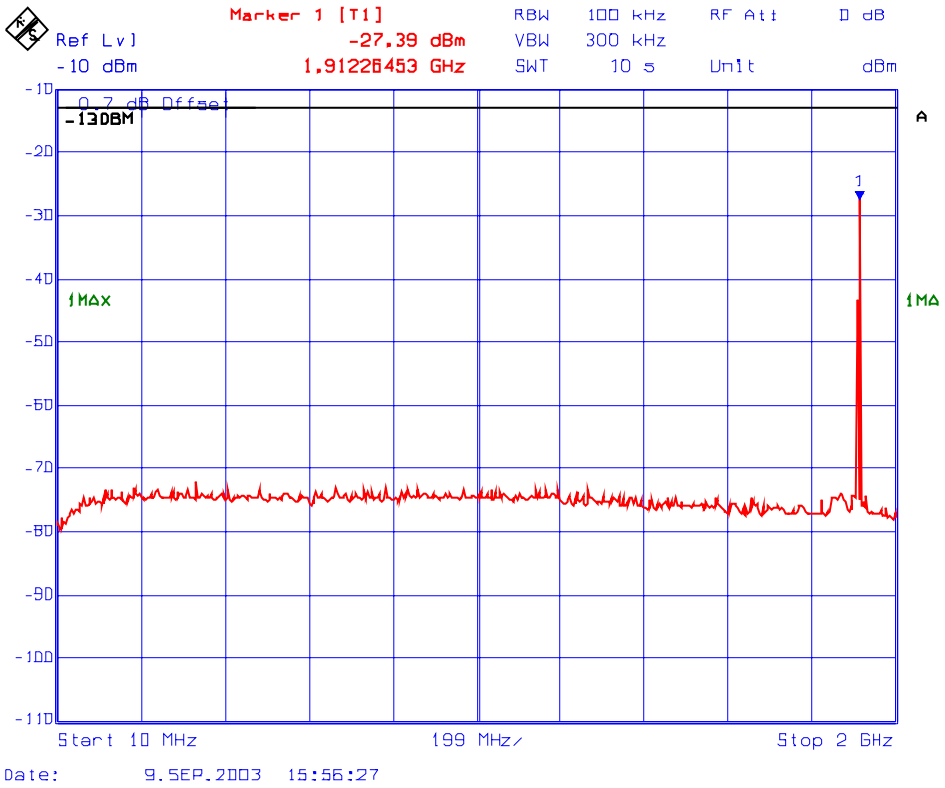
Fc: 1909 MHz, Fc - 200 kHz, Unmodulated



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

Plot # 206 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

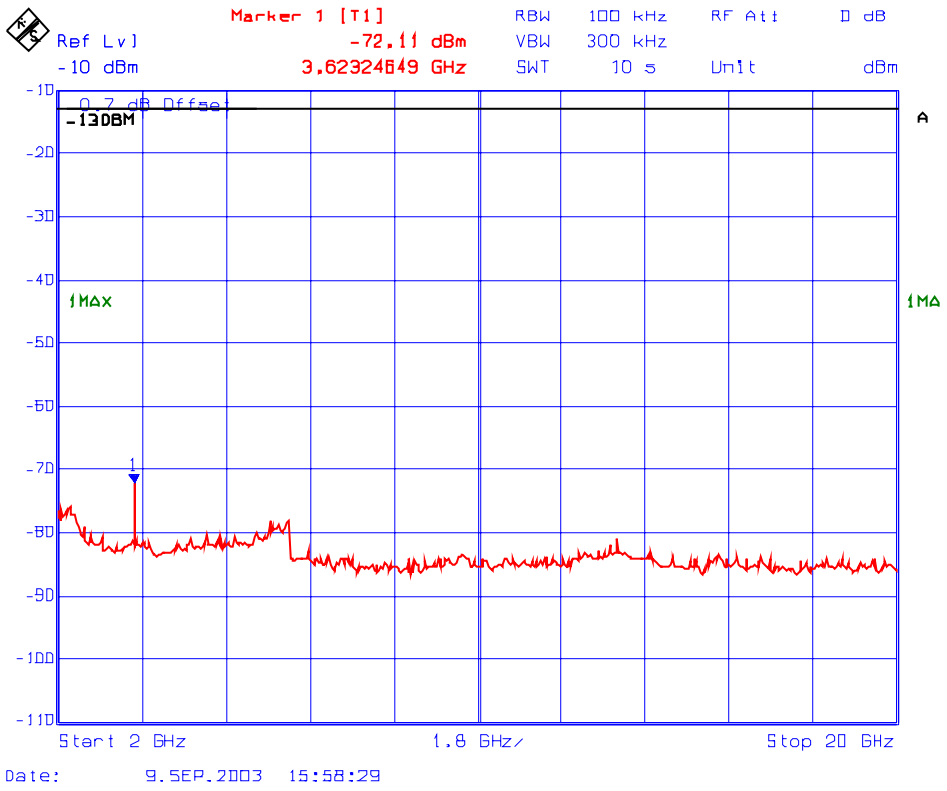
Fc: 1909 MHz, Fc - 200 kHz, Fc - 400 kHz, Unmodulated



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

Plot # 207 : Transmitter Conducted Emissions (Multi Input/Output) In 1850–1910 MHz Band

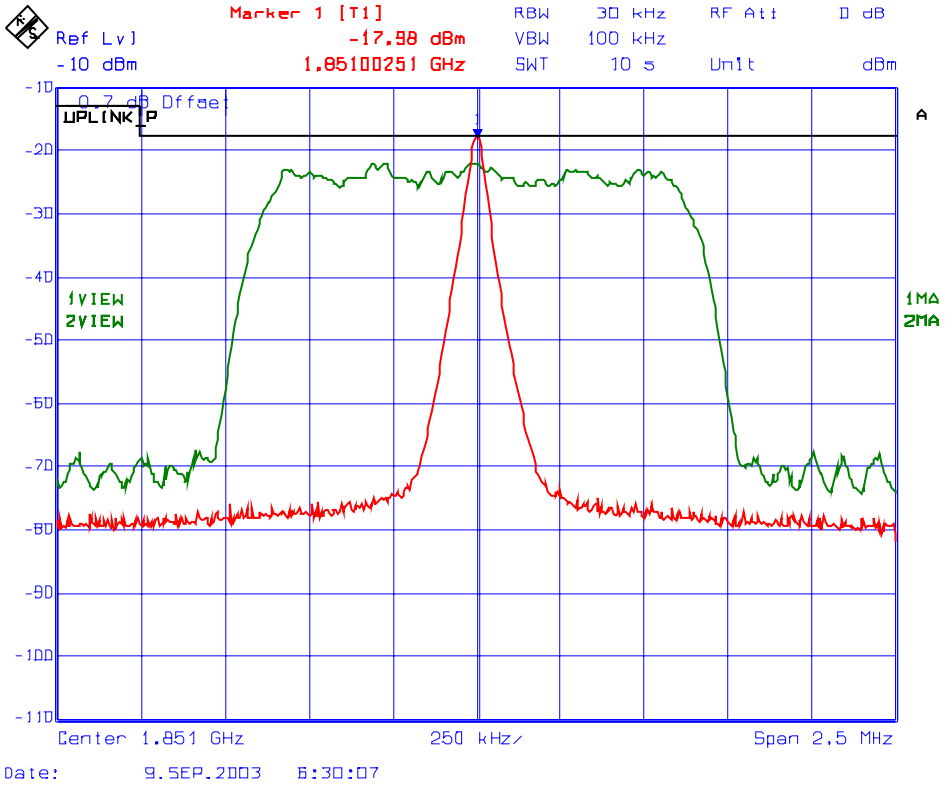
Fc: 1909 MHz, Fc - 200 kHz, Fc - 400 kHz, Unmodulated



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

Plot # 208 : Band-Edge Conducted Emissions

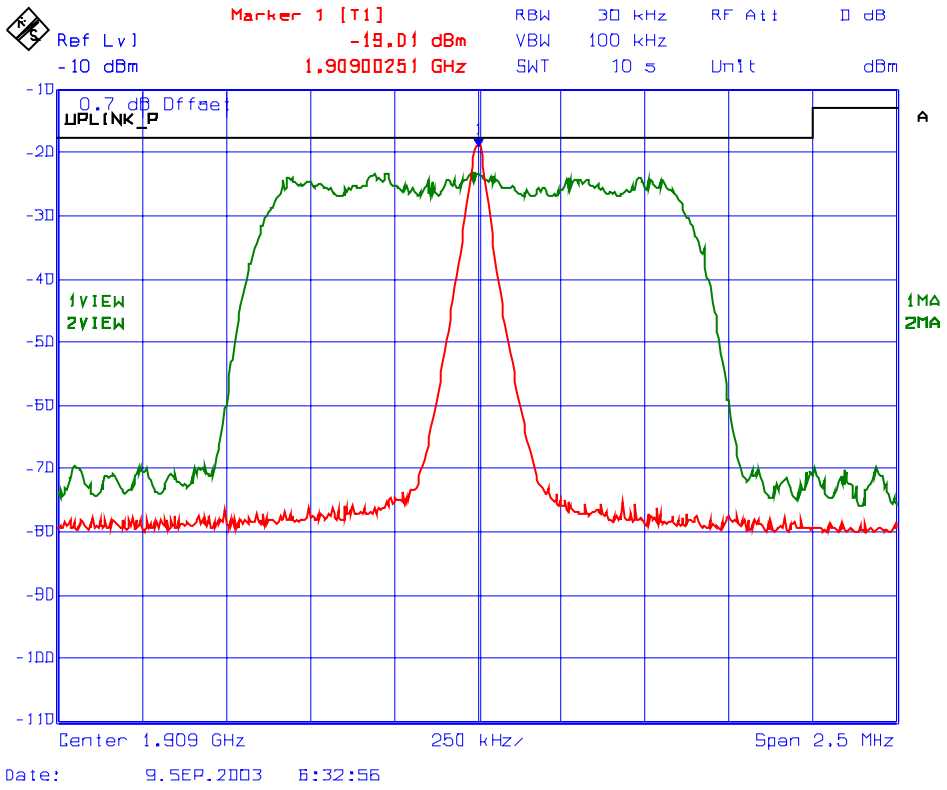
Frequency: 1851 MHz, Modulation: CDMA
Trace 1; Unmodulated RF Output, Trace 2: CDMA RF Output



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

Plot # 209 : Band-Edge Conducted Emissions

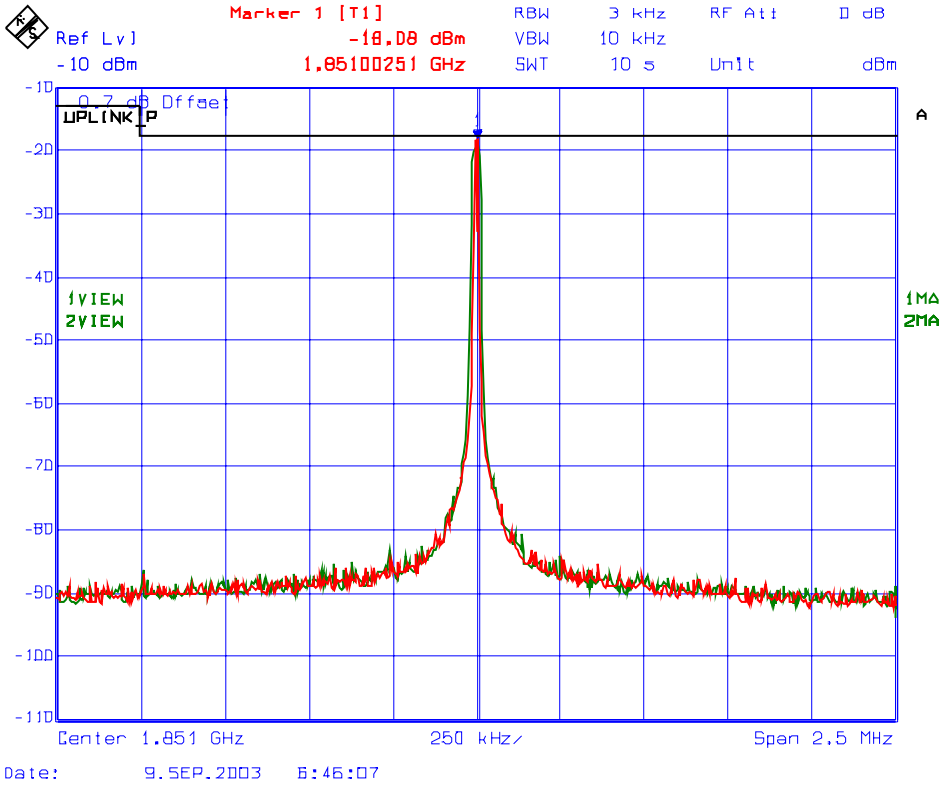
Frequency: 1909 MHz, Modulation: CDMA
Trace 1; Unmodulated RF Output, Trace 2: CDMA RF Output



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

Plot # 210 : Band-Edge Conducted Emissions

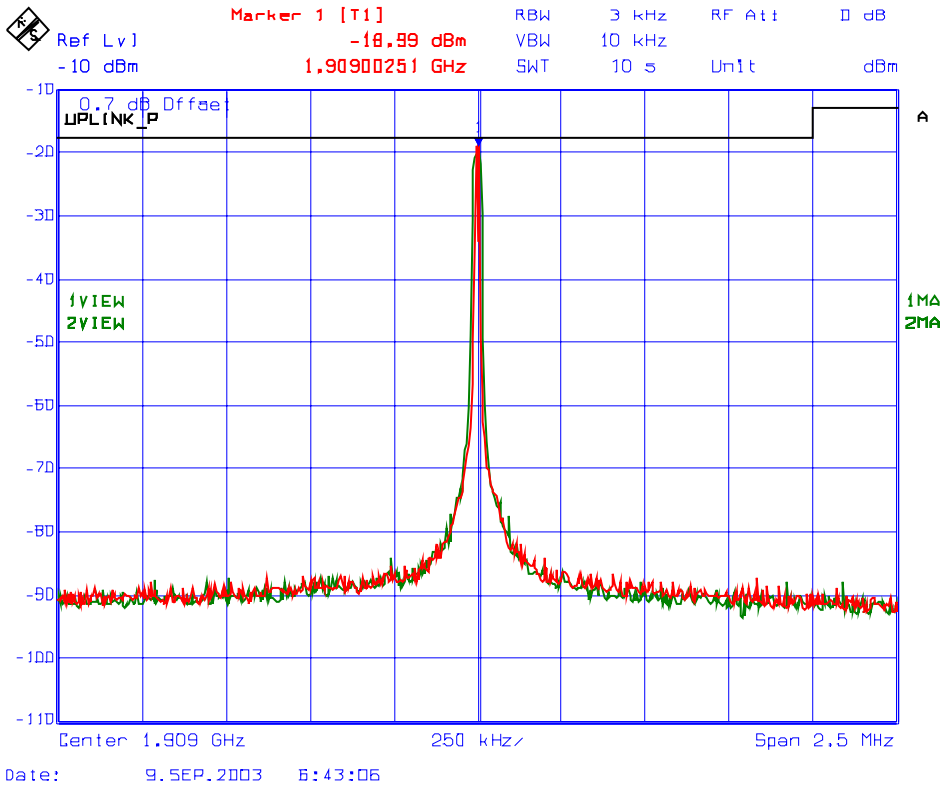
Frequency: 1851 MHz, Modulation: TDMA
Trace 1; Unmodulated RF Output, Trace 2: TDMA RF Output



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

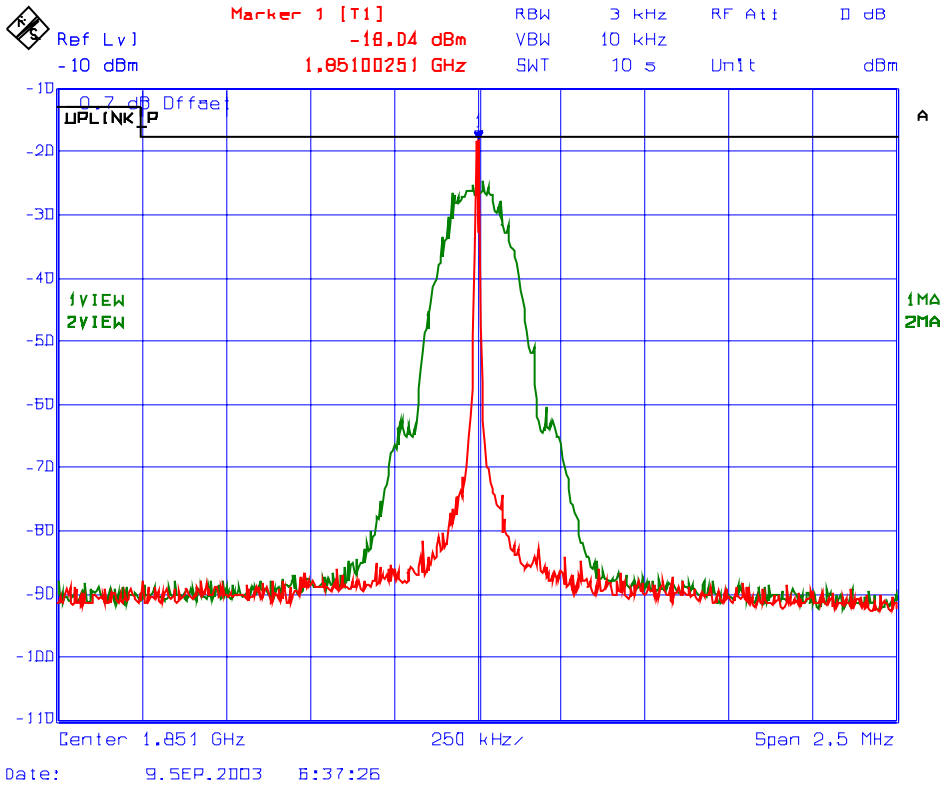
Plot # 211 : Band-Edge Conducted Emissions

Frequency: 1909 MHz, Modulation: TDMA
Trace 1; Unmodulated RF Output, Trace 2: TDMA RF Output



Plot # 212 : Band-Edge Conducted Emissions

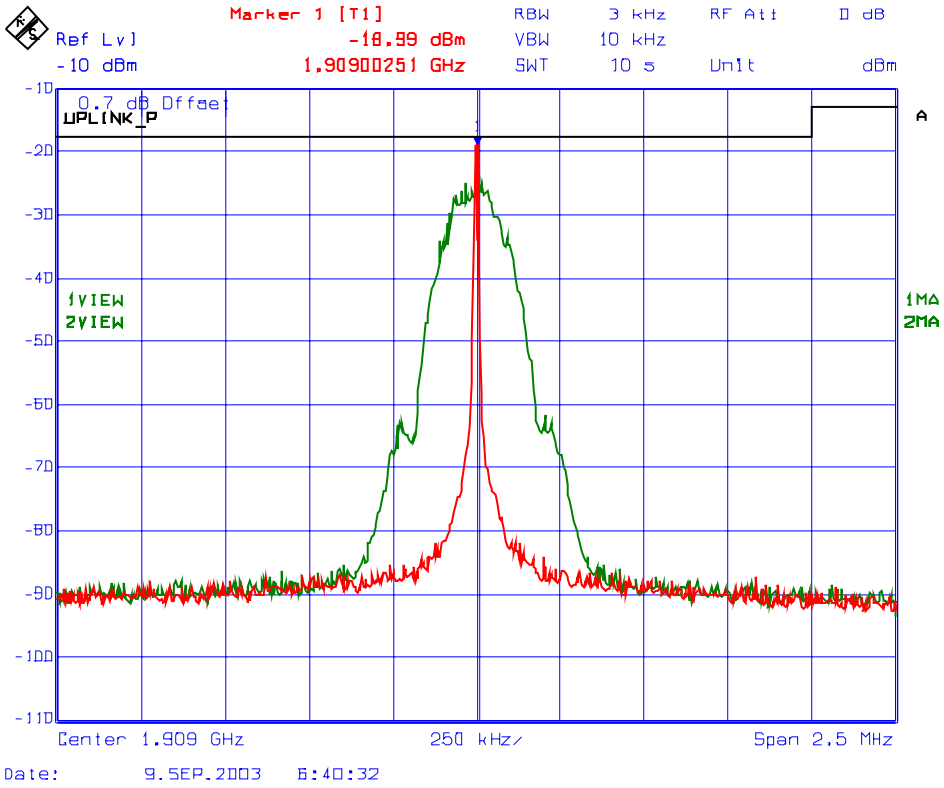
Frequency: 1851 MHz, Modulation: GSM
Trace 1; Unmodulated RF Output, Trace 2: GSM RF Output



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

Plot # 213 : Band-Edge Conducted Emissions

Frequency: 1909 MHz, Modulation: GSM
Trace 1; Unmodulated RF Output, Trace 2: GSM RF Output



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

5.11. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS @ 22.917(A), (B), (C) & (D), 90.208 & 90.210

5.11.1. Limits

The most stringent limit of 50+10*log(P in Watts) dBc is applied for all sub-bands for worst case.

5.11.2. Method of Measurements

The spurious/harmonic ERP measurements are using substitution method specified in Exhibit 7, § 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)

5.11.3. 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

5.11.4. Test Setup

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

5.11.5. Test Data

5.11.5.1. 806 – 824 MHz (Trunking)

5.11.5.1.1. Lowest Frequencies

Fundamental Frequency: 806 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.79 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10,000	**	4.2	**	PASS

- The emissions were scanned from 10 MHz to 10 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 806 & 806.025 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.5 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	3.5	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 806, 806.025 & 806.50 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.9 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	4.1	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.1.2. Middle Frequencies

Fundamental Frequency: 815 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 7.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	5.3	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 815 & 815.025 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	4.7	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 815, 815.025 & 814.975 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	4.3	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.1.3. Highest Frequencies

Fundamental Frequency: 824 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 8.4 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	4.6	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 824 & 823.975 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	3.9	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 824, 823.975 & 823.95 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 9.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	3.7	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.2. 824 – 849 (Cellular)

5.11.5.2.1. Lowest Frequencies

Fundamental Frequency: 824 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -17.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-4.8	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 824 & 824.03 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 17.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-4.1	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 824, 824.030 & 824.060 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 17.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-4.6	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.2.2. Middle Frequencies

Fundamental Frequency: 836.5 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: - 14.7 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-1.7	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 836.5 & 836.530 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: - 16.2 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-3.2	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 836.5, 836.530 & 836.470 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -16.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-3.8	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.2.3. Highest Frequencies

Fundamental Frequency: 849 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -19.3 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-6.3	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 849 & 848.970 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -20.5 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-7.5	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 849 , 848.970 & 848.940 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -21.1 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	Tx conducted Antenna Emission (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-8.1	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.3. 896 – 901 MHz (Paging)

5.11.5.3.1. Lowest Frequencies

Fundamental Frequency: 896 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -15.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-2.8	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 896 & 896.0125 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -17.0 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-4.0	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 896 ,896.0125 & 896.025 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -16.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-3.8	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.5.3.2. Highest Frequencies

Fundamental Frequency: 901 MHz (1 Channel input)
RF Input Power: - 40.0 dBm
RF Output Power: -14.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBc)	Limit (dBc)	Margin (dB)	Pass / Fail
30-10000	**	-1.6	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 901 & 900.9875 MHz (2 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -15.8 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-2.8	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

Fundamental Frequency: 901, 900.9875 & 900.975 MHz (3 Channel inputs)
RF Input Power: - 40.0 dBm
RF Output Power: -15.6 dBm / Channel
Modulation: unmodulated

Frequency (MHz)	RF Level (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
30-10000	**	-2.6	**	PASS

- The emissions were scanned from 10 MHz to 20 GHz and no emissions within 20 dB below the limits were found.

5.11.6. Test Data

5.11.6.1.1. Uplink Band 1850 - 1910 MHz: Test Frequency: 1851 MHz, Modulation: CDMA

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.6	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.2. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: CDMA

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	4.0	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.3. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: CDMA

Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: CDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.1	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.4. Uplink Band 1850 - 1910 MHz: Test Frequency: 1851 MHz, Modulation: TDMA

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.6	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.5. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: TDMA

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	4.0	***	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.6. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: TDMA

Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: TDMA

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.1	***	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.7. Uplink Band 1850 - 1910 MHz: 1851 MHz, Modulation: GSM

Fundamental Frequency: 1851 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -17.6 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.6	***	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.8. Uplink Band 1850 - 1910 MHz: Test Frequency: 1880 MHz, Modulation: GSM

Fundamental Frequency: 1880 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.7 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	4.0	***	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.9. Uplink Band 1850 - 1910 MHz: Test Frequency: 1909 MHz, Modulation: GSM

Fundamental Frequency: 1909 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -18.5 dBm as maximum rated by the manufacturer
Modulation: GSM

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-0.1	***	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.10. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1851 & 1851.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1851 & 1851.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -22.0 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-30.0	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.11. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1851 & 1851.2, 1851.4 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1851 & 1851.2, 1851.4 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -26.3 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-29.0	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.12. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1880 & 1880.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1880 & 1880.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -23.5 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER EMISSIONS	RADIATED (ERP)	ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-30.0	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.13. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1959.8, 1880 & 1880 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1959.8, 1880 & 1880.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -27.3 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER RADIATED EMISSIONS (ERP)		ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-29.7	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.14. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1909 & 1909.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1909 & 1909.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -22.7 dBm as maximum rated by the manufacturer
Modulation: unmodulated

FREQUENCY	TRANSMITTER RADIATED EMISSIONS (ERP)		ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-30.0	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

5.11.6.1.15. Uplink Band 1850 - 1910 MHz: Test Frequencies: 1988.8, 1909 & 1909.2 MHz, Modulation: unmodulated (for worst case)

Fundamental Frequencies: 1988.8, 1909 & 1909.2 MHz
RF Input Power: -40.0 dBm as maximum rated by the manufacturer
RF Output Power: -27.4 dBm
Modulation: unmodulated

FREQUENCY	TRANSMITTER RADIATED EMISSIONS (ERP)		ERP LIMIT	MARGIN	PASS/
(MHz)	(dBm)	(dBc)	(dBc)	(dB)	FAIL
10 – 20000	**	**	-30.4	**	PASS

- ** The emissions were scanned from 10 MHz to 20 GHz and no emissions less than 40 dB below the limits were found.

EXHIBIT 6. MEASUREMENT UNCERTAINTY

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

6.1. 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 $20\text{Log}(1\pm\Gamma_1\Gamma_R)$	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

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

EXHIBIT 7. MEASUREMENT METHODS

7.1. 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.

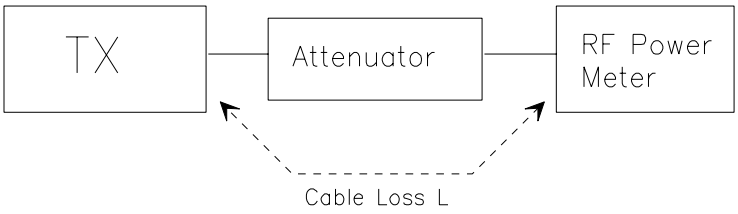
Step 2: Calculation of Average EIRP. See Figure 1

- 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.



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

7.2.1. 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

7.2.2. 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^{o} 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

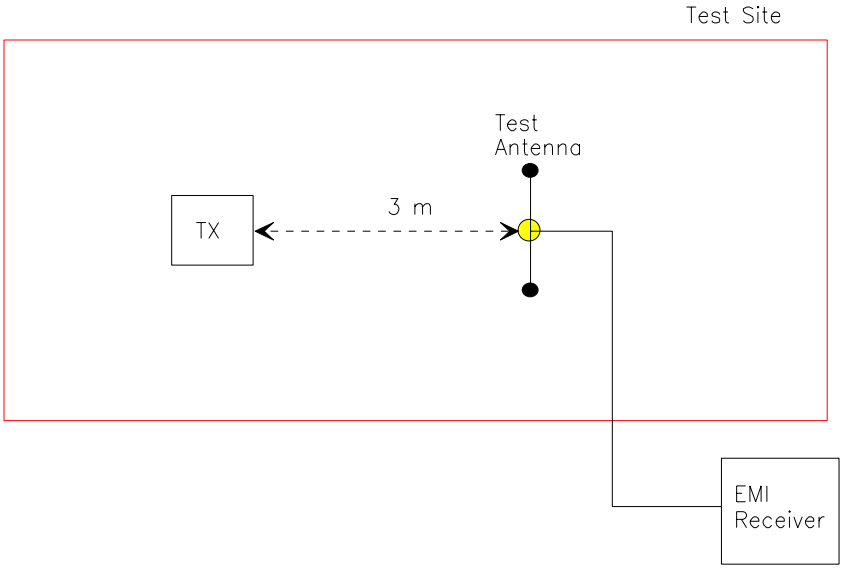
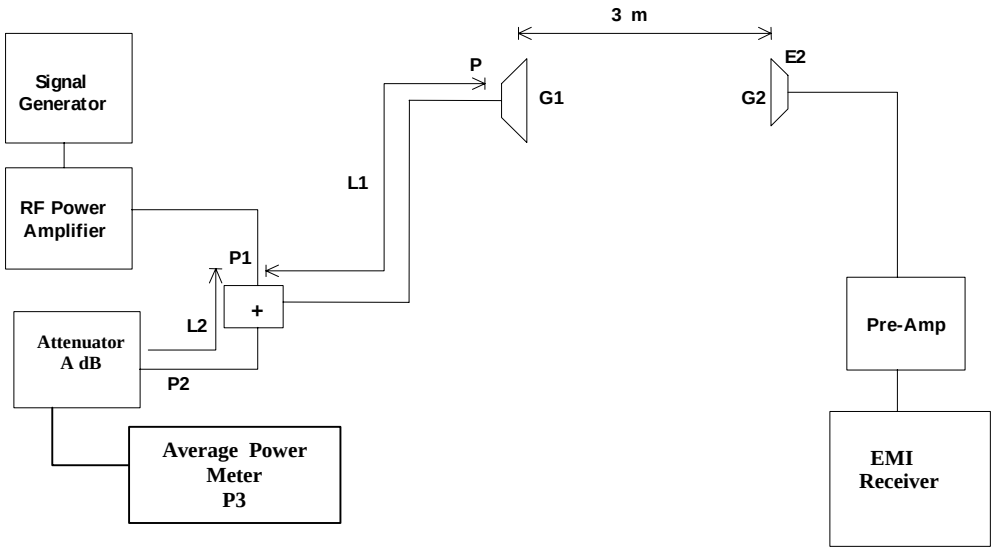


Figure 3



7.3. 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).

7.4. 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.

7.5. 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.