ENGINEERING TEST REPORT

AN-50e/AN-30e SYSTEM

Model No.: AN-50e and AN-30e with T-58e Trasceiver Module (5.8 GHz)

FCC ID: QC8-AN5030EX

Applicant: **REDLINE COMMUNICATIONS INC.**
302 Town Centre Blvd.
Markham, Ontario
Canada, L3R 0E8

In Accordance With

FEDERAL COMMUNICATIONS COMMISSION (FCC)
PART 15, SUBPART C, SEC. 15.247
Intentional Radiators
operating in: 5.735-5.840 GHz

UltraTech's File No.: RCI-093-FCC15C

This Test report is Issued under the Authority of
Tri M. Luu, Professional Engineer,
Vice President of Engineering
UltraTech Group of Labs

Date: Oct. 07, 2004

Report Prepared by: Tri M. Luu	Tested by: Hung Trinh, RFI Technician
Issued Date: Oct. 07, 2004	Test Dates: Sept. 24 - Oct. 02, 2004

- *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.*

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31040/SIT C-1376 46390-2049 200093-0 SL2-IN-E-1119R 00-034

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Sec. 15.247 - Intentional Radiators
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15, Subpart C, Sec. 15.247
Purpose of Test:	This report is covered test results for Certification compliance with FCC regulations for New Digital Modulation Technology Devices operating in the 5.735-5.840 GHz bands.
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.
Environmental Classification:	• Light-industry, Commercial • Industry
Grant Note:	**Grant Note: This device requires professional installation. The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2.5 meters for Point-to-Point application and of at least 20 cm for Point to Multi-Point application. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.**

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

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	2004	Code of Federal Regulations – Telecommunication
ANSI C63.4	2004	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	2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1	2003	Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	Redline Communications Inc.
Address:	302 Town Centre Blvd. Markham, Ontario Canada, L3R 0E8
Contact Person:	Mr. Eddie Chiu Phone #: 905-479-8344 (x336) Fax #: 905-479-7432 Email Address: echiu@redlinecommunications.com

MANUFACTURER:	
Name:	Redline Communications Inc.
Address:	302 Town Centre Blvd. Markham, Ontario Canada, L3R 0E8
Contact Person:	Mr. Eddie Chiu Phone #: 905-479-8344 (x336) Fax #: 905-479-7432 Email Address: echiu@redlinecommunications.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	REDLINE COMMUNICATIONS INC.
Product Name	AN-50e/AN-30e SYSTEM
Model Name or Number	AN-50e and AN-30e with T-58e Transceiver Module (5.8 GHz)
Serial Number	Preproduction
Type of Equipment	Intentional Radiators
Input Power Supply Type	120 V, 60 Hz, 24 - 60 Vdc
Primary User Functions of EUT:	Fixed, Point to Multi-point and Point to Point application wireless access. Please refer to attached Technical Description for details.

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Base station (fixed , point to multi-point and point to point)
Intended Operating Environment:	▪ Commercial, light industry & heavy industry
Power Supply Requirement:	120 V, 60 Hz, 24 - 60 Vdc
RF Peak Conducted Power Rating: *Note: Please refer to the following Table for Power Ratings versus Antenna Gain*	• Minimum: -12.68 dBm (0.054 mWatts) for all different antennas and applications • Maximum: +26.17 dBm (414.0 mili-Watts) varied with different antennas.
RF Peak EIRP Ratings: *Note: Please refer to the following Table for Power Ratings versus Antenna Gain*	• Maximum for Point to Multipoint: 4.0 Watts. • Maximum for Point to Point: 1.2 kWatts. Please refer to the following summary of RF Conducted Power and EIRP for detailed information.
Operating Frequency Range:	5.735-5.840 GHz
RF Output Impedance:	50 Ohms
Duty Cycle:	100%
Total number of Channels:	22
Channel Spacing:	5 MHz
6 dB Bandwidth:	15.5 MHz max.
Modulation Type (Maximum Data Rate):	Time Division Duplex (TDD) • 64 QAM (54 Mb/s maximum) • 16 QAM (36 Mb/s maximum) • QPSK (18 Mb/s maximum) • BPSK (9 Mb/s maximum)
Emission Designation:	15M5DXW
Environmental Temperature:	• Indoor Unit: 0°C to +55°C • Outdoor Unit: -40°C to +60°C
Antenna Connector Type:	• Standard TNC connector (transmitter side) and N connector (antenna side). Professional Installation is required by the manufacturer. Please refer to the User's manual for detailed instruction of antenna installation and RF Exposure Warning.
Antenna Description:	Please refer to the table below for available antennas provide for this EUT. This equipment and its antenna are required to be professionally installed by the manufacturer or its subcontracted professional installer.
Clock Frequencies (MHz):	8.33, 16.67, 815, 2460-2525 and 4920-5050
Temperature Rating:	• Indoor Unit: 0 to +40°C • Outdoor Unit: -40 to +60°C

Summary of Maximum RF Conducted Output Power and EIRP wrt. Antenna

Power Ratings and Antennas for point to multipoint application

Supplier's Antenna Part Number	Redline's Part Number	Antenna Gain (dBi)	Antenna Type	Maker	Minimum Conducted Power (dBm)	Max Conducted Power Ratings (dBm)	Max EIRP (dBm)
ODN9-5725	48-00048-00	9.0	Omni-directional	Mobile Mark	-12.7	27.0	36.0
484027	48-00017	14.0	Directional	MTI Wireless Edge	-12.7	22.0	36.0
484026	48-00014	15.0	Directional	MTI Wireless Edge	-12.7	21.0	36.0
484034	48-00047-00	15.0	Directional	MTI Wireless Edge	-12.7	21.0	36.0
485028	48-00020-01	22.0	Directional	MTI Wireless Edge	-12.7	14.0	36.0
485002	48-00020	23.0	Directional	MTI Wireless Edge	-12.7	13.0	36.0
486001	48-00006	28.0	Directional	MTI Wireless Edge	-12.7	8.0	36.0
SEC-55V-60-17	48-00028	17.0	Directional	Radiowaves	-12.7	19.0	36.0
SEC-55V-90-16	48-00029	16.0	Directional	Radiowaves	-12.7	20.0	36.0
SP1-5.2NS	48-00030	22.0	Directional	Radiowaves	-12.7	14.0	36.0
SP2-5.2NS	48-00031	28.0	Directional	Radiowaves	-12.7	8.0	36.0
SP3-5.2NS	48-00032	31.2	Directional	Radiowaves	-12.7	4.8	35.2
SP4-5.2NS	48-00033	34.6	Directional	Radiowaves	-12.7	1.4	35.6

Note: The RF output power and selected shall be professionally programmed and installed by the manufacturer or its trained professional installer for compliance with FCC Requirements of maximum EIRP of 36 dBm.

Power Ratings and Antennas for point to point application

Supplier's Antenna Part Number	Redline's Part Number	Antenna Gain (dBi)	Antenna Type	Maker	Minimum Conducted Power (dBm)	Max Conducted Power Ratings (dBm)	Max EIRP (dBm)
485028	48-00020-01	22.0	Directional	MTI Wireless Edge	-12.7	26.2	No Limit
485002	48-00020	23.0	Directional	MTI Wireless Edge	-12.7	26.2	No Limit
486001	48-00006	28.0	Directional	MTI Wireless Edge	-12.7	26.2	No Limit
SP1-5.2NS	48-00030	22.0	Directional	Radiowaves	-12.7	26.2	No Limit
SP2-5.2NS	48-00031	28.0	Directional	Radiowaves	-12.7	26.2	No Limit
SP3-5.2NS	48-00032	31.2	Directional	Radiowaves	-12.7	26.2	No Limit
SP4-5.2NS	48-00033	34.6	Directional	Radiowaves	-12.7	26.2	No Limit

Note: The RF output power and selected shall be professionally programmed and installed by the manufacturer or its trained professional installer for compliance with FCC Requirements of maximum EIRP of specified by the manufacturer.

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	Serial Port	1	DB9	Shielded
2	IF Out Port	1	F	Shielded
3	Sync In/Out Port	1	BNC	Shielded
4	Ethernet Port	1	RJ-45	Non-shielded
5	RF input/output port	1	TNC (female)	Shielded

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. BLOCK DIAGRAM OF TEST SETUP

The equipment under test is arranged as intended set up for normal operation. The Indoor AN-30e Unit is located indoor and connect to the Outdoor AN-30e (transmitter) Unit using a minimum 100 foot, F-type shielded cable. The Outdoor AN-30e (Transmitter) is mounted on the antenna and its RF output port is connected to the antenna using a short N-to-N cable.

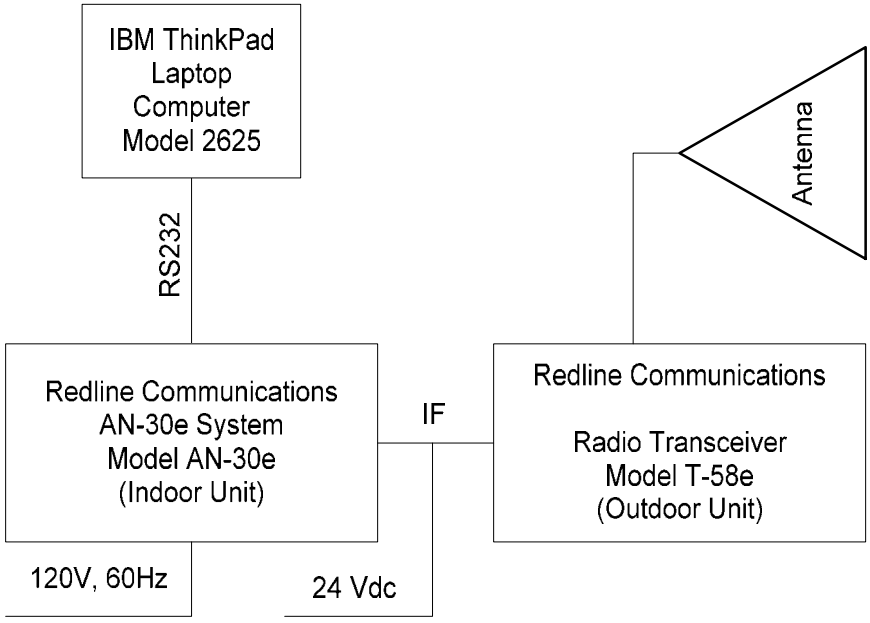


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

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:	120 V, 60 Hz and 60 Vdc applied to Indoor Unit 24 Vdc applied to T-58e Transceiver Module

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	▪ Each channel from the transmitter is tested for worst case emissions since the maximum power rating of each channel is different. The transmitter is transmitted continuously in a test mode configuration for worst case and convenience of measurements
Special Test Software:	▪ Special software is provided by the Applicant to select and operate the EUT at each channel frequency continuously.
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as a non-integral antenna equipment. The professional installation is required field installation and operation

Transmitter Test Signals:	
Frequencies: ▪ 5.735-5.840 GHz	• All channels will be tested since they have different maximum output power ratings.
Transmitter Wanted Output Test Signals:	
▪ RF Power Output:	▪ Please refer to test data for details of rf output power with respect to antenna gain
▪ Normal Test Modulation	▪ 64QAM, 16QAM, QPSK & BPSK
▪ Modulating signal source:	▪ Internal

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: Feb. 17, 2004.

4.2. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

4.3. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.107 & 15.207	Class B - AC Power Conducted Emissions on Tx, Rx and standby modes	Yes
15.247(a)(2)	6dB Bandwidth of a Digital Modulation System	Yes
15.247(b) & (c)	Maximum Peak Power (Conducted)	Yes
15.247(i) & 1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
15.247(d)	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
15.247(e)	Transmitted Power Density of a Digital Modulation System	Yes
15.247(d), 15.209 & 15.205	Transmitter Radiated Emissions	Yes
15.109(b)	Class A - Radiated Emissions from Unintentional Radiators	Yes. A separate test report will be provided upon request.

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 8 of this report and ANSI C63-4

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 C64-3, FCC 15.247 and CISPR 16-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER:

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

5.5. COMPLIANCE WITH FCC PART 15 – GENERAL TECHNICAL REQUIREMENTS

FCC Section	FCC Rules	
15.203	Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed: • The application (or intended use) of the EUT • The installation requirements of the EUT • The method by which the EUT will be marketed	The devices under test and its antenna are required to be professionally installed by the manufacturer or its sub-contractor.
15.204	Provided the information for every antenna proposed for use with the EUT: (a) type (e.g. Yagi, patch, grid, dish, etc…), (b) manufacturer and model number (c) gain with reference to an isotropic radiator	Please refer to Sec. 3.4 of this test report for a list of antennas' specification

5.6. AC POWERLINE CONDUCTED EMISSIONS @ FCC PART 15, SUBPART B, PARA. 15.207 & 15.107(A)

5.6.1. Limits

The equipment shall meet the limits of the following table:

	CLASS B LIMITS		
Test Frequency Range (MHz)	**Quasi-Peak (dBμV)**	**Average* (dBμV)**	**Measuring Bandwidth**
0.15 to 0.5	66 to 56*	56 to 46*	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 to 5	56	46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
5 to 30	60	50	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average

* Decreasing linearly with logarithm of frequency

5.6.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.6.3. 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
Transient Limiter	Hewlett Packard	11947A	310701998	9 kHz – 200 MHz 10 dB attenuation
L.I.S.N.	EMCO	3825/2	89071531	9 kHz – 200 MHz 50 Ohms / 50 μH
12'x16'x12' RF Shielded Chamber	RF Shielding	…	..	…

5.6.4. Photographs of Test Setup

Refer to the Photographs #1 & #2 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

5.6.5. Test Data

Test Configuration #1: Model AN-30e @ AC Power Supply #1

The emissions were scanned from 150 kHz to 30 MHz at AC mains Terminal via a LISN, and all emissions less than 20 dB below the limits were recorded.

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP LIMIT (dBuV)	AVG LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED (L1/L2)
0.17	50.8	QP	64.9	54.9	-14.1	PASS	L1
0.17	36.4	AVG	65.0	55.0	-18.6	PASS	L1
0.29	49.7	QP	60.6	50.6	-10.9	PASS	L1
0.29	40.7	AVG	60.6	50.6	-9.9	PASS	L1
0.17	51.7	QP	64.9	54.9	-13.2	PASS	L2
0.17	36.5	AVG	64.9	54.9	-18.4	PASS	L2
0.29	50.5	QP	60.6	50.6	-10.1	PASS	L2
0.29	40.5	AVG	60.6	50.6	-10.1	PASS	L2

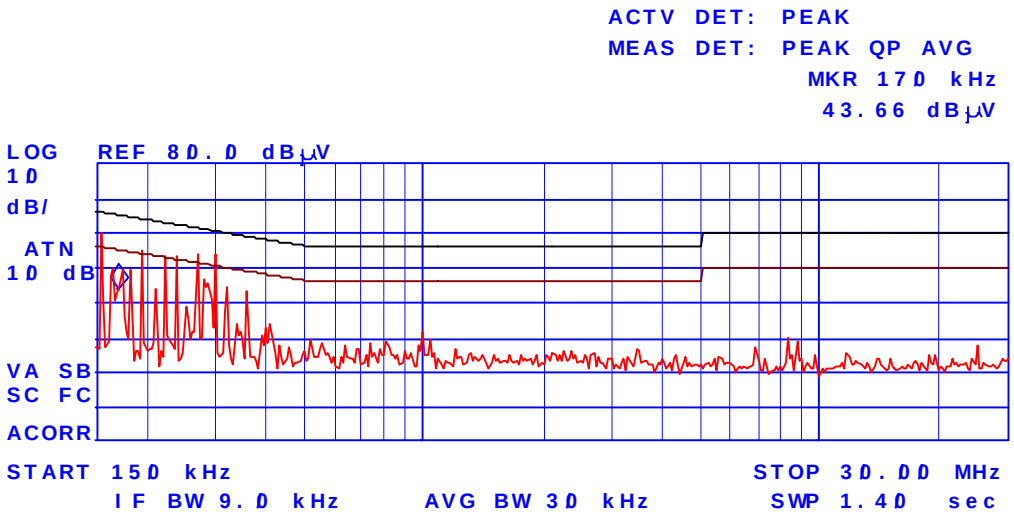
The following plots graphically represent the test results recorded in the above Test Data Table.

Plot # 1

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: 1	Line Voltage: 120Vac	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	@ AC Power Supply #1		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.172750	58.8	50.8	36.4	-14.1
2	0.288875	57.7	49.7	40.7	-10.9



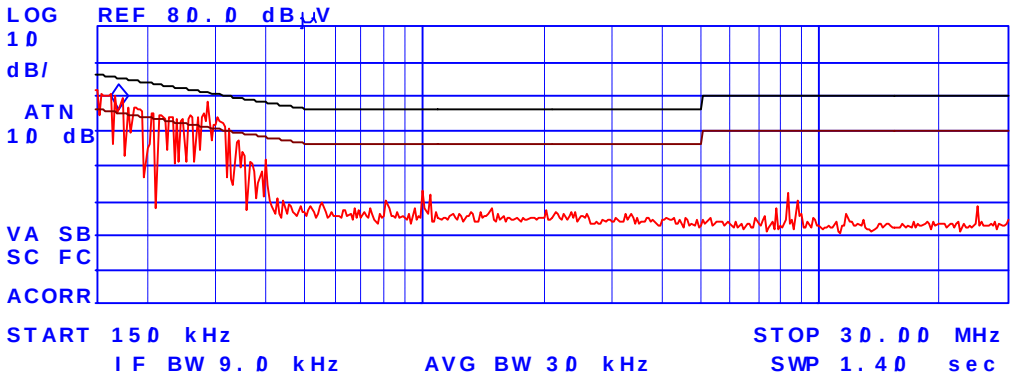
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot # 2

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: 2	Line Voltage: 120Vac	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	@ AC Power Supply #1		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.172950	59.8	51.7	36.5	-13.2
2	0.288650	57.5	50.5	40.5	-10.1



Test Configuration #2: Model AN-30e @ AC Power Supply #2

The emissions were scanned from 150 kHz to 30 MHz at AC mains Terminal via a LISN, and all emissions less than 20 dB below the limits were recorded.

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP LIMIT (dBuV)	AVG LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED (L1/L2)
0.17	54.9	QP	64.8	54.8	-9.9	PASS	L1
0.17	43.3	AVG	64.8	54.8	-11.5	PASS	L1
0.29	47.1	QP	60.5	50.5	-13.4	PASS	L1
0.29	41.9	AVG	60.5	50.5	**-8.6**	PASS	L1
0.17	55.7	QP	64.8	54.8	-9.1	PASS	L2
0.17	43.7	AVG	64.8	54.8	-11.1	PASS	L2
0.29	47.6	QP	60.5	50.5	-12.9	PASS	L2
0.29	41.8	AVG	60.5	50.5	-8.7	PASS	L2

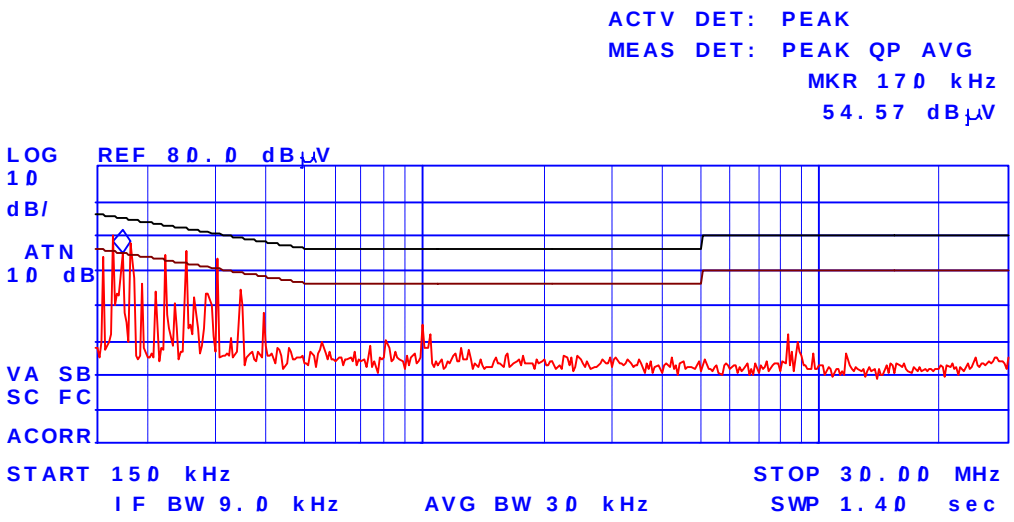
The following plots graphically represent the test results recorded in the above Test Data Table.

Plot # 3

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: 1	Line Voltage: 120Vac	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	@ AC Power Supply #2		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.174763	61.1	54.9	43.3	-9.9
2	0.290500	55.6	47.1	41.9	-13.5

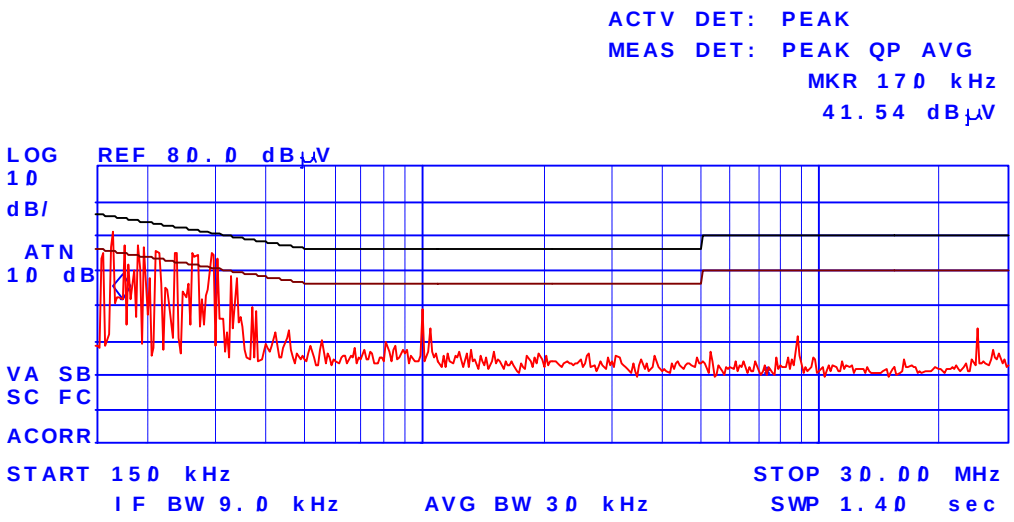


Plot # 4

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: 2	Line Voltage: 120Vac	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	@ AC Power Supply #2		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.174500	61.9	55.7	43.7	-9.1
2	0.290875	56.4	47.6	41.8	-13.0



Test Configuration #3: Model AN-30e @ DC Power Supply #1

The emissions were scanned from 150 kHz to 30 MHz at AC mains Terminal via a LISN, and all emissions less than 20 dB below the limits were recorded.

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP LIMIT (dBuV)	AVG LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED Negative & Positive
0.15	56.5	QP	66.0	56.0	-9.5	PASS	Negative & Positive
0.15	49.9	AVG	66.0	56.0	-6.1	PASS	Negative & Positive
0.31	44.5	QP	59.9	49.9	-15.4	PASS	Negative & Positive
0.31	31.8	AVG	60.0	50.0	-18.2	PASS	Negative & Positive
0.42	44.7	QP	57.5	47.5	-12.8	PASS	Negative & Positive
0.42	31.9	AVG	57.5	47.5	-15.6	PASS	Negative & Positive
0.33	44.3	QP	59.4	49.4	-15.1	PASS	Negative & Positive
0.33	32.4	AVG	59.4	49.4	-17.0	PASS	Negative & Positive
0.41	44.8	QP	57.7	47.7	-12.9	PASS	Negative & Positive
0.41	36.5	AVG	57.7	47.7	-11.2	PASS	Negative & Positive

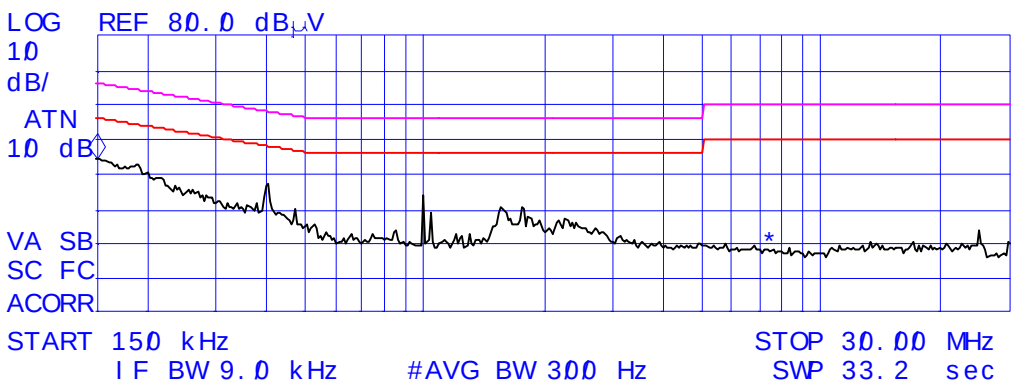
The following plots graphically represent the test results recorded in the above Test Data Table.

Plot # 5

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

DC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: Positive	Line Voltage: 60 Vdc	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	DC Power Supply #1		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.150625	56.5	56.5	49.9	-9.5
2	0.314443	50.0	44.5	31.8	-15.3
3	0.416345	49.0	44.7	31.9	-12.9

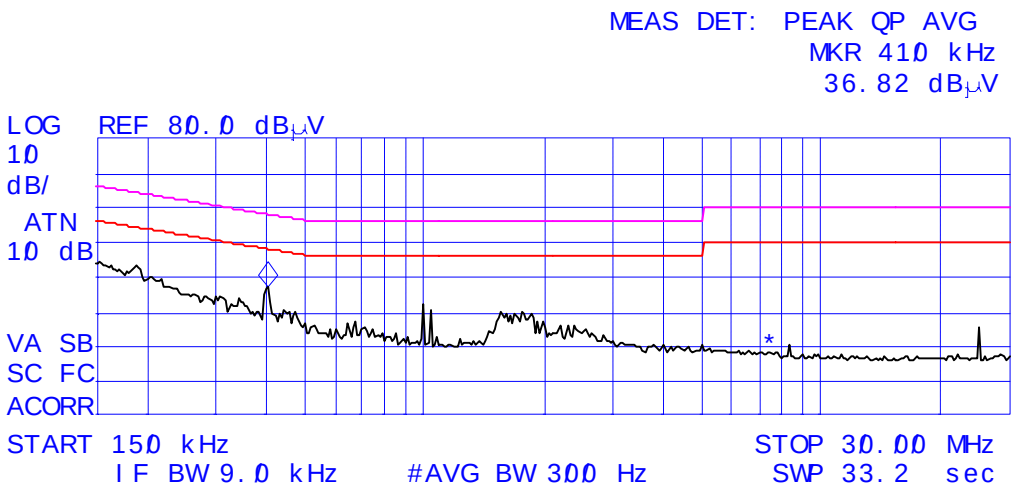


Plot # 6

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

DC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: Negative	Line Voltage: 60 Vdc	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	@ AN-30e - DC Power Supply #1		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.332750	50.5	44.3	32.4	-15.1
2	0.407125	49.6	44.8	36.5	-12.9



Test Configuration #4: Model AN-30e @ DC Power Supply #2

The emissions were scanned from 150 kHz to 30 MHz at AC mains Terminal via a LISN, and all emissions less than 30 dB below the limits were recorded.

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP LIMIT (dBuV)	AVG LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED Negative & Positive
0.40	46.1	QP	57.9	47.9	-11.8	PASS	Negative & Positive
0.40	32.7	AVG	57.9	47.9	-15.2	PASS	Negative & Positive
0.41	46.2	QP	57.7	47.7	-11.5	PASS	Negative & Positive
0.41	34.7	AVG	57.7	47.7	-13.0	PASS	Negative & Positive
1.01	32.0	QP	56.0	46.0	-24.0	PASS	Negative & Positive
1.01	27.1	AVG	56.0	46.0	-18.9	PASS	Negative & Positive
0.40	46.4	QP	57.8	47.8	-11.4	PASS	Negative & Positive
0.40	33.5	AVG	57.9	47.9	-14.4	PASS	Negative & Positive
0.53	35.2	QP	56.0	46.0	-20.8	PASS	Negative & Positive
0.53	22.0	AVG	56.0	46.0	-24.0	PASS	Negative & Positive

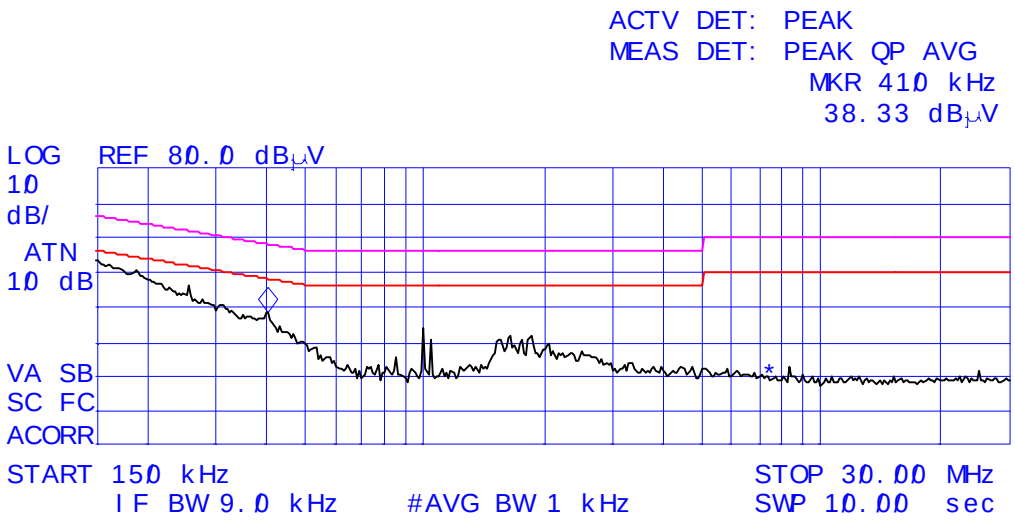
The following plots graphically represent the test results recorded in the above Test Data Table.

Plot # 7

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

DC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: Positive	Line Voltage: 60 Vdc	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	DC Power Supply # 2		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.398625	51.4	46.1	32.7	-11.8
2	1.013875	36.6	32.0	27.1	-24.0
3	0.407000	50.1	46.2	34.7	-11.6

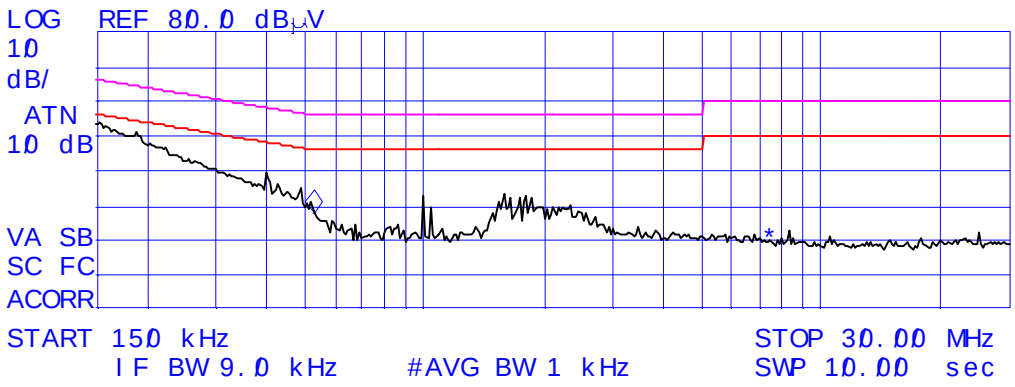


Plot # 8

UltraTech Group of Labs	
Applicant:	Redline Communication Inc.
Product:	AN-30e System with T-58e Modular Transceiver (5.8 GHz),
Model:	AN-30e

DC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT			
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity: 29%
Line Tested: Negative	Line Voltage: 60 Vdc	Test Tech: Hung Trinh	Test Date: Oct. 02/04
Standard: FCC15B	DC Power Supply # 2		

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	QP△L1
1	0.402300	50.4	46.4	33.5	-11.4
2	0.532500	39.5	35.2	22.0	-20.8



5.7. 6 DB BANDWIDTH @ FCC 15.247(A)(2)

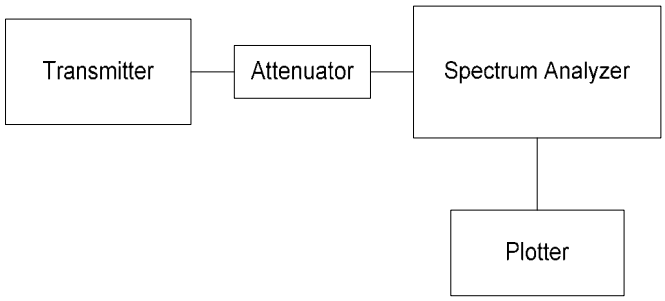
5.7.1. Limits

For a Digital Modulation System, the minimum 6 dB bandwidth shall be at least 500 KHz.

5.7.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P003-2004 and ANSI C63.4 for measurement methods

5.7.3. Test Arrangement



5.7.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

5.7.5. Test Data

CHANNEL FREQUENCY (MHz)	MODULATION	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
5735	64QAM	15.531	0.5	PASS
5775	64QAM	15.531	0.5	PASS
5835	64QAM	15.531	0.5	PASS
5735	16QAM	15.531	0.5	PASS
5775	16QAM	15.531	0.5	PASS
5835	16QAM	15.531	0.5	PASS
5735	QPSK	15.531	0.5	PASS
5775	QPSK	15.531	0.5	PASS
5835	QPSK	15.531	0.5	PASS
5735	BPSK	15.531	0.5	PASS
5775	BPSK	15.531	0.5	PASS
5835	BPSK	15.531	0.5	PASS

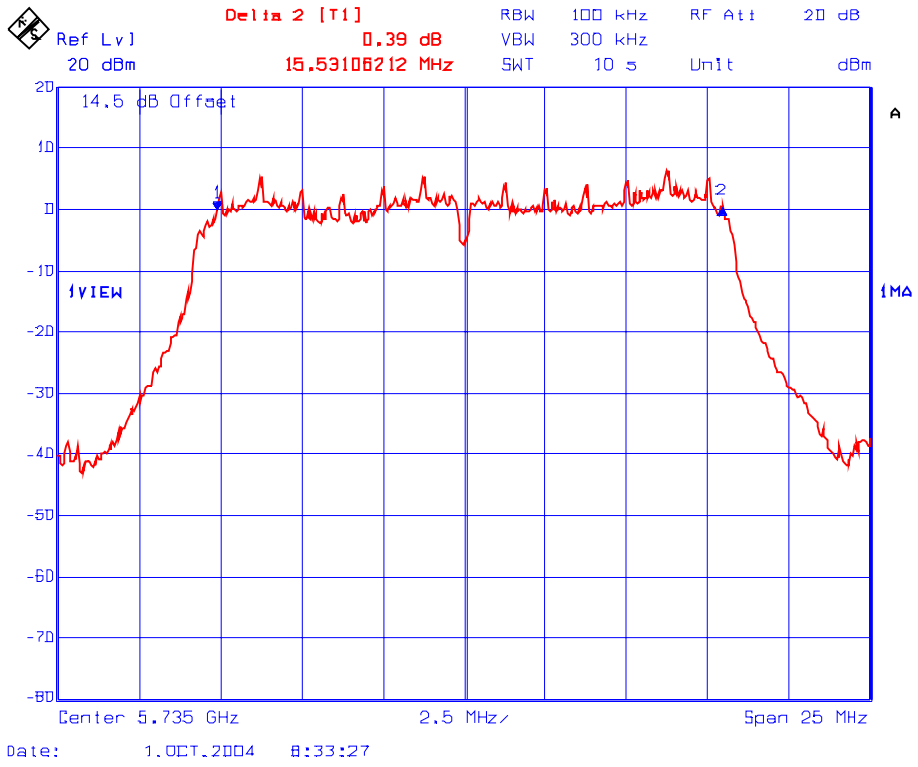
Observation: *The bandwidths were exactly identical with different modulation.*

5.7.6. Plots

Please refer to Plots # 9 to 20 for Measurements data

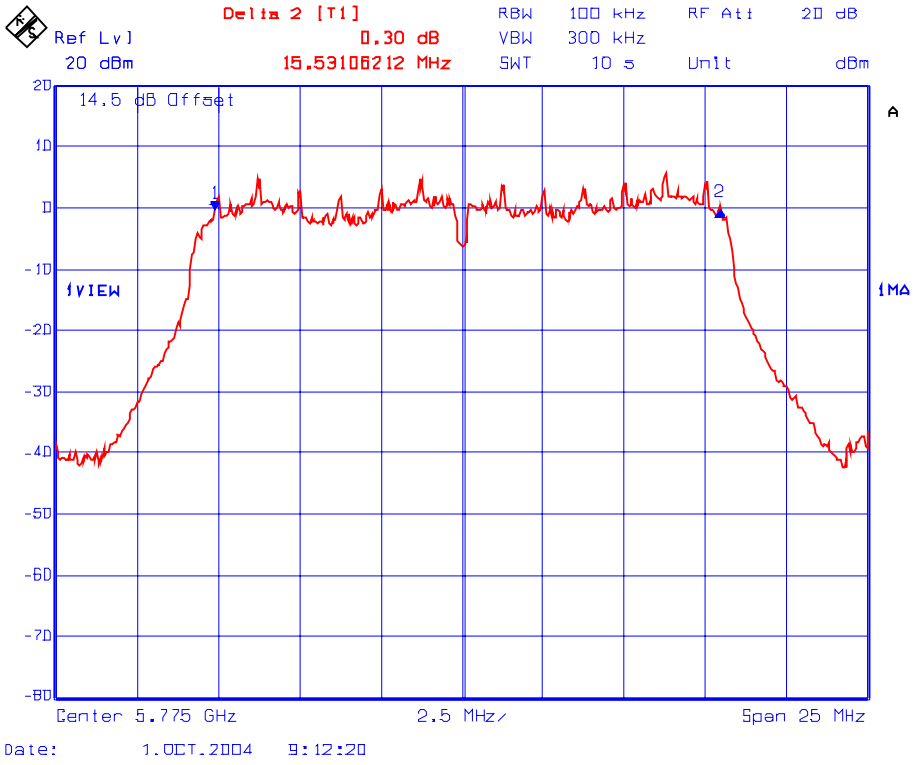
Plot #9: 6 dB Bandwidth Measurements

Tx Frequency: 5735 MHz, Power Output: 25.50 dBm, Modulation: 64 QAM (54 Mbps)



Plot #10: 6 dB Bandwidth Measurements

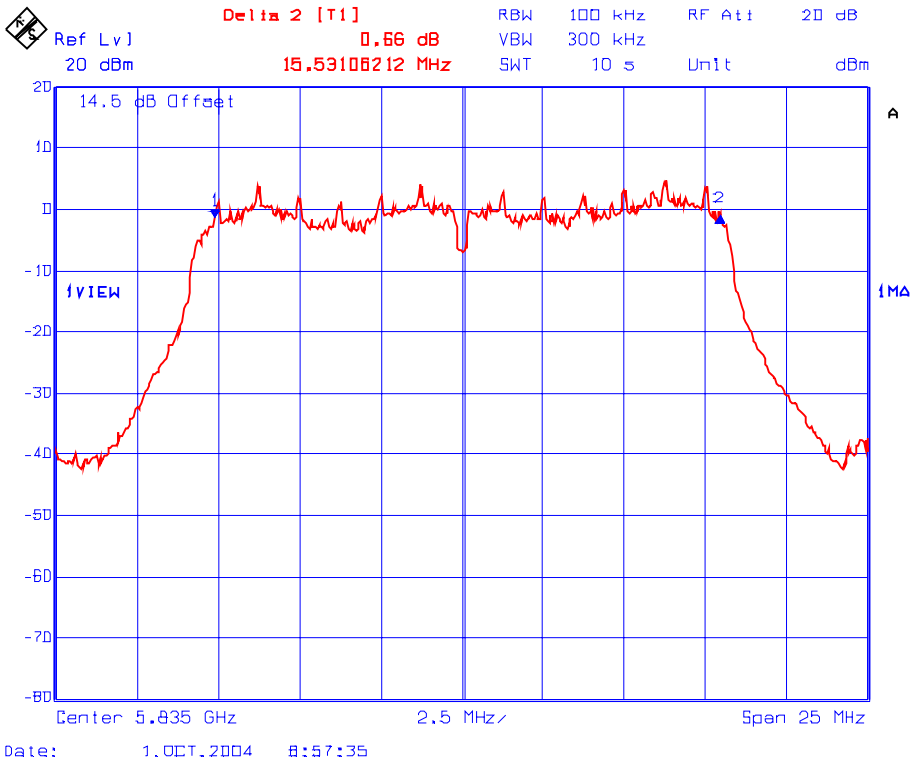
Tx Frequency: 5775 MHz, Power Output: 25.18 dBm, Modulation: 64 QAM (54 Mbps)



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

Plot #11: 6 dB Bandwidth Measurements

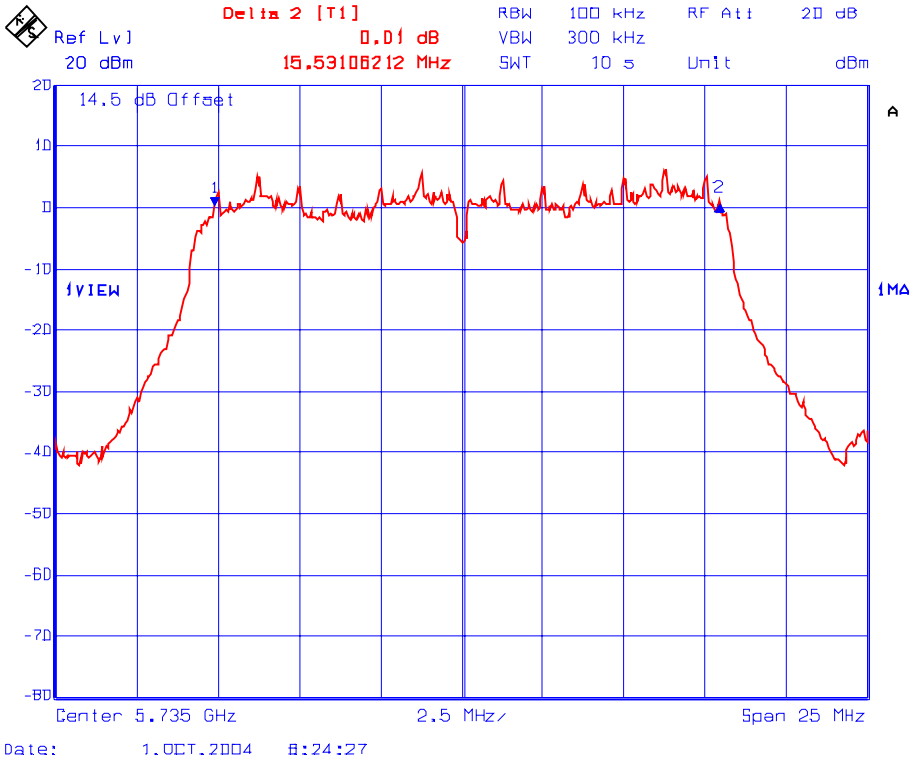
Tx Frequency: 5835 MHz, Power Output: 26.17 dBm, Modulation: 64 QAM (54 Mbps)



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

Plot #12: 6 dB Bandwidth Measurements

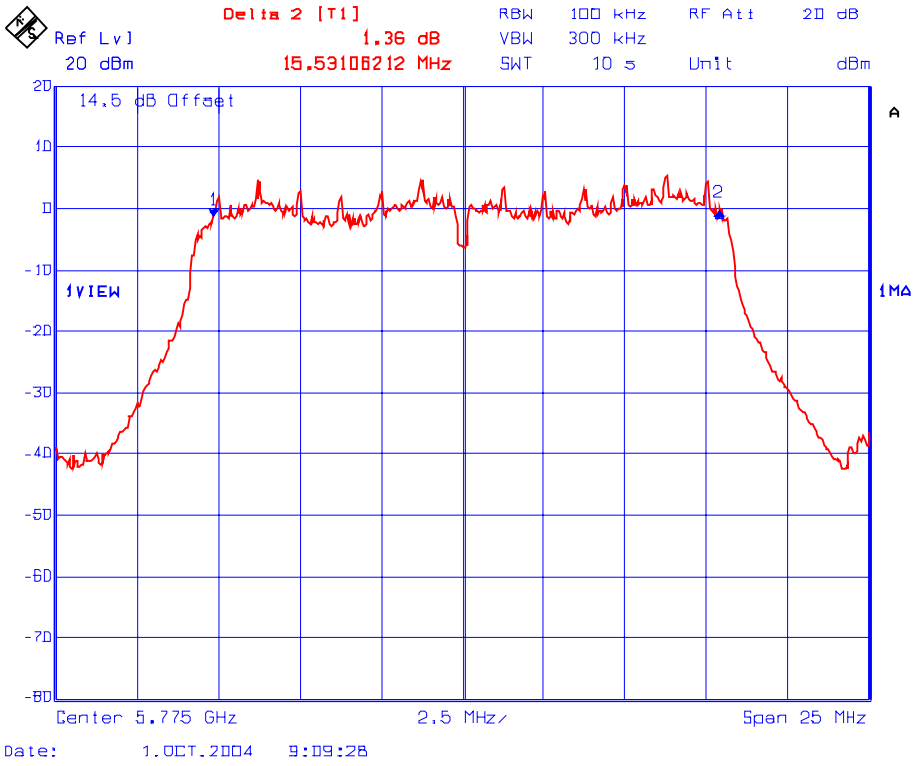
Tx Frequency: 5735 MHz, Power Output: 26.14 dBm, Modulation: 16 QAM (36 Mbps)



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

Plot #13: 6 dB Bandwidth Measurements

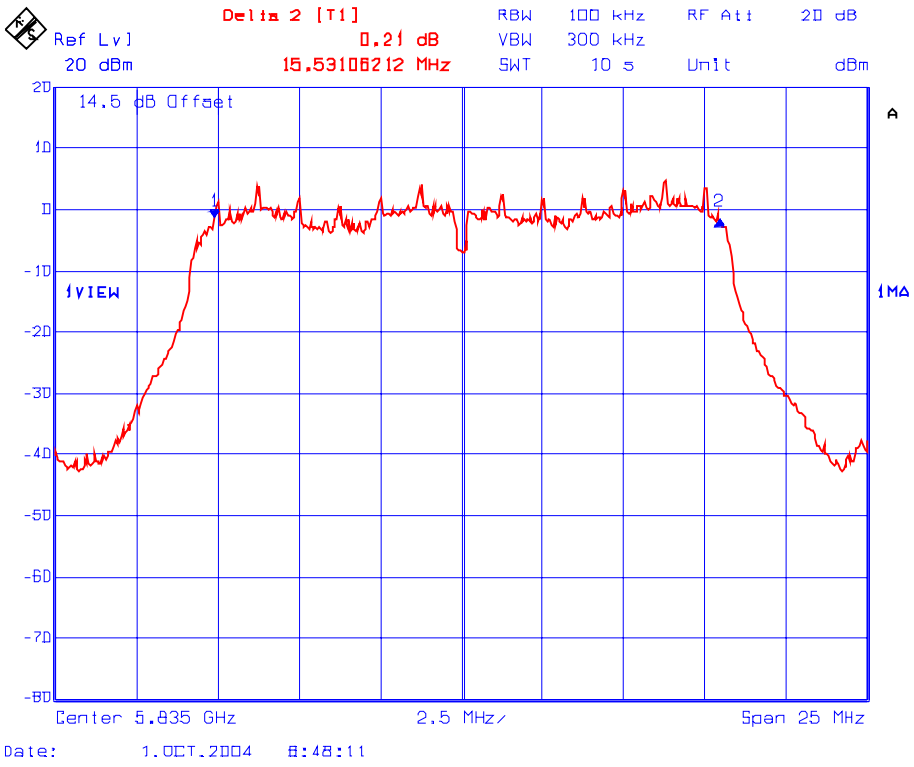
Tx Frequency: 5775 MHz, Power Output: 25.47 dBm, Modulation: 16 QAM (36 Mbps)



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

Plot #14: 6 dB Bandwidth Measurements

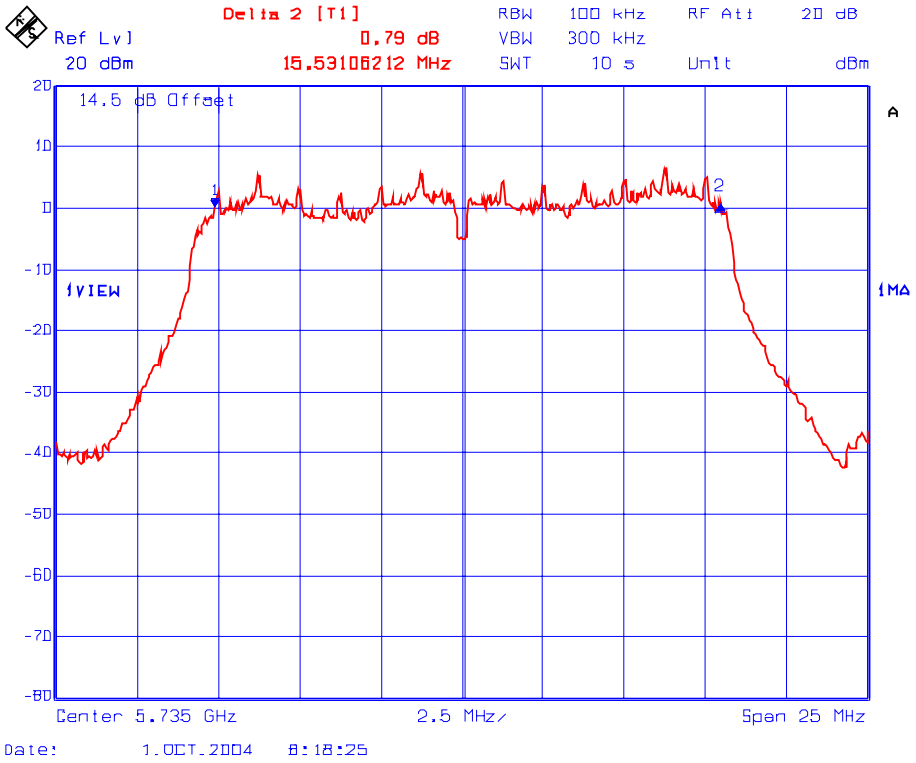
Tx Frequency: 5835 MHz, Power Output: 25.11 dBm, Modulation: 16 QAM (36 Mbps)



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

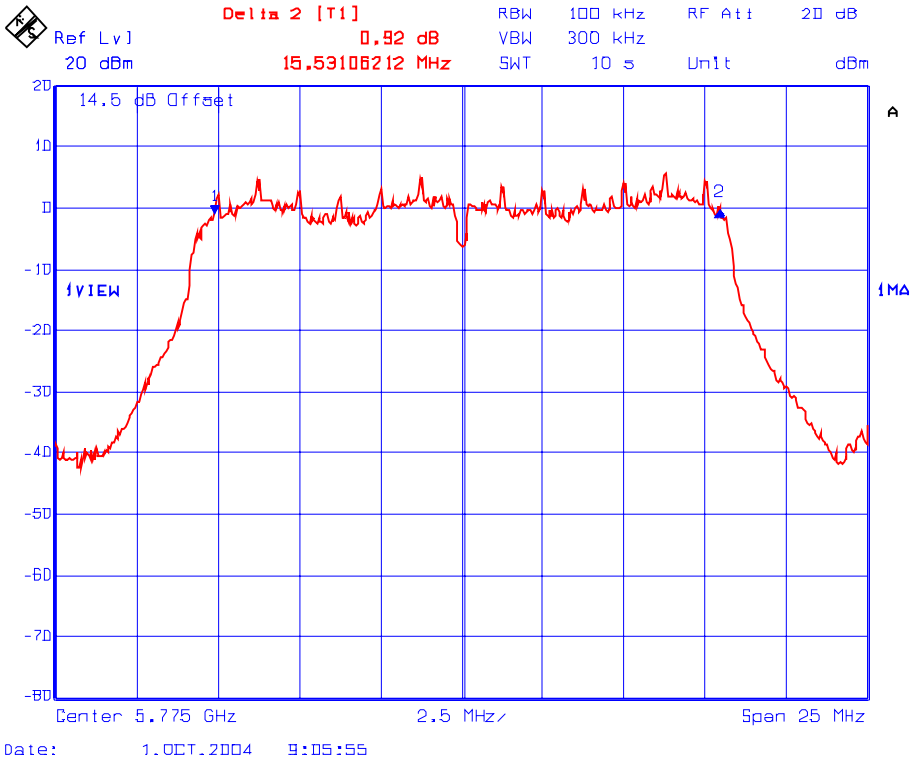
Plot #15: 6 dB Bandwidth Measurements

Tx Frequency: 5735 MHz, Power Output: 26.17 dBm, Modulation: QPSK (18 Mbps)



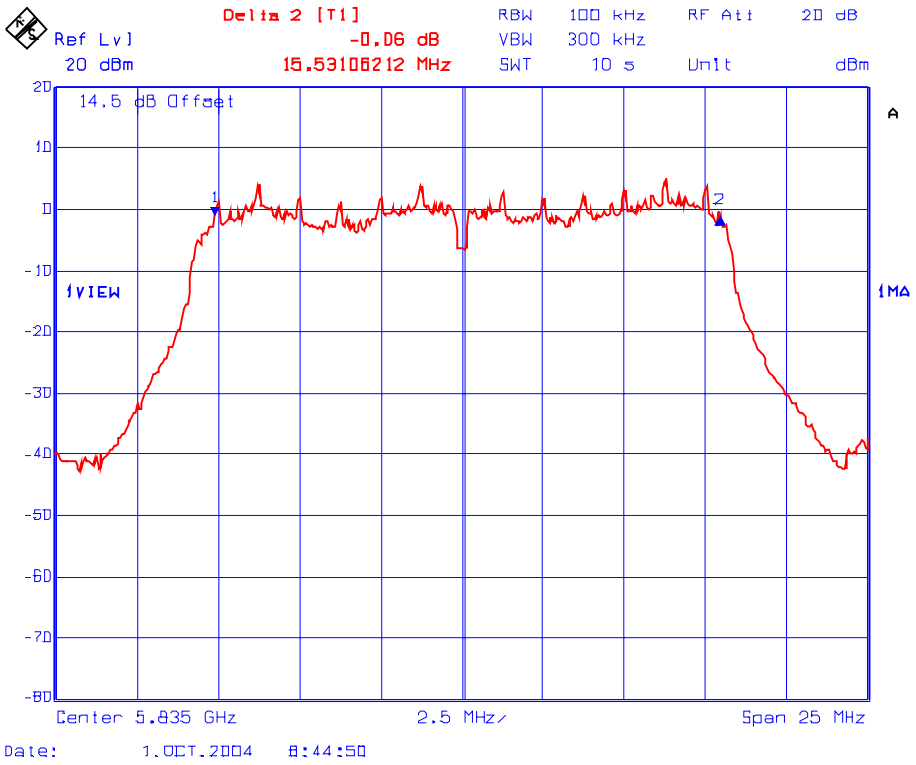
Plot #16: 6 dB Bandwidth Measurements

Tx Frequency: 5775 MHz, Power Output: 25.50 dBm, Modulation: QPSK (18 Mbps)



Plot #17: 6 dB Bandwidth Measurements

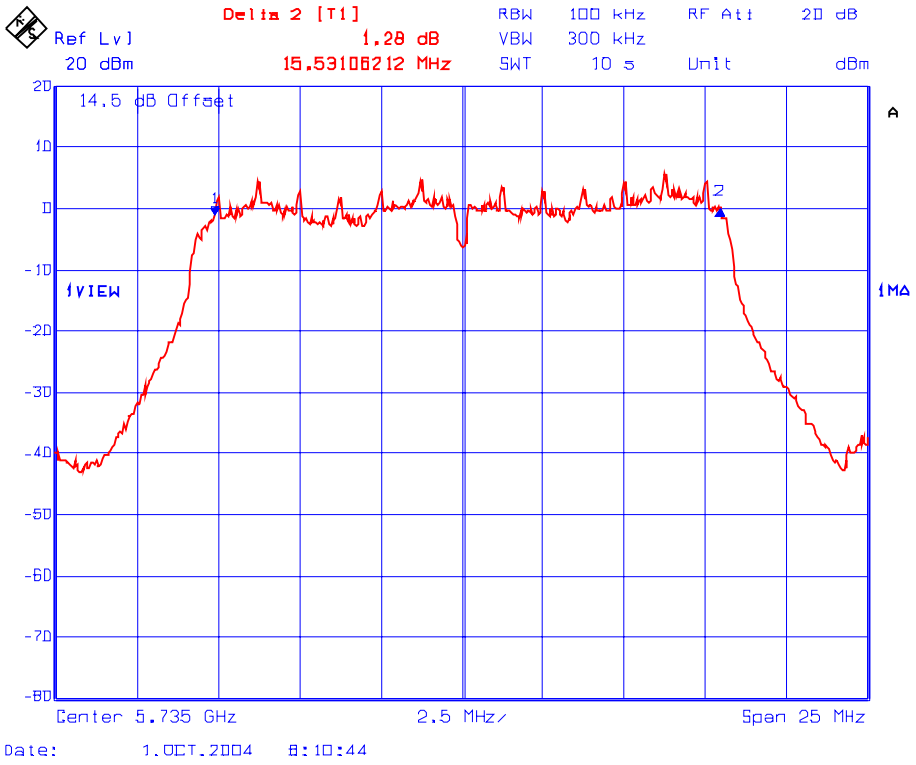
Tx Frequency: 5835 MHz, Power Output: 25.14 dBm, Modulation: QPSK (18 Mbps)



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

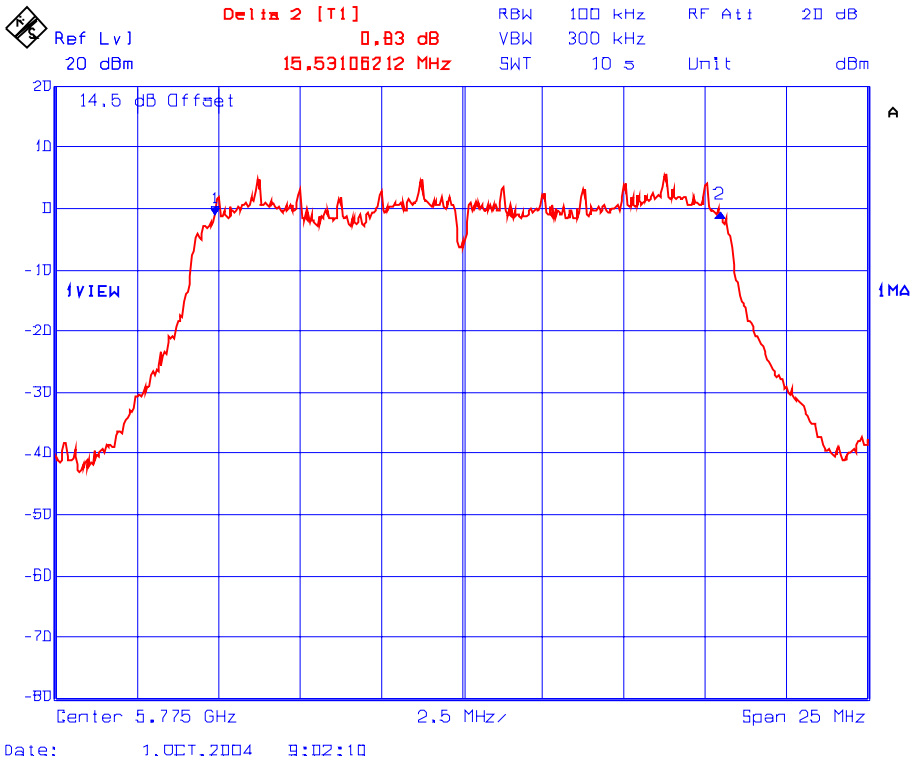
Plot #18: 6 dB Bandwidth Measurements

Tx Frequency: 5735 MHz, Power Output: 26.17 dBm, Modulation: BPSK (9 Mbps)



Plot #19: 6 dB Bandwidth Measurements

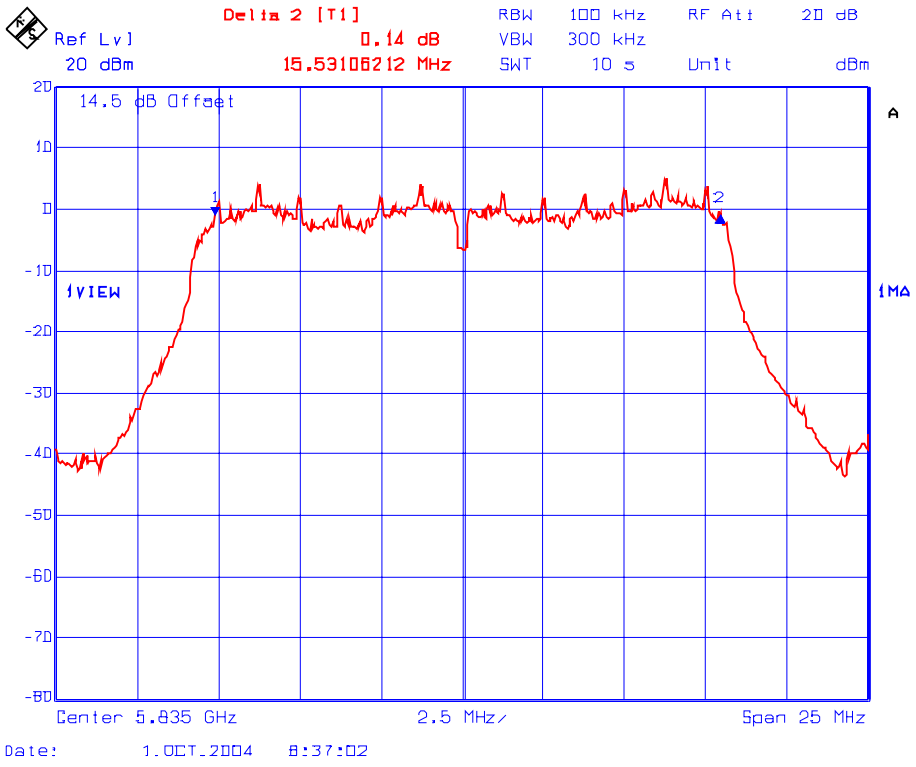
Tx Frequency: 5775 MHz, Power Output: 25.50 dBm, Modulation: BPSK (9 Mbps)



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

Plot #20: 6 dB Bandwidth Measurements

Tx Frequency: 5835 MHz, Power Output: 25.18 dBm, Modulation: BPSK (9 Mbps)



5.8. PEAK OUTPUT POWER (CONDUCTED) @ FCC 15.247(B)&(C)

5.8.1. Limits

FCC 15.247(b):

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC 15.247(c): Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

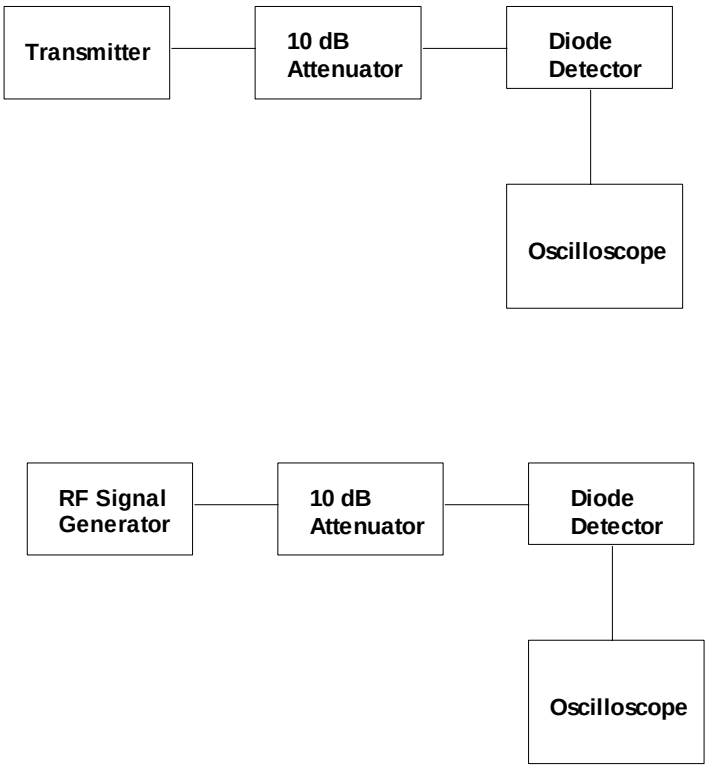
(iii) Fixed, point-to-point operation, as used in paragraphs (c)(4)(i) and (c)(4)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

5.8.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P003-2004, FCC DA-00-705 and ANSI C63.4 for measurement methods

5.8.3. Test Arrangement

Peak Power Measurements using Peak Diode Detector



5.8.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
RF Signal Generator	Hewlett Packard	HP 83752B	3610A00457	0.01 – 20 GHz
67297 RF Detector (Diode Detector)	Herotex	DZ122-553	63400	..
Storage Oscilloscope	Philips	PM3320A	ST9907959	--

5.8.5. Test Data

5.8.5.1. MIMNIMUM RF OUTPUT POWER FOR BOTH POINT TO POINT (P-P) APPLICATION

Channel Frequency (MHz)	Modulation	T-58e – Software Minimum Power Setting (dBm)	Minimum Conducted RF Output Power (dBm)	Min. EIRP with Min. P-P Antenna Gain of 22 dBi (dBm)	FCC EIRP Limits for P-P (dBm)
5735	BPSK @ 9Mb/s	-20.0	-11.79	10.21	No Limit
5735	QPSK @ 18 Mb/s	-20.0	-11.79	10.21	No Limit
5735	16QAM @ 36 Mb/s	-20.0	-11.79	10.21	No Limit
5735	64QAM @ 54 Mb/s	-20.0	-11.79	10.21	No Limit
5775	BPSK @ 9Mb/s	-20.0	-12.30	9.70	No Limit
5775	QPSK @ 18 Mb/s	-20.0	-12.30	9.70	No Limit
5775	16QAM @ 36 Mb/s	-20.0	-12.30	9.70	No Limit
5775	64QAM @ 54 Mb/s	-20.0	-12.30	9.70	No Limit
5835	BPSK @ 9Mb/s	-20.0	-12.68	9.32	No Limit
5835	QPSK @ 18 Mb/s	-20.0	-12.68	9.32	No Limit
5835	16QAM @ 36 Mb/s	-20.0	-12.68	9.32	No Limit
5835	64QAM @ 54 Mb/s	-20.0	-12.68	9.32	No Limit
5840	BPSK @ 9Mb/s	-20.0	-12.68	9.32	No Limit
5840	QPSK @ 18 Mb/s	-20.0	-12.68	9.32	No Limit
5840	16QAM @ 36 Mb/s	-20.0	-12.68	9.32	No Limit
5840	64QAM @ 54 Mb/s	-20.0	-12.68	9.32	No Limit

5.8.5.2. MAXIMUM RF OUTPUT POWER FOR POINT-TO-POINT (P-P) APPLICATION

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 34.6 dBi (dBm)	FCC EIRP Limits for P-P Application (dBm)
5735	BPSK @ 9Mb/s	20.0	26.17	60.77	No Limit
5735	QPSK @ 18 Mb/s	20.0	26.14	60.74	No Limit
5735	16QAM @ 36 Mb/s	20.0	26.08	60.68	No Limit
5735	64QAM @ 54 Mb/s	20.0	25.50	60.10	No Limit
5775	BPSK @ 9Mb/s	20.0	25.50	60.10	No Limit
5775	QPSK @ 18 Mb/s	20.0	25.47	60.07	No Limit
5775	16QAM @ 36 Mb/s	20.0	25.57	60.17	No Limit
5775	64QAM @ 54 Mb/s	20.0	25.18	59.78	No Limit
5835	BPSK @ 9Mb/s	20.0	25.14	59.74	No Limit
5835	QPSK @ 18 Mb/s	20.0	25.11	59.71	No Limit
5835	16QAM @ 36 Mb/s	20.0	25.11	59.71	No Limit
5835	64QAM @ 54 Mb/s	20.0	26.17	60.77	No Limit
5840	BPSK @ 9Mb/s	20.0	25.12	59.72	No Limit
5840	QPSK @ 18 Mb/s	20.0	25.08	59.68	No Limit
5840	16QAM @ 36 Mb/s	20.0	25.09	59.69	No Limit
5840	64QAM @ 54 Mb/s	20.0	26.14	60.74	No Limit

5.8.5.3. MIMNIMUM RF OUTPUT POWER FOR BOTH POINT TO MULTI-POINT (P-MP) APPLICATION

Channel Frequency (MHz)	Modulation	T-58e – Software Minimum Power Setting (dBm)	Minimum Conducted RF Output Power (dBm)	Min. EIRP with Min. Antenna Gain of 9.0 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	-20.0	-11.79	-2.79	36.0
5735	QPSK @ 18 Mb/s	-20.0	-11.79	-2.79	36.0
5735	16QAM @ 36 Mb/s	-20.0	-11.79	-2.79	36.0
5735	64QAM @ 54 Mb/s	-20.0	-11.79	-2.79	36.0
5775	BPSK @ 9Mb/s	-20.0	-12.30	-3.30	36.0
5775	QPSK @ 18 Mb/s	-20.0	-12.30	-3.30	36.0
5775	16QAM @ 36 Mb/s	-20.0	-12.30	-3.30	36.0
5775	64QAM @ 54 Mb/s	-20.0	-12.30	-3.30	36.0
5835	BPSK @ 9Mb/s	-20.0	-12.68	-3.68	36.0
5835	QPSK @ 18 Mb/s	-20.0	-12.68	-3.68	36.0
5835	16QAM @ 36 Mb/s	-20.0	-12.68	-3.68	36.0
5835	64QAM @ 54 Mb/s	-20.0	-12.68	-3.68	36.0
5840	QPSK @ 18 Mb/s	-20.0	-12.68	-3.68	36.0
5840	16QAM @ 36 Mb/s	-20.0	-12.68	-3.68	36.0
5840	64QAM @ 54 Mb/s	-20.0	-12.68	-3.68	36.0
5840	QPSK @ 18 Mb/s	-20.0	-12.68	-3.68	36.0

5.8.5.4. MAXIMUM RF OUPTUT POWER FOR POINT-TO-MULTI-POINT APPLICATION @ MOBILE MARK OMNI DIRECTIONAL ANTENNA, P/N: ODN9-5725, GAIN: 9 dBi

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 9 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	20	26.17	35.17	36
5735	QPSK @ 18 Mb/s	20	26.14	35.14	36
5735	16QAM @ 36 Mb/s	20	26.08	35.08	36
5735	64QAM @ 54 Mb/s	20	25.50	34.50	36
5775	BPSK @ 9Mb/s	20	25.50	34.50	36
5775	QPSK @ 18 Mb/s	20	25.47	34.47	36
5775	16QAM @ 36 Mb/s	20	25.57	34.57	36
5775	64QAM @ 54 Mb/s	20	25.18	34.18	36
5835	BPSK @ 9Mb/s	20	25.14	34.14	36
5835	QPSK @ 18 Mb/s	20	25.11	34.11	36
5835	16QAM @ 36 Mb/s	20	25.11	34.11	36
5835	64QAM @ 54 Mb/s	20	26.17	35.17	36
5840	QPSK @ 18 Mb/s	20	25.12	34.12	36
5840	16QAM @ 36 Mb/s	20	25.08	34.08	36
5840	64QAM @ 54 Mb/s	20	25.09	34.09	36
5840	QPSK @ 18 Mb/s	20	26.14	35.14	36

5.8.5.5. MAXIMUM RF OUPTUT POWER FOR POINT-TO-MULTI-POINT APPLICATION @ MTI DIRECTIONAL ANTENNA, P/N: 484026, GAIN: 15 dBi

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 15 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	13	20.18	35.18	36.0
5735	QPSK @ 18 Mb/s	13	20.18	35.18	36.0
5735	16QAM @ 36 Mb/s	13	20.30	35.30	36.0
5735	64QAM @ 54 Mb/s	13	20.30	35.30	36.0
5775	BPSK @ 9Mb/s	13	19.41	34.41	36.0
5775	QPSK @ 18 Mb/s	13	19.41	34.41	36.0
5775	16QAM @ 36 Mb/s	13	19.55	34.55	36.0
5775	64QAM @ 54 Mb/s	13	19.55	34.55	36.0
5835	BPSK @ 9Mb/s	13	19.12	34.12	36.0
5835	QPSK @ 18 Mb/s	13	19.12	34.12	36.0
5835	16QAM @ 36 Mb/s	13	19.27	34.27	36.0
5835	64QAM @ 54 Mb/s	13	19.27	34.27	36.0
5840	BPSK @ 9Mb/s	13	19.14	34.14	36.0
5840	QPSK @ 18 Mb/s	13	19.11	34.11	36.0
5840	16QAM @ 36 Mb/s	13	19.25	34.25	36.0
5840	64QAM @ 54 Mb/s	13	19.24	34.24	36.0

5.8.5.6. MAXIMUM RF OUPTUT POWER FOR POINT-TO-MULTI-POINT APPLICATION @ RADIOWAVES DIRECTIONAL ANTENNA, P/N: SEC-55V-60-17, GAIN: 17 dBi

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 17 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	11	18.48	35.48	36.0
5735	QPSK @ 18 Mb/s	11	18.48	35.48	36.0
5735	16QAM @ 36 Mb/s	11	18.65	35.65	36.0
5735	64QAM @ 54 Mb/s	11	18.65	35.65	36.0
5775	BPSK @ 9Mb/s	11	17.72	34.72	36.0
5775	QPSK @ 18 Mb/s	11	17.72	34.72	36.0
5775	16QAM @ 36 Mb/s	11	17.92	34.92	36.0
5775	64QAM @ 54 Mb/s	11	17.92	34.92	36.0
5835	BPSK @ 9Mb/s	11	17.29	34.29	36.0
5835	QPSK @ 18 Mb/s	11	17.29	34.29	36.0
5835	16QAM @ 36 Mb/s	11	17.51	34.51	36.0
5835	64QAM @ 54 Mb/s	11	17.51	34.51	36.0
5840	BPSK @ 9Mb/s	11	17.28	34.28	36.0
5840	QPSK @ 18 Mb/s	11	17.27	34.27	36.0
5840	16QAM @ 36 Mb/s	11	17.48	34.48	36.0
5840	64QAM @ 54 Mb/s	11	17.50	34.50	36.0

5.8.5.7. MAXIMUM RF OUPTUT POWER FOR POINT-TO-MULTI-POINT APPLICATION @ MTI DIRECTIONAL ANTENNA, P/N: 486001, ANTENNA GAIN 28 dBi

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 28 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	-1.0	7.72	35.72	36.0
5735	QPSK @ 18 Mb/s	-1.0	7.72	35.72	36.0
5735	16QAM @ 36 Mb/s	-1.0	7.92	35.92	36.0
5735	64QAM @ 54 Mb/s	-1.0	7.92	35.92	36.0
5775	BPSK @ 9Mb/s	-1.0	6.85	34.85	36.0
5775	QPSK @ 18 Mb/s	-1.0	6.85	34.85	36.0
5775	16QAM @ 36 Mb/s	-1.0	7.09	35.09	36.0
5775	64QAM @ 54 Mb/s	-1.0	7.09	35.09	36.0
5835	BPSK @ 9Mb/s	-1.0	6.34	34.34	36.0
5835	QPSK @ 18 Mb/s	-1.0	6.34	34.34	36.0
5835	16QAM @ 36 Mb/s	-1.0	6.60	34.60	36.0
5835	64QAM @ 54 Mb/s	-1.0	6.60	34.60	36.0
5840	BPSK @ 9Mb/s	-1.0	6.32	34.32	36.0
5840	QPSK @ 18 Mb/s	-1.0	6.31	34.31	36.0
5840	16QAM @ 36 Mb/s	-1.0	6.59	34.59	36.0
5840	64QAM @ 54 Mb/s	-1.0	6.58	34.58	36.0

5.8.5.8. MAXIMUM RF OUPTUT POWER FOR POINT-TO-MULTI-POINT APPLICATION @ RADIOWAVES DIRECTIONAL ANTENNA, P/N: SP4-5.2NS, ANTENNA GAIN 34.6 dBi

Channel Frequency (MHz)	Modulation	T-58e – Software Power Setting (dBm)	Conducted RF Output Power (dBm)	Maximum EIRP with Maximum Antenna Gain of 34.6 dBi (dBm)	FCC EIRP Limits for P-MP Application (dBm)
5735	BPSK @ 9Mb/s	-6.0	1.29	35.89	36.0
5735	QPSK @ 18 Mb/s	-6.0	1.29	35.89	36.0
5735	16QAM @ 36 Mb/s	-6.0	1.29	35.89	36.0
5735	64QAM @ 54 Mb/s	-6.0	1.29	35.89	36.0
5775	BPSK @ 9Mb/s	-6.0	0.32	34.92	36.0
5775	QPSK @ 18 Mb/s	-6.0	0.32	34.92	36.0
5775	16QAM @ 36 Mb/s	-6.0	0.32	34.92	36.0
5775	64QAM @ 54 Mb/s	-6.0	0.32	34.92	36.0
5835	BPSK @ 9Mb/s	-6.0	-0.93	33.67	36.0
5835	QPSK @ 18 Mb/s	-6.0	-0.93	33.67	36.0
5835	16QAM @ 36 Mb/s	-6.0	-0.93	33.67	36.0
5835	64QAM @ 54 Mb/s	-6.0	-0.93	33.67	36.0
5840	BPSK @ 9Mb/s	-6.0	-0.93	33.67	36.0
5840	QPSK @ 18 Mb/s	-6.0	-0.93	33.67	36.0
5840	16QAM @ 36 Mb/s	-6.0	-0.93	33.67	36.0
5840	64QAM @ 54 Mb/s	-6.0	-0.93	33.67	36.0

5.9. RF EXPOSURE REQUIRMENTS @ FCC 15.247(I), 1.1307(B)(1)

5.9.1. Limits

- **FCC 15.247(i):** Systems operating under provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See @ 1.1307(b)(1).
- **FCC 1.1310:**- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
1500-100,000	...	...	5	6
(B) Limits for General Population/Uncontrolled Exposure				
1500-100,000	...	...	1.0	30

F = Frequency in MHz

5.9.2. Method of Measurements

Refer to FCC @ 1.1310, 2.1091

- Spread spectrum transmitters operating under section 15.247 are categorically from routine environmental evaluation to demonstrating RF exposure compliance with respect to MPE and/or SAR limits. These devices are not exempted from compliance (As indicated in Section 15.247(b)(4), these transmitters are required to operate in a manner that ensures that exposure to public users and nearby persons) does not exceed the Commission's RF exposure guidelines (see Section 1.1307 and 2.1093). Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

- In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:

(1) Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.
(2) Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement
(3) Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits
(4) Any other RF exposure related issues that may affect MPE compliance

Calculation Method of RF Safety Distance:

$S = PG/4\Pi r^2 = EIRP/4\Pi r^2$

Where: P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$r = \sqrt{PG/4\Pi S}$

FCC radio frequency exposure limits may not be exceeded at distances closer than r cm from the antenna of this device

- For portable transmitters (see Section 2.1093), or devices designed to operate next to a person's body, compliance is determined with respect to the SAR limit (define in the body tissues) for near-field exposure conditions. If the maximum average output power, operating condition configurations and exposure conditions are comparable to those of existing cellular and PCS phones., an SAR evaluation may be required in order to determine if such a device complies with SAR limit. When SAR evaluation data is not available, and the additional supporting information cannot assure compliance, the Commission may request that a SAR evaluation be performed, as provided for in Section 1.1307(d)

5.9.3. Test Data

5.9.3.1. FOR POINT TO MULTIPOINT APPLICATION

With any antenna, the maximum EIRP is allowed to be 36 dBm or 4,000 mili-Watts

The minimum separation distance = 17.8 cm

Note 1: RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\Pi S)^{1/2} = (EIRP/4\Pi S)^{1/2}$
$S = 1.0\ mW/cm^2$

5.9.3.2. FOR POINT TO POINT APPLICATION

The maximum antenna gain is 34.6 dBi by using Radiowaves SP4-5-2NS Antenna, which allows the maximum EIRP of 60.77 dBm or 1.19 kWatts.

The minimum separation distance = 308 cm

Note 1: RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\Pi S)^{1/2} = (EIRP/4\Pi S)^{1/2}$
$S = 1.0\ mW/cm^2$

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	**Compliance with FCC Rules**
Minimum calculated separation distance between antenna and persons required: • 17.8 centimeters for Point to MultiPoint application • 308 centimeters for Point to Point application.	Manufacturer' instruction for separation distance between antenna and persons required: • 20 cm for Point to Multipoint application. • 3.1 meters for Point-to-Point application The transmitter antenna and EUT are required to be professional installed.

5.10. TRANSMITTER BAND-EDGE & SPURIOUS EMISSIONS (CONDUCTED), FCC CFR 47, PARA. 15.247(D)

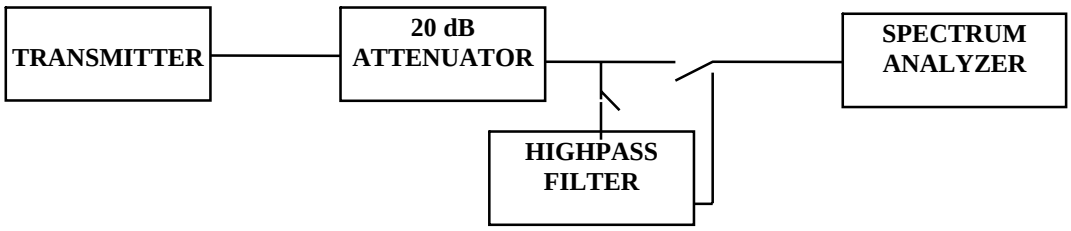
5.10.1. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.10.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P003-2004 and ANSI C63.4 for measurement methods

5.10.3. Test Arrangement



5.10.4. Test Equipment List

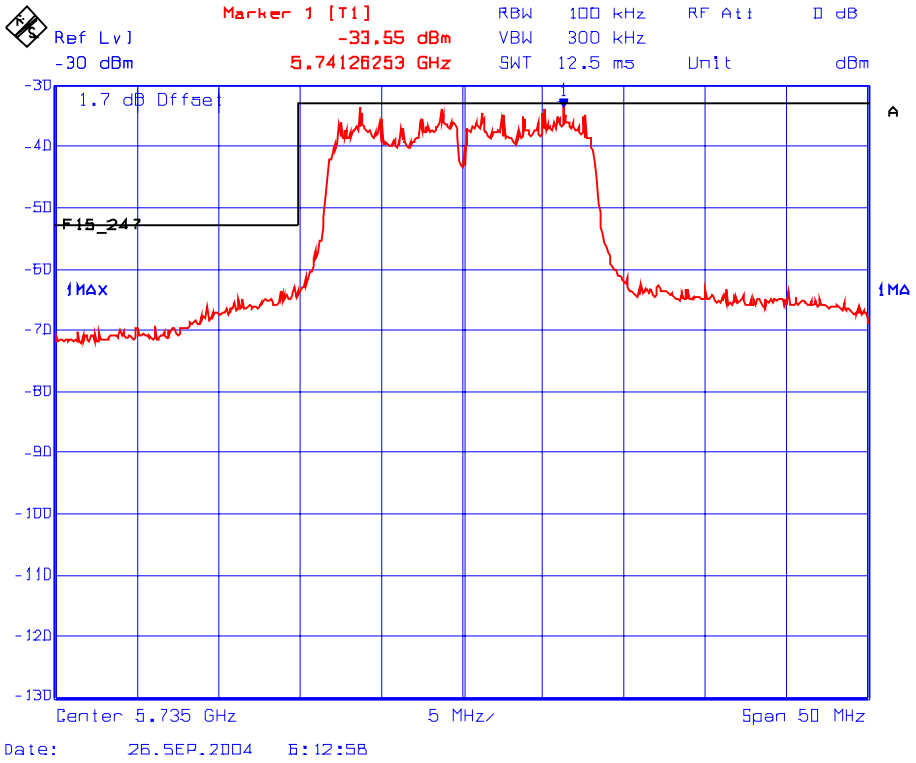
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

5.10.5. Test Data

5.10.5.1. TX CONDUCTED BAND-EDGE EMISSIONS WITH MINIMUM RF OUTPUT POWER

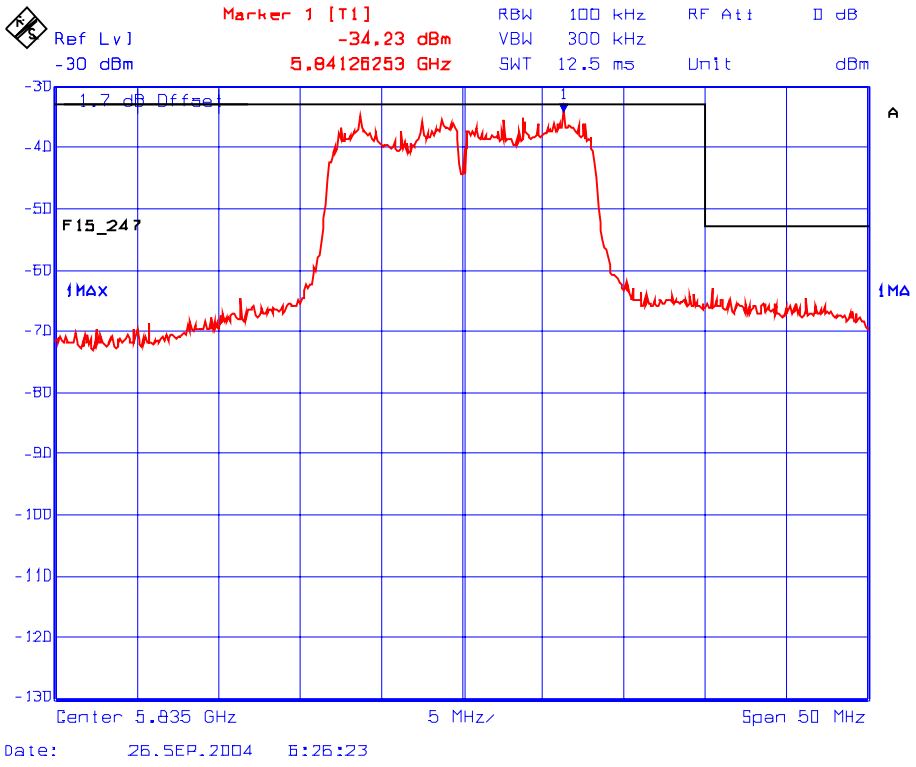
Plot #21: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Minimum): -11.79 dBm, Modulation: 64QAM (54 Mbps)



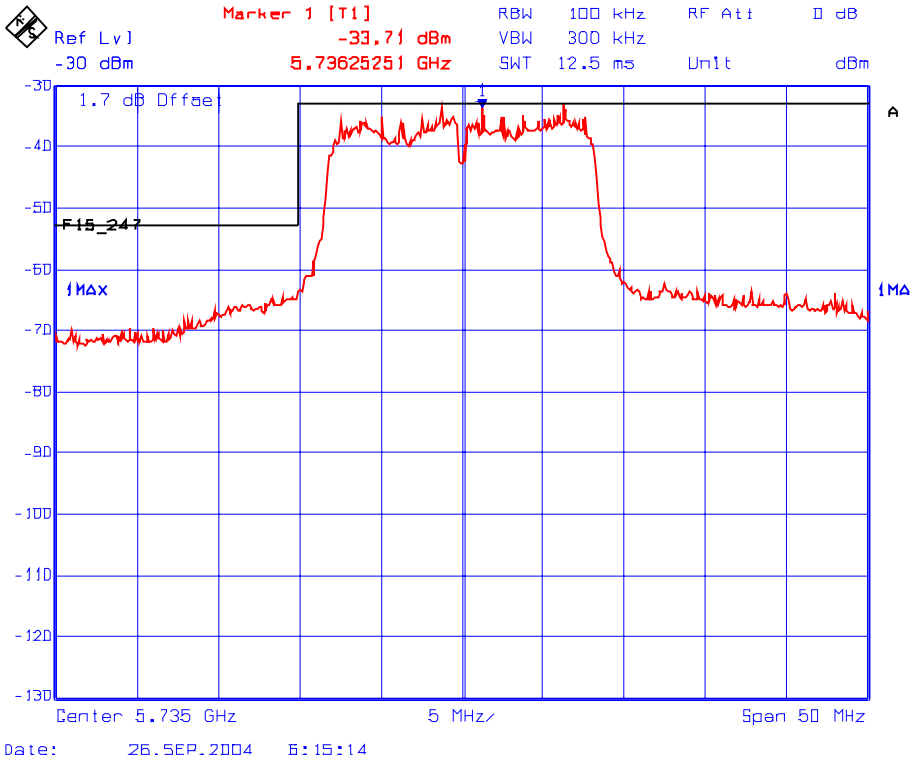
Plot #22: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Minimum): -12.68 dBm, Modulation: 64QAM (54 Mbps)



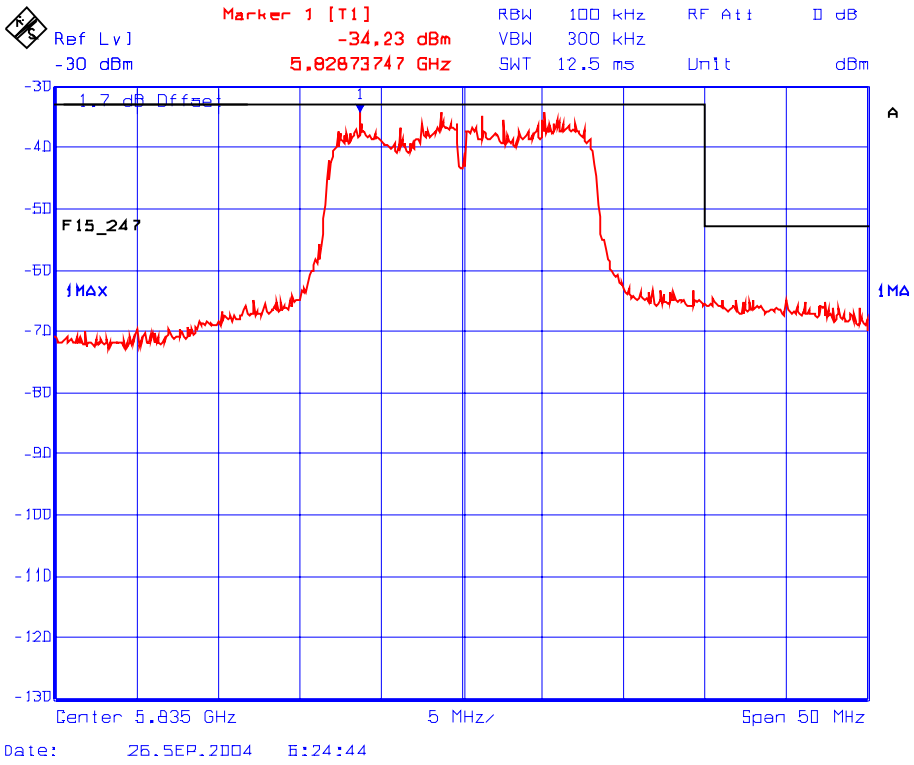
Plot #23: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Minimum): -11.79 dBm, Modulation: 16QAM (36 Mbps)



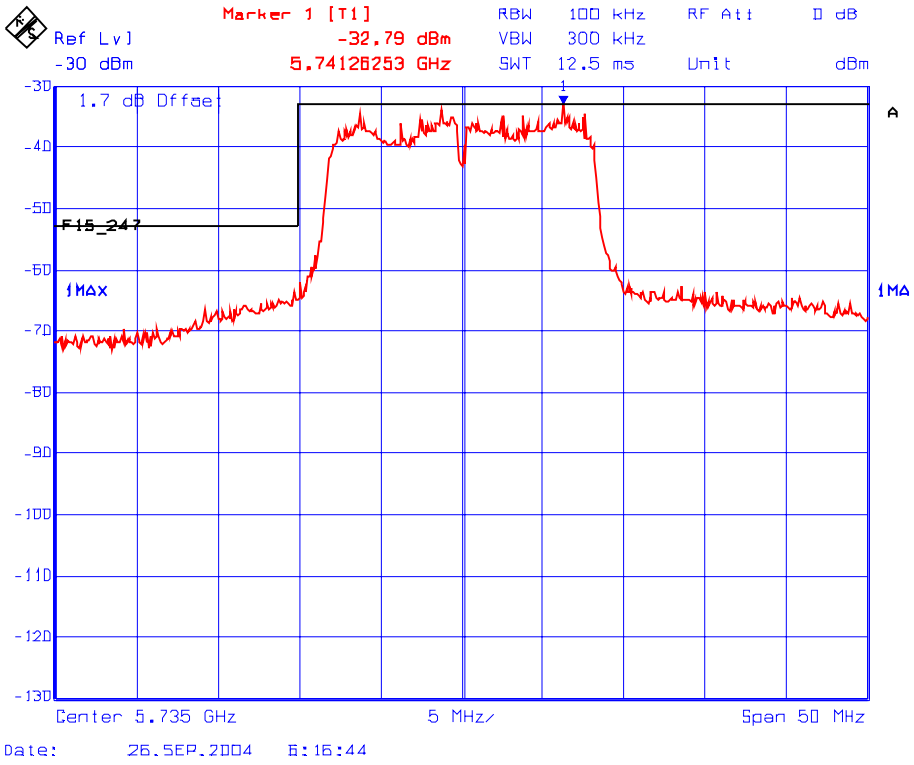
Plot #24: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Minimum): -12.68 dBm, Modulation: 16QAM (36 Mbps)



Plot #25: Transmitter Band-edge Conducted Emissions Measurements

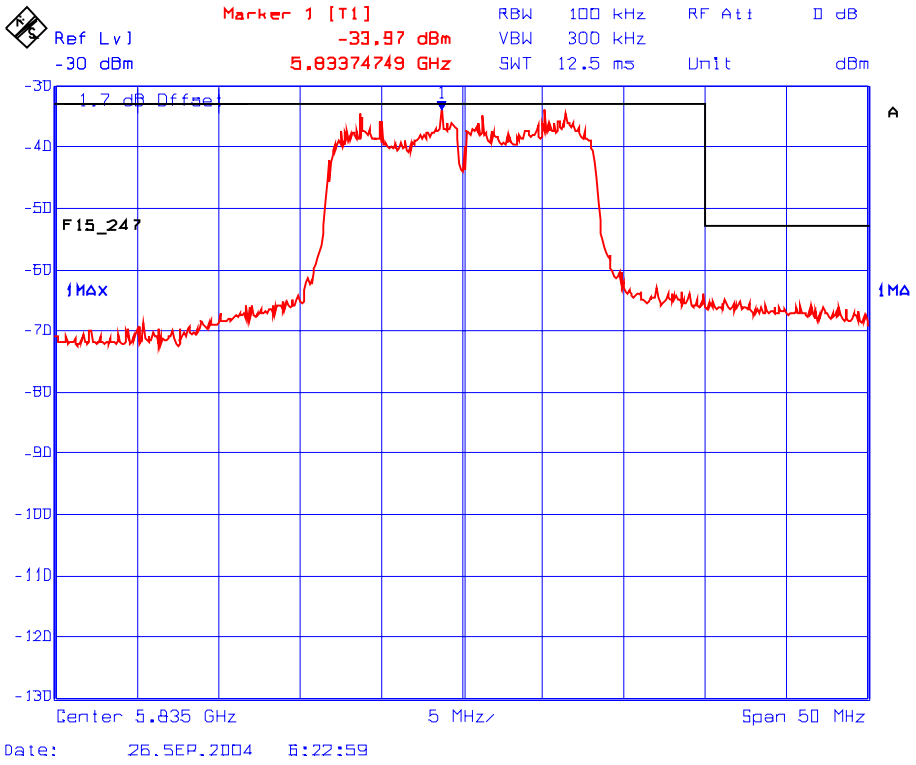
Transmit Freq.: 5735 MHz, Output Power (Minimum): -11.79 dBm, Modulation: QPSK (18 Mbps)



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

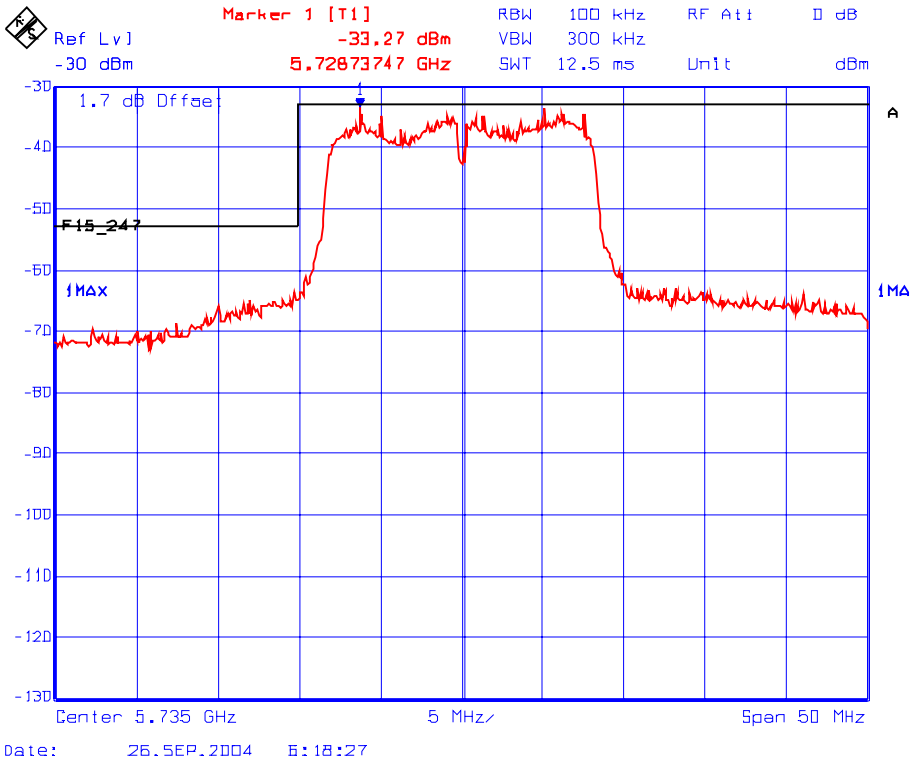
Plot #26: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Minimum): -12.68 dBm, Modulation: QPSK (18 Mbps)



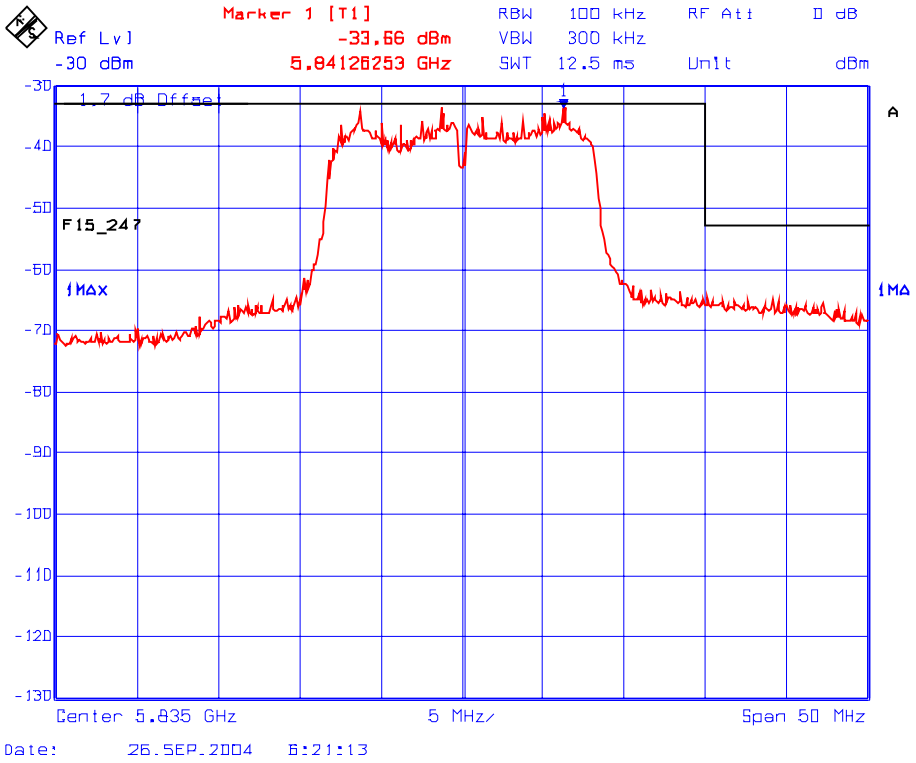
Plot #27: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Minimum): -11.79 dBm, Modulation: BPSK (9 Mbps)



Plot #28: Transmitter Band-edge Conducted Emissions Measurements

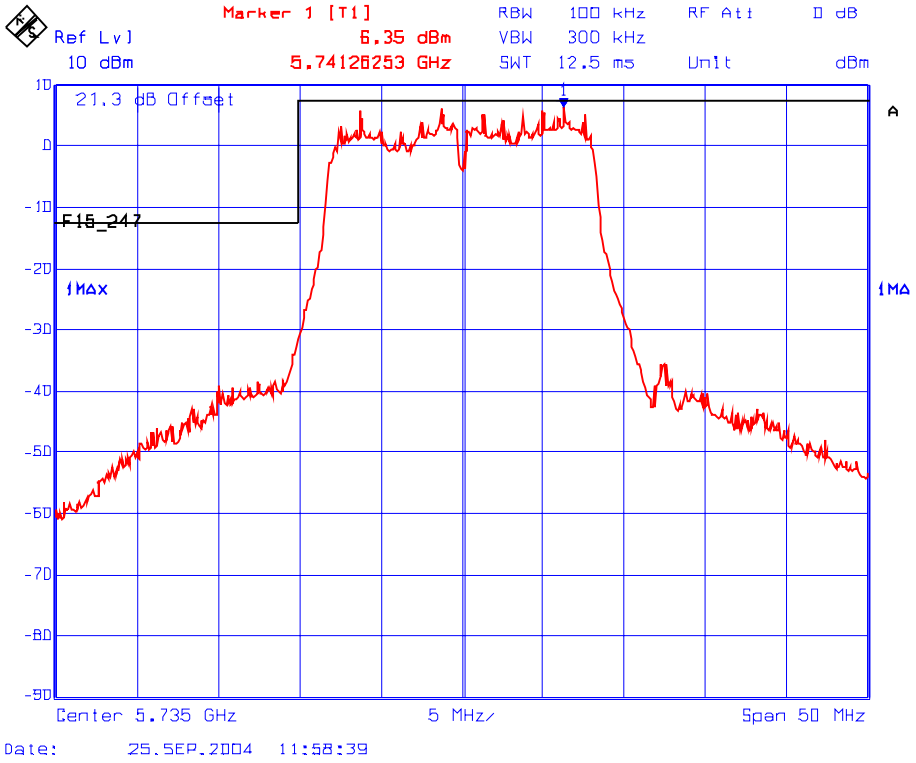
Transmit Freq.: 5835 MHz, Output Power (Minimum): -12.68 dBm, Modulation: BPSK (9 Mbps)



5.10.5.2. TX CONDUCTED BAND-EDGE EMISSIONS WITH MAXIMUM RF OUTPUT POWER

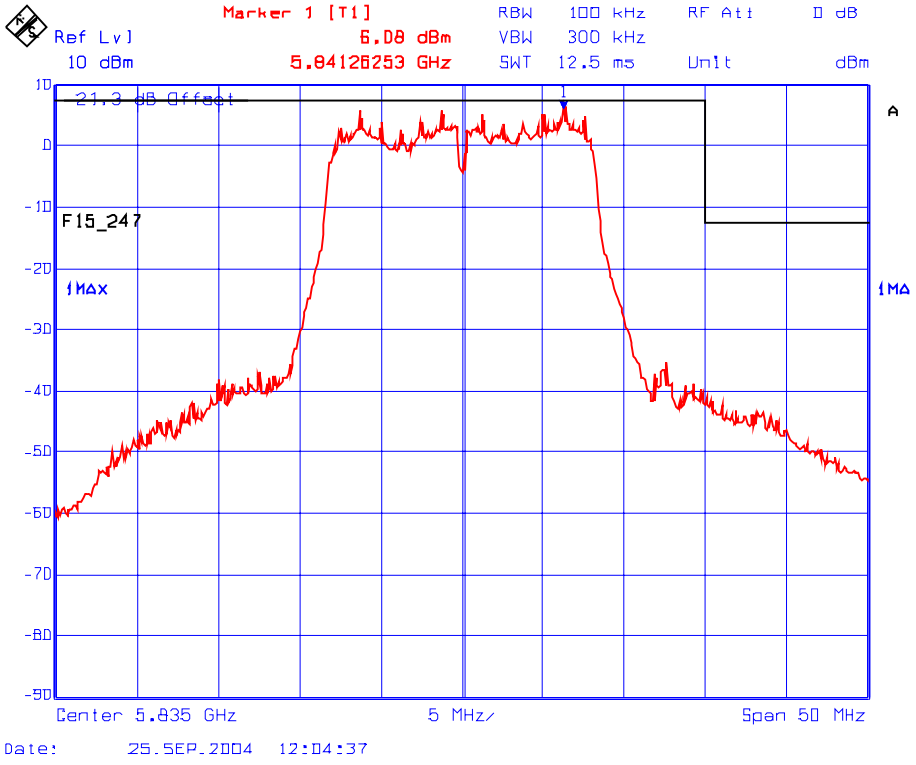
Plot #29: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Maximum): 25.5 dBm, Modulation: 64QAM (54 Mbps)



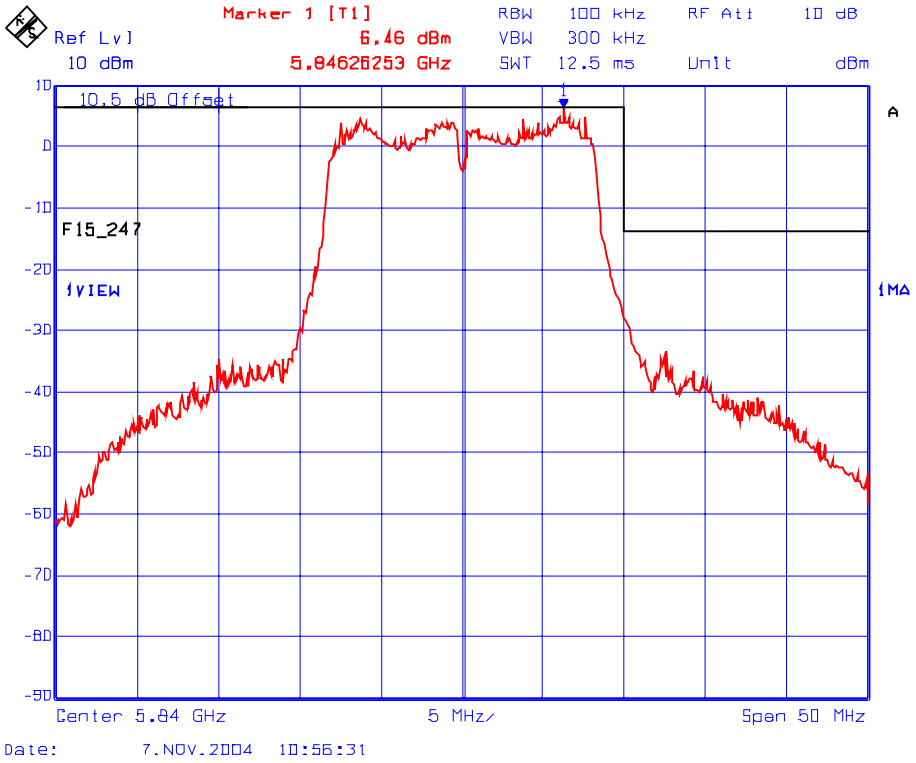
Plot #30: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Maximum): 26.17 dBm, Modulation: 64QAM (54 Mbps)



Plot #31: Transmitter Band-edge Conducted Emissions Measurements

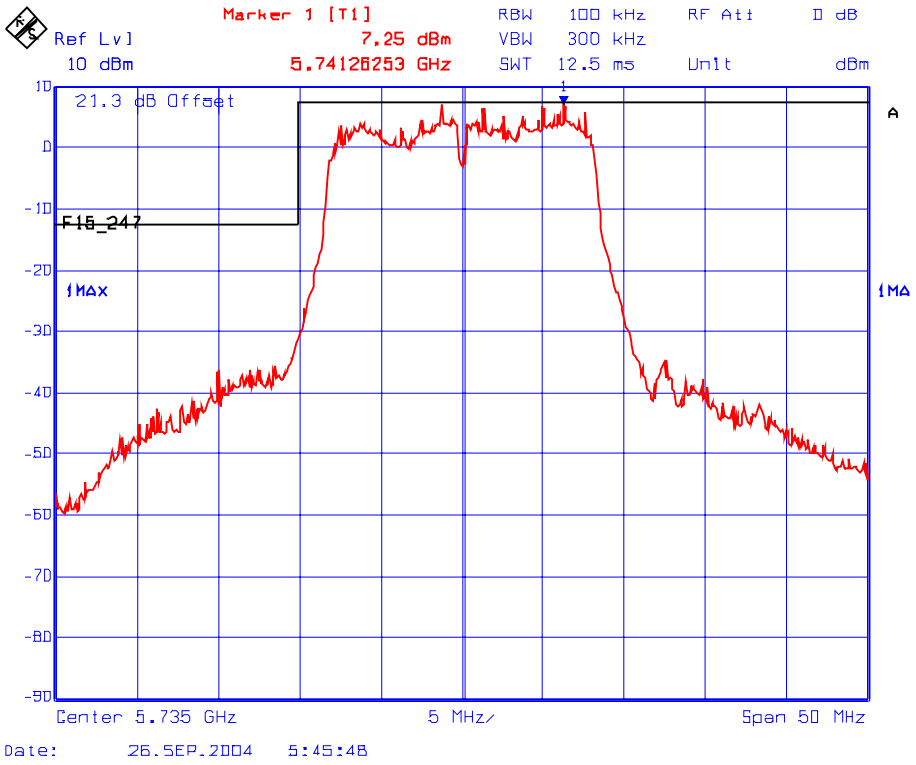
Transmit Freq.: 5840 MHz, Output Power (Maximum): 26.14 dBm, Modulation: 64QAM (54 Mbps)



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

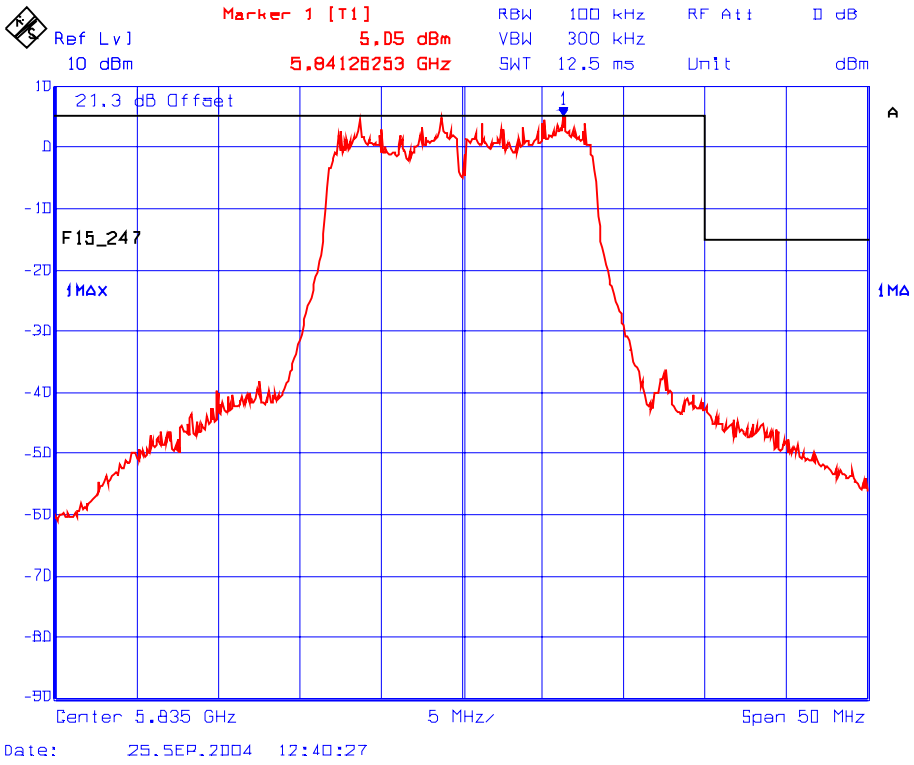
Plot #32: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Maximum): 26.14 dBm, Modulation: 16QAM (36 Mbps)



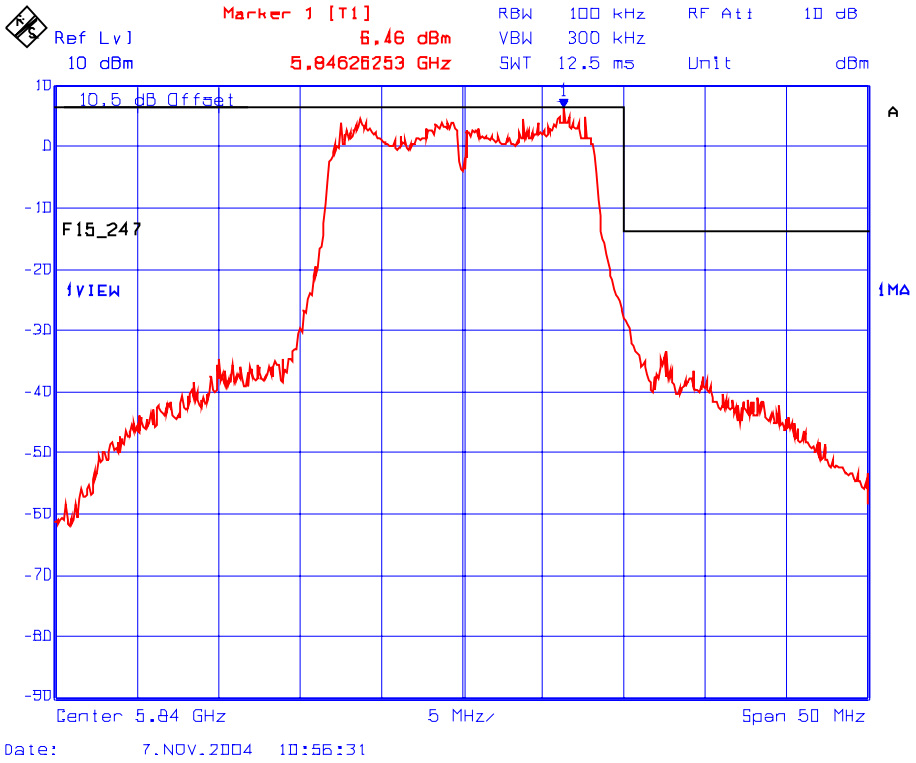
Plot #33: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Maximum): 25.11 dBm, Modulation: 16QAM (36 Mbps)



Plot #34: Transmitter Band-edge Conducted Emissions Measurements

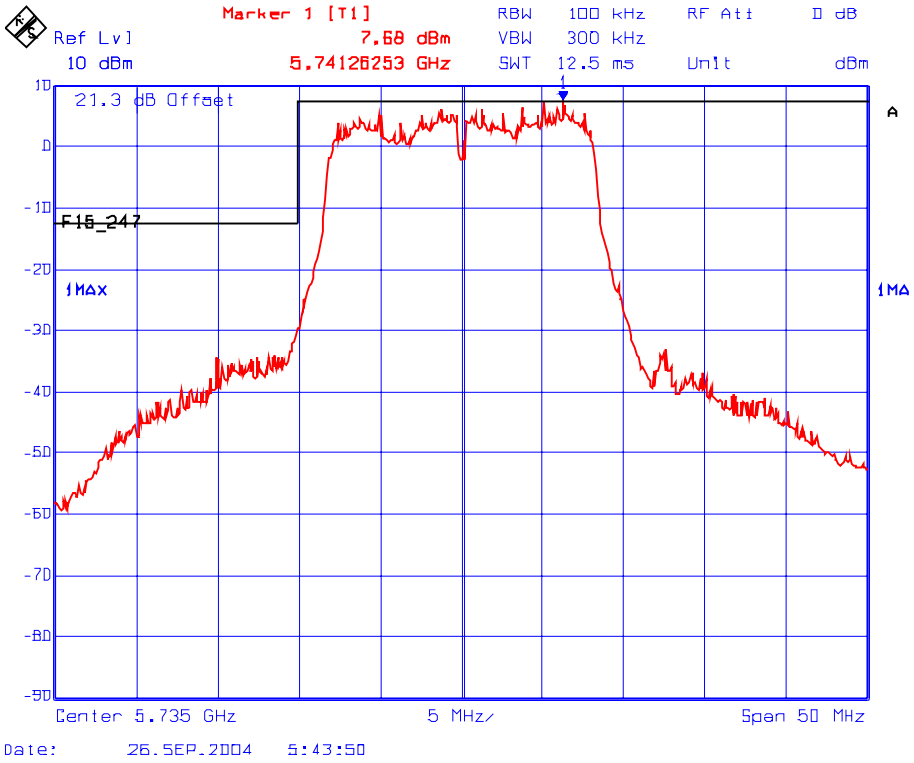
Transmit Freq.: 5840 MHz, Output Power (Maximum): 25.09 dBm, Modulation: 16QAM (36 Mbps)



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

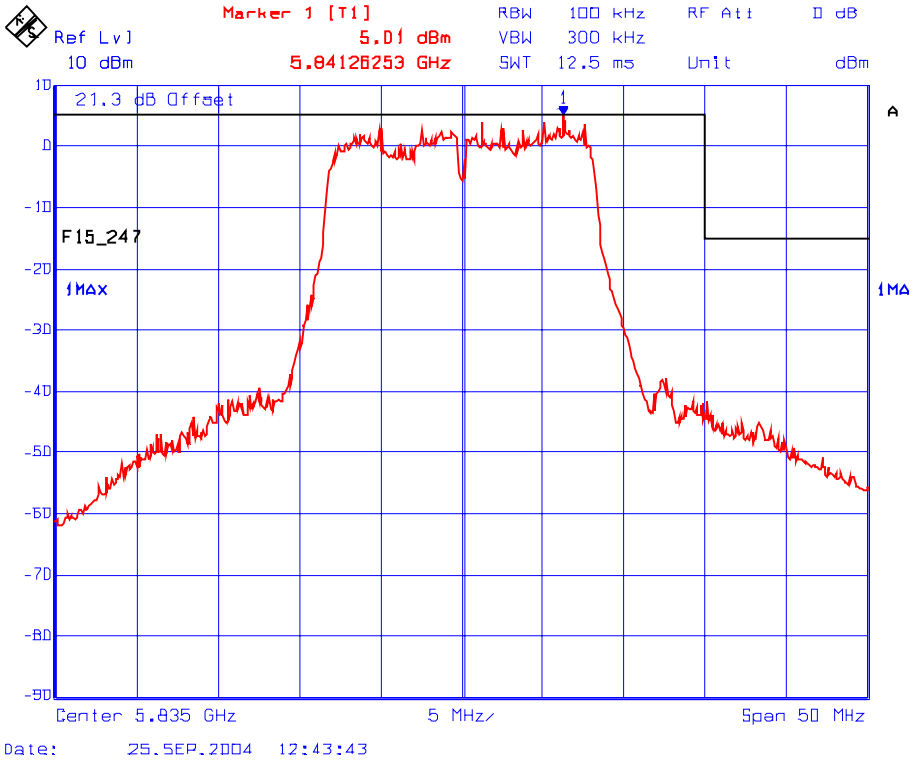
Plot #35: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Maximum): 26.17 dBm, Modulation: QPSK (18 Mbps)



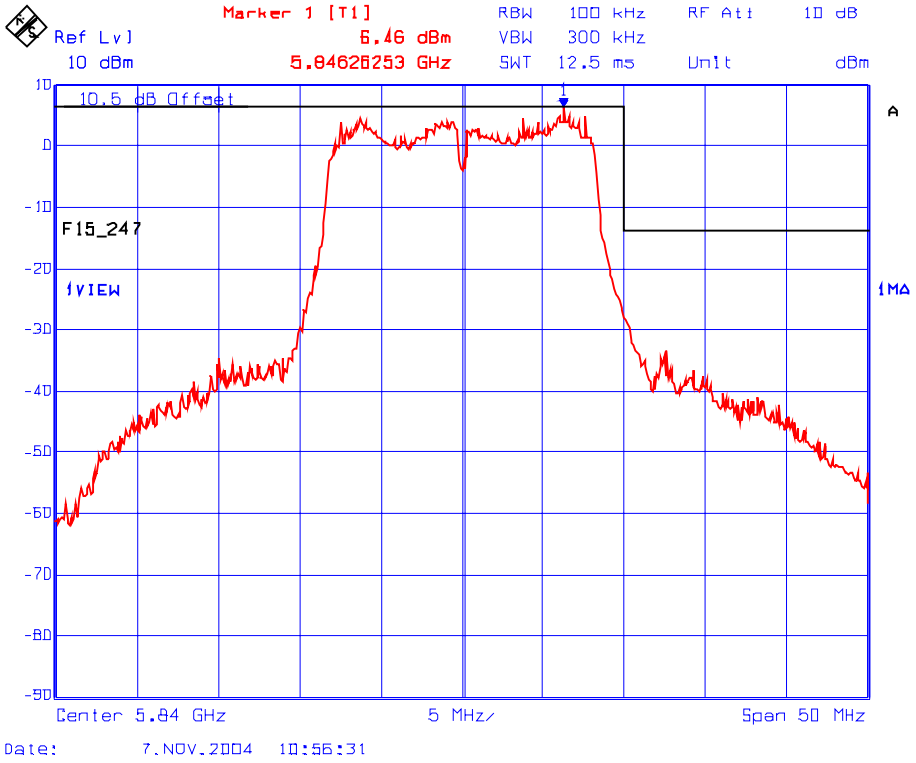
Plot #36: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Maximum): 25.11 dBm, Modulation: QPSK (18 Mbps)



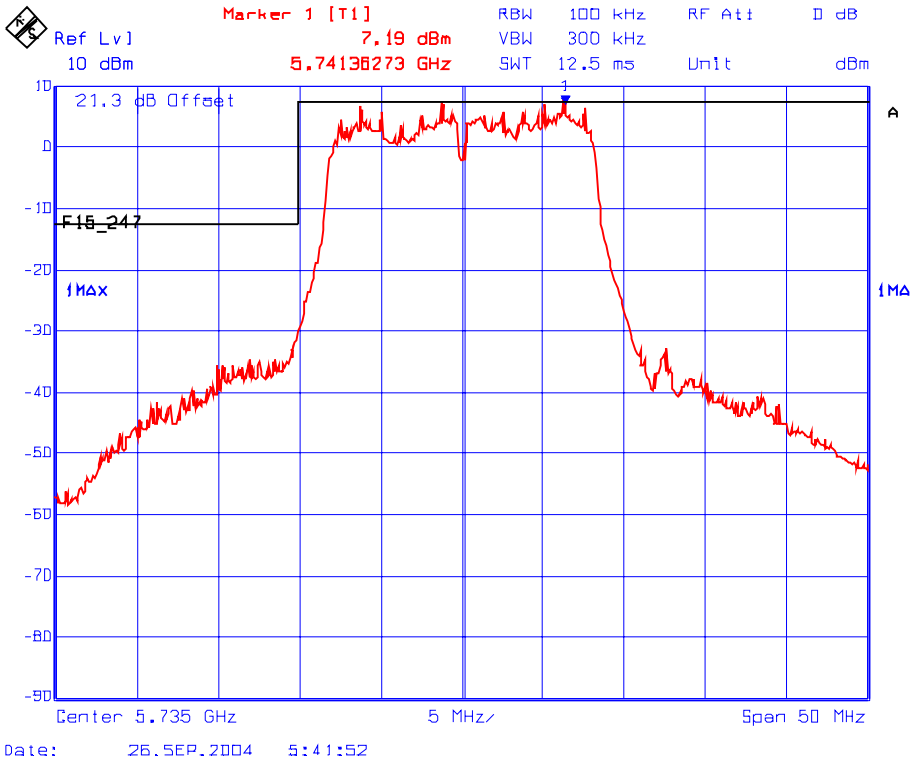
Plot #37: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5840 MHz, Output Power (Maximum): 25.08 dBm, Modulation: QPSK (18 Mbps)



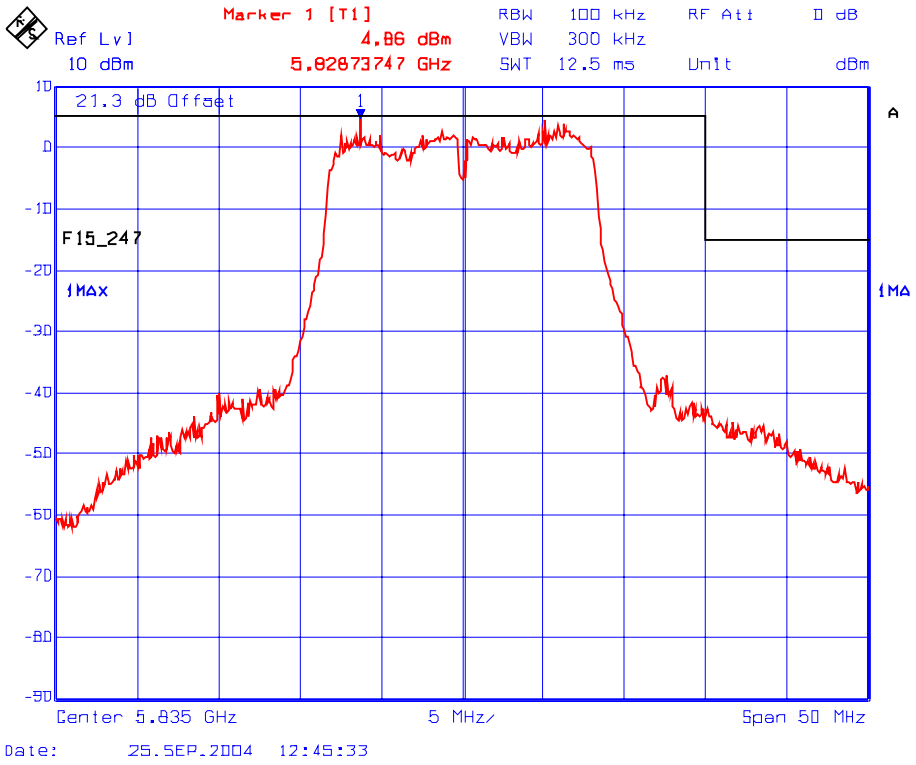
Plot #38: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5735 MHz, Output Power (Maximum): 26.17 dBm, Modulation: BPSK (9 Mbps)



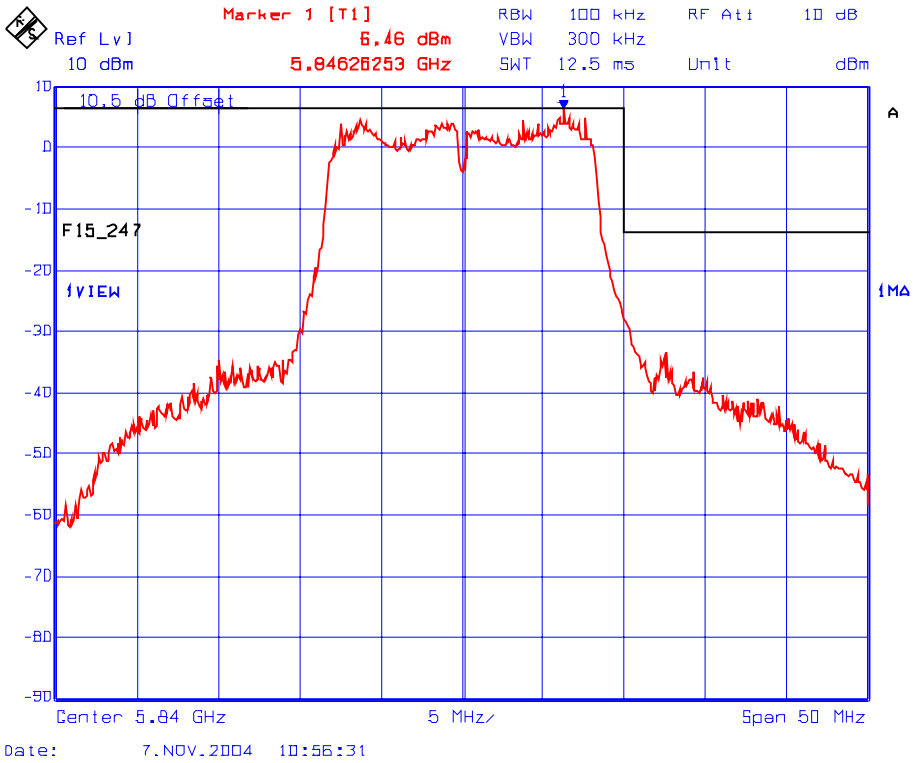
Plot #39: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5835 MHz, Output Power (Maximum): 25.18 dBm, Modulation: BPSK (9 Mbps)



Plot #40: Transmitter Band-edge Conducted Emissions Measurements

Transmit Freq.: 5840 MHz, Output Power (Maximum): 25.12 dBm, Modulation: BPSK (9 Mbps)



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

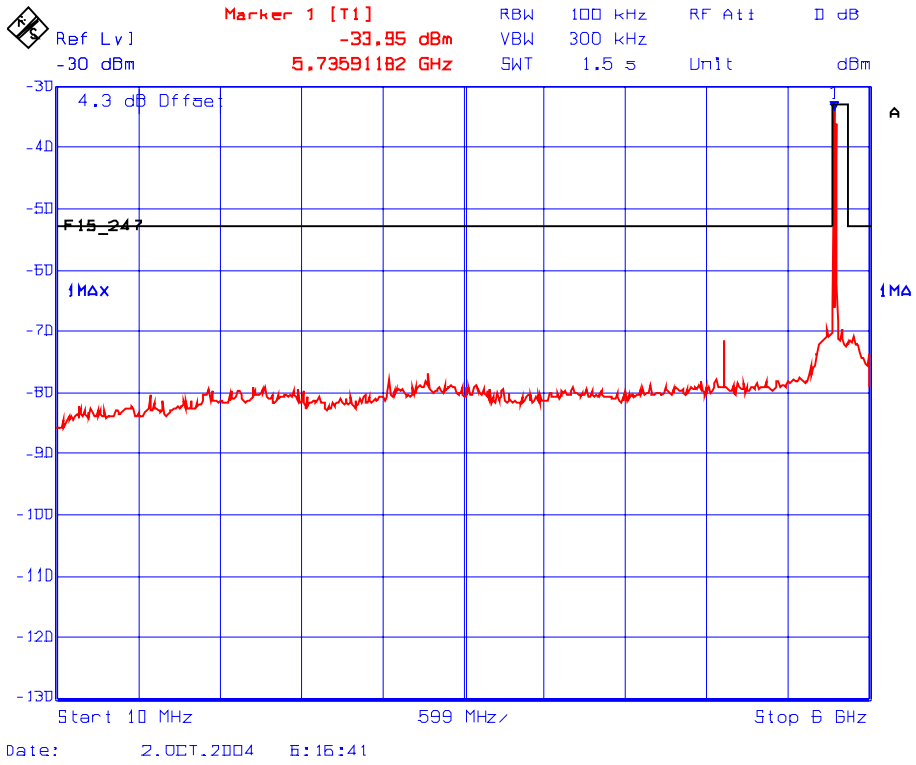
5.10.5.3. TX CONDUCTED SPURIOUS EMISSIONS AT MINIMUM RF OUTPUT POWER

- The emissions were scanned from 10 MHz to 40 GHz and all emissions less 20 dB below the limits were recorded.
- Refer to Plots # 41(a)(b) to 43(a)(b) for detailed measurements of Spurious Conducted Emission at lowest, middle and highest channel frequencies and minimum RF output powers.

Remarks: Based on the RF Output Power, 6 dB Bandwidth and Band-edge measurements, we found that signal characteristics are un-changed with different modulation modes. Therefore, the Transmitter Spurious Emissions will only be conducted with 64QAM (54 Mb/s) and the results shall represent for all oter modulations.

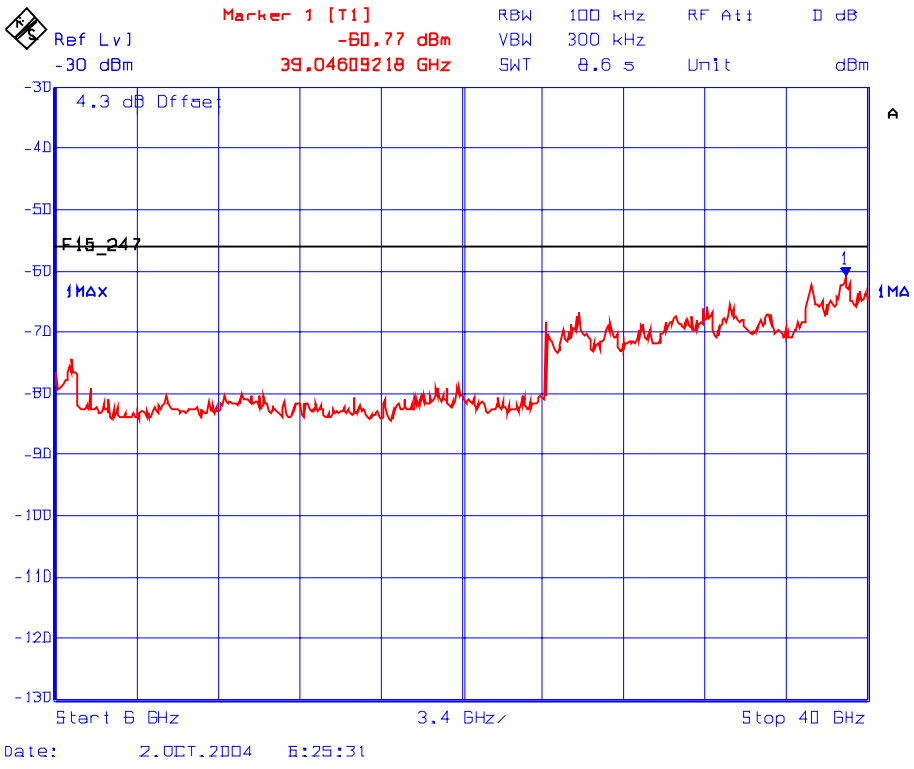
Plot #41(a): Spurious Conducted Emissions Measurements

Tx Frequency: 5735 MHz, Power Output (Minimum): -11.79 dBm, Modulation: 64 QAM (54 Mbps)



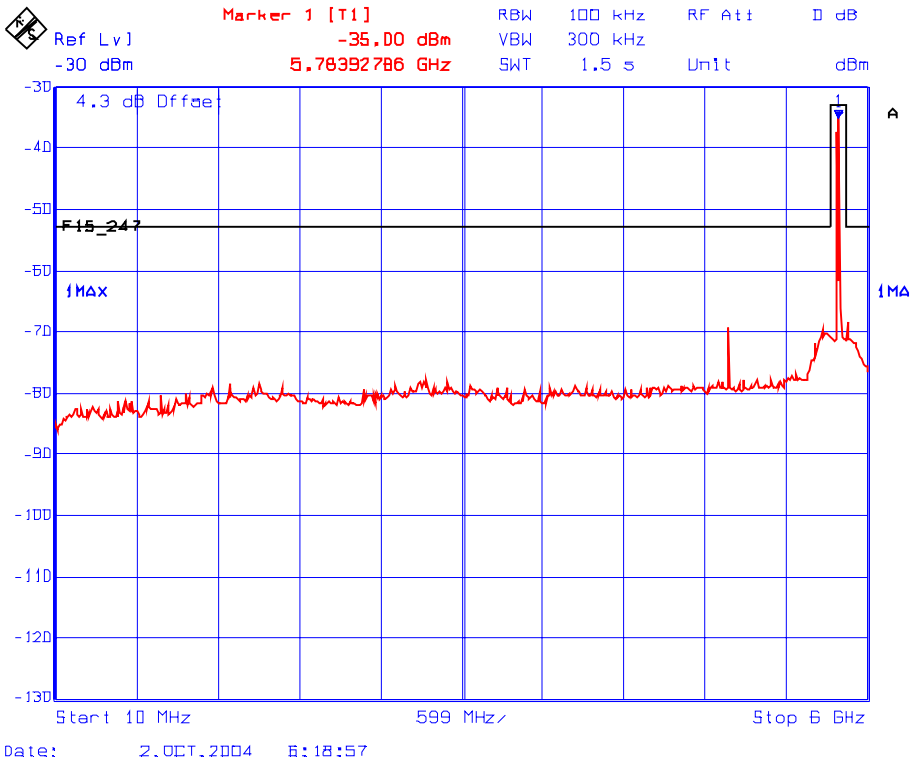
Plot #41(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5735 MHz, Power Output (Minimum): -11.79 dBm, Modulation: 64 QAM (54 Mbps)



Plot #42(a): Spurious Conducted Emissions Measurements

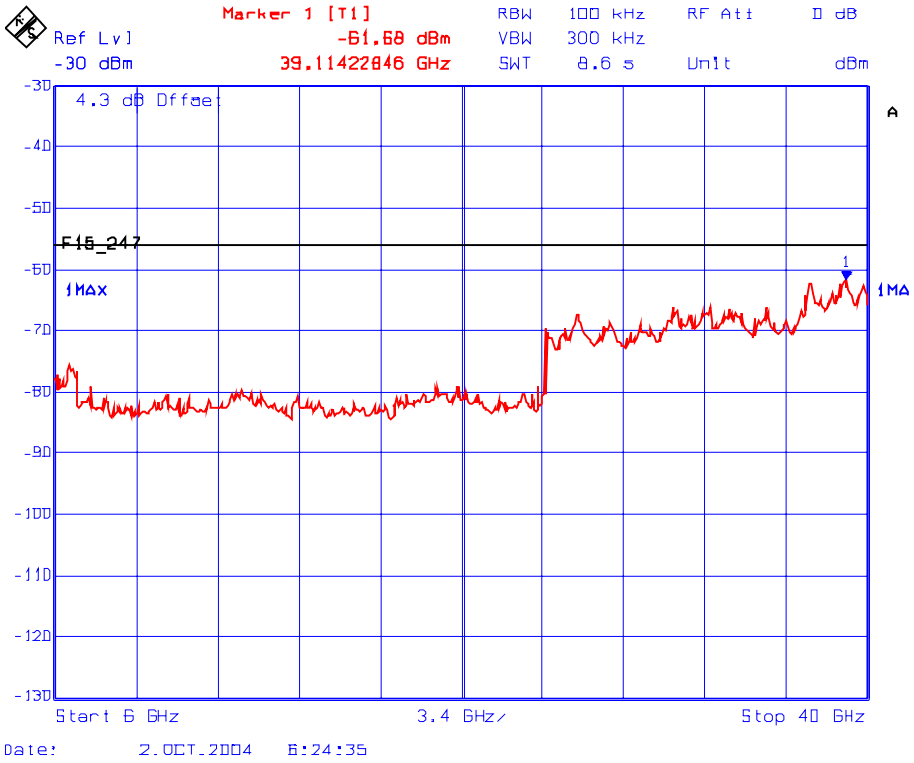
Tx Frequency: 5775 MHz, Power Output (Minimum): -12.30 dBm, Modulation: 64 QAM (54 Mbps)



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

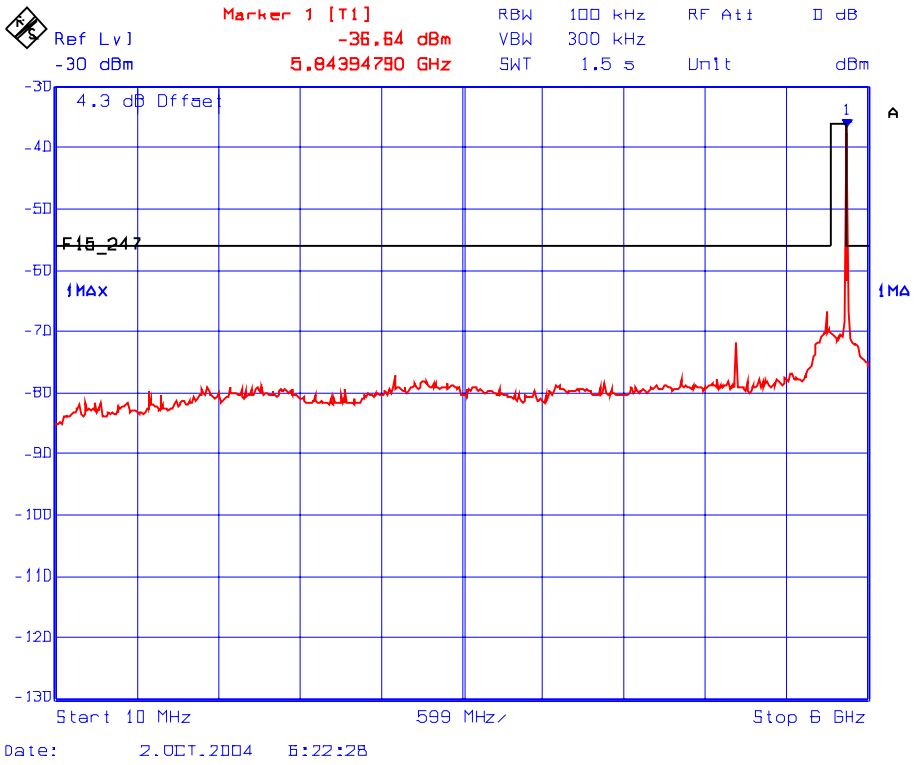
Plot #42(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5775 MHz, Power Output (Minimum): -12.30 dBm, Modulation: 64 QAM (54 Mbps)



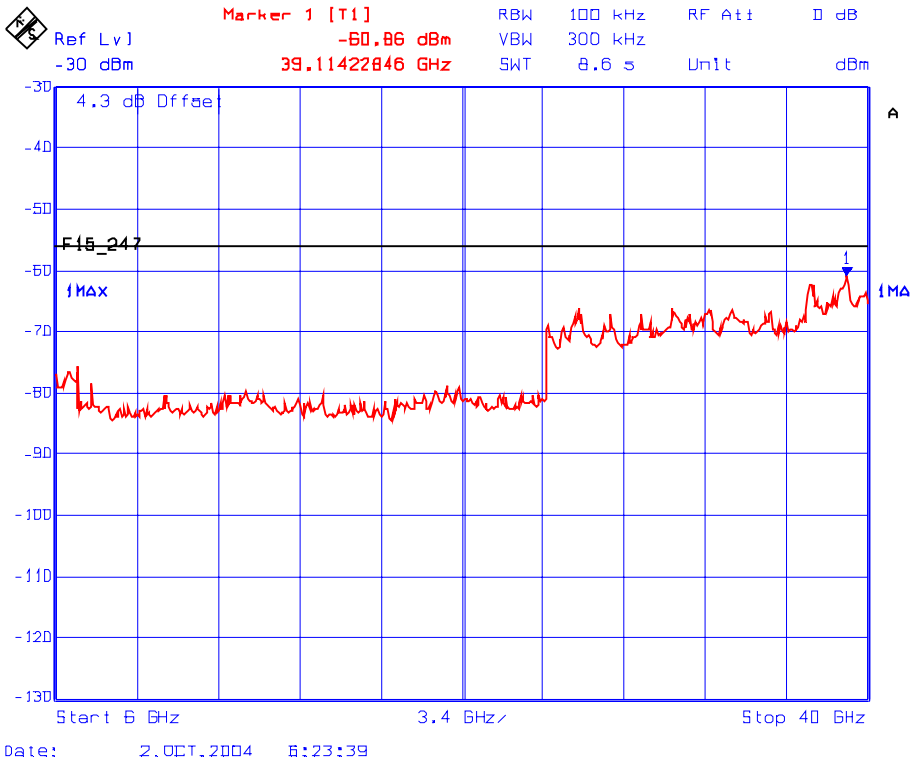
Plot #43(a): Spurious Conducted Emissions Measurements

Tx Frequency: 5835 MHz, Power Output (Minimum): -12.68 dBm, Modulation: 64 QAM (54 Mbps)



Plot #43(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5835 MHz, Power Output (Minimum): -12.68 dBm, Modulation: 64 QAM (54 Mbps)



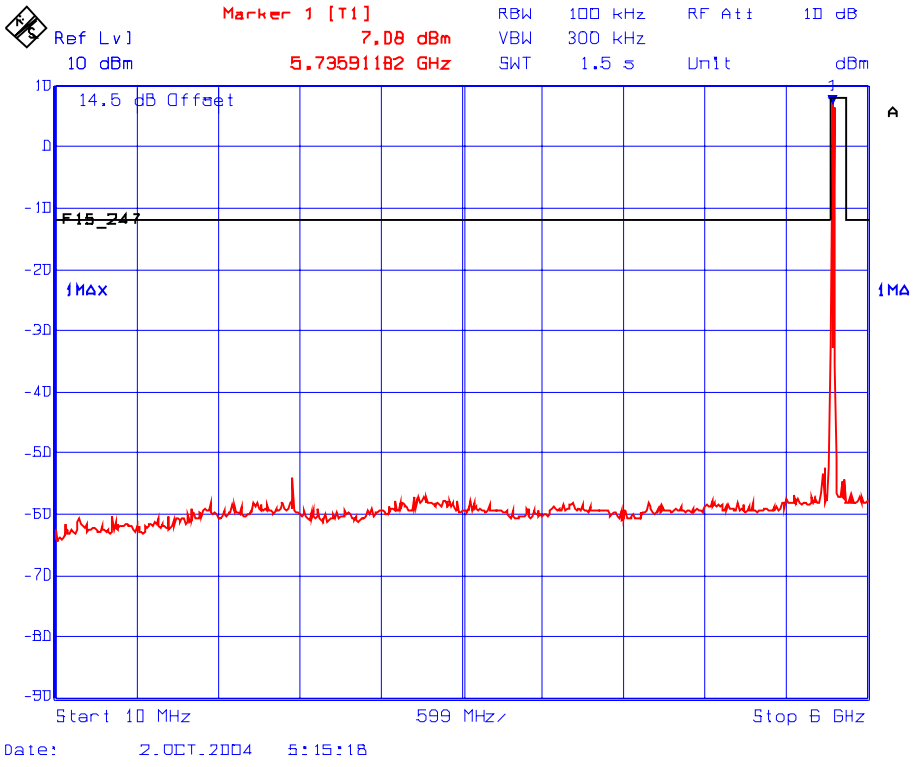
5.10.5.4. TX CONDUCTED SPURIOUS EMISSIONS AT MAXIMUM RF OUTPUT POWER

- The emissions were scanned from 10 MHz to 40 GHz and all emissions less 20 dB below the limits were recorded.
- Refer to Plots # 44(a)(b) to 46(a)(b) for detailed measurements of Spurious Conducted Emission at lowest, middle and highest channel frequencies and maximum RF output powers.

Remarks: Based on the RF Output Power, 6 dB Bandwidth and Band-edge measurements, we found that signal characteristics are un-changed with different modulation modes. Therefore, the Transmitter Spurious Emissions will only be conducted with 64QAM (54 Mb/s) and the results shall represent for all oter modulations.

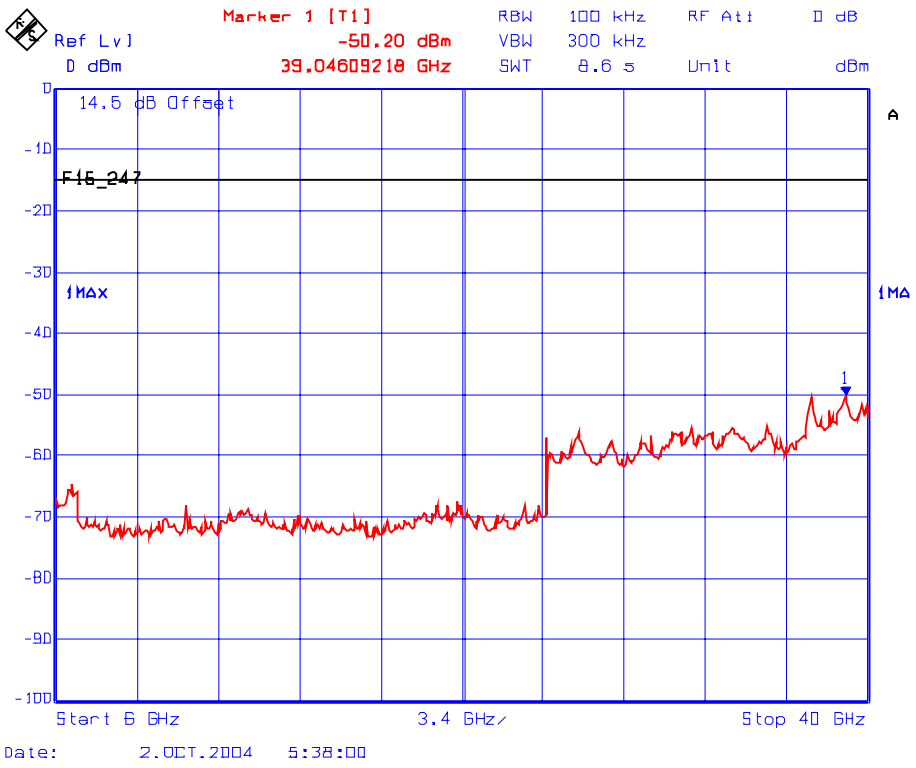
Plot #44(a): Spurious Conducted Emissions Measurements

Tx Frequency: 5735 MHz, Power Output (Maximum): 25.50 dBm, Modulation: 64 QAM (54 Mbps)



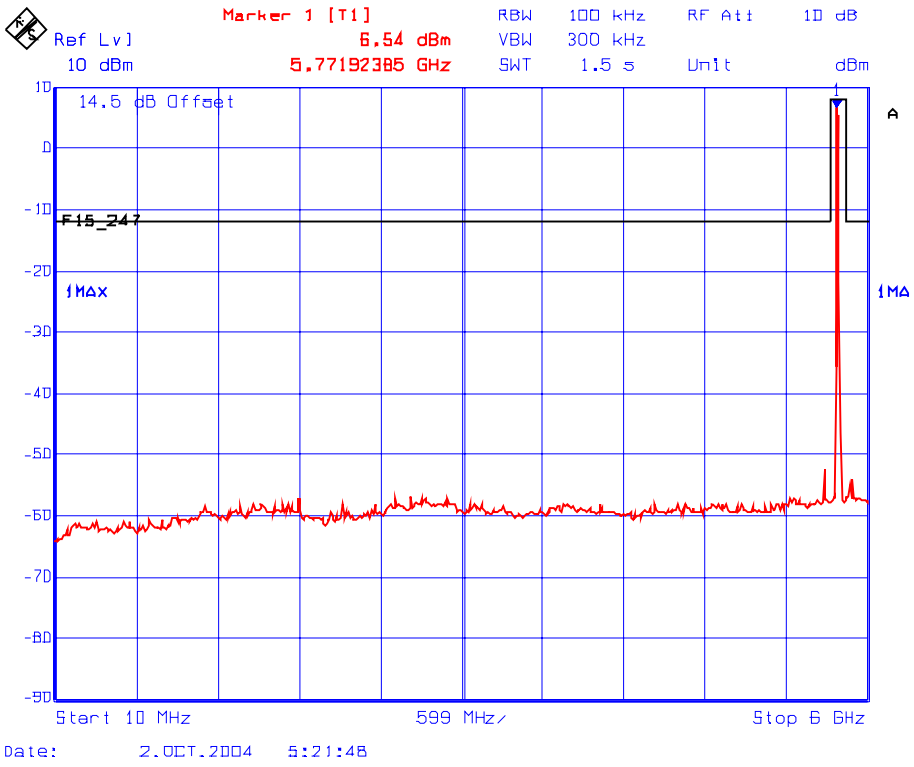
Plot #44(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5735 MHz, Power Output (Maximum): 25.50 dBm, Modulation: 64 QAM (54 Mbps)



Plot #45(a): Spurious Conducted Emissions Measurements

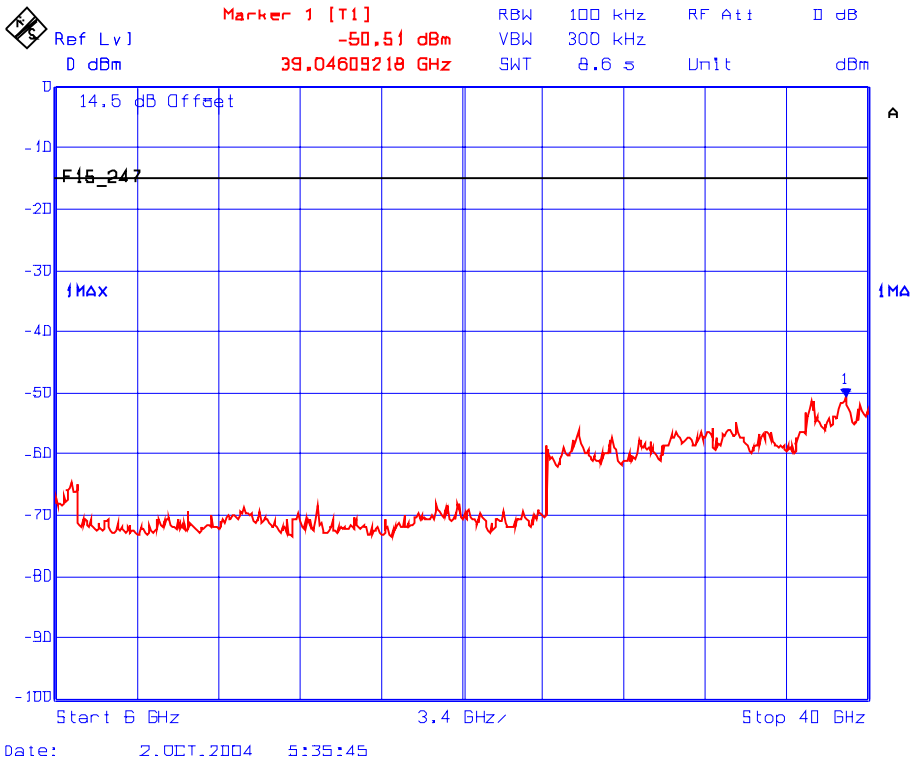
Tx Frequency: 5775 MHz, Power Output (Maximum): 25.18 dBm, Modulation: 64 QAM (54 Mbps)



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

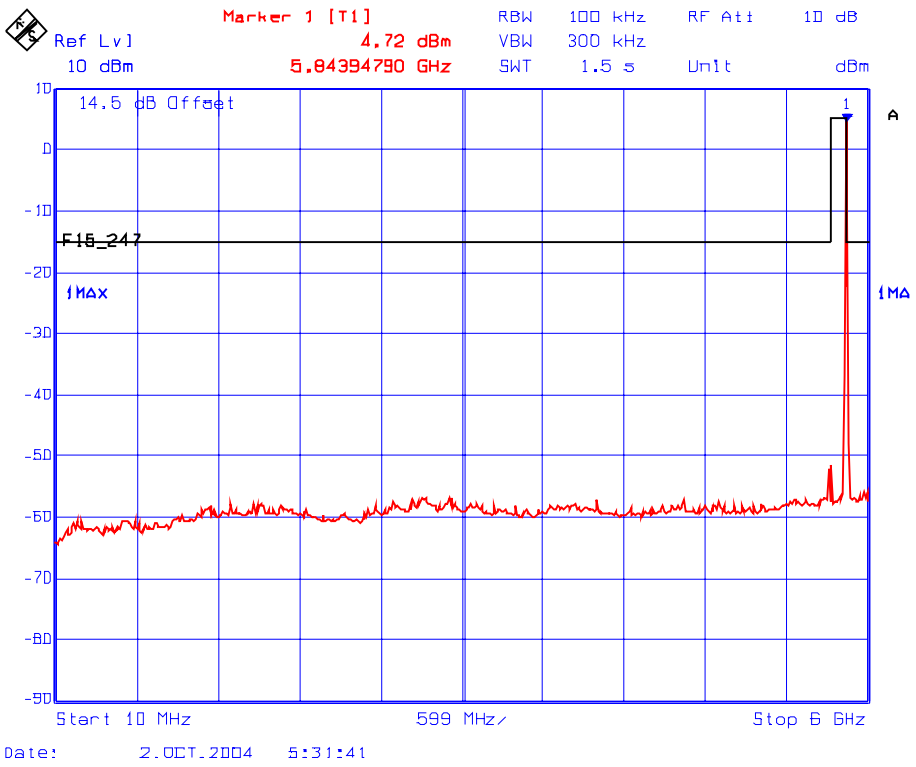
Plot #45(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5775 MHz, Power Output (Maximum): 25.18 dBm, Modulation: 64 QAM (54 Mbps)



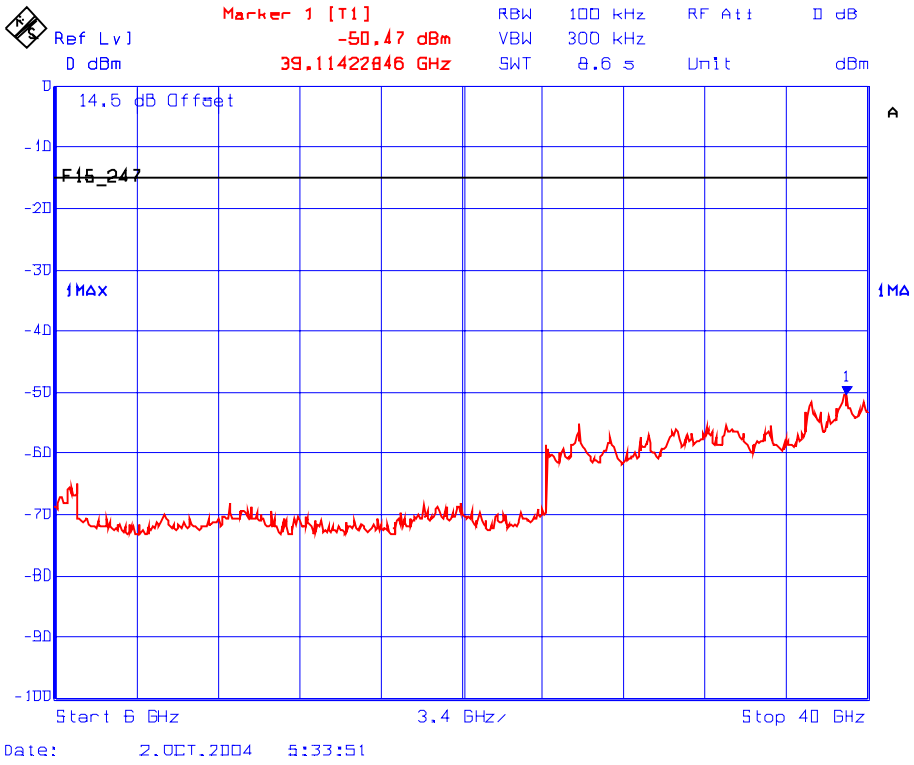
Plot #46(a): Spurious Conducted Emissions Measurements

Tx Frequency: 5835 MHz, Power Output (Maximum): 26.17 dBm, Modulation: 64 QAM (54 Mbps)



Plot #46(b): Spurious Conducted Emissions Measurements

Tx Frequency: 5835 MHz, Power Output (Maximum): 26.17 dBm, Modulation: 64 QAM (54 Mbps)



5.11. TRANSMITTED POWER DENSITY OF A DIGITAL MODULATION SYSTEM, FCC CFR 47, PARA. 15.247(D)

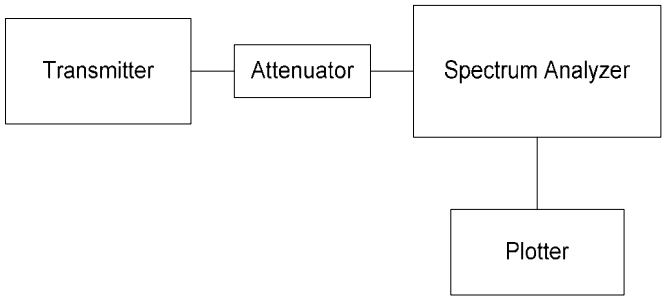
5.11.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.11.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P003-2004, FCC DA-00-705 and ANSI C63.4 for measurement methods

5.11.3. Test Arrangement



5.11.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

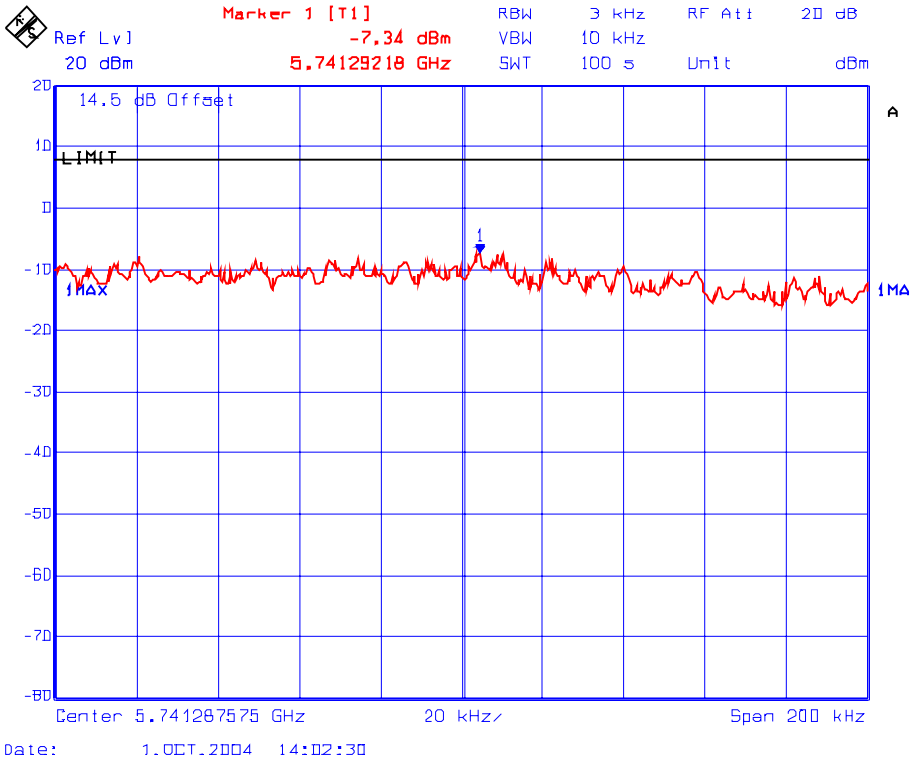
5.11.5. Test Data

CHANNEL FREQUENCY (MHz)	MODULATION DATA RATE	RF POWER LEVEL IN 3 KHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	COMMENTS (PASS/FAIL)
5735	64QAM (54 Mb/s)	-7.34	8.0	-15.34	PASS
5775	64QAM (54 Mb/s)	-8.50	8.0	-16.50	PASS
5835	64QAM (54 Mb/s)	-9.13	8.0	-17.13	PASS
5735	16QAM (36 Mb/s)	-8.03	8.0	-16.03	PASS
5775	16QAM (36 Mb/s)	-8.35	8.0	-16.35	PASS
5835	16QAM (36 Mb/s)	-10.32	8.0	-18.32	PASS
5735	QPSK (18 Mb/s)	-7.60	8.0	-15.60	PASS
5775	QPSK (18 Mb/s)	-9.56	8.0	-17.56	PASS
5835	QPSK (18 Mb/s)	-9.71	8.0	-7.71	PASS
5735	BPSK (9 Mb/s)	-6.66	8.0	-14.66	PASS
5775	BPSK (9 Mb/s)	-9.42	8.0	-17.42	PASS
5835	BPSK (9 Mb/s)	-9.79	8.0	-17.79	PASS

** Refer to Plots # 47 to 58 for details of measurements.

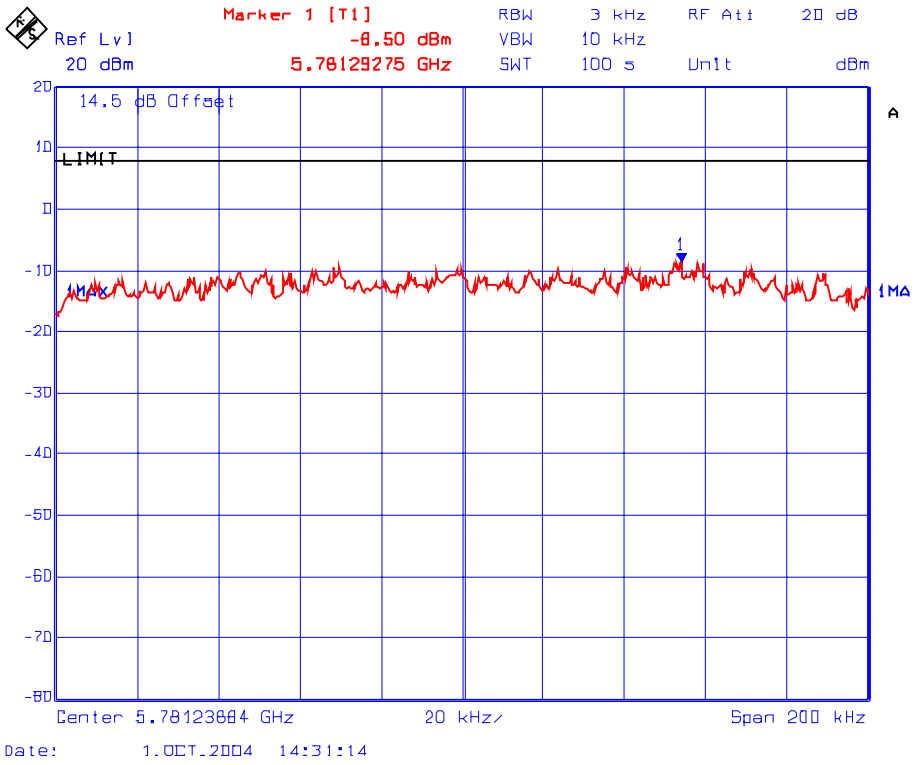
Plot #47: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5735 MHz, Power Output: 25.50 dBm, Modulation: 64 QAM (54 Mbps)



Plot #48: Maximum Power Density Measurements in 3 kHz BW

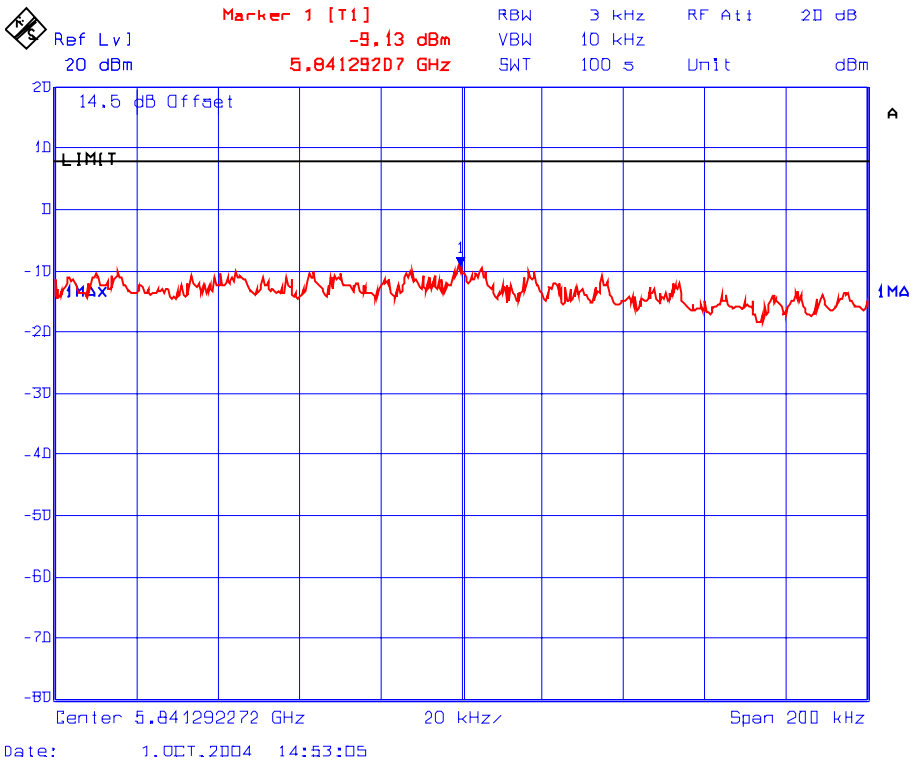
Tx Frequency: 5775 MHz, Power Output: 25.18 dBm, Modulation: 64 QAM (54 Mbps)



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

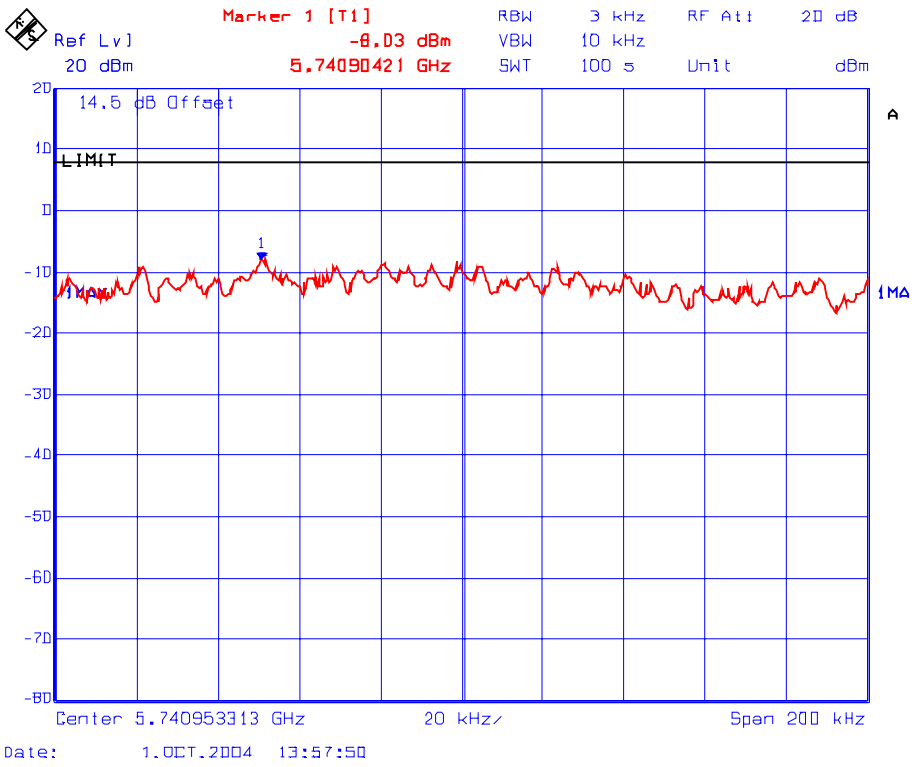
Plot #49: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5835 MHz, Power Output: 26.17 dBm, Modulation: 64 QAM (54 Mbps)



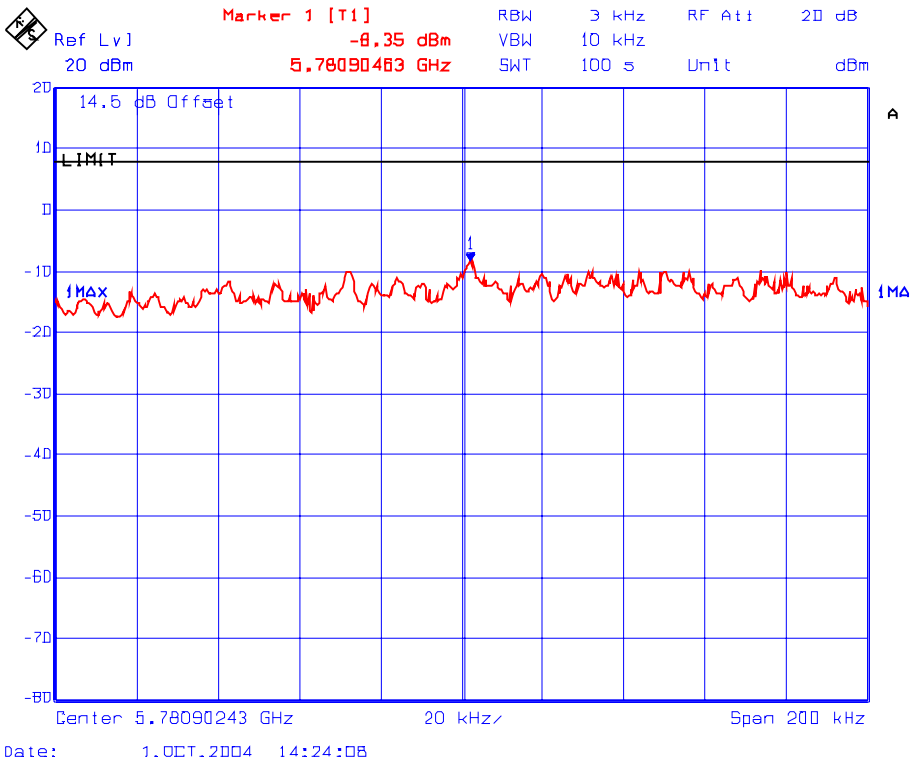
Plot #50: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5735 MHz, Power Output: 26.14 dBm, Modulation: 16QAM (36 Mbps)



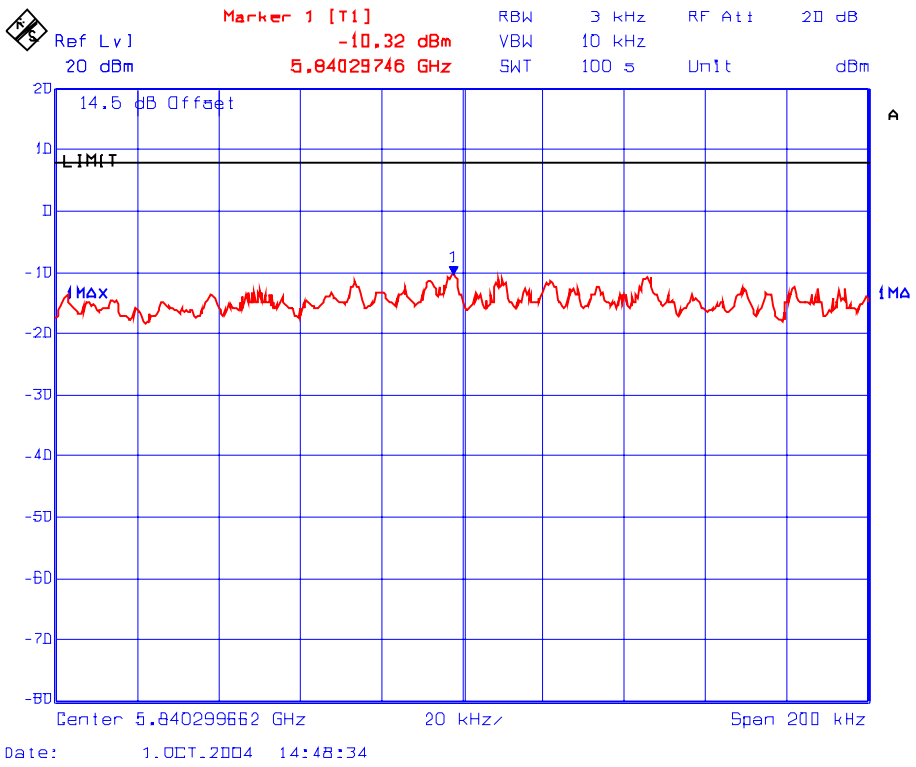
Plot #51: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5775 MHz, Power Output: 25.47 dBm, Modulation: 16QAM (36 Mbps)



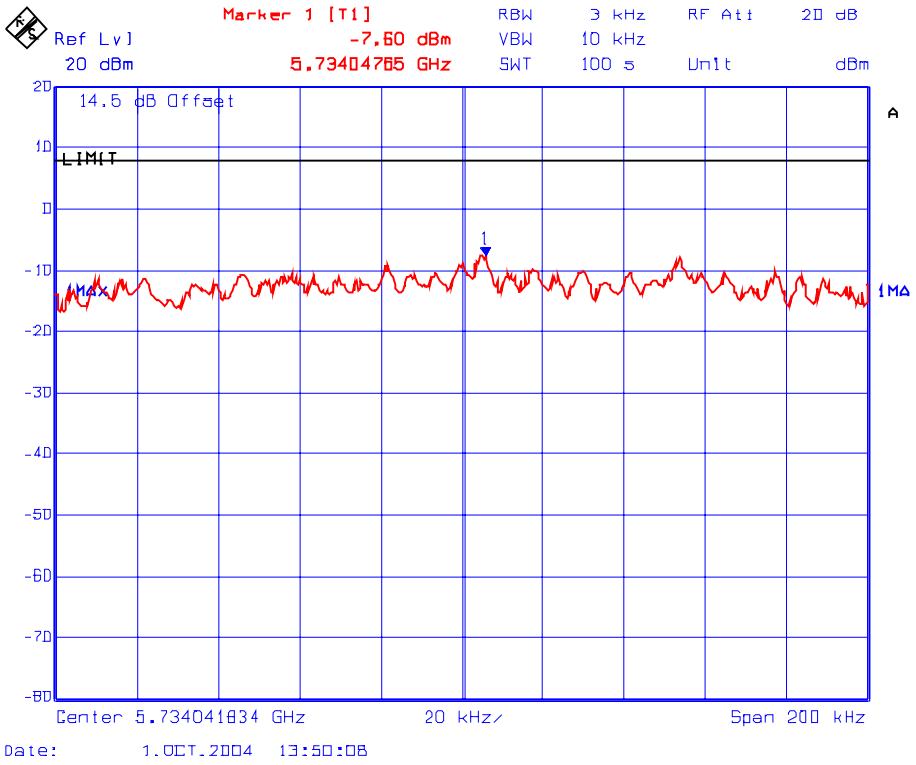
Plot #52: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5835 MHz, Power Output: 25.11 dBm, Modulation: 16QAM (36 Mbps)



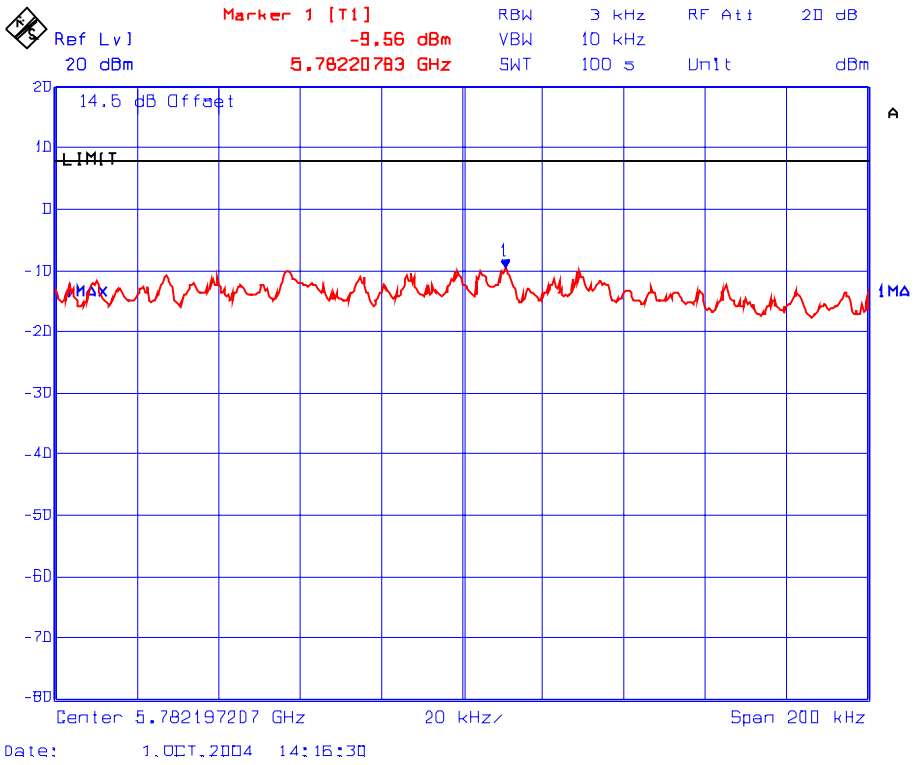
Plot #53: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5735 MHz, Power Output: 26.17 dBm, Modulation: QPSK (18 Mbps)



Plot #54: Maximum Power Density Measurements in 3 kHz BW

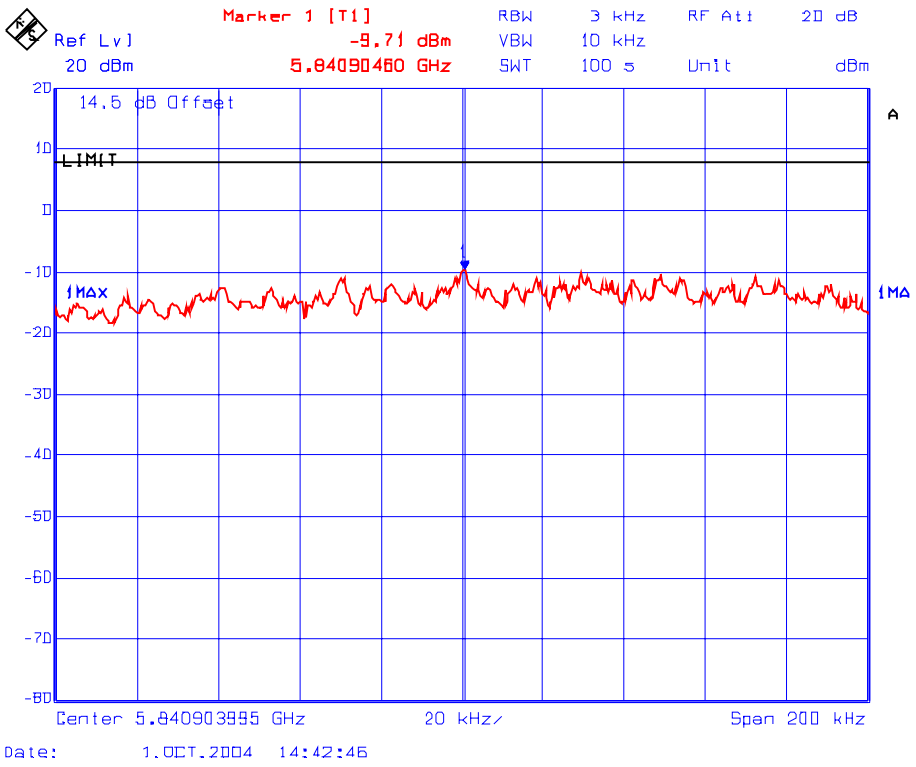
Tx Frequency: 5775 MHz, Power Output: 25.50 dBm, Modulation: QPSK (18 Mbps)



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

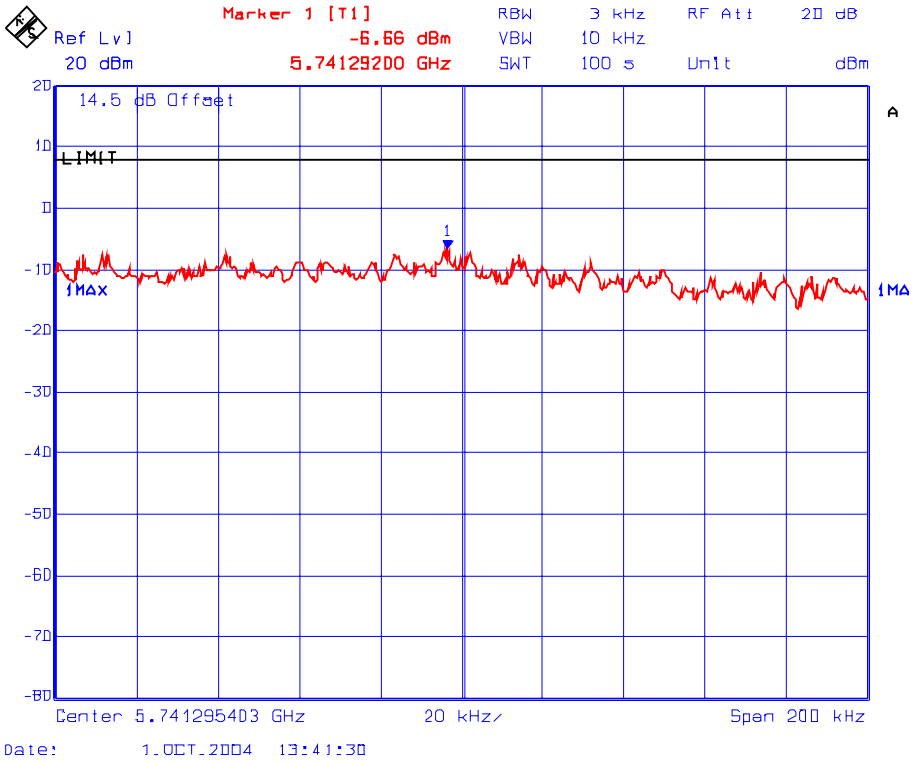
Plot #55: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5835 MHz, Power Output: 25.14 dBm, Modulation: QPSK (18 Mbps)



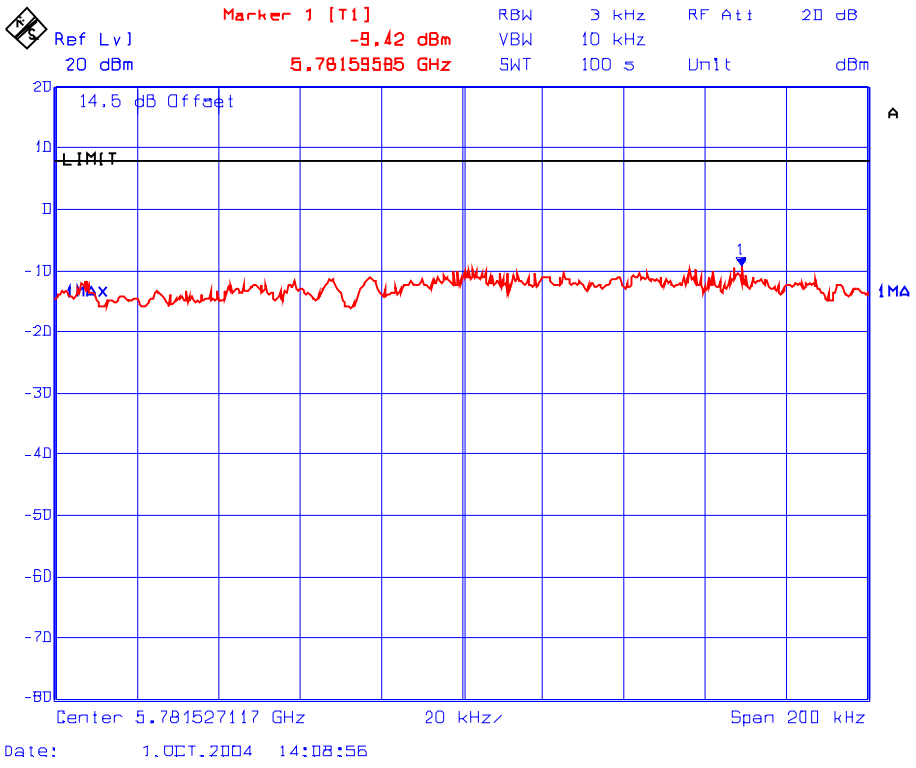
Plot #56: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5735 MHz, Power Output: 26.17 dBm, Modulation: BPSK (9 Mbps)



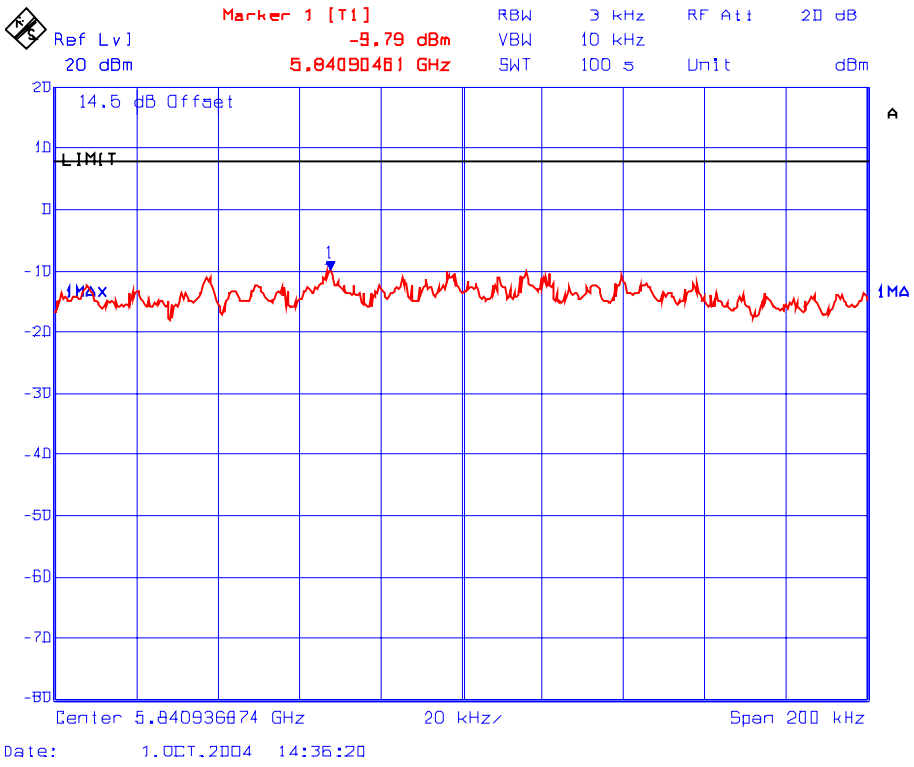
Plot #57: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5775 MHz, Power Output: 25.50 dBm, Modulation: BPSK (9 Mbps)



Plot #58: Maximum Power Density Measurements in 3 kHz BW

Tx Frequency: 5835 MHz, Power Output: 25.18 dBm, Modulation: BPSK (9 Mbps)



5.12. SPURIOUS EMISSIONS (RADIATED @ 3 METERS), FCC CFR 47, PARA. 15.247(D), 15.209 & 15.205

5.12.1. Limits

In any 100 KHz bandwidth outside the operating frequency band, the radio frequency power that is produced by modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 KHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in @ 15.209(a), which lesser attenuation.

All other emissions inside restricted bands specified in @ 15.205(a) shall not exceed the general radiated emission limits specified in @ 15.209(a)

Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- **@ FCC CFR 47, Para. 15.237(c)** - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in **@15.35** for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 – 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 – 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 – 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 – 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 – 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 – 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 – 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

5.12.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P003-2004, FCC DA-00-705 and ANSI C63.4 for measurement methods

5.12.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3160-09	..	18 GHz – 26.5 GHz
Horn Antenna	EMCO	3160-10	..	26.5 GHz – 40 GHz
Mixer	Tektronix	118-0098-00	..	18 GHz – 26.5 GHz
Mixer	Tektronix	119-0098-00	..	26.5 GHz – 40 GHz

5.12.4. Photographs of Test Setup

Refer to the Photographs #3 to #10 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

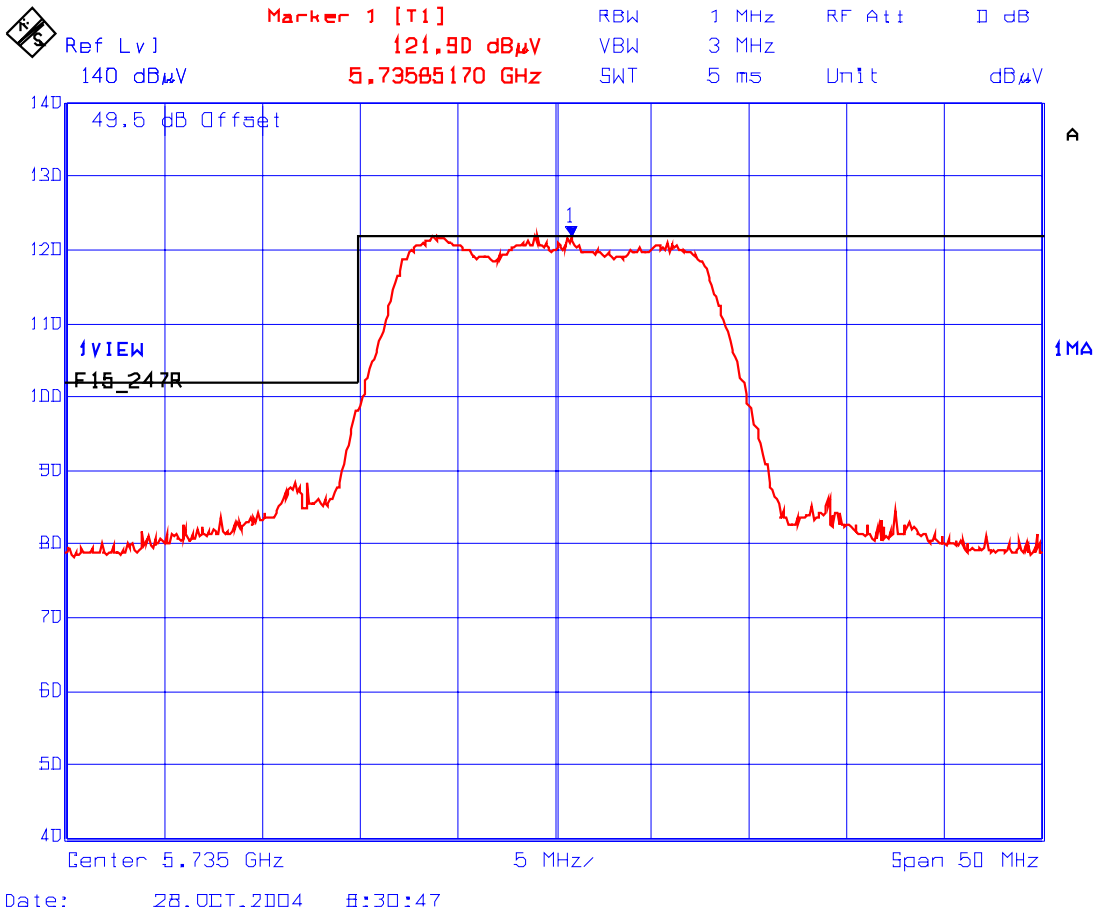
5.12.5. Test Data

5.12.5.1. BAND-EDGE RADIATED EMISSIONS AT 3 METERS

- Refer to Plots # 59(a)(b) – 73(a)(b) for detailed Band-edge Measurements of the transmitter with the maximum rf output power with the maximum gain antenna of each antenna family.
- The modulation 64QAM (54 Mb/s) was tested and represent for all other modulations since rf output signals with different modulations are identical.
- Each highest gain antenna of its family was selected to test for the worst case within its family.

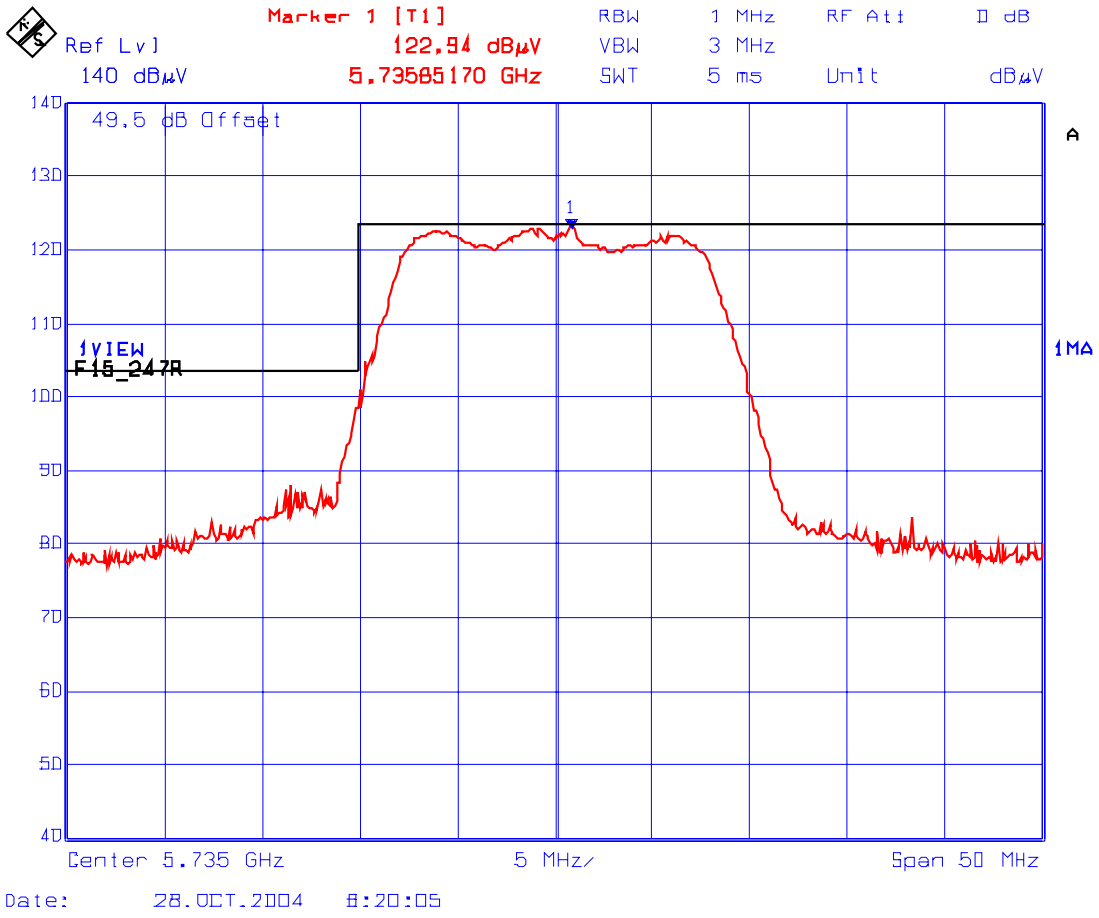
Plot # 59(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.5 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



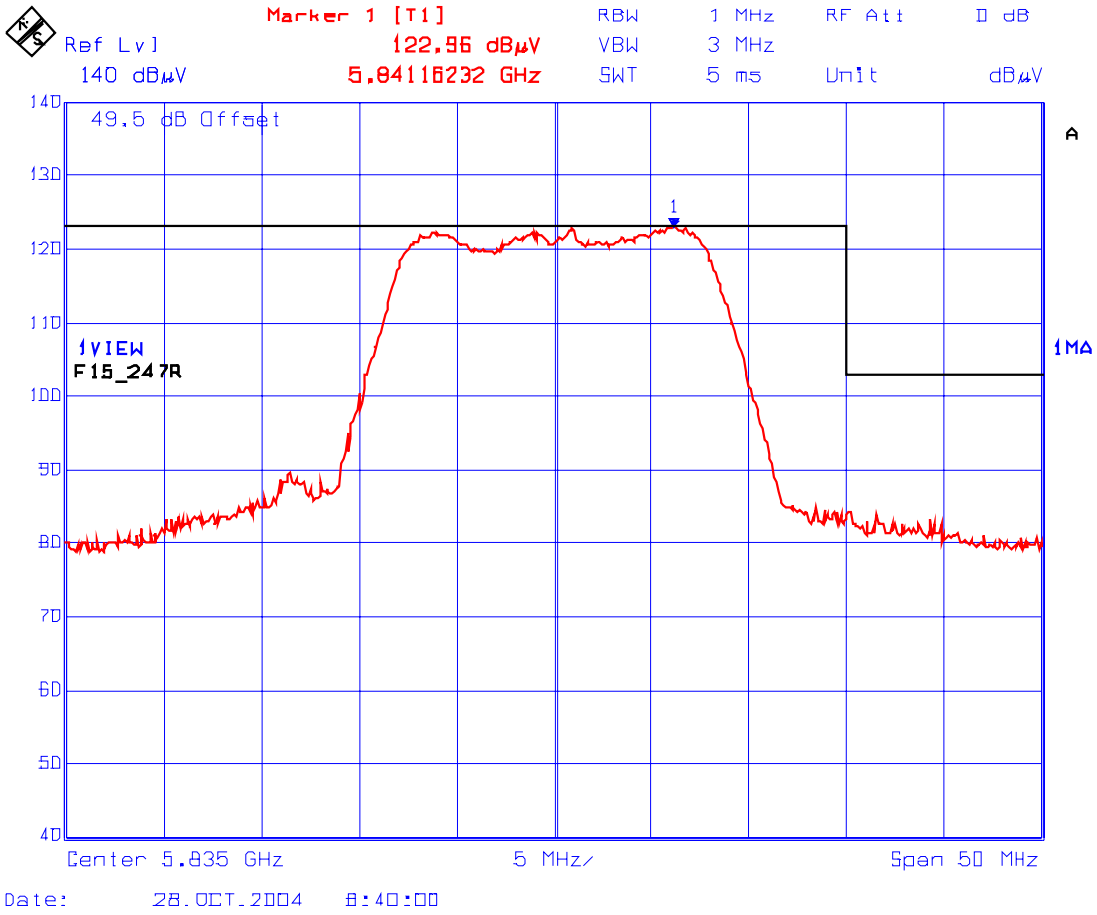
Plot # 59(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.5 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



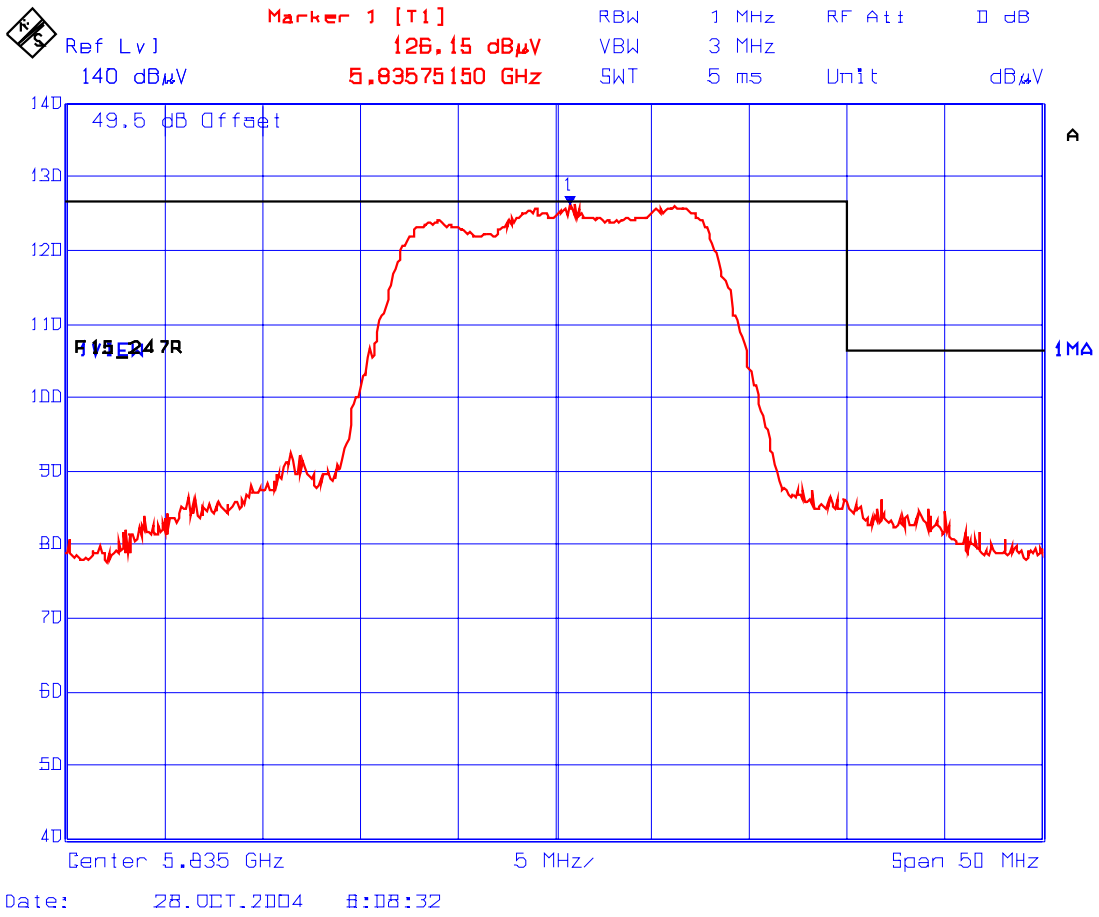
Plot # 60(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



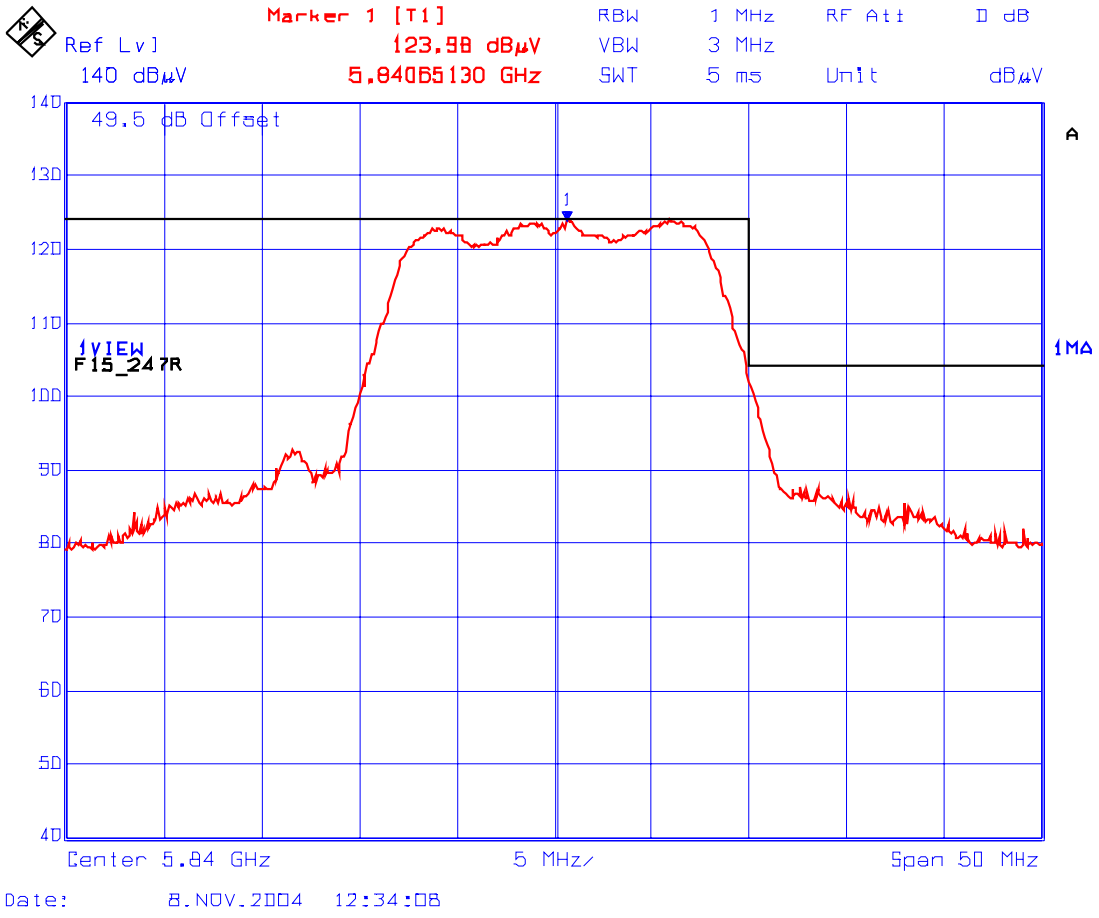
Plot # 60(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



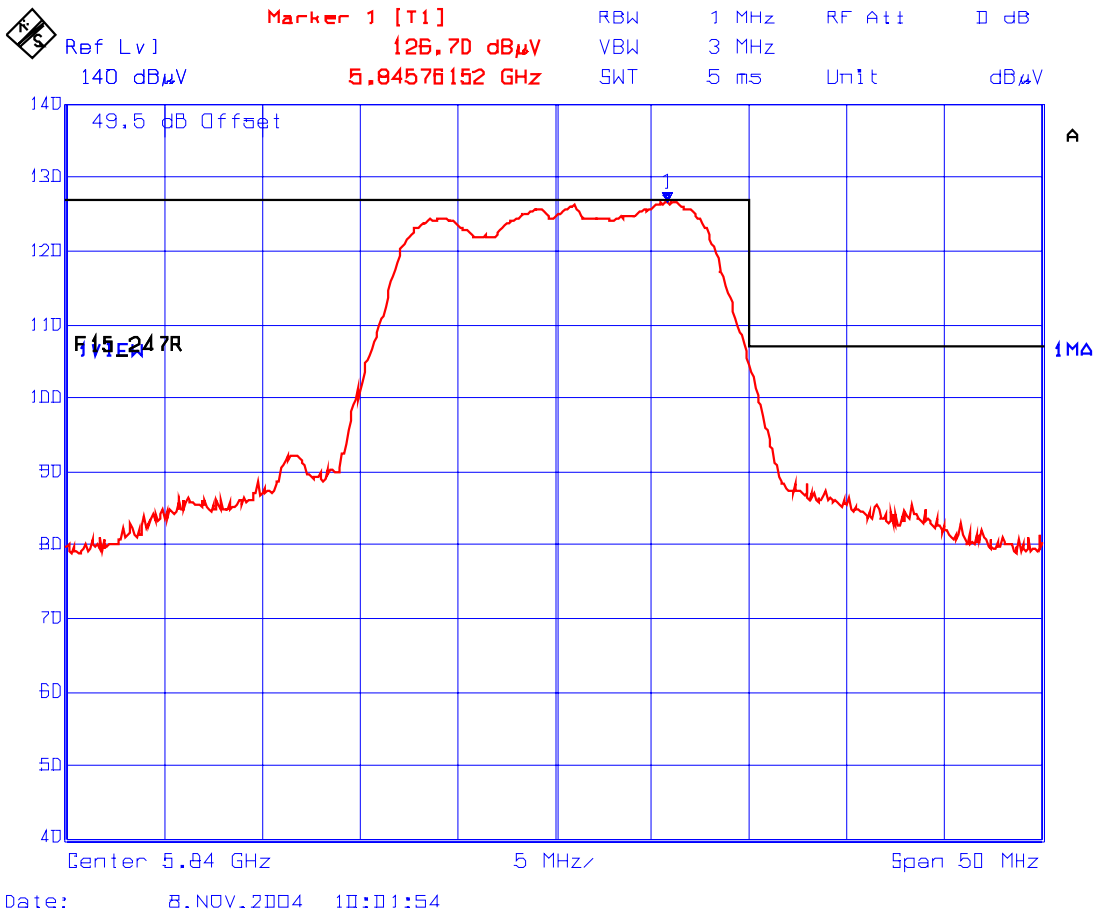
Plot # 61(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



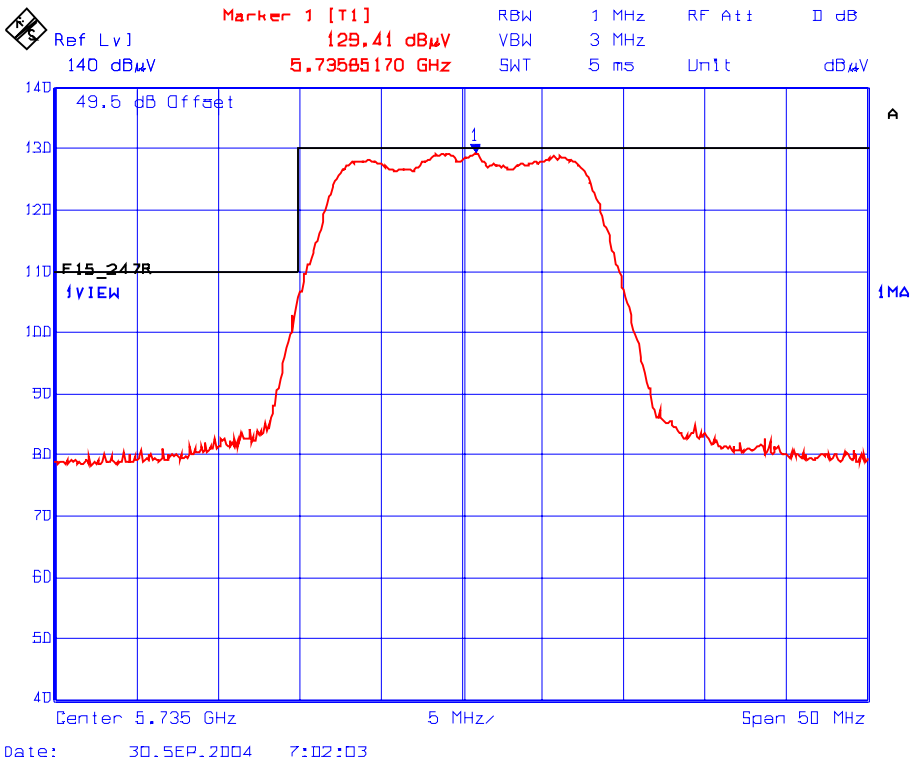
Plot # 61(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: Mobile Mark Omni Directional Antenna, Model: ODN9-5725, Serial: N/A, Gain: 9 dBi



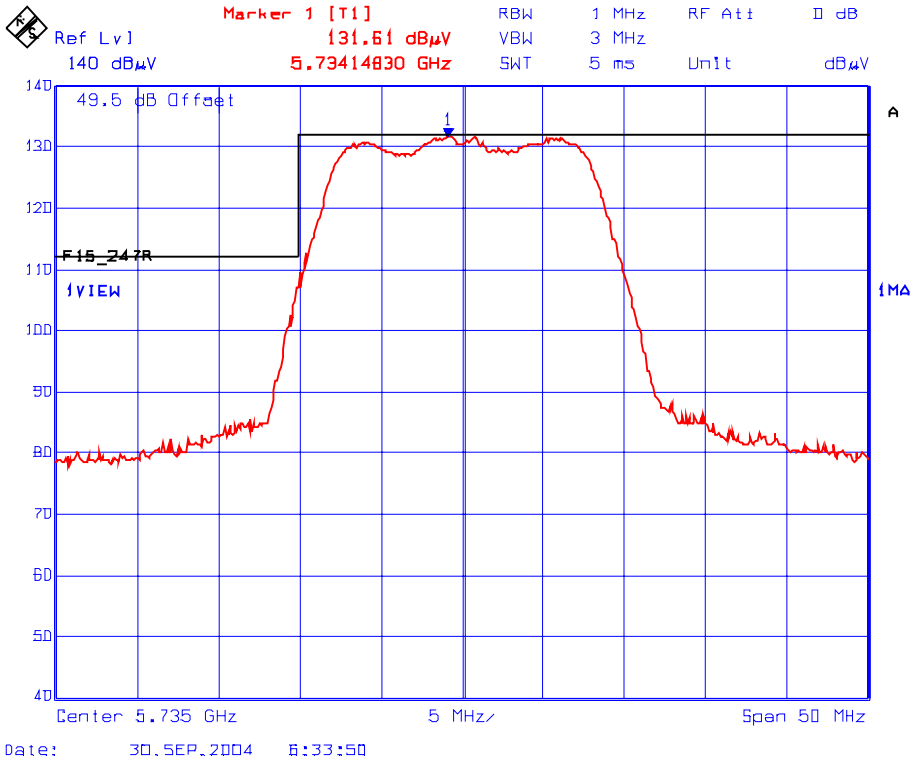
Plot # 62(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 20.3 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



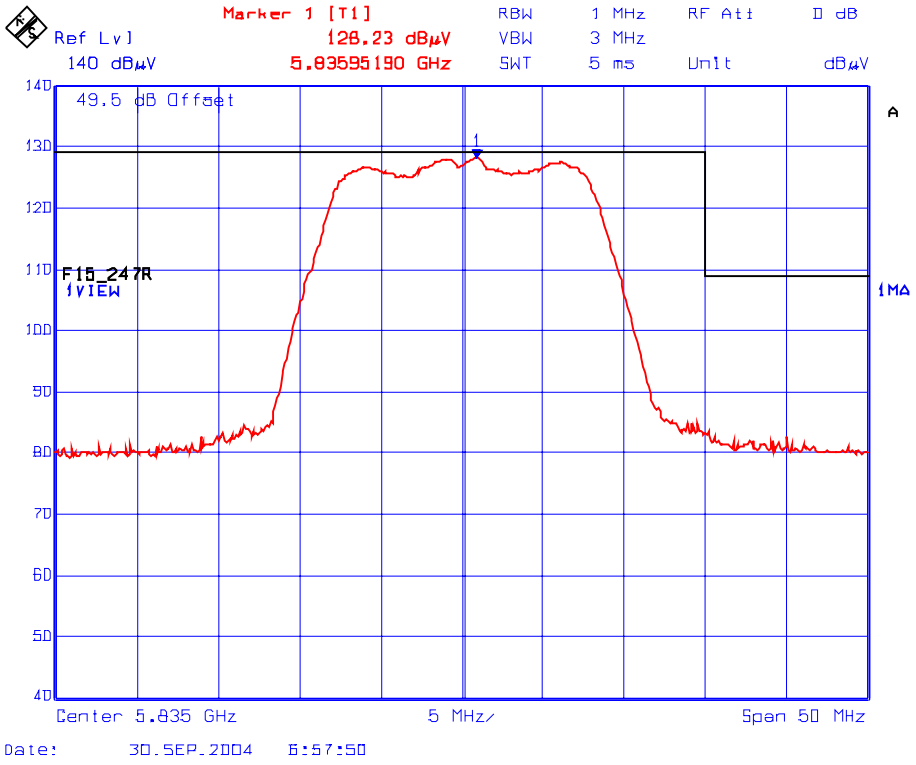
Plot # 62(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 20.3 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



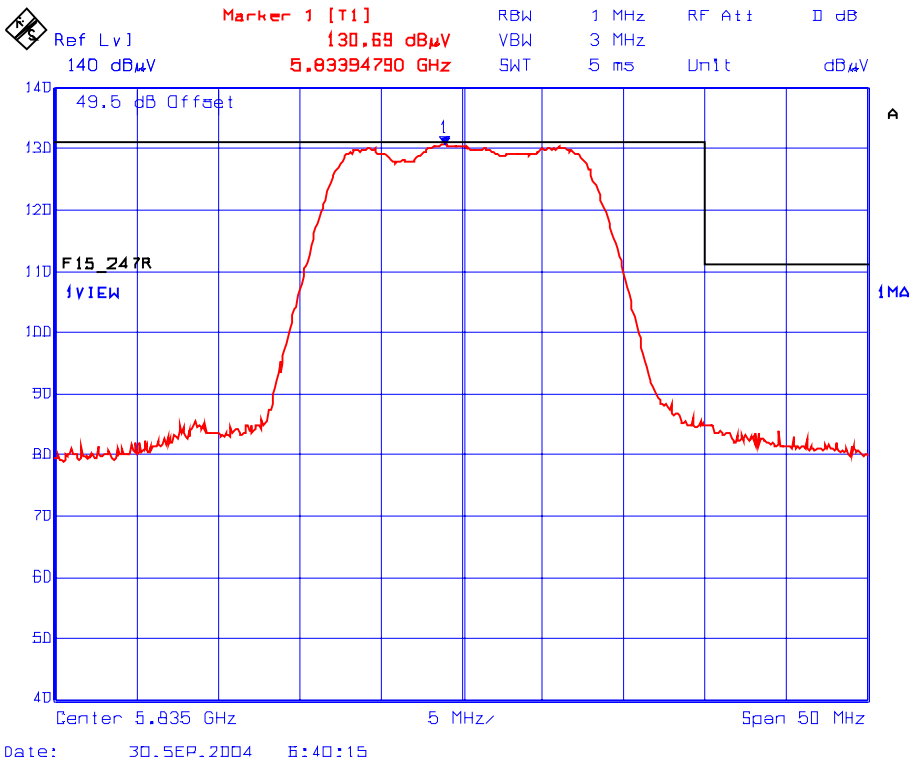
Plot # 63(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 19.27 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



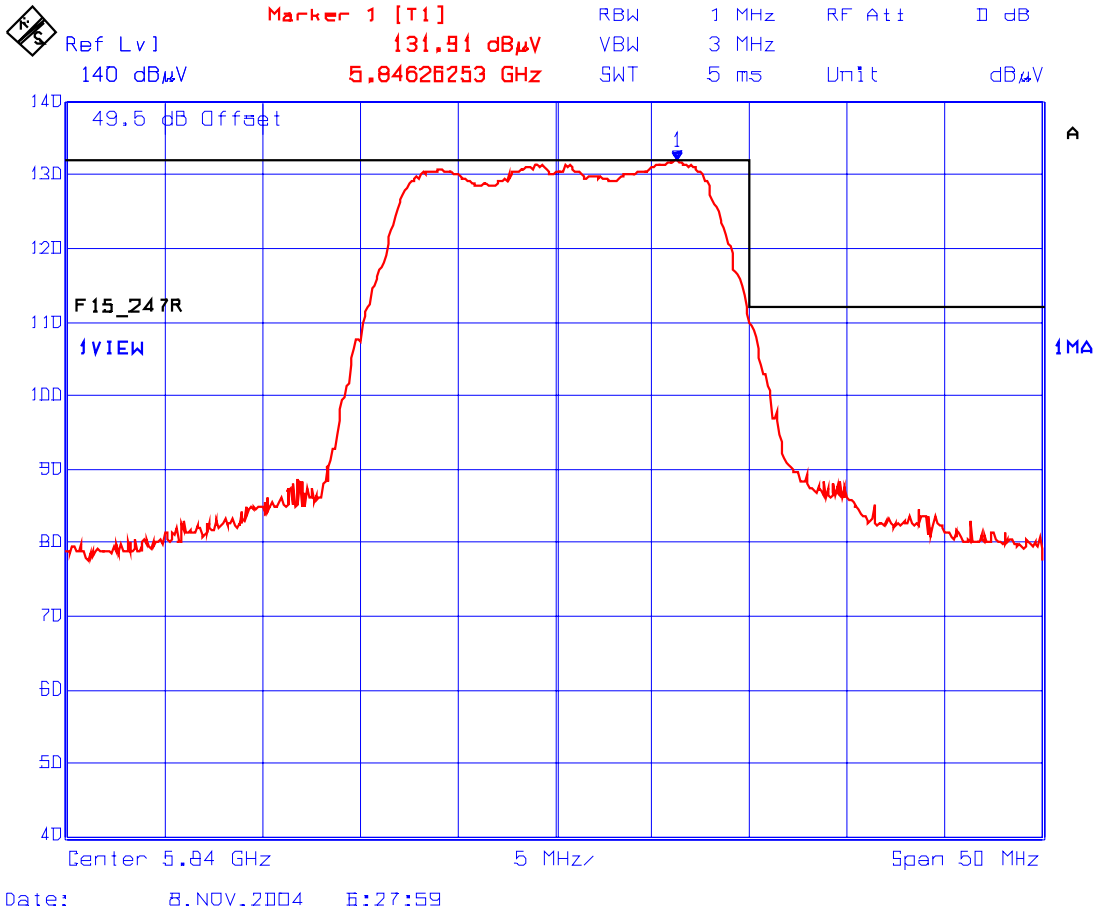
Plot # 63(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 19.27 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



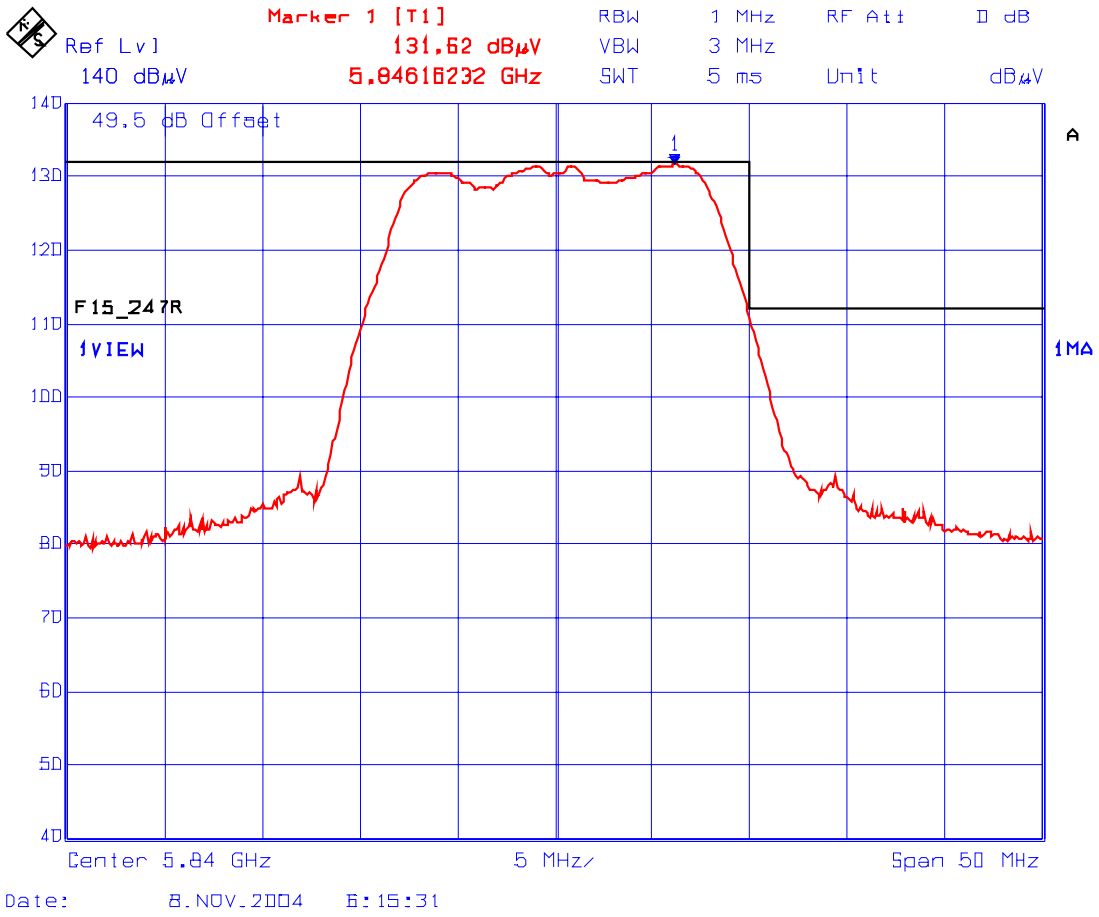
Plot # 64(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 19.24 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



Plot # 64(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

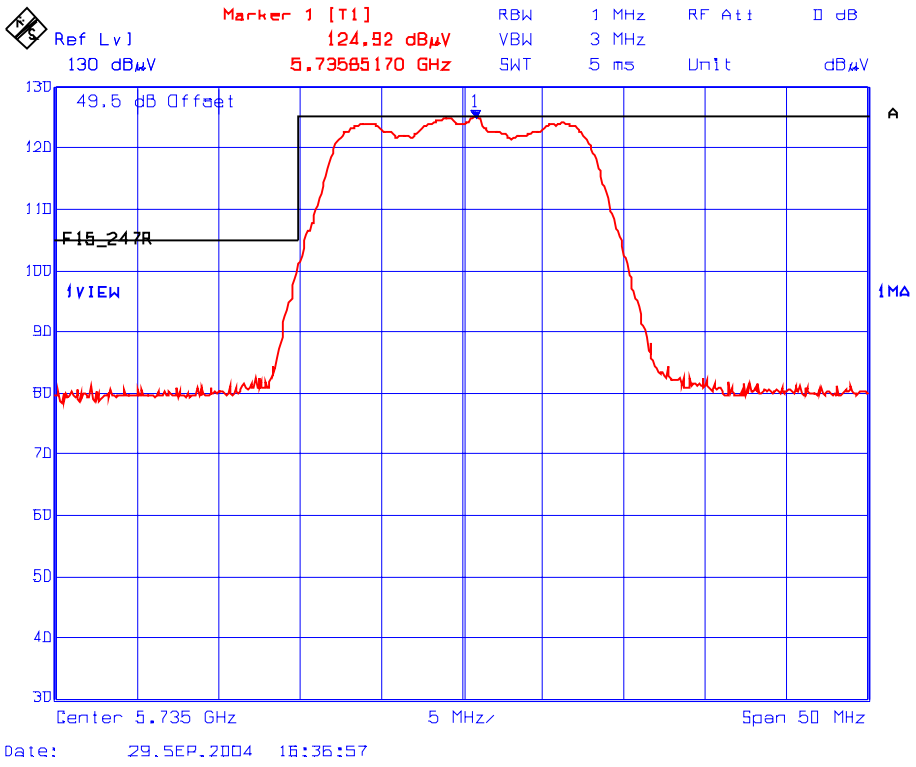
Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 19.24 dBm
Tx Antenna: MTI Wireless Edge Directional Antenna, Model: 484026,, Gain: 15 dBi



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

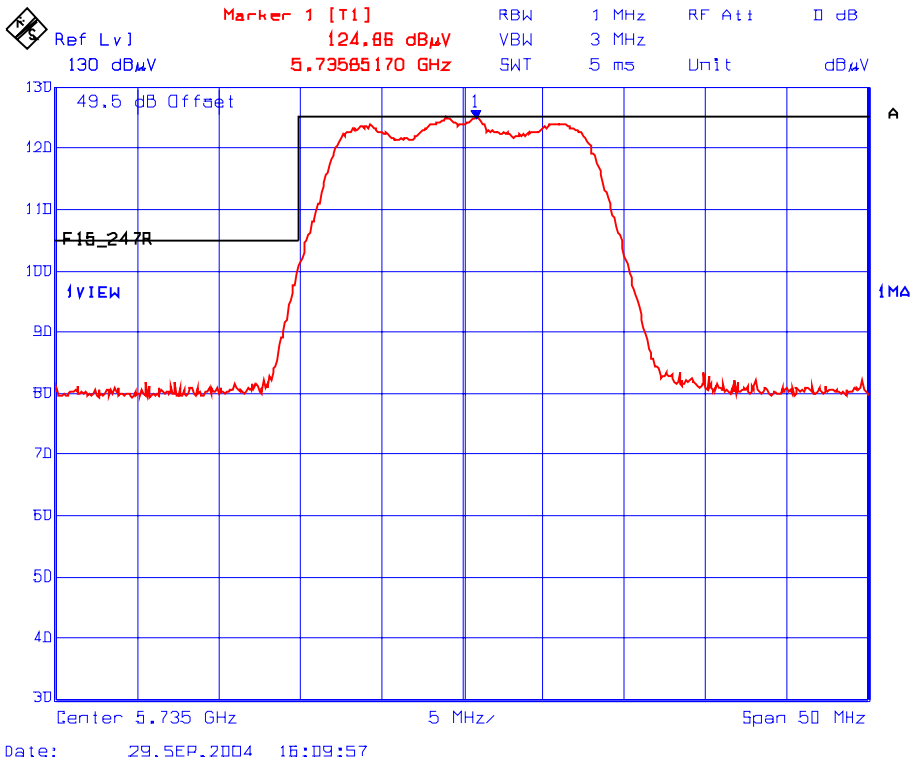
Plot # 65(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 18.65 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



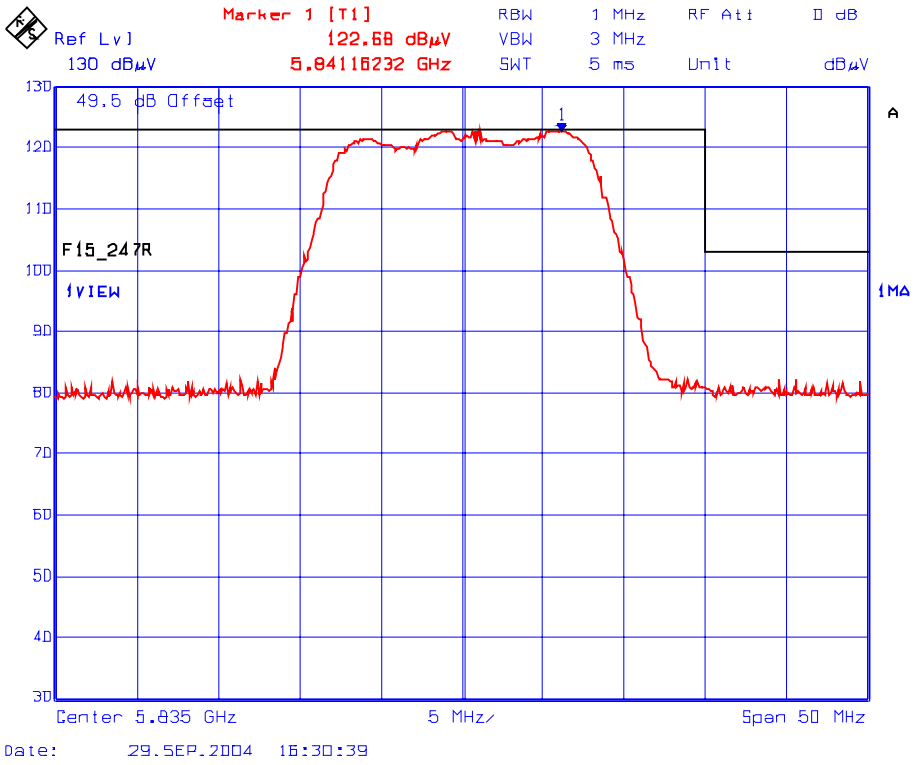
Plot # 65(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 18.65 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



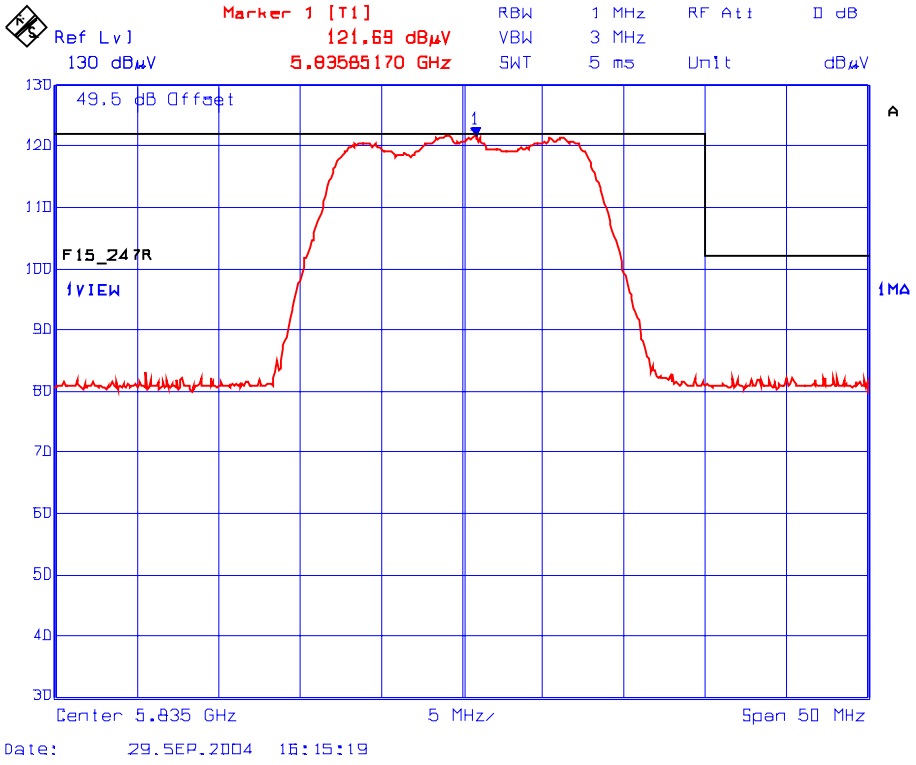
Plot # 66(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 17.50 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



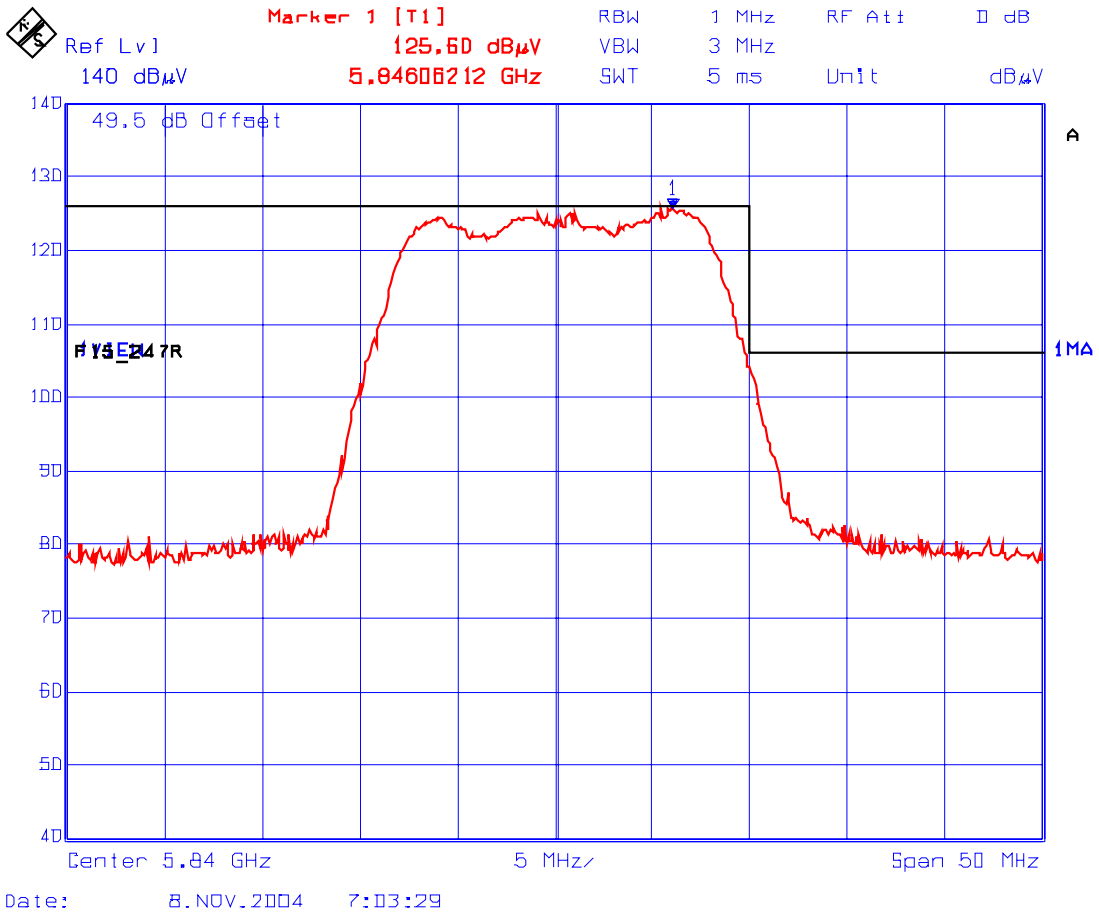
Plot # 66(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 17.50 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



Plot # 67(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

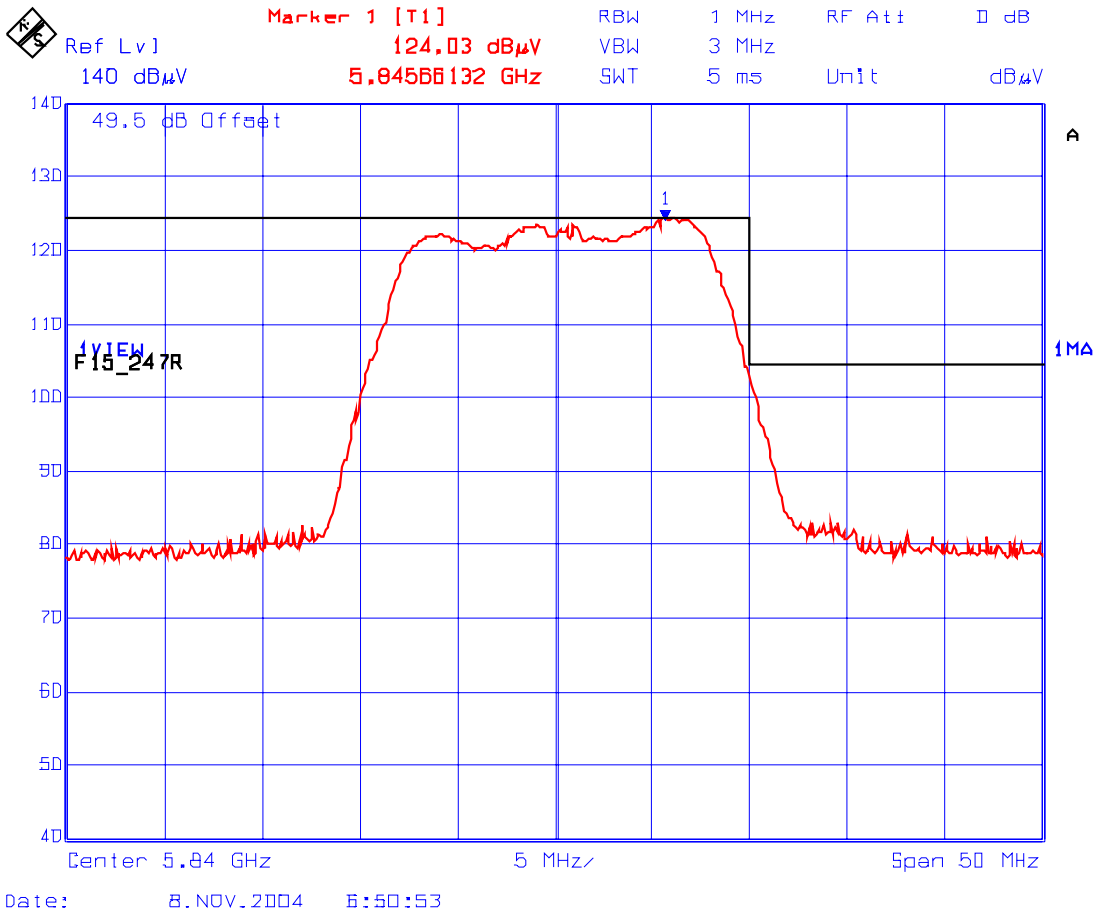
Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 17.7 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



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

Plot # 67(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

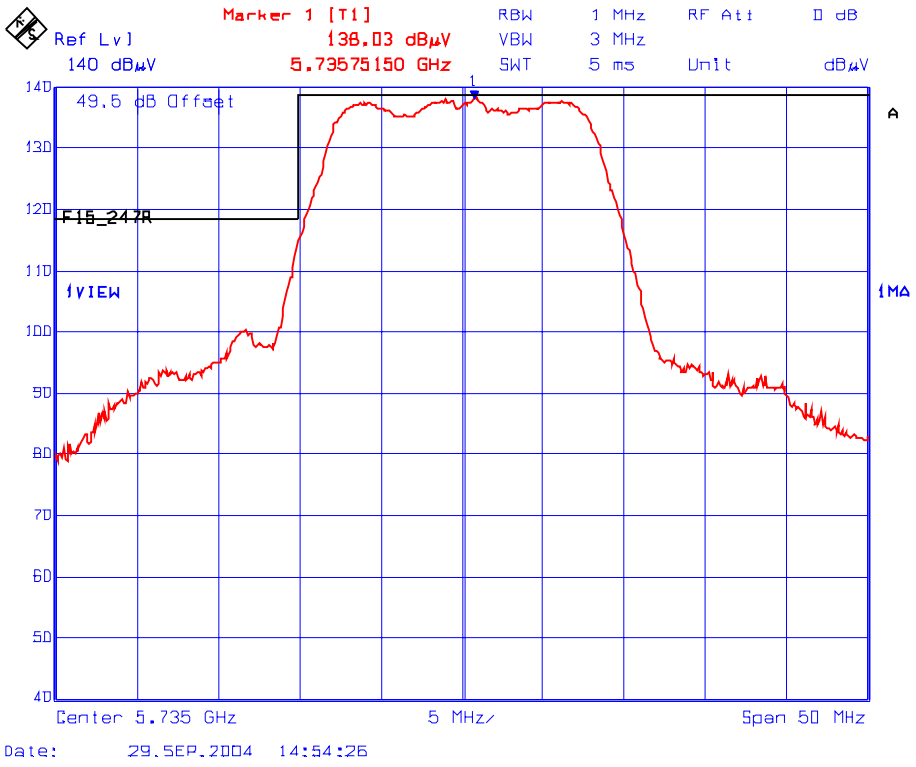
Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 17.7 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SEC-55V-60-17, S/N: 141, Gain: 17 dBi



Plot # 68(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.50 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi

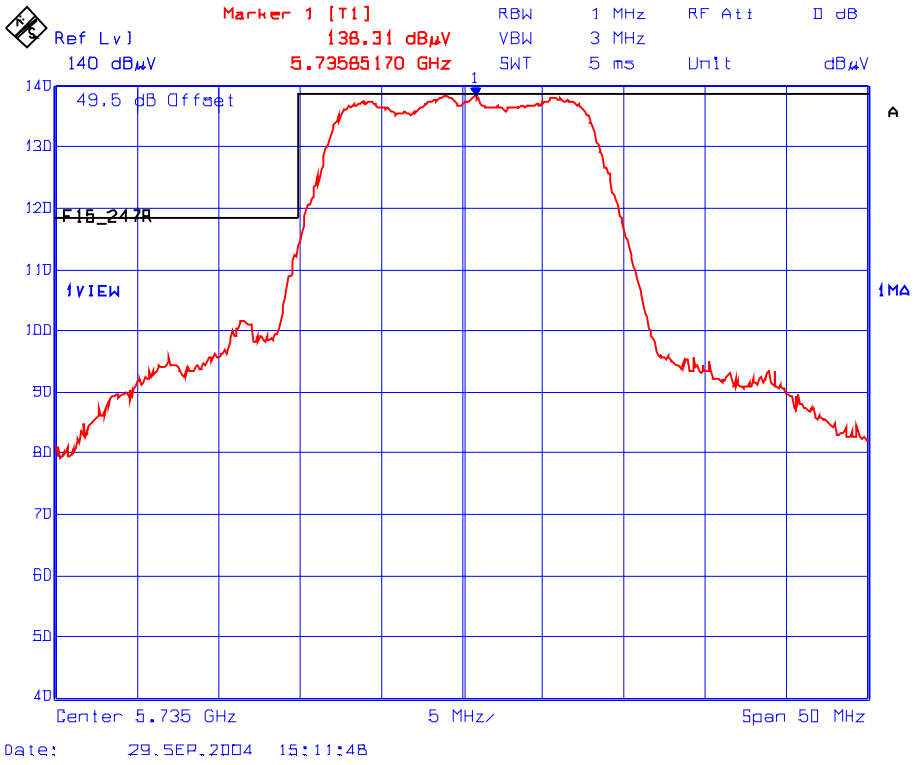
Note: Worst Case for Point to Point application



Plot # 68(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.50 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi

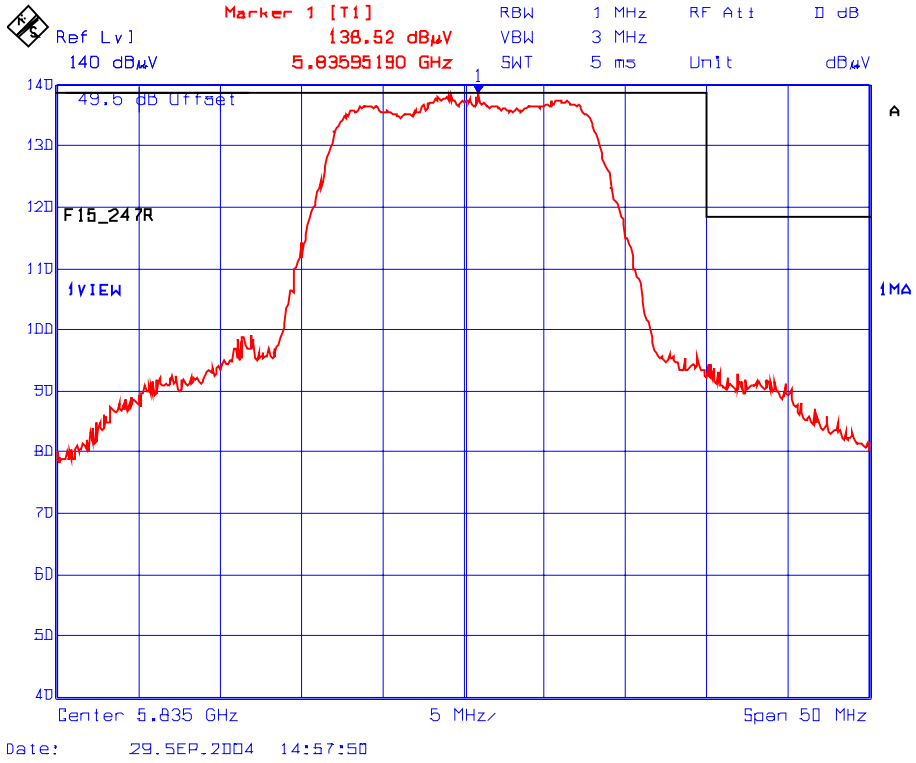
Note: Worst Case for Point to Point application



Plot # 69(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi

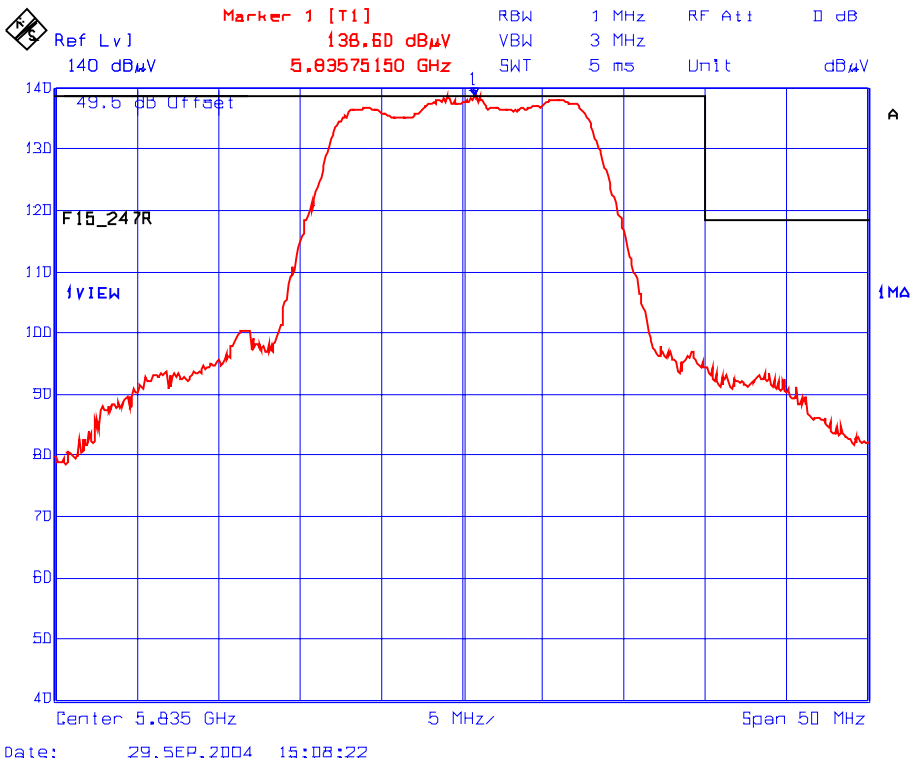
Note: Worst Case for Point to Point application



Plot # 69(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

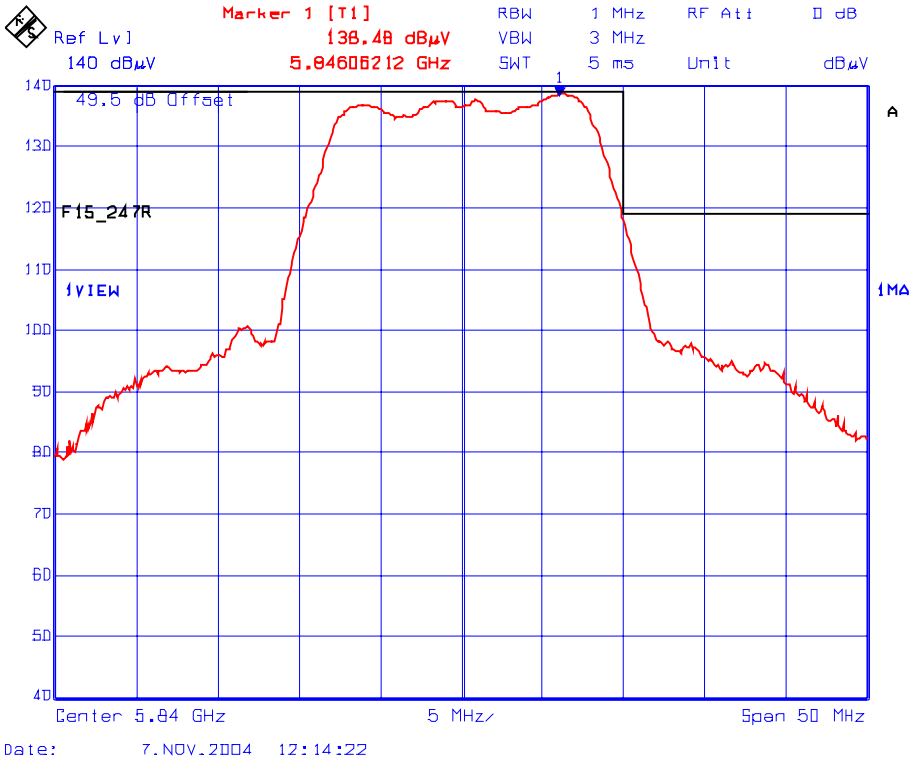
Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi

Note: Worst Case for Point to Point application



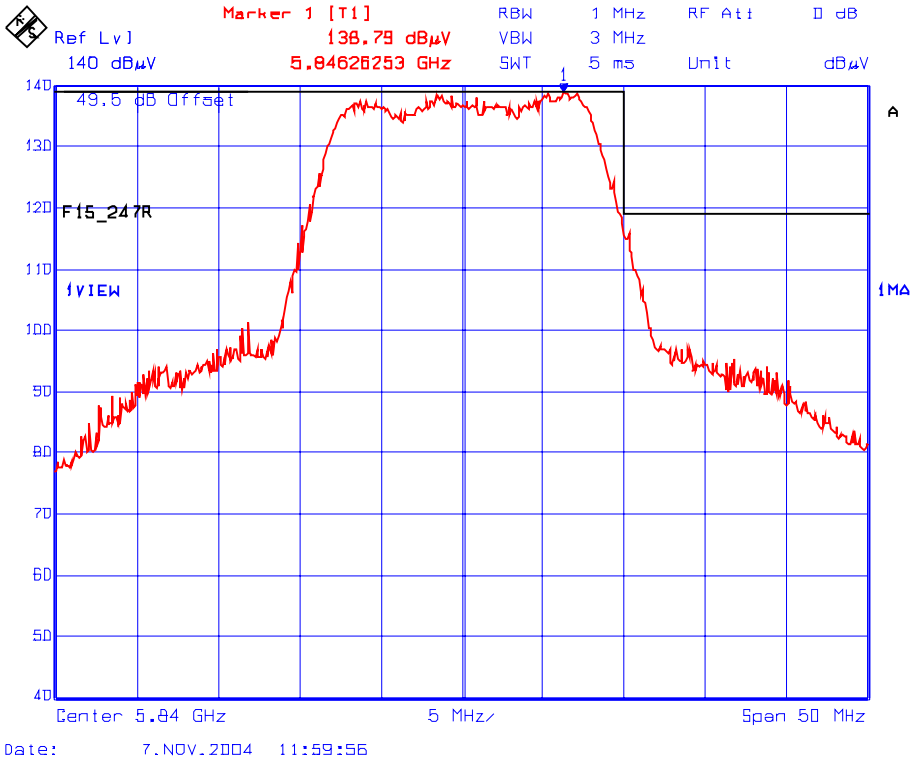
Plot # 70(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi



Plot # 70(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: MTI Directional Antenna, Model: 486001, S/N: 00058, Gain: 28 dBi

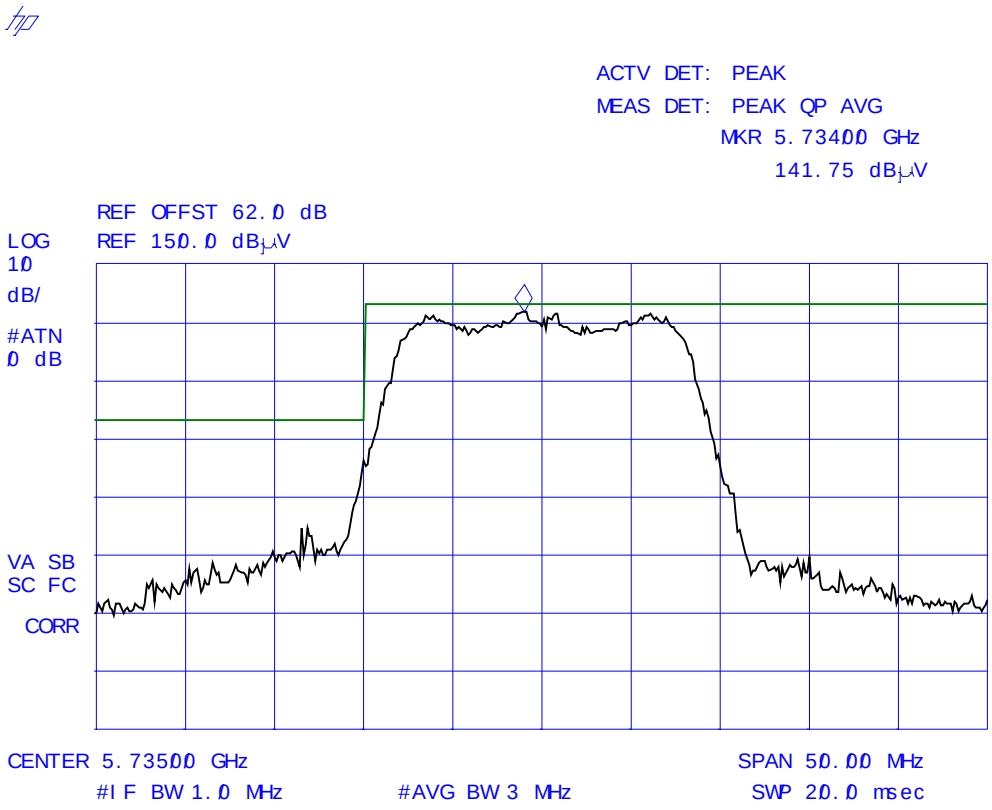


All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot # 71(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.50 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi

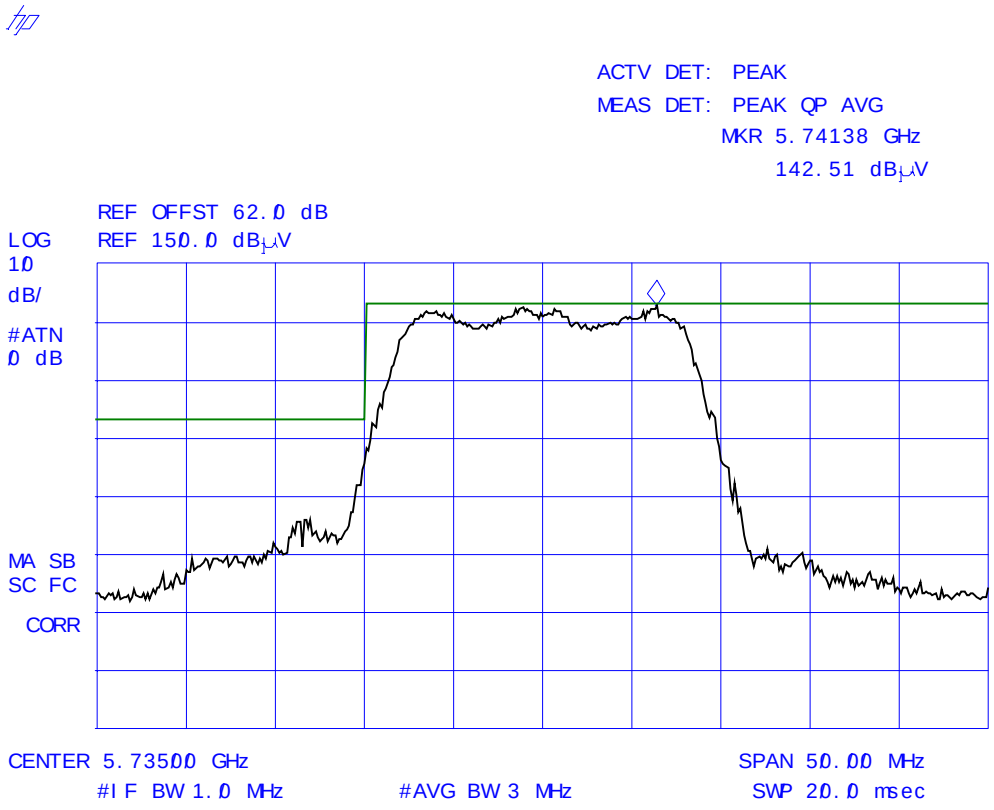
Note: Worst Case for Point to Point application



Plot # 71(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5735 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 25.50 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi

Note: Worst Case for Point to Point application

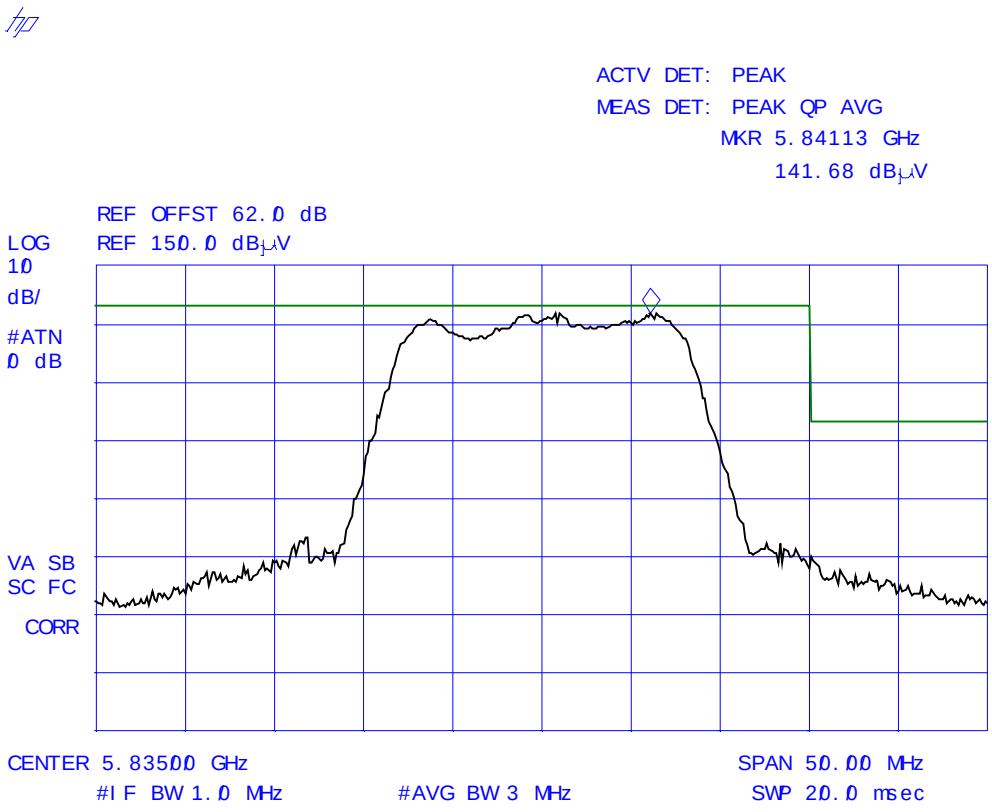


All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot # 72(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi

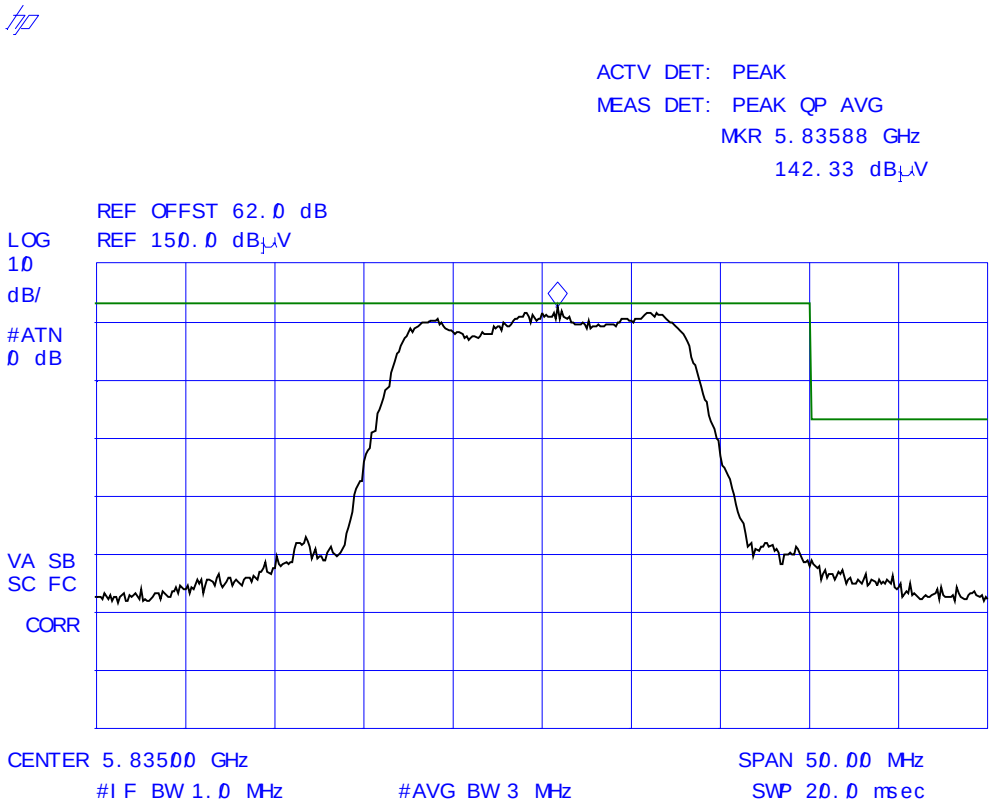
Note: Worst Case for Point to Point application



Plot # 72(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

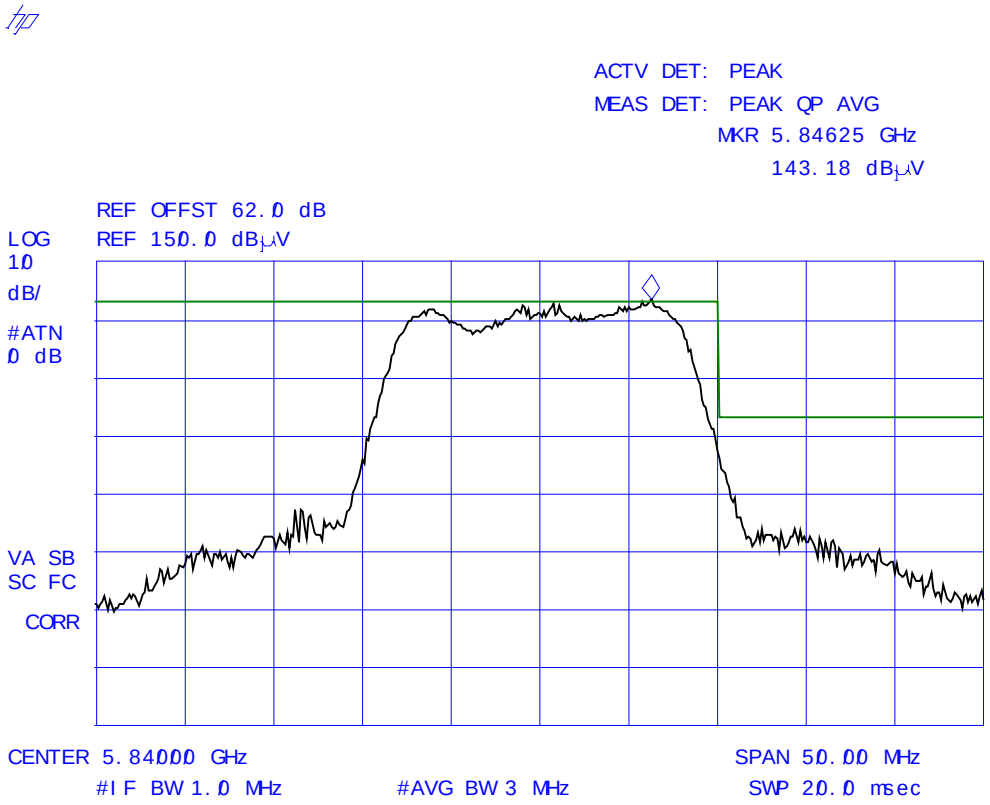
Tx Freq.: 5835 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.17 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi

Note: Worst Case for Point to Point application



Plot # 73(a): Band-edge Radiated Emissions @ 3 Meters, Horizontal Polarization

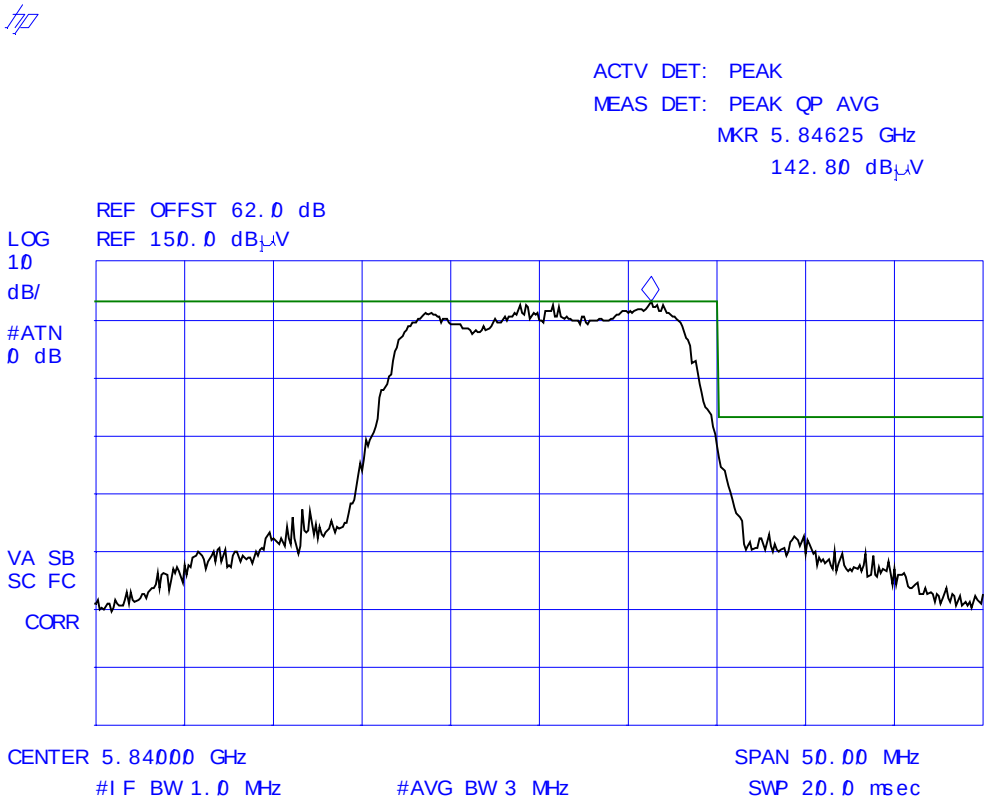
Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi



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

Plot # 73(b): Band-edge Radiated Emissions @ 3 Meters, Vertical Polarization

Tx Freq.: 5840 MHz, Modulation: 64 QAM (54 Mbps), RF Output Power: 26.14 dBm
Tx Antenna: Radiowaves Directional Antenna, Model: SP4-5-2NS, S/N: 5444, Gain: 34.6 dBi



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

5.12.5.2. TRANSMITTER SPURIOUS RADIATED @ 3 METERS

Notes:

- The modulation 64QAM (54 Mb/s) was tested and represent for all other modulations since rf output signals with different modulations are identical.
- Each highest gain antenna of its family was selected to test for the worst case within its family.

5.12.5.3. TRANSMITTER RADIATED EMISSIONS WITH MOBILE MARK OMNI DIRECTIONAL ANTENNA, MODEL NO.: ODN9-5725, GAIN: 9 dBi (MAXIMUM GAIN WITHIN ITS FAMILY)

5.12.5.3.1. Channel Frequency: 5735 MHz, Output power: 25.50 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5735.00	122.94	N/A	V	--	--	--	PASS
5735.00	121.90	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	102.94	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.3.2. Channel Frequency: 5775 MHz, Output power: 25.18 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5775.00	123.05	N/A	V	--	--	--	PASS
5775.00	121.09	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	103.05	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.3.3. Channel Frequency: 5835 MHz, Output Power: 26.17 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5835.00	126.15	N/A	V	--	--	--	PASS
5830.00	122.96	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	106.15	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.4. TRANSMITTER RADIATED EMISSIONS WITH MTI DIRECTIONAL ANTENNA, MODEL NO.: 484026, GAIN: 15 dBi (MAXIMUM GAIN WITHIN ITS FAMILY)

5.12.5.4.1. Channel Frequency: 5735 MHz, Output power: 20.3 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5735.00	131.61	N/A	V	--	--	--	PASS
5735.00	129.61	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	111.61	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

5.12.5.4.2. Channel Frequency: 5775 MHz, Output power: 19.55 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5775.00	131.23	N/A	V	--	--	--	PASS
5775.00	128.57	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	111.23	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

5.12.5.4.3. Channel Frequency: 5835 MHz, Output Power: 19.27 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5835.00	130.69	N/A	V	--	--	--	PASS
5830.00	128.23	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	110.69	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

5.12.5.5. TRANSMITTER SPURIOUS RADIATED EMISSIONS WITH RADIOWAVE ANTENNA MODEL SEC-55V-60-17, GAIN: 17 dBi (MAXIMUM GAIN WITHIN ITS FAMILY)

5.12.5.5.1. Channel Frequency: 5735 MHz, Output power: 18.65 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5735.00	124.86	N/A	V	--	--	--	PASS
5735.00	124.92	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	104.92	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.5.2. Channel Frequency: 5775 MHz, Output power: 17.92 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5775.00	121.51	N/A	V	--	--	--	PASS
5775.00	122.21	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	102.21	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.5.3. Channel Frequency: 5835 MHz, Output Power: 17.51 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5835.00	121.69	N/A	V	--	--	--	PASS
5830.00	122.68	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	102.68	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.6. TRANSMITTER SPURIOUS RADIATED EMISSIONS WITH MTI ANTENNA, MODEL NO: 486001, GAIN: 28 dBi (MAXIMUM GAIN WITHIN ITS FAMILY)

5.12.5.6.1. Channel Frequency: 5735 MHz, Output power: 25.50 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5735.00	138.31	N/A	V	--	--	--	PASS
5735.00	138.03	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	118.31	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.6.2. Channel Frequency: 5775 MHz, Output power: 25.18 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5775.00	138.25	N/A	V	--	--	--	PASS
5775.00	138.16	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	118.25	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.6.3. Channel Frequency: 5835 MHz, Output Power: 26.17 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5835.00	138.60	N/A	V	--	--	--	PASS
5830.00	138.52	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	118.60	>>	PASS
• The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).							

5.12.5.7. TRANSMITTER RSPURIOUS RADIATED EMISSIONS WITH RADIOWAVE ANTENNA, MODEL NO.: SP4-5.2NS, GAIN: 34.6 dBi (MAXIMUM GAIN WITHIN ITS FAMILY)

5.12.5.7.1. Channel Frequency: 5735 MHz, Output power: 25.50 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5735.00	142.51	N/A	V	--	--	--	PASS
5735.00	141.75	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	122.51	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

5.12.5.7.2. Channel Frequency: 5775 MHz, Output power: 25.18 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5775.00	142.35	N/A	V	--	--	--	PASS
5775.00	141.38	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	122.35	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

5.12.5.7.3. Channel Frequency: 5835 MHz, Output Power: 26.17 dBm, Modulation: 64QAM

FREQUENCY (MHz)	RF PEAK LEVEL @ 3m (dBuV/m)	RF AVG LEVEL @3m (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
5835.00	142.33	N/A	V	--	--	--	PASS
5830.00	141.68	N/A	H	--	--	--	PASS
10 MHz to 40 GHz	<<	<<	V & H	Refer to 15.209	122.33	>>	PASS

- The emissions were scanned from 10 MHz to 40 GHz and no significant spurious emissions were found (all emissions were at least 20 dB below the FCC 15.209 Limits).

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. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 450 kHz to 30 MHz Band:

$$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30 \text{ dB}$$

$$U = 2u_c(y) = \pm 2.6 \text{ dB}$$

6.2. 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 Directivity	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