UltraTech
Group of Labs

Ultratech's Accreditations:

ANSI American National Standards Institute
0685

FC
31040/SIT

VCI
C-1376

Canada
46390-2049

NVLAP
200093-0

BSMI
SL2-IN-E-1119R

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

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

Oct. 10, 2006

TIMCO ENGINEERING INC.
P.O. Box 370
849 N.W. State Road 45
Newberry, Florida
USA 32669

Subject: **FCC Certification Authorization Application under FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 5725 - 5850 MHz.**

Product: **Broadband Wireless System (10, 20 & 40 Mhz Channel Bandwidths)**
Model No.: **AN-80i**
FCC ID: **QC8-AN80I**

Dear Sir/Madam

As appointed agent for **Redline Communications Inc.**, we would like to submit this application for FCC Certification of the above product. Please review all required documents uploaded to TIMCO Upload Web Site.

Limit of the Certification:

- The Model AN-80i is only used for Point to Point application
- The Model AN-80i and it's antenna are required to be professionally installed

If you have any queries, please do not hesitate to contact us.

Yours truly,

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

Encl

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Email: vic@ultratech-labs.com

Oct. 10, 2006

Redline Communications Inc.
302 Town Centre Blvd.
Markham, Ontario
Canada, L3R 0E8

Attn.: **Mr. Medhat Fawzy, P.Eng.**

Subject: **FCC Certification Application Testing under FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 5725 - 5850 MHz.**

Product: **Broadband Wireless System (10, 20 & 40 Mhz Channel Bandwidths)**
Model No.: **AN-80i**
FCC ID: **QC8-AN80I**

Dear Mr. Fawzy,

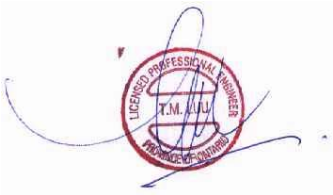
The product sample, as provided by you, has been tested and found to comply with **FCC Part 15, Subpart C, Sec. 15.247 - Digital Modulation Transmitters operating in the frequency band 5725 - 5850 MHz.**

Limit of the Certification:

- The Model AN-80i is only used for Point to Point application
- The Model AN-80i and it's antenna are required to be professionally installed

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

Yours truly,



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

Encl.

ENGINEERING TEST REPORT

Broadband Wireless System

(10, 20 & 40 MHz Channel Bandwidths)

Model No.: AN-80i

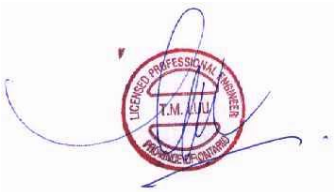
FCC ID: QC8-AN80I

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
Digital Modulation Transmitters operating in the frequency band 5725 - 5850 MHz

UltraTech's File No.: RCI168FCC15C

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Oct. 10, 2006	
Report Prepared by: Mr. Tri Luu, P.Eng. Issued Date: Oct. 10, 2006	Tested by: Mr. Hung Trinh, RFI Technologist Test Dates: Apr. 10 to 18 and Oct. 06-09, 2006

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

UltraTech

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

ANSI	FC	VCI	Canada	NVLAP	BSMI
0685	31040/SIT	C-1376	46390-2049	200093-0	SL2-IN-E-1119R

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Certification Authorization for Digital Modulation Transmitters operating in the Frequency Band 5725 - 5850 MHz .
Test Procedures	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	• Light-industry, Commercial • Industry
Limit of Operation:	• The Model AN-80i is only used for Point to Point application • The Model AN-80i and it's antenna are required to be professionally installed

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

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	2005	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 +A1 EN 55022	2003-04-10 2004-10-14 2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement
FCC Test Procedures	Mar. 23, 2005	Measurement of Digital Transmission Systems. Operating under Section 15.247
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval

EXHIBIT 1. PERFORMANCE ASSESSMENT

1.1. CLIENT INFORMATION

APPLICANT:	
Name:	Redline Communications Inc.
Address:	302 Town Centre Blvd. Markham, Ontario Canada, L3R 0E8
Contact Person:	Mr. Medhat Fawzy, P.Eng. Phone #: 905-479-8344 (ext. 443) Fax #: 905-479-5331 Email Address: mfawzy@redlinecommunications.com

MANUFACTURER:	
Name:	Redline Communications Inc.
Address:	302 Town Centre Blvd. Markham, Ontario Canada, L3R 0E8
Contact Person:	Mr. Sherwyn Welshman Phone #: 905-479-8344 (ext. 362) Fax #: 905-479-5331 Email Address: swelshman@redlinecommunications.com

1.2. 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	Broadband Wireless System
Model Name or Number	AN-80i
Serial Number	N/A
Type of Equipment	Digital Modulation Transmitters
Input Power Supply Type	48 Vdc from an external power PoE (power over the Ethernet Port), made by Cincon Electronics, Model TR60A-POE-L (SN: 002204), AC IN: 100-240 V, 50/60 Hz
Primary User Functions of EUT:	Provide data communication link through air

1.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Base station (fixed use)
Intended Operating Environment:	▪ Commercial, light industry & heavy industry
Power Supply Requirement:	48 Vdc from an external power PoE (power over the Ethernet Port), made by Cincon Electronics, Model TR60A-POE-L (SN: 002204), AC IN: 100-240 V, 50/60 Hz
Maximum RF Output Power Rating (Conducted): • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	• 26.1 dBm or 407 mWatts @ 5730 – 5845 MHz • 23.3 dBm or 214 mWatts @ 5735 – 5840 MHz • 21.2 dBm or 132 mwatts @ 5745 – 5830 MHz
Operating Frequency Range: • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	• 5730 – 5845 MHz • 5735 – 5840 MHz • 5745 – 5830 MHz
RF Output Impedance:	50 Ohms
Duty Cycle:	100% maximum
6 dB Bandwidth: • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	• 8.3 MHz • 16.5 MHz • 32.9 MHz
Modulation Type: • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	• BPSK @ 4.5Mb/s, QPSK @9 Mb/s 16QAM @18 Mb/s and 64QAM @27 Mb/s • BPSK @ 9Mb/s, QPSK @18 Mb/s 16QAM @36 Mb/s and 64QAM @54 Mb/s • BPSK @ 18Mb/s, QPSK @36 Mb/s 16QAM @72 Mb/s and 64QAM @108 Mb/s
Emission Designation: • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	• 8M3GXW • 16M5GXW • 32M9GXW
Antenna Connector Type:	Female N connector (Professional Installation). Please refer to the User's manual for detailed instruction of antenna installation and RF Exposure Warning.
Temperature Rating:	-40°C to + 60 °C

Transmitter & Receiver Antenna List

	Redline's Part Number	Antenna Description	Maker	Supplier's Antenna Part Number
1	48-00021-02	ANTENNA, AN-80i, 9 DEG, 22dBi, 5.15-5.875 GHz, SS, 1 FT, FP	MTI WIRELESS EDGE LTD	MT-485028/N/A
3	48-00006-00	ANTENNA, 4.5 DEG, 28 dBi, 5.725-5.875 GHz, SS, 2 FT, FP.	MTI WIRELESS EDGE LTD	MT-20004/N-R
4	48-00030-00	ANTENNA, 12 DEG, 22dBi, 5.250-5.850 GHz, SS, 1 FT, PARABOLIC	RADIO WAVES INC	SP1-5.2
5	48-00031-00	ANTENNA, 6.2 DEG, 28dBi, 5.250-5.850 GHz, SS, 2 FT, PARABOLIC	RADIO WAVES INC	SP2-5.2
6	48-00032-00	ANTENNA, 4.2 DEG, 31.2dBi, 5.250-5.850 GHz, SS, 3 FT, PARABOLIC	RADIO WAVES INC	SP3-5.2
7	48-00033-00	ANTENNA, 3.4 DEG, 34.6 dBi, 5.250-5.850 GHz, SS, 4 FT, PARABOLIC	RADIO WAVES INC	SP4-5.2

RECEIVER	
Operating Frequency Range:	5725 - 5850 MHz
RF Input Impedance:	50 Ohms

1.4. LIST OF ACCESSORIES

Index Number	Parts Description	Parts Number/ Model Number	Serial Number
1	Cincon Power Supply	TR60A-POE-L	N/A
2	Ethernet Cable	CAT 5e Outdoor	N/A
3	RF Cable	LMR 240	N/A
4	Antennas	See attached	N/A

1.5. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)	Is cable length restricted to be < 3 meters?
1	RF Port	1	N-Type	RF Shielded Coax	Yes
2	Ethernet Port	1	RJ-45	CAT 5e (Shielded)	No

1.6. ANCILLARY EQUIPMENT

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

Ancillary Equipment # 1	
Description:	Laptop Computer
Brand name:	Dell
Model Name or Number:	PA6
FCC Certification	FCC DoC
Serial Number:	N/A
Connected to EUT's Port:	Ethernet Port • Non-shielded RJ-45 cable from Laptop PC to AC/DC Power Adaptor • Shielded RJ-45 cable from AC/DC Power Adaptor to EUT

1.7. TEST SETUP BLOCK DIAGRAM

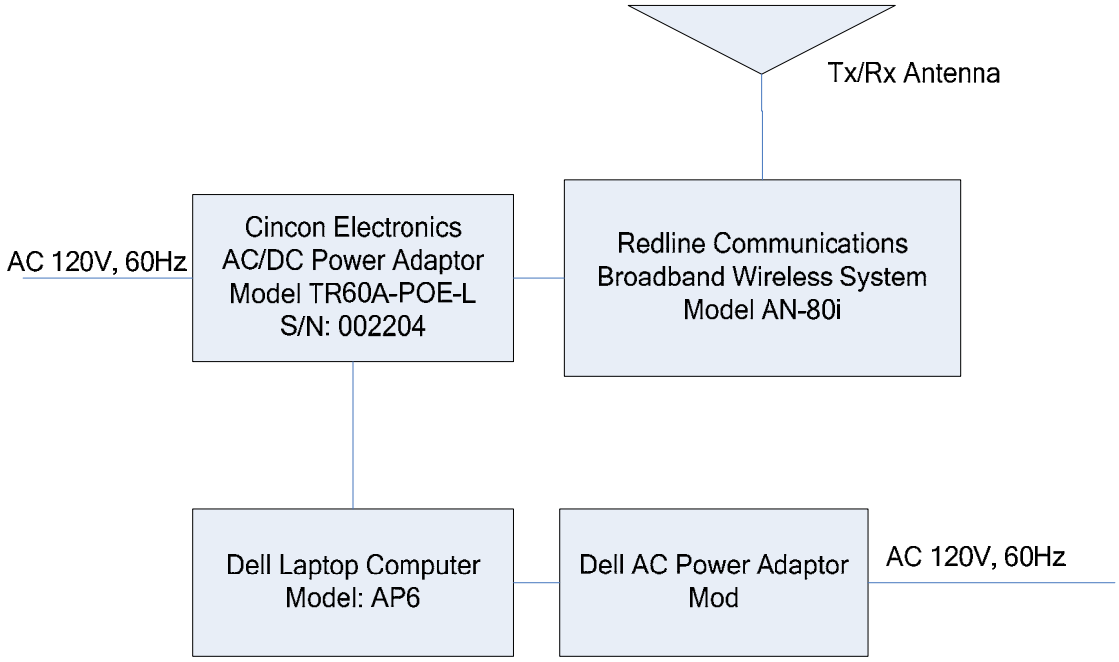


EXHIBIT 2. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

2.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	48 Vdc from an external power PoE (power over the Ethernet Port), made by Cincon Electronics, Model TR60A-POE-L (SN: 002204), AC IN: 100-240 V, 50/60 Hz

2.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	▪ Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements. ▪ The EUT operates in normal Direct Sequence mode for occupancy duration, and frequency separation.
Special Test Software:	▪ Special software is provided by the Applicant to select and operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing.
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT was tested with the highest gain antenna in each family of antennas listed in Sec. 1.3 of this test report.

Transmitter Test Signals:	
Frequencies: ▪ 5725 - 5850 MHz band:	Lowest, middle and highest channel frequencies tested:
Transmitter Wanted Output Test Signals: • RF Power Output (measured maximum output power): • Normal Test Modulation • Modulating signal source:	 • 26.1 dBm or 407 mWatts @ 5730-5845 MHz (Channel BW: 10 MHz), 23.3 dBm or 214 mWatts @ 5735 – 5840 MHz (Channel BW: 20 MHz) and 21.2 dBm or 132 mwatts @ 5745 – 5830 MHz (Channel BW: 40 MHz) • BPSK, QPSK 16QAM and 64QAM • Internal

EXHIBIT 3. SUMMARY OF TEST RESULTS

3.1. 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 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site 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 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049-1). Last Date of Site Calibration: June. 20, 2005.

3.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
Public Notice DA 00-1407	Part 15 Unlicensed Modular Transmitter Approval	Yes
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
FCC Part 15, Sub. B, Sec. 15.109	Class B Radiated Emissions	Yes. Note 1

Note 1: A separate engineering test report for compliance with FCC Part 15, Subpart B - Class B Unintentional Radiators will be provided upon request.

3.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

EXHIBIT 4. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

4.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4, "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005", ULTR-P001-2004, ULTR-P002-2004 and ULTR-P003-2004.

4.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

4.3. MEASUREMENT EQUIPMENT USED:

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

4.4. 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 antenna connector is standard "N" type connector. The device and it's antenna are required to be professionally installed.
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 the antenna list below

Transmitter & Receiver Antenna List

	Redline's Part Number	Antenna Description	Maker	Supplier's Antenna Part Number
1	48-00021-02	ANTENNA, AN-80i, 9 DEG, 22dBi, 5.15-5.875 GHz, SS, 1 FT, FP	MTI WIRELESS EDGE LTD	MT-485028/N/A
3	48-00006-00	ANTENNA, 4.5 DEG, 28 dBi, 5.725-5.875 GHz, SS, 2 FT, FP.	MTI WIRELESS EDGE LTD	MT-20004/N-R
4	48-00030-00	ANTENNA, 12 DEG, 22dBi, 5.250-5.850 GHz, SS, 1 FT, PARABOLIC	RADIO WAVES INC	SP1-5.2
5	48-00031-00	ANTENNA, 6.2 DEG, 28dBi, 5.250-5.850 GHz, SS, 2 FT, PARABOLIC	RADIO WAVES INC	SP2-5.2
6	48-00032-00	ANTENNA, 4.2 DEG, 31.2dBi, 5.250-5.850 GHz, SS, 3 FT, PARABOLIC	RADIO WAVES INC	SP3-5.2
7	48-00033-00	ANTENNA, 3.4 DEG, 34.6 dBi, 5.250-5.850 GHz, SS, 4 FT, PARABOLIC	RADIO WAVES INC	SP4-5.2

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

4.5.1. 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

4.5.2. Method of Measurements

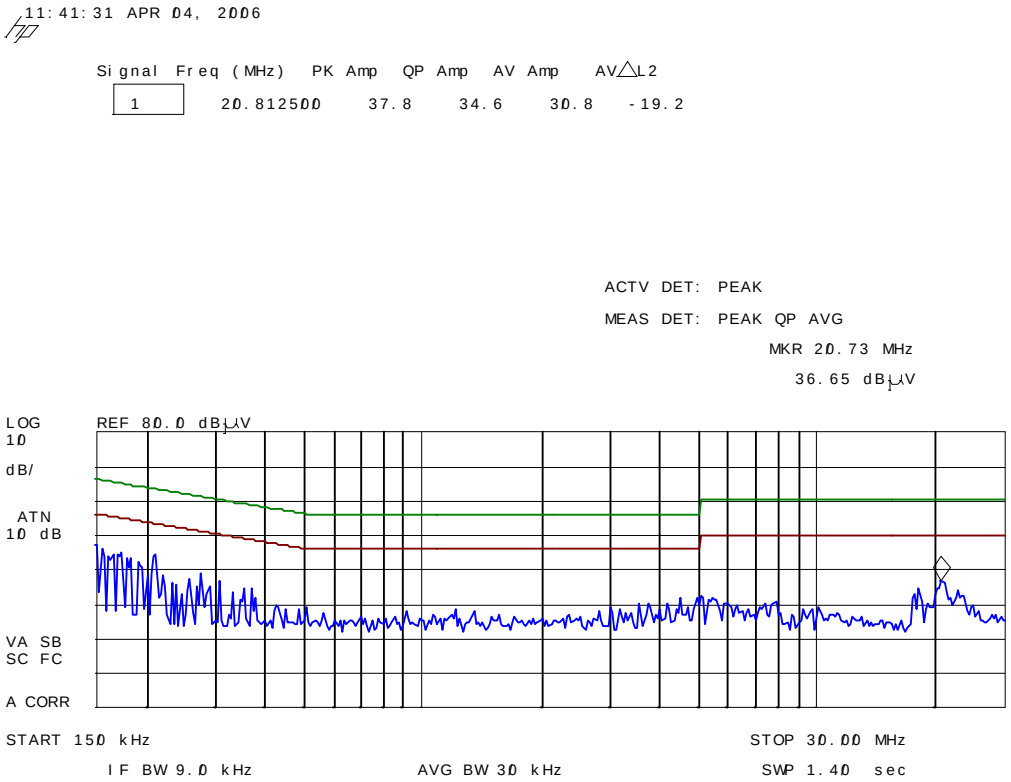
Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

4.5.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver System/Spectrum Analyzer with built-in Amplifier	Hewlett Packard	HP 8546A	3520A00248	9KHz-5.6GHz, 50 Ohms
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	…	..	…

4.5.4. Test Data

Plot # 1: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT				
Detector:[X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23°C	Humidity :20%	File #:RCI-155Q
Line Tested: 1	Line Voltage: 120V AC	Test Tech: Sumeet	Test Date:4th April,2006	
Standard: FCC 15 Class B	Comments: Tested at AC Mains of Cincon External Power Supply, Model no: TR60A-POE-L, S/N: 000639			



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

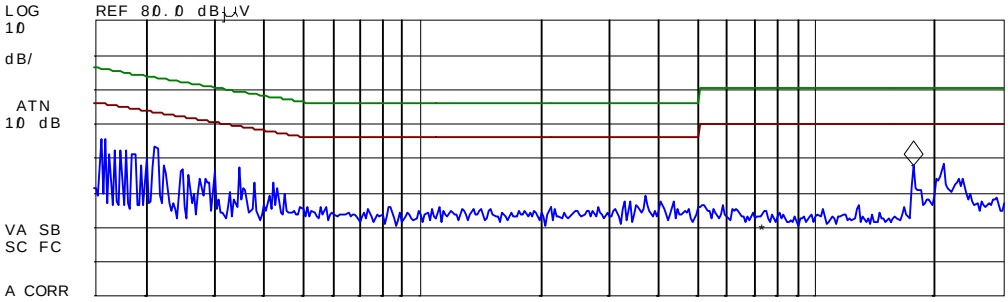
Plot # 2: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT

Detector:[**X**] PEAK [**X**] QUASI-PEAK [**X**] AVERAGE		Temp: 23°C	Humidity :20%	File #:RCI-155Q
Line Tested: 2	Line Voltage: 120V AC	Test Tech: Sumeet	Test Date:4th April,2006	
Standard: FCC 15 Class B	Comments: Tested at AC Mains of Cincon External Power Supply, Model no: TR60A-POE-L, S/N: 000639			

11:48:55 APR 04, 2006

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	17.700000	31.9	28.6	25.0	-25.0

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 17.71 MHz
37.65 dBµV



START 150 kHz
STOP 30.00 MHz
IF BW 9.0 kHz
AVG BW 30 kHz
SWP 1.40 sec

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

4.6. 6 DB BANDWIDTH @ FCC 15.247(A)(2)

4.6.1. Limits

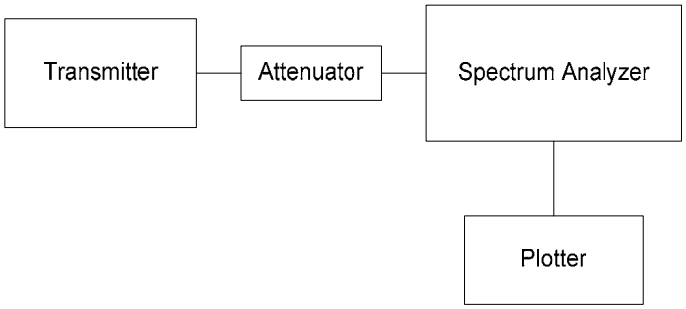
For a Digital Modulation System, the minimum 6 dB bandwidth shall be at least 500 KHz.

4.6.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005"

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

4.6.3. Test Arrangement



4.6.4. 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

4.6.5. Test Data

4.6.5.1. Test Configuration #1: Channel Spacing 10 MHz

CHANNEL FREQUENCY (MHz)	Modulation *	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
5730.0	BPSK @ 4.5 Mb/s	8.25	0.5	PASS
5787.5	BPSK @ 4.5 Mb/s	8.25	0.5	PASS
5845.0	BPSK @ 4.5 Mb/s	8.25	0.5	PASS
5730.0	QPSK @ 9 Mb/s	8.30	0.5	PASS
5787.5	QPSK @ 9 Mb/s	8.30	0.5	PASS
5845.0	QPSK @ 9 Mb/s	8.30	0.5	PASS
5730.0	16QAM @ 18 Mb/s	8.25	0.5	PASS
5787.5	16QAM @ 18 Mb/s	8.34	0.5	PASS
5845.0	16QAM @ 18 Mb/s	8.32	0.5	PASS
5730.0	64QAM @ 27 Mb/s	8.27	0.5	PASS
5787.5	64QAM @ 27 Mb/s	8.30	0.5	PASS
5845.0	64QAM @ 27 Mb/s	8.30	0.5	PASS

Refer to Plots # 3 to # 14 for details of measurements.

4.6.5.2. Test Configuration #2: Channel Spacing 20 MHz

CHANNEL FREQUENCY (MHz)	Modulation *	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
5735.0	BPSK @ 9 Mb/s	16.4	0.5	PASS
5787.5	BPSK @ 9 Mb/s	16.4	0.5	PASS
5840.0	BPSK @ 9 Mb/s	16.5	0.5	PASS
5735.0	QPSK @ 18 Mb/s	16.5	0.5	PASS
5787.5	QPSK @ 18 Mb/s	16.4	0.5	PASS
5840.0	QPSK @ 18 Mb/s	16.3	0.5	PASS
5735.0	16QAM @ 36 Mb/s	16.5	0.5	PASS
5787.5	16QAM @ 36 Mb/s	16.5	0.5	PASS
5840.0	16QAM @ 36 Mb/s	16.5	0.5	PASS
5735.0	64QAM @ 54 Mb/s	16.5	0.5	PASS
5787.5	64QAM @ 54 Mb/s	16.5	0.5	PASS
5840.0	64QAM @ 54 Mb/s	16.5	0.5	PASS

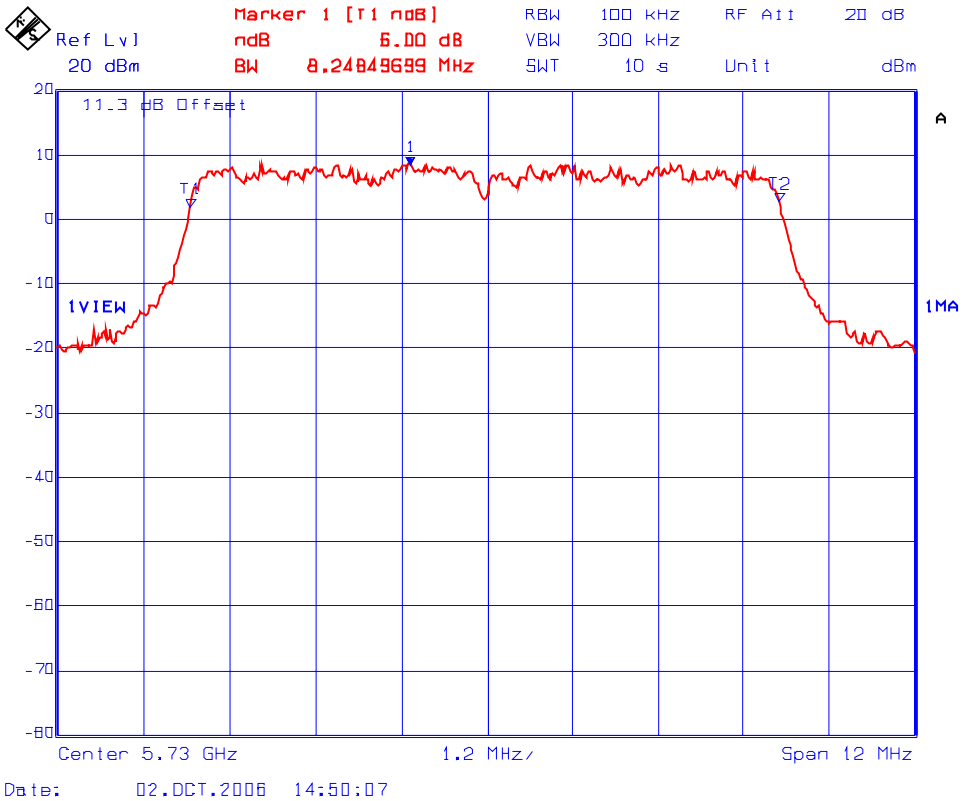
Refer to Plots # 15 to # 26 for details of measurements.

4.6.5.3. Test Configuration #3: Channel Spacing 40 MHz

CHANNEL FREQUENCY (MHz)	Modulation *	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
5745.0	BPSK @ 18 Mb/s	32.7	0.5	PASS
5787.5	BPSK @ 18 Mb/s	32.7	0.5	PASS
5830.0	BPSK @ 18 Mb/s	32.7	0.5	PASS
5745.0	QPSK @ 36 Mb/s	32.8	0.5	PASS
5787.5	QPSK @ 36 Mb/s	32.0	0.5	PASS
5830.0	QPSK @ 36 Mb/s	32.7	0.5	PASS
5745.0	16QAM @ 72 Mb/s	32.8	0.5	PASS
5787.5	16QAM @ 72 Mb/s	32.9	0.5	PASS
5830.0	16QAM @ 72 Mb/s	32.8	0.5	PASS
5745.0	64QAM @ 108 Mb/s	32.8	0.5	PASS
5787.5	64QAM @ 108 Mb/s	32.8	0.5	PASS
5830.0	64QAM @ 108 Mb/s	32.1	0.5	PASS

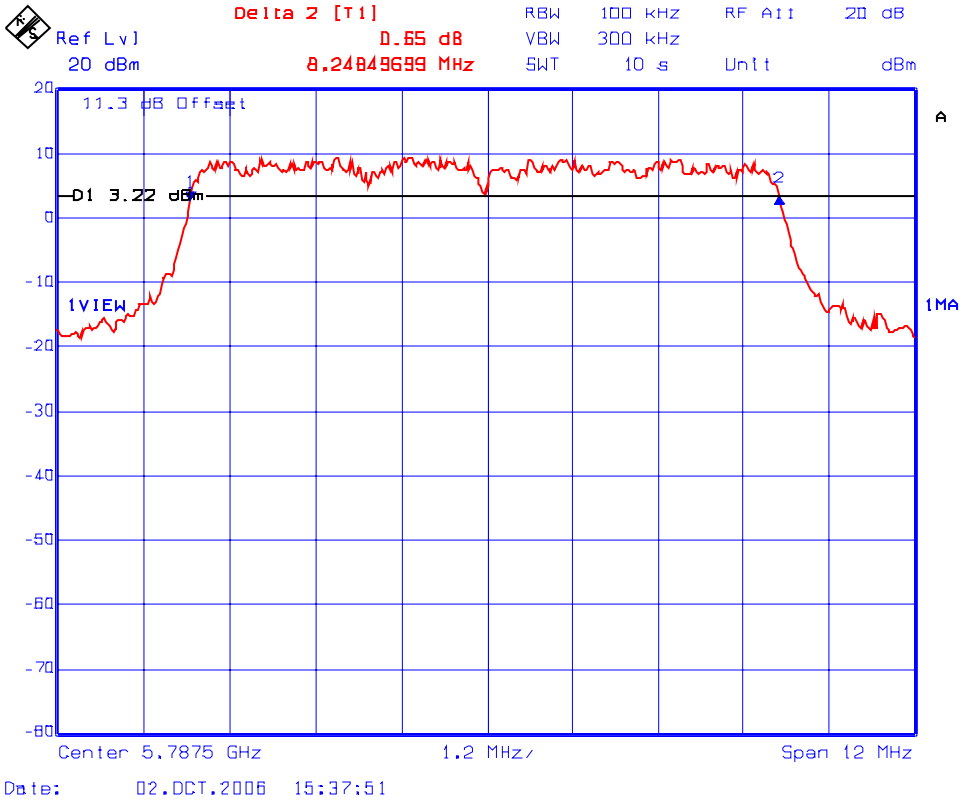
Refer to Plots # 27 to # 38 for details of measurements.

Plot #3: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: BPSK @ 4.5 Mb/s



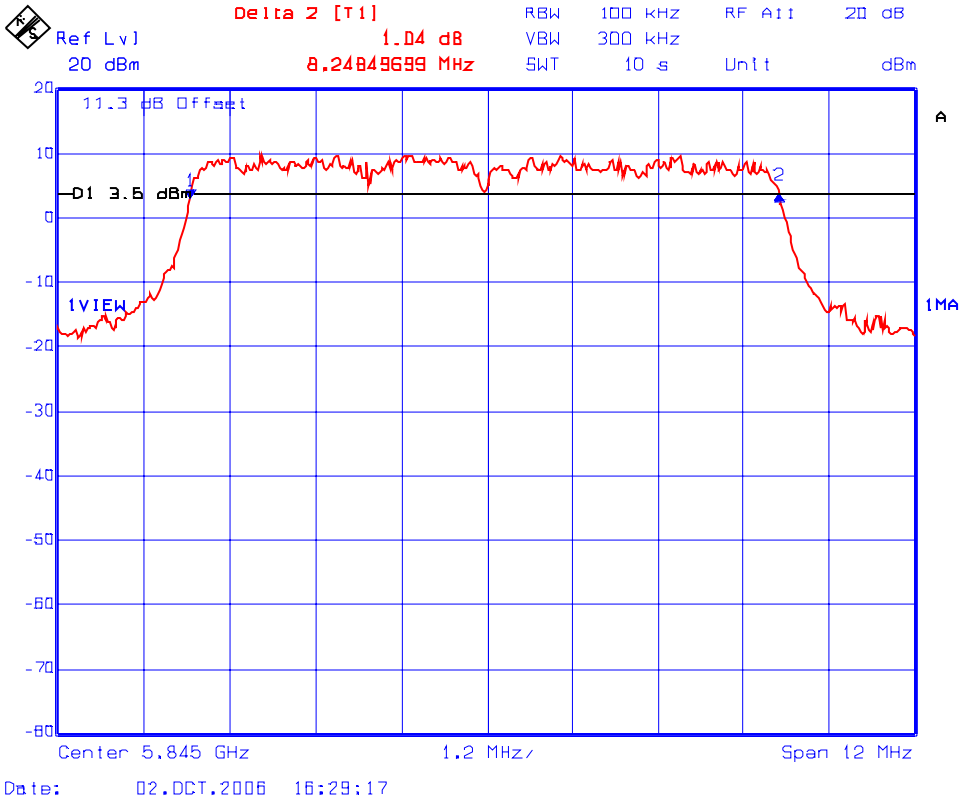
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #4: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: BPSK @ 4.5 Mb/s



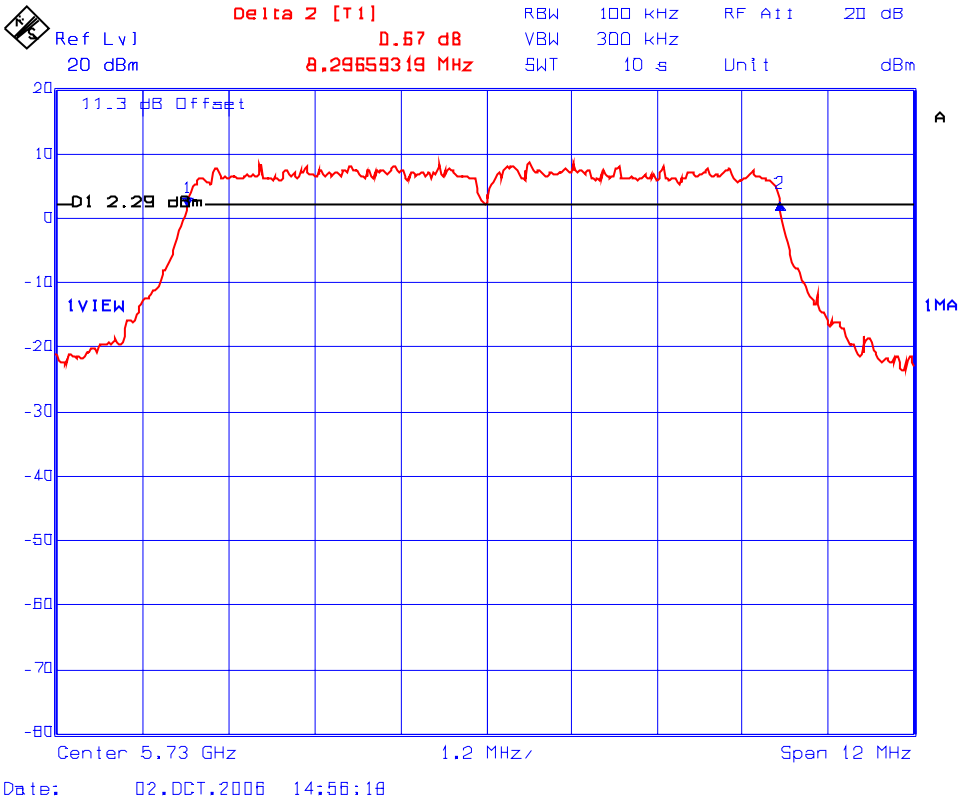
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #5: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: BPSK @ 4.5 Mb/s



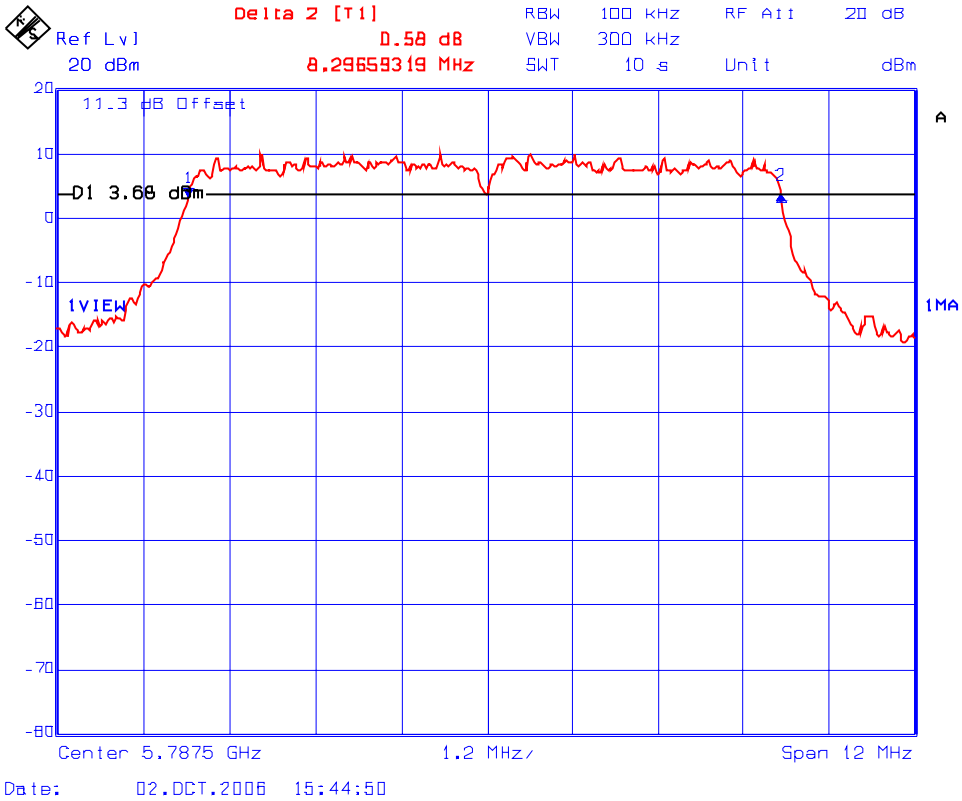
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #6: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: QPSK @ 9 Mb/s



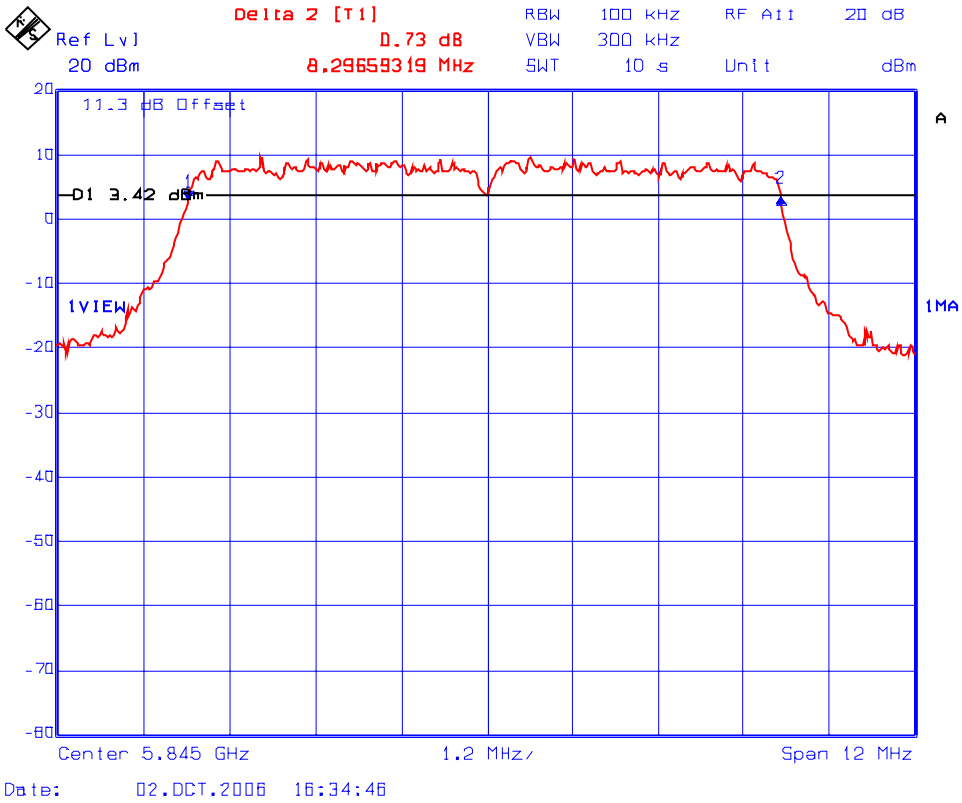
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #7: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: QPSK @ 9 Mb/s



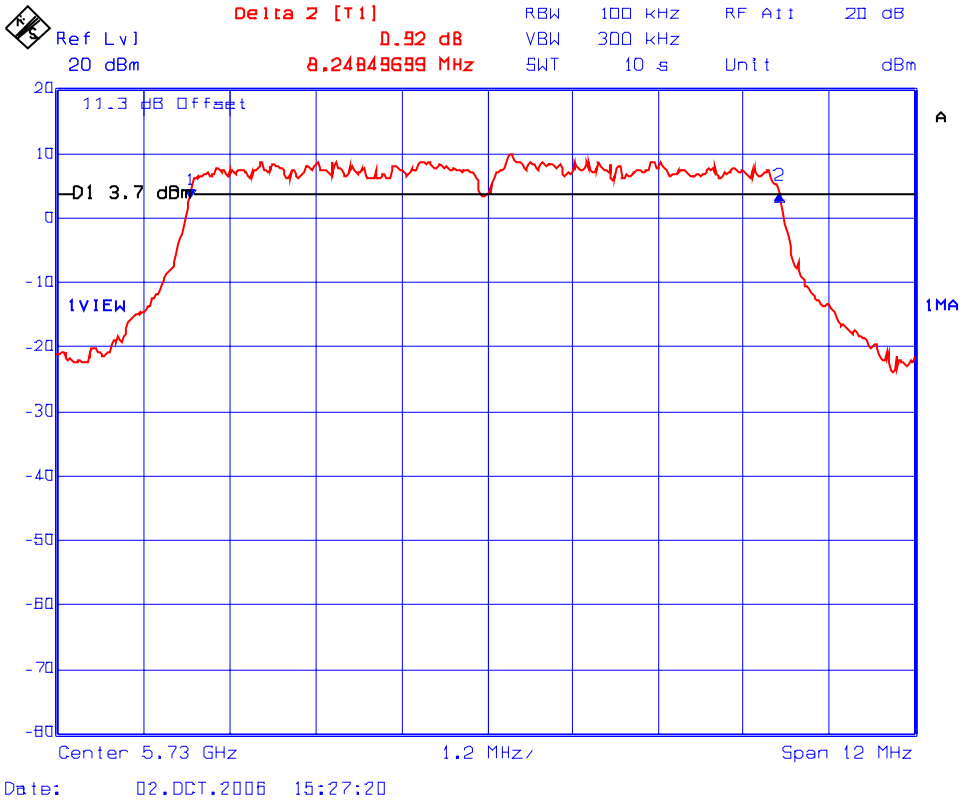
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #8: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: QPSK @ 9 Mb/s



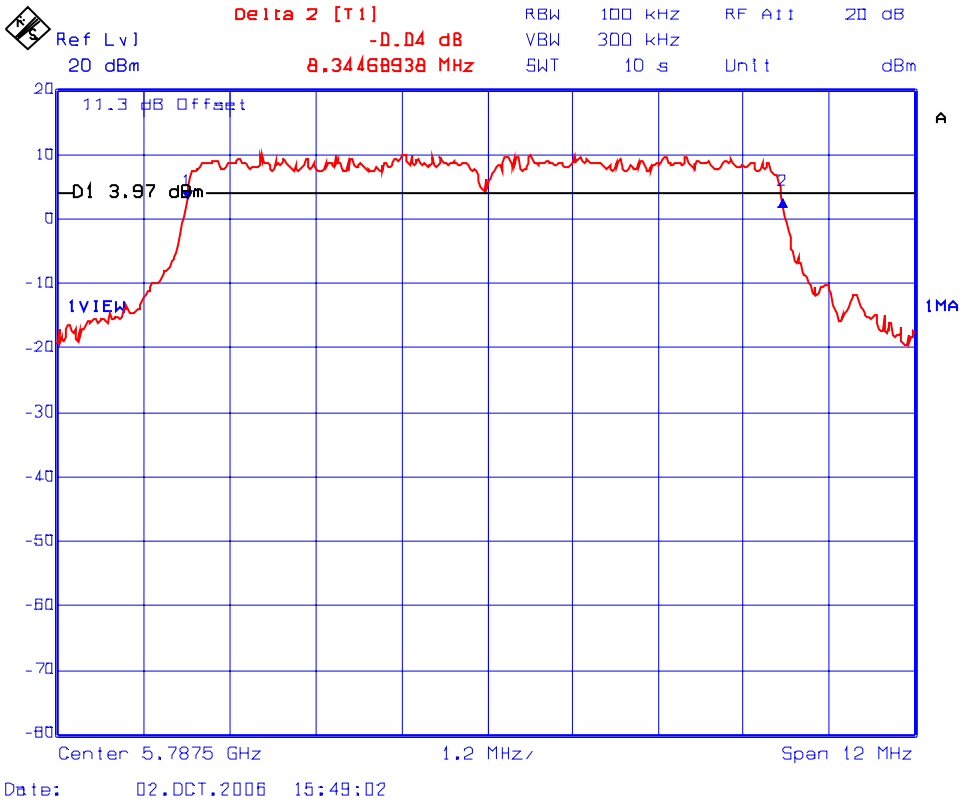
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #9: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: 16QAM @ 18 Mb/s



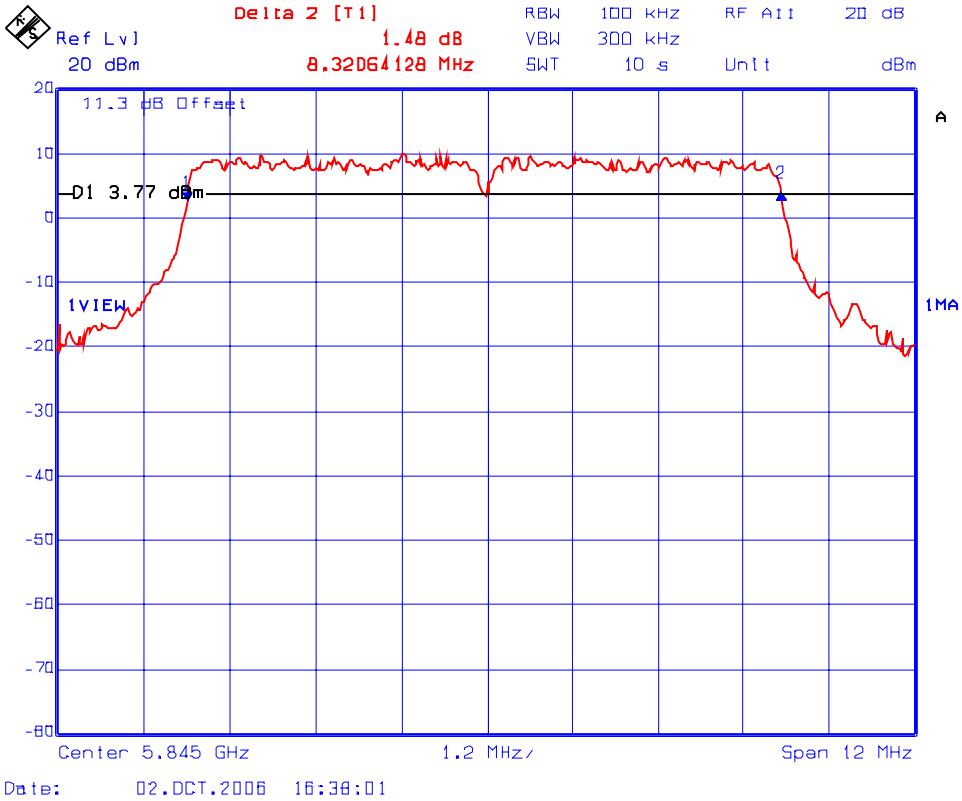
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #10: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 16QAM @ 18 Mb/s



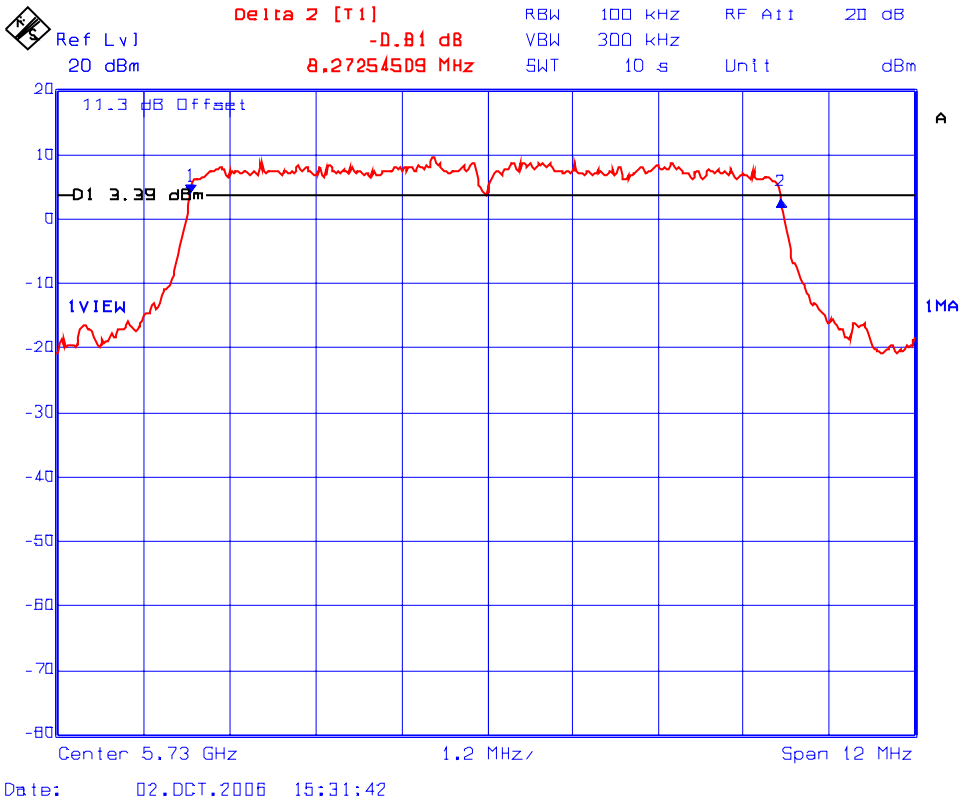
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #11: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: 16QAM @ 18 Mb/s



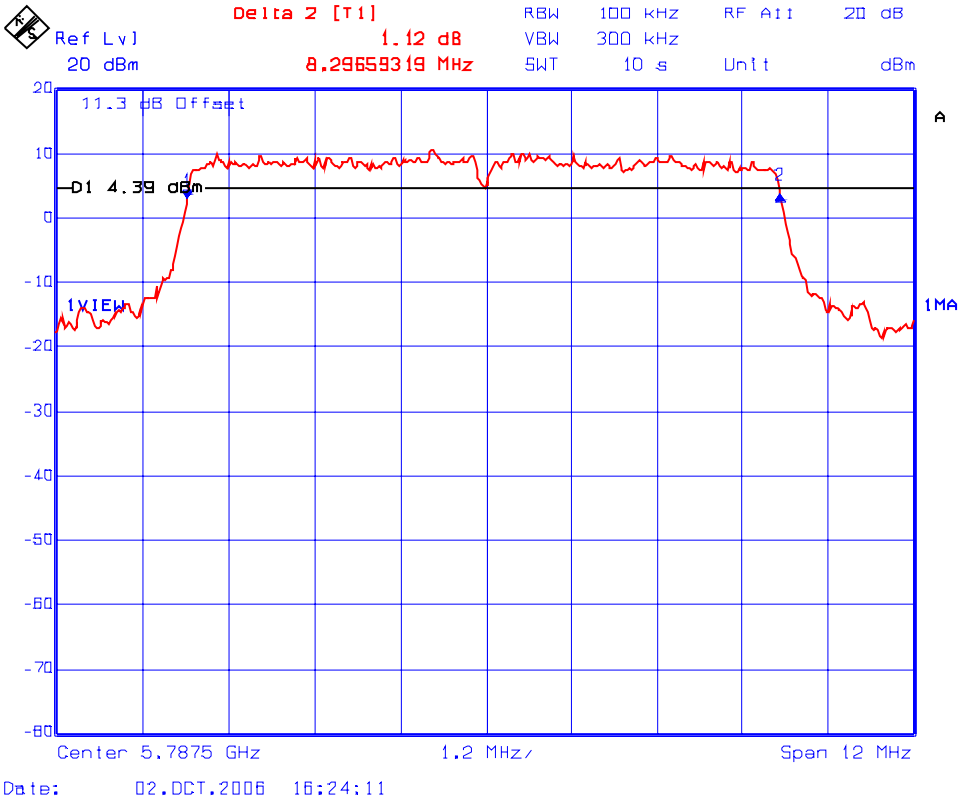
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #12: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: 64QAM @ 27 Mb/s



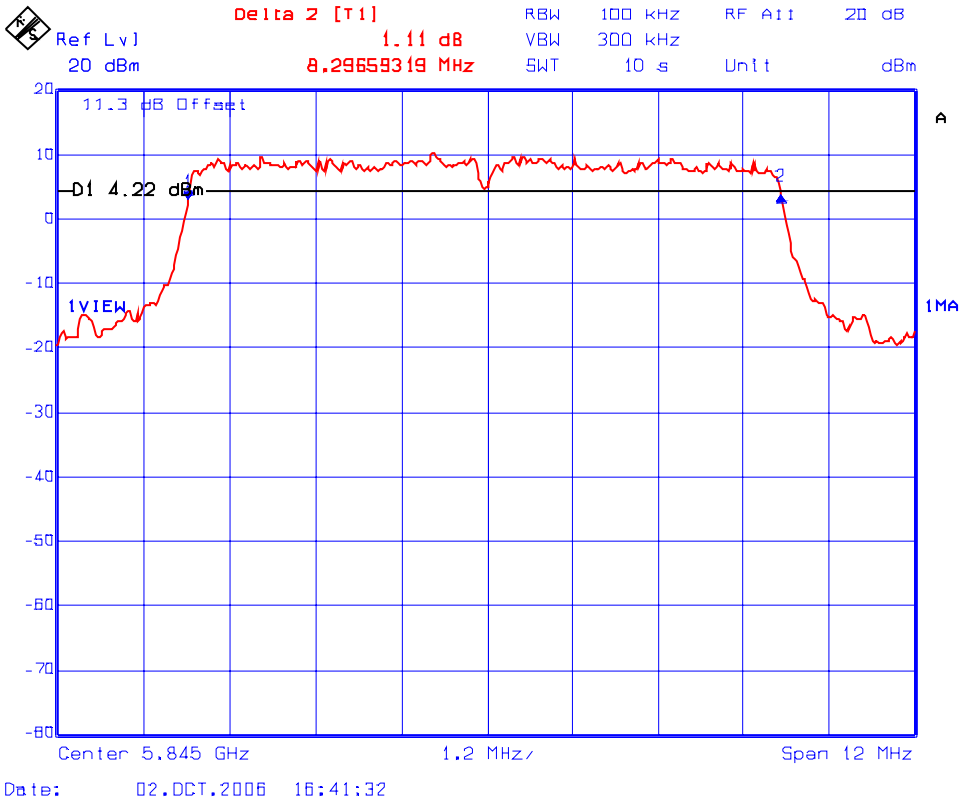
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #13: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 64QAM @ 27 Mb/s



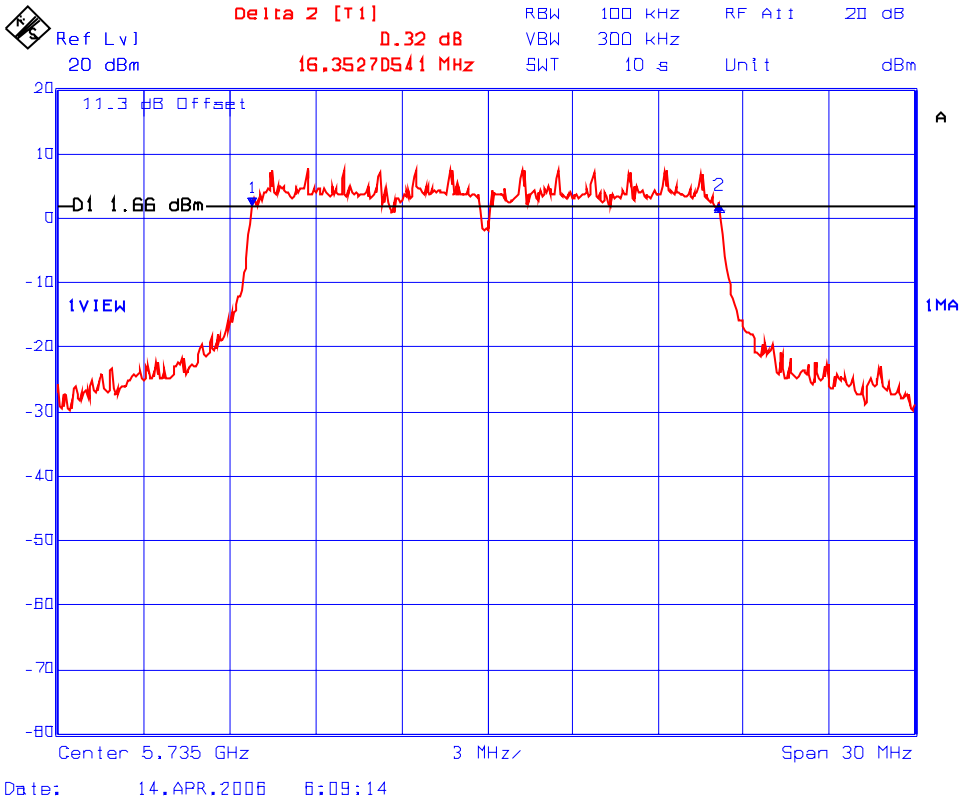
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #14: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: 64QAM @ 27Mb/s



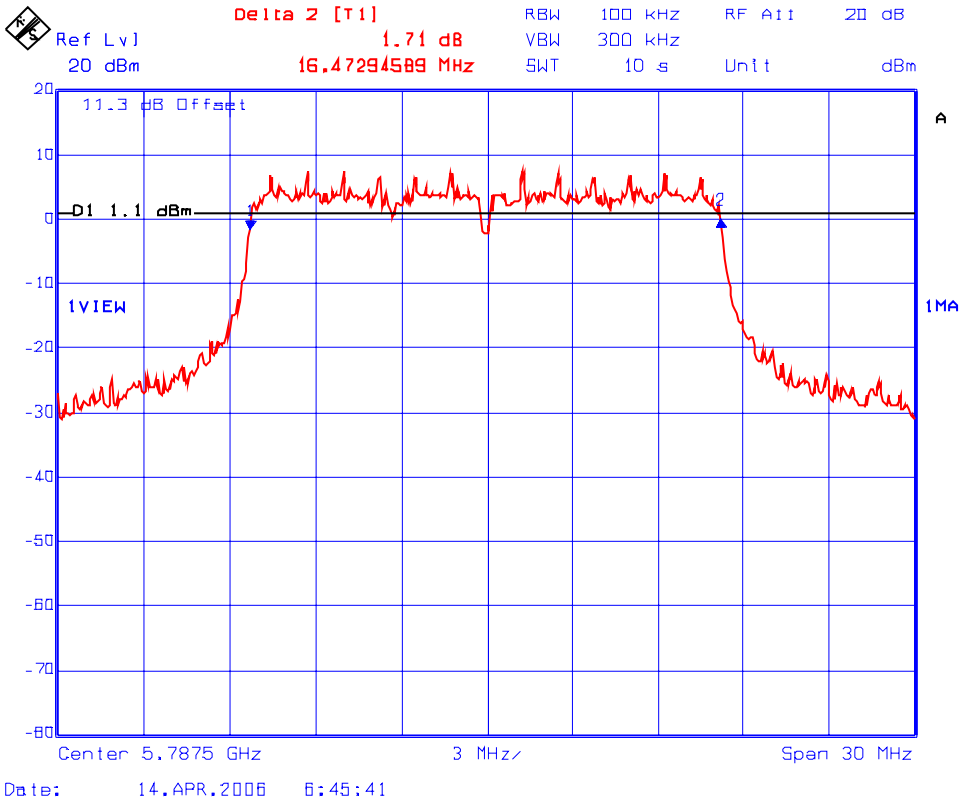
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #15: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: BPSK @ 9Mb/s



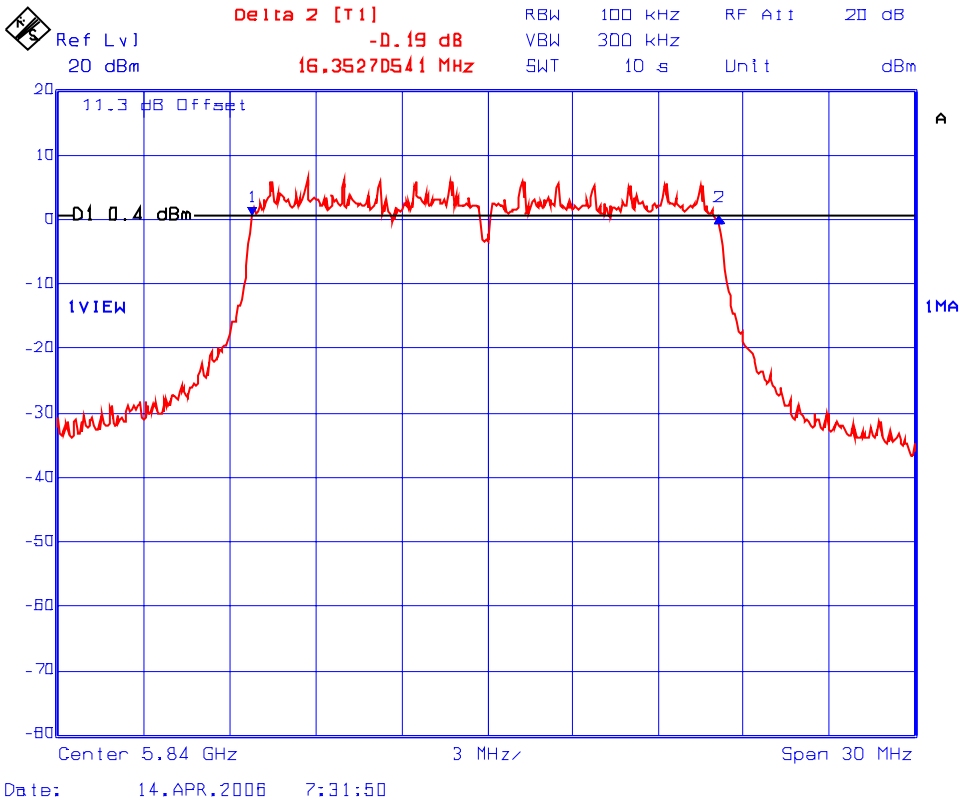
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #16 : 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: BPSK @ 9Mb/s



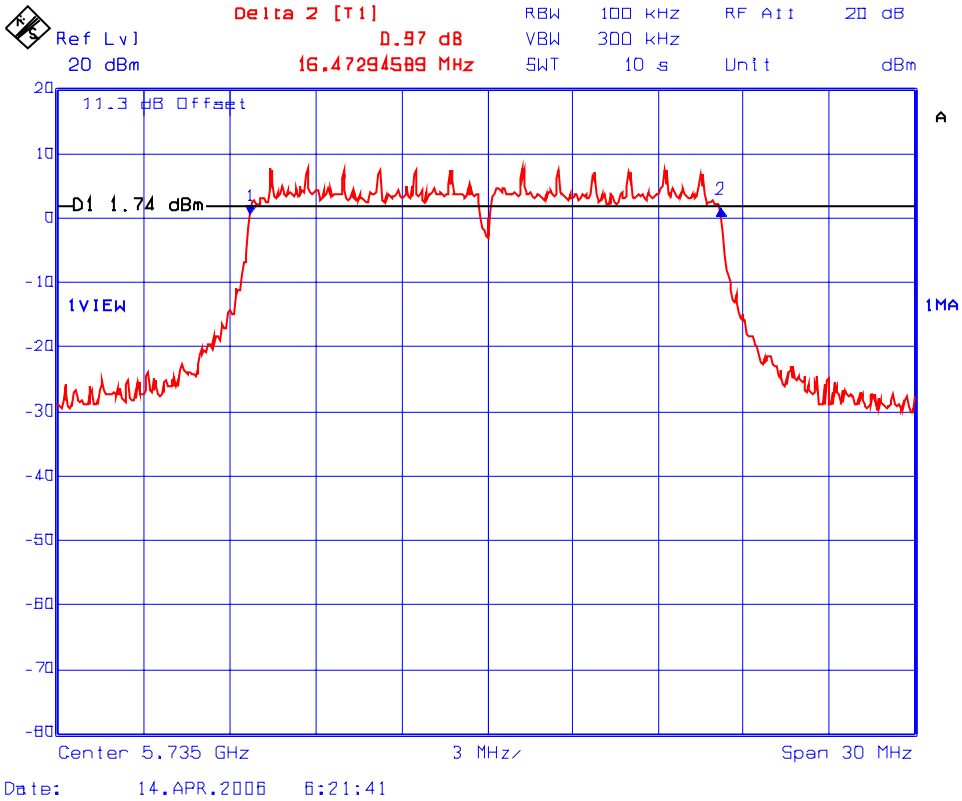
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #17: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: BPSK @ 9Mb/s



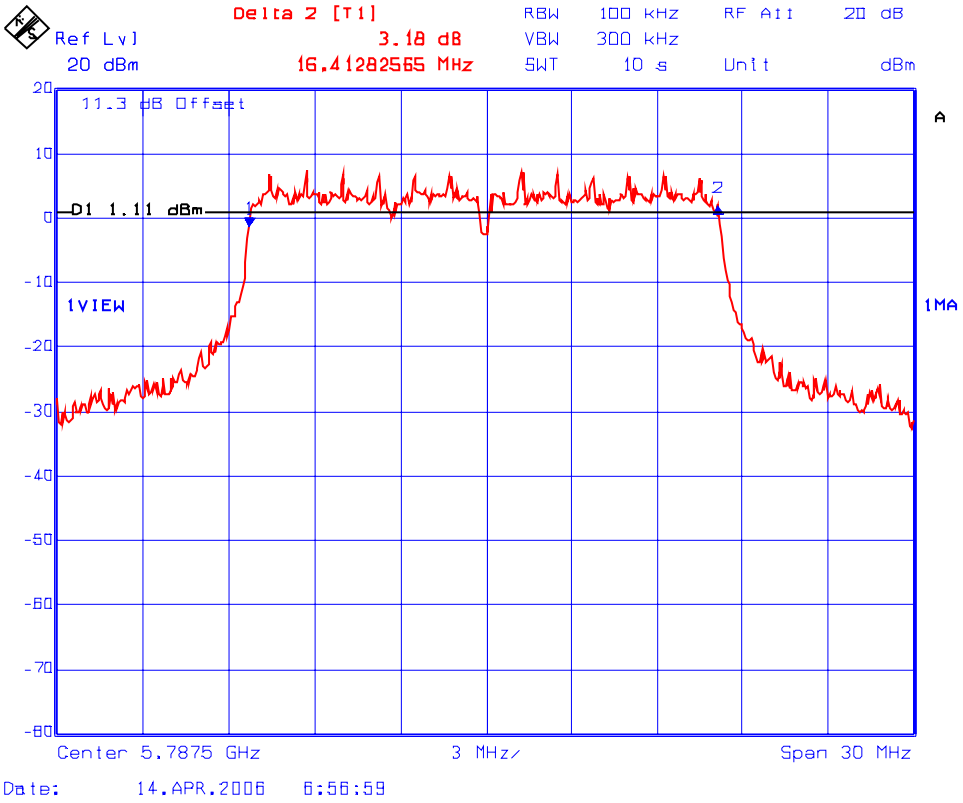
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #18: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: QPSK @ 18Mb/s



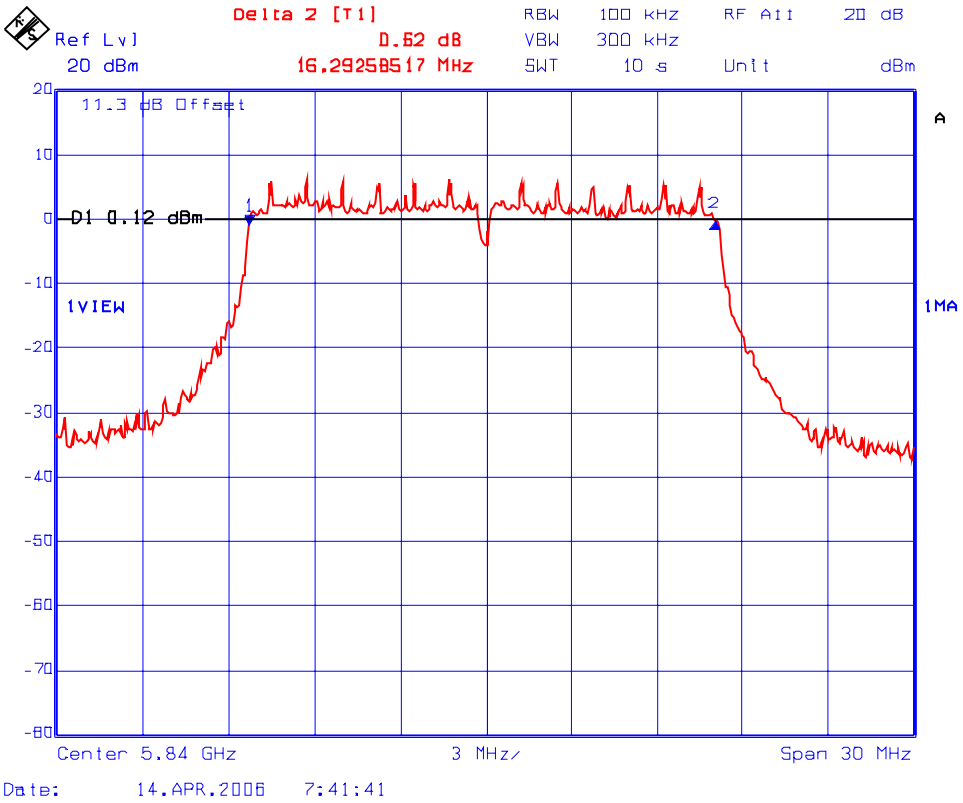
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #19: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: QPSK @ 18Mb/s



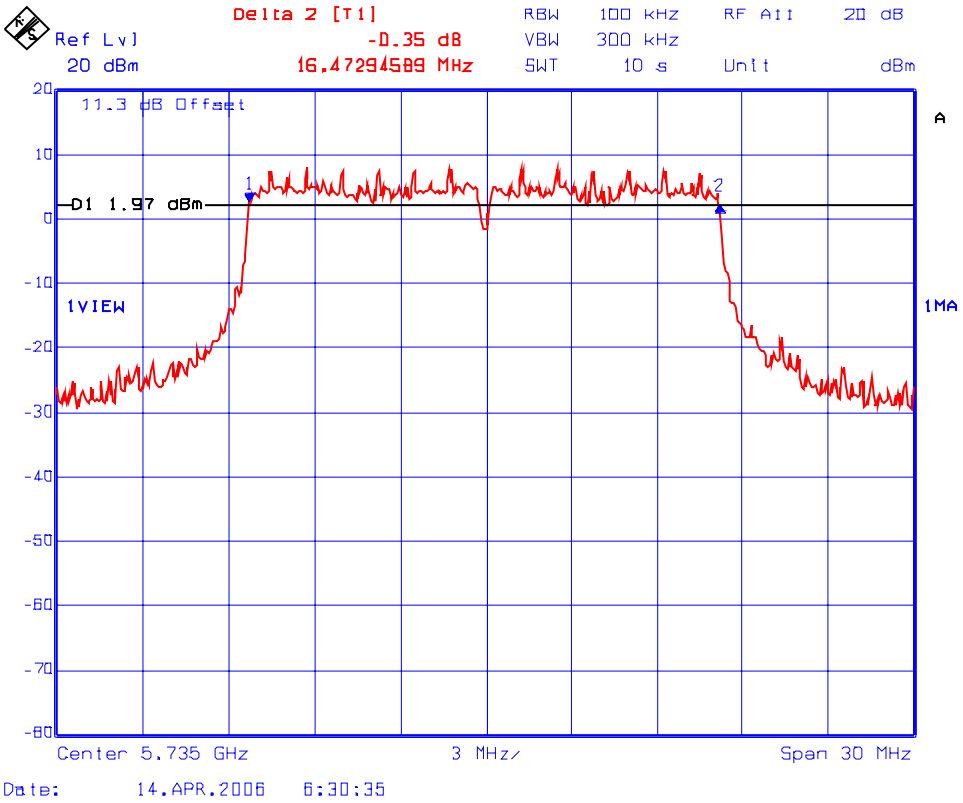
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #20: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: QPSK @ 18Mb/s



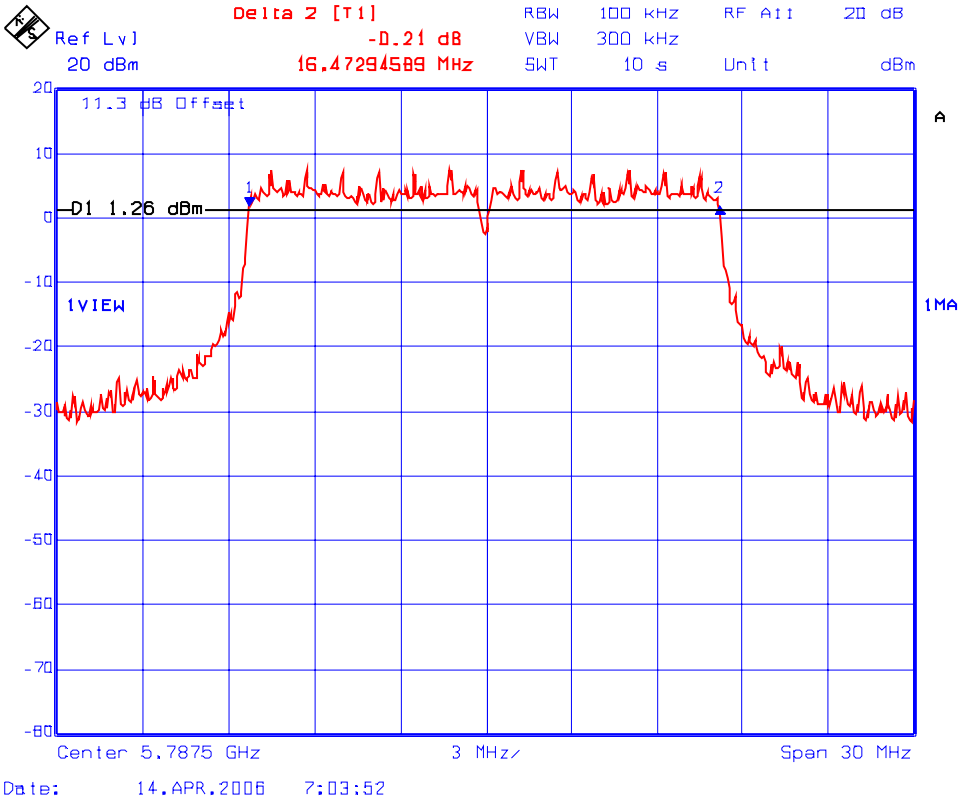
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #21: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: 16QAM @ 36Mb/s



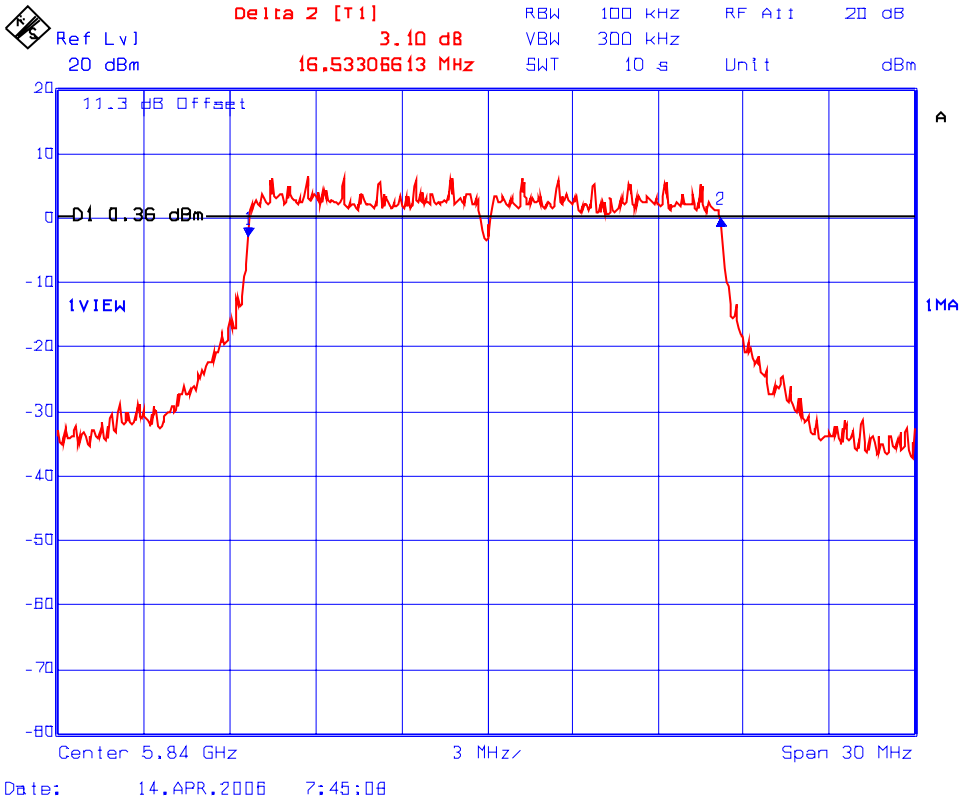
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #22: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 16QAM @ 36Mb/s



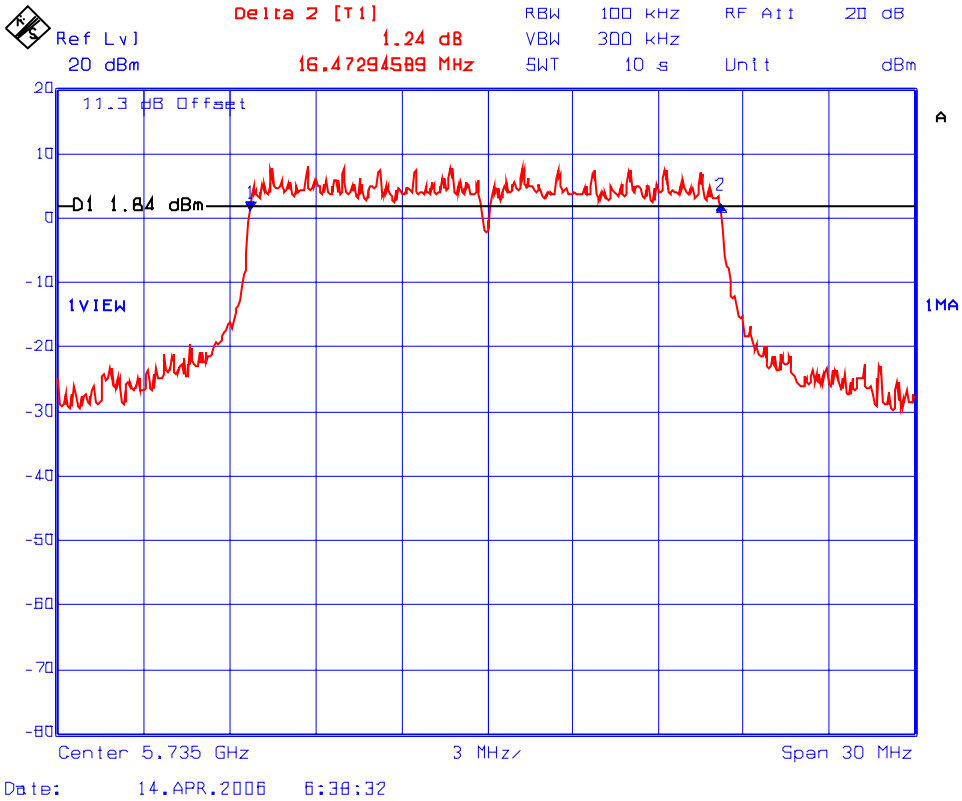
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #23: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: 16QAM @ 36Mb/s



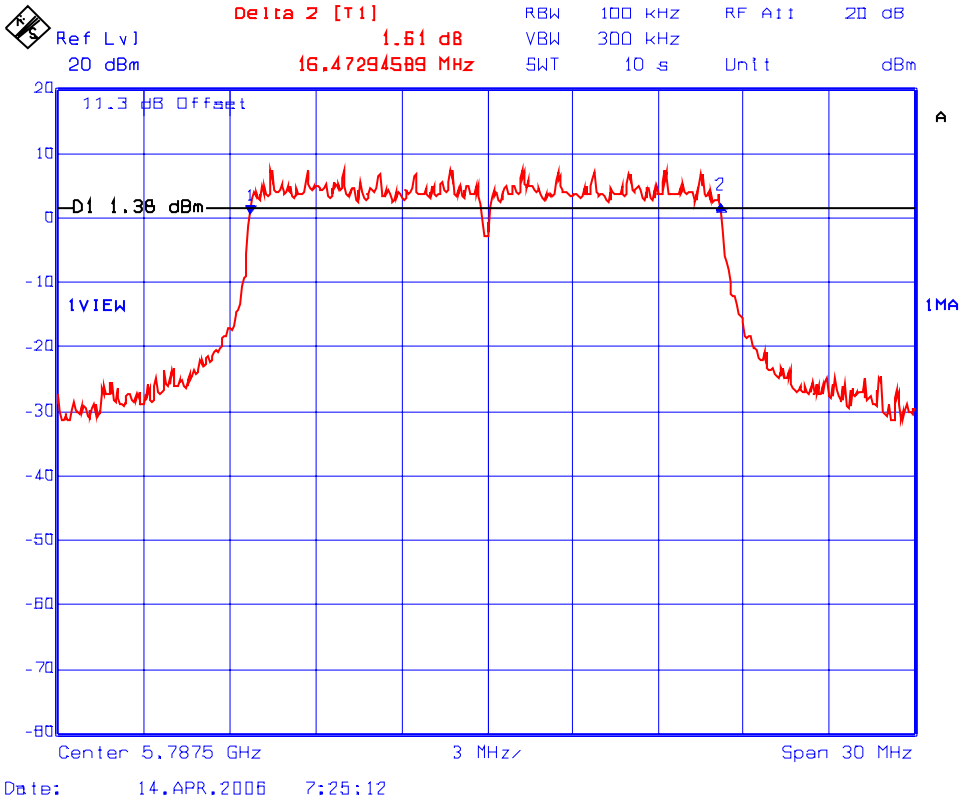
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #24: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: 64QAM @ 54Mb/s



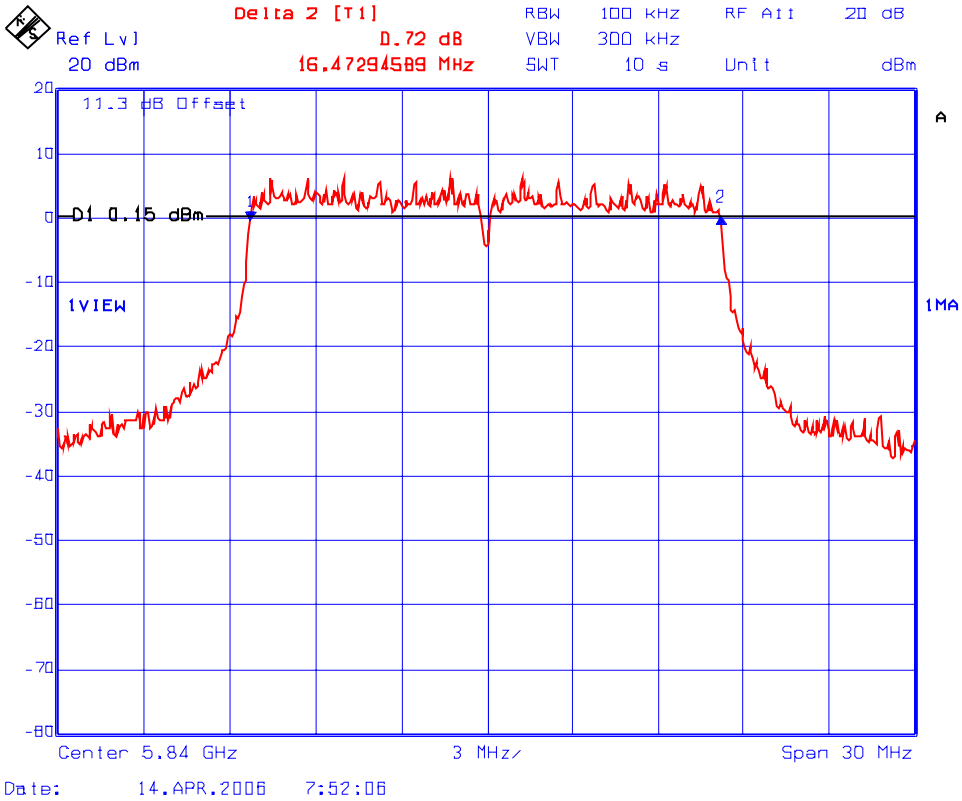
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #25: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 64QAM @ 54Mb/s



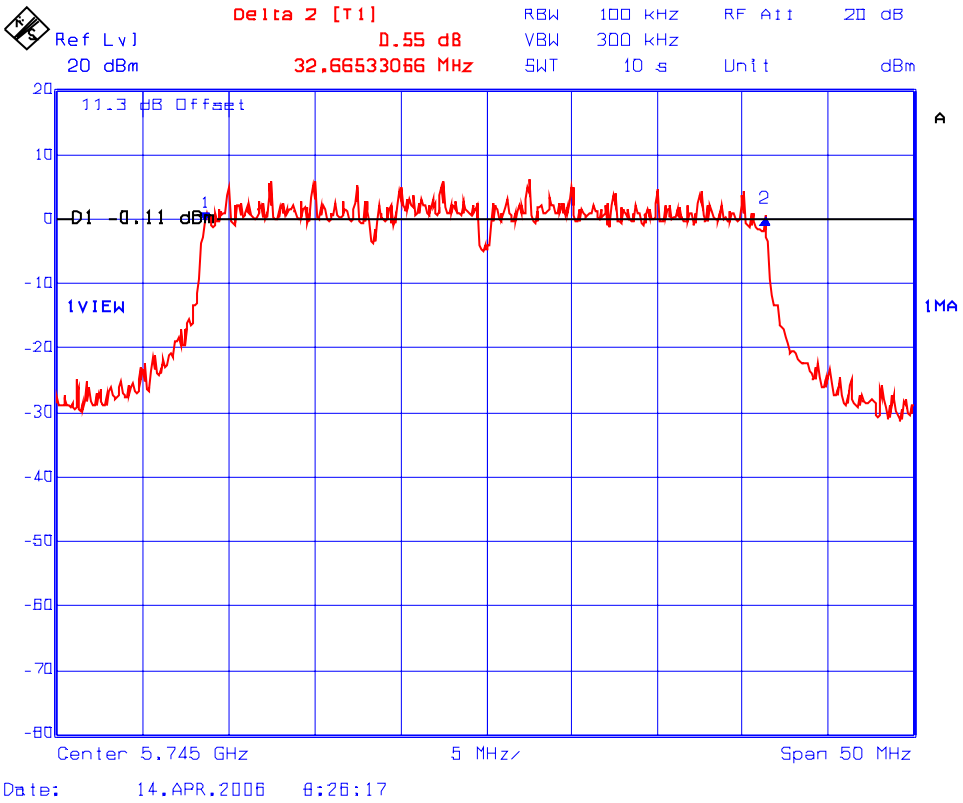
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #26: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: 64QAM @ 54 Mb/s



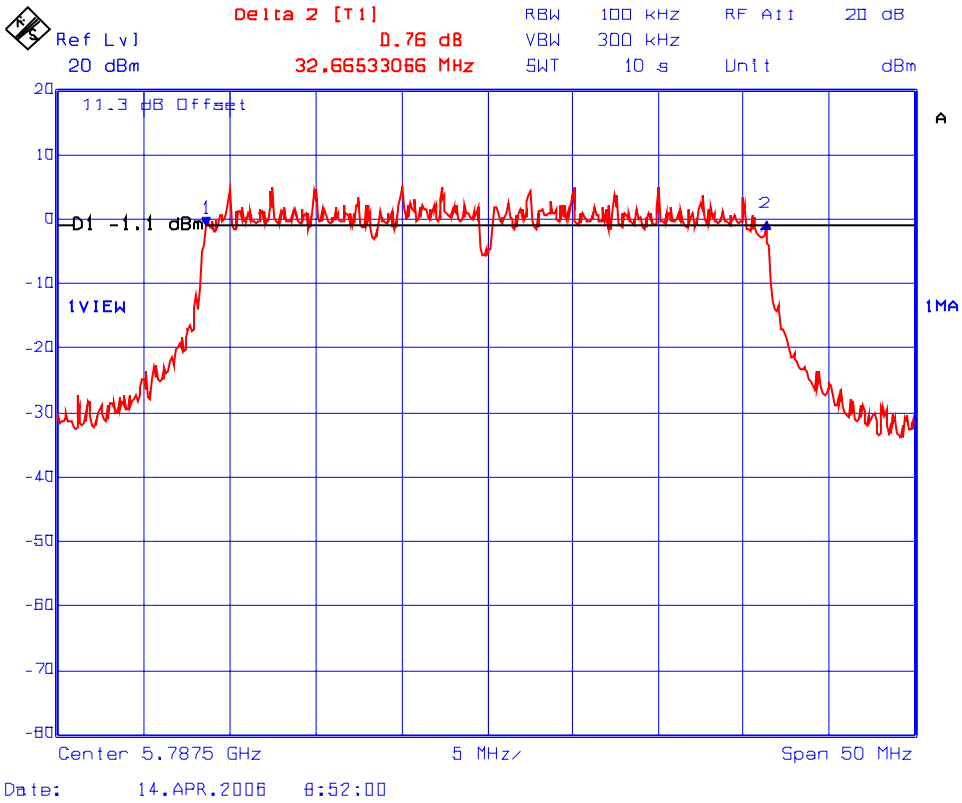
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #27: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5745 MHz, Modulation: BPSK @ 18Mb/s



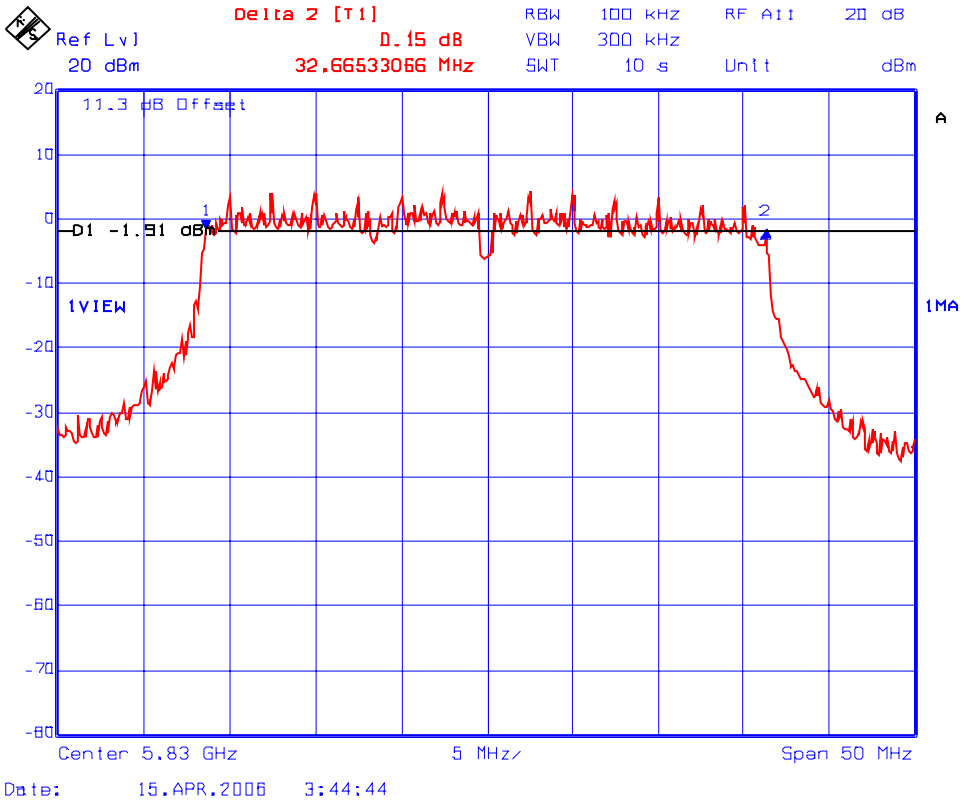
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #28: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: BPSK @ 18Mb/s



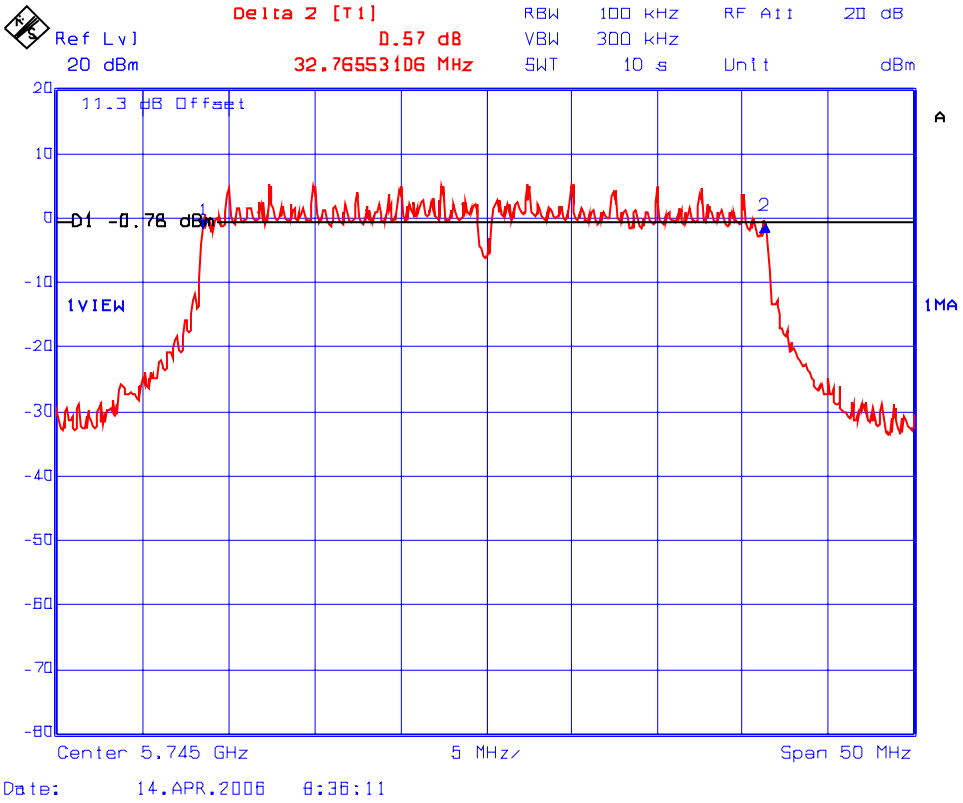
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #29: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5830 MHz, Modulation: BPSK @ 18Mb/s



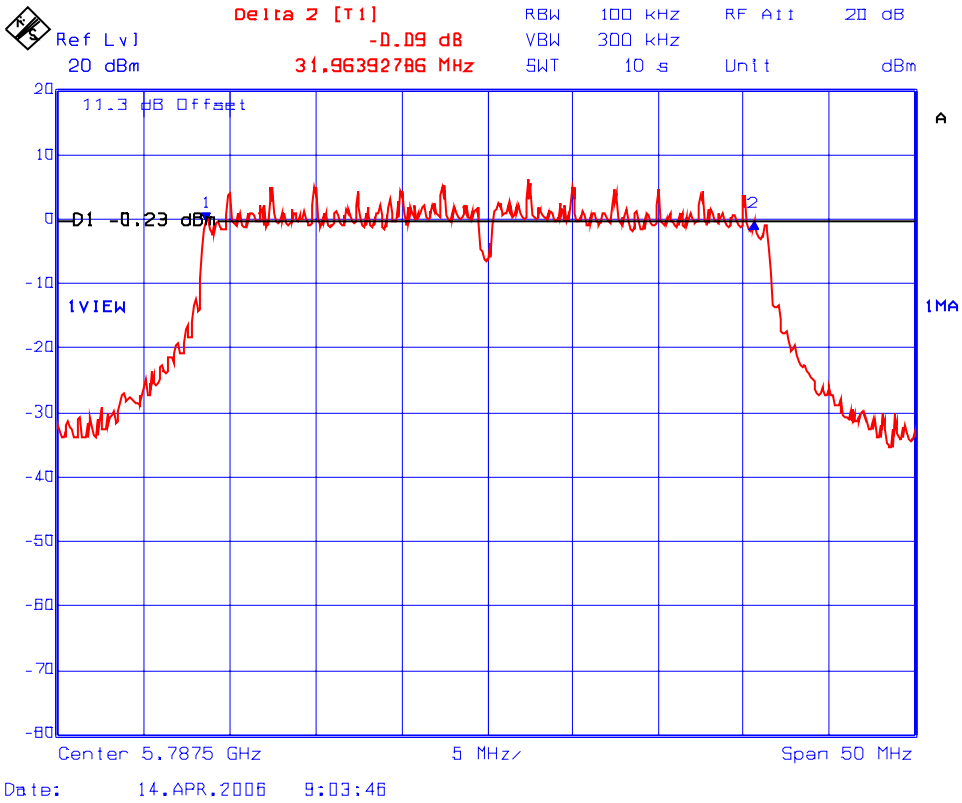
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #30: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5745 MHz, Modulation: QPSK @ 36Mb/s



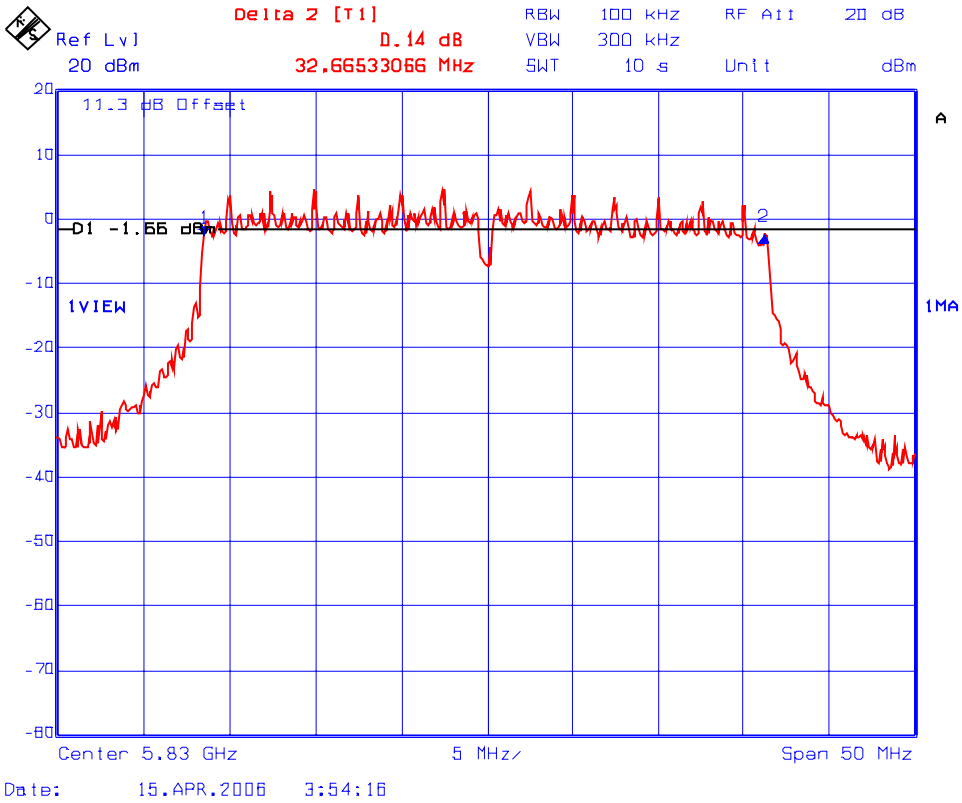
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #31: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: QPSK @ 36Mb/s



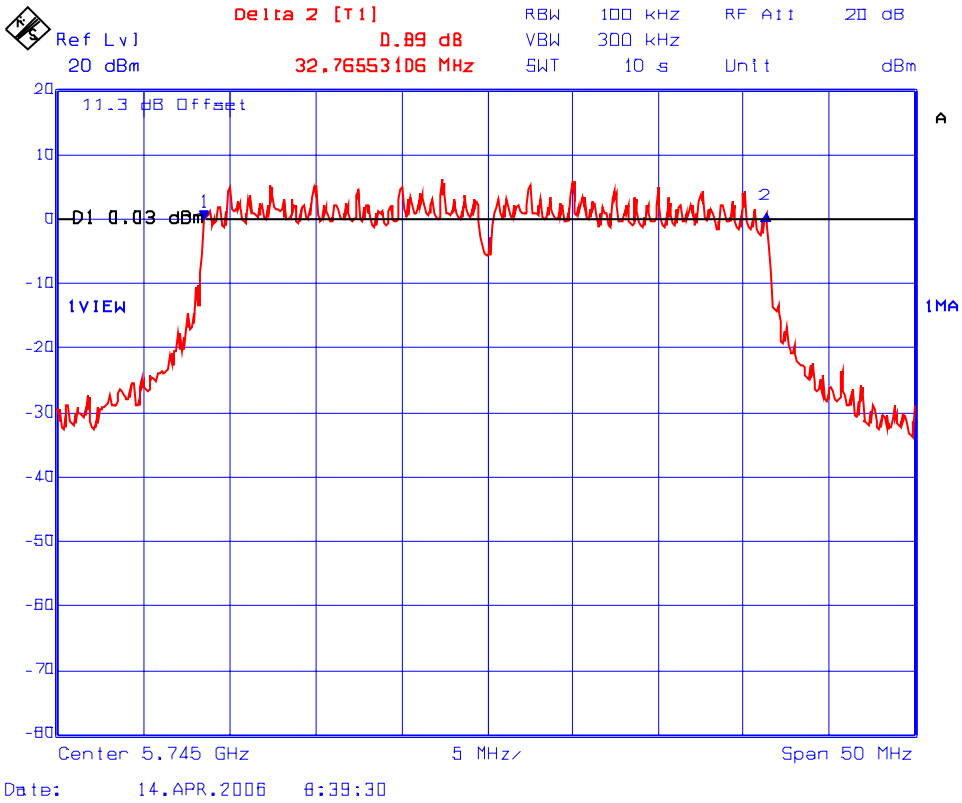
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #32: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5830 MHz, Modulation: QPSK @ 36Mb/s



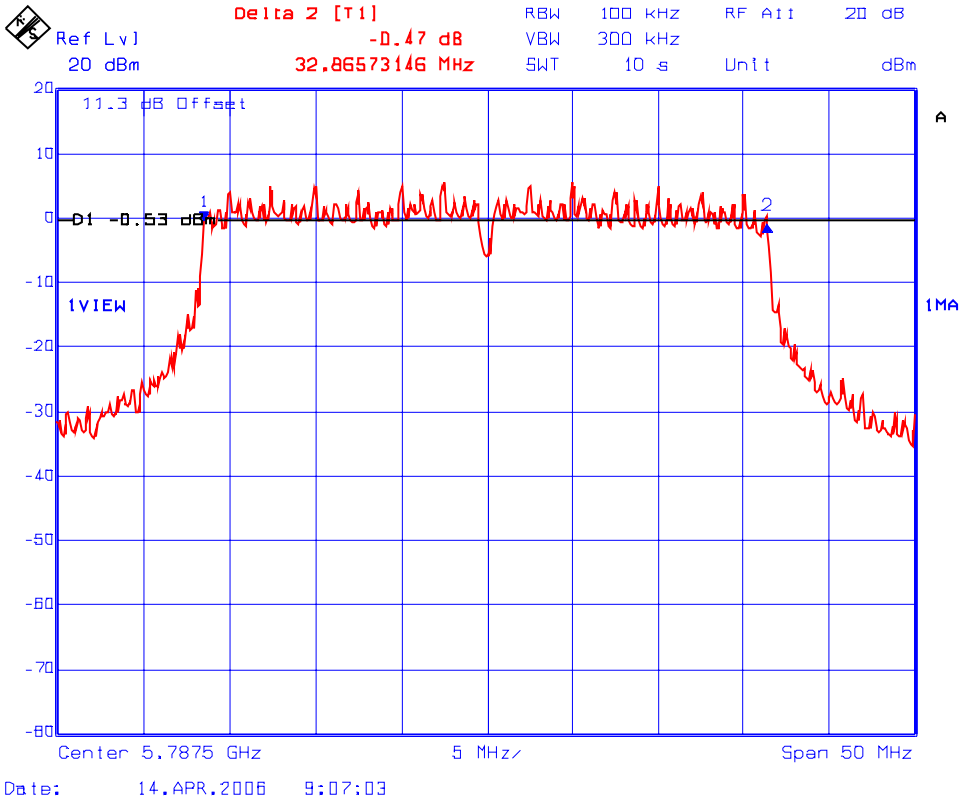
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #33: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5745 MHz, Modulation: 16QAM @ 72Mb/s



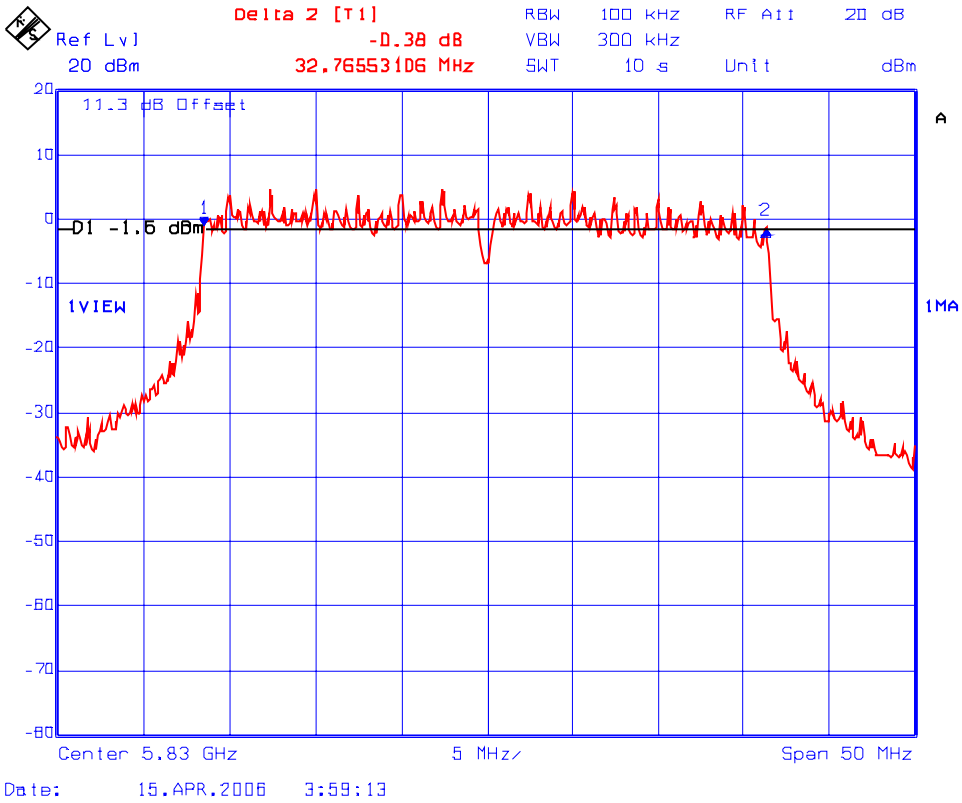
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #34: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 16QAM @ 72Mb/s



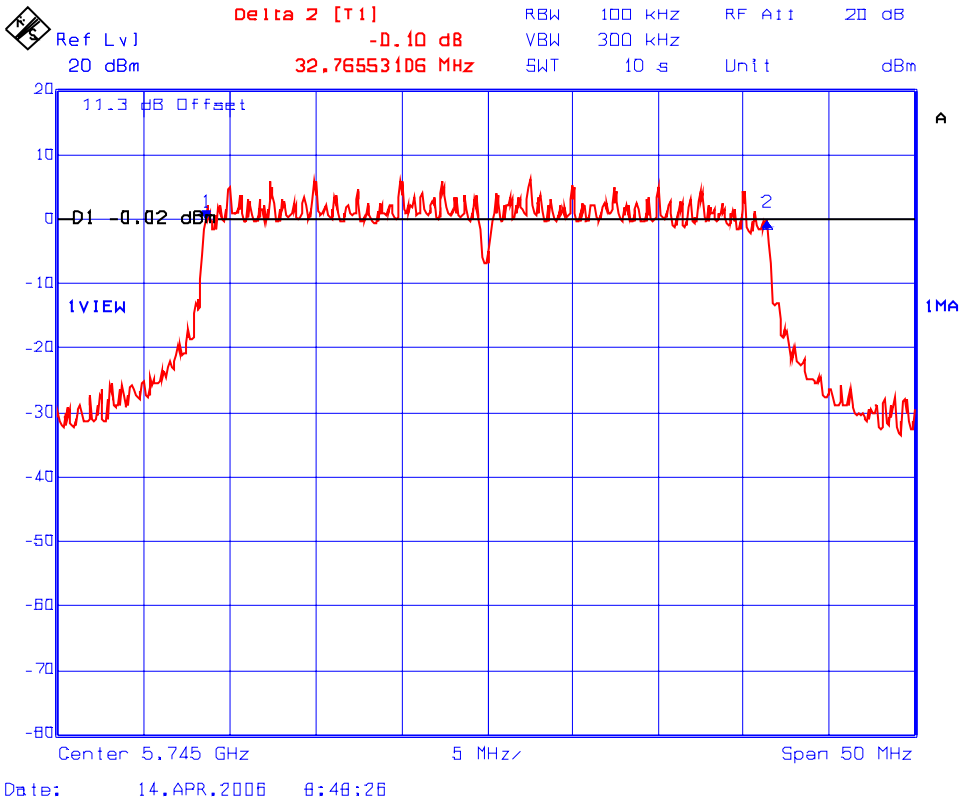
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #35: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5830 MHz, Modulation: 16QAM @ 72Mb/s



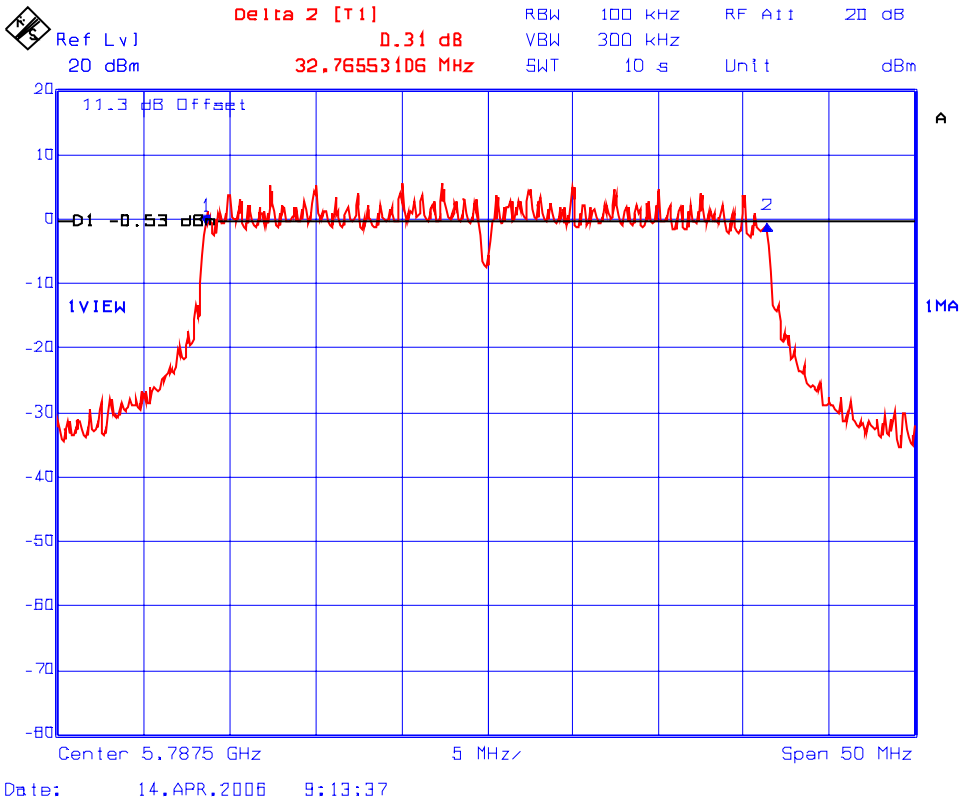
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #36 : 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5745 MHz, Modulation: 64QAM @ 108Mb/s



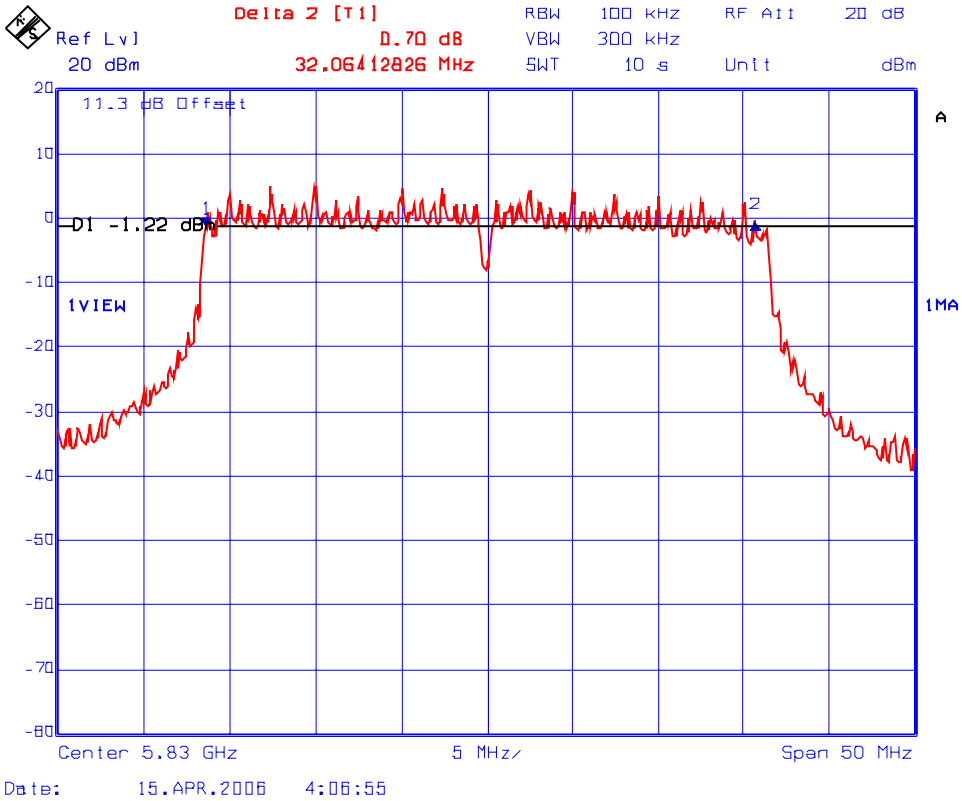
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #47: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5787.5 MHz, Modulation: 64QAM @ 108Mb/s



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

Plot #38: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5830 MHz, Modulation: 64QAM @ 108 Mb/s



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

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

4.7.1. 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:

(i) 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.

4.7.2. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Power Meter	Hewlett Packard	8900D	2131A01044	9 kHz – 40 GHz

4.7.3. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005"

This is an RF conducted test. Use a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. Power Output Option 1 is a peak measurement. Power Output Option 2 is the same procedure used for UNII output power measurements. Either option can be used for DTS devices.

<u>Power Output Option 1</u>:

The total peak power was measured using peak power meter

4.7.4. Test Data

4.7.4.1. Test Configuration # 1: 10 MHz Channel Spacing

Modulation: BPSK @ 4.5 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	25.46	34.6	60.06	30.0	Note (1)
5787.5	25.98	34.6	60.58	30.0	Note (1)
5845.0	26.12	34.6	60.72	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 9 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	25.11	34.6	59.71	30.0	Note (1)
5787.5	25.77	34.6	60.37	30.0	Note (1)
5845.0	25.82	34.6	60.42	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 18 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	25.15	34.6	59.75	30.0	Note (1)
5787.5	25.79	34.6	60.39	30.0	Note (1)
5845.0	25.91	34.6	60.51	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 27 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	24.97	34.6	59.57	30.0	Note (1)
5787.5	25.80	34.6	60.40	30.0	Note (1)
5845.0	25.92	34.6	60.52	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: BPSK @ 4.5 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	-12.61	34.6	21.99	30.0	Note (1)
5787.5	-12.27	34.6	22.33	30.0	Note (1)
5845.0	-12.38	34.6	22.22	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 9 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	-12.24	34.6	22.36	30.0	Note (1)
5787.5	-12.28	34.6	22.32	30.0	Note (1)
5845.0	-12.31	34.6	22.29	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 18 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	-12.28	34.6	22.32	30.0	Note (1)
5787.5	-12.32	34.6	22.28	30.0	Note (1)
5845.0	-12.44	34.6	22.16	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 27 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5730.0	-12.25	34.6	22.35	30.0	Note (1)
5787.5	-12.04	34.6	22.56	30.0	Note (1)
5845.0	-12.57	34.6	22.03	30.0	Note (1)

Note (1): No Limit for Point to Point Application

4.7.4.2. Test Configuration # 2: 20 MHz Channel Spacing

Modulation: BPSK @ 9 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	24.0	34.6	58.6	30.0	Note (1)
5787.5	24.0	34.6	58.6	30.0	Note (1)
5840.0	23.3	34.6	57.9	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 18 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	23.5	34.6	58.1	30.0	Note (1)
5787.5	23.5	34.6	58.1	30.0	Note (1)
5840.0	22.5	34.6	57.1	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 36 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	23.5	34.6	58.1	30.0	Note (1)
5787.5	23.5	34.6	58.1	30.0	Note (1)
5840.0	22.6	34.6	57.2	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 54 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	23.6	34.6	58.2	30.0	Note (1)
5787.5	23.4	34.6	58.0	30.0	Note (1)
5840.0	22.6	34.6	57.2	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: BPSK @ 9 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-11.8	34.6	22.8	30.0	Note (1)
5787.5	-12.8	34.6	21.8	30.0	Note (1)
5840.0	-13.6	34.6	21.0	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 18 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.0	34.6	22.6	30.0	Note (1)
5787.5	-12.6	34.6	22.0	30.0	Note (1)
5840.0	-13.7	34.6	20.9	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 36 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-11.9	34.6	22.7	30.0	Note (1)
5787.5	-12.8	34.6	21.8	30.0	Note (1)
5840.0	-13.8	34.6	20.8	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 54 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.0	34.6	22.6	30.0	Note (1)
5787.5	-12.7	34.6	21.9	30.0	Note (1)
5840.0	-13.7	34.6	20.9	30.0	Note (1)

Note (1): No Limit for Point to Point Application

4.7.4.3. Test Configuration # 3: 40 MHz Channel Spacing

Modulation: BPSK @ 18 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	22.6	34.6	57.2	30.0	Note (1)
5787.5	22.2	34.6	56.8	30.0	Note (1)
5840.0	22.2	34.6	55.8	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 36 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	21.6	34.6	57.2	30.0	Note (1)
5787.5	21.1	34.6	56.8	30.0	Note (1)
5840.0	20.0	34.6	55.8	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 72 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	21.7	34.6	56.3	30.0	Note (1)
5787.5	21.2	34.6	55.8	30.0	Note (1)
5840.0	20.2	34.6	54.8	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 108 Mb/s, Power Setting: 20 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	21.8	34.6	56.4	30.0	Note (1)
5787.5	21.4	34.6	56.0	30.0	Note (1)
5840.0	20.6	34.6	55.2	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: BPSK @ 18 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.5	34.6	22.1	30.0	Note (1)
5787.5	-13.0	34.6	21.6	30.0	Note (1)
5840.0	-13.8	34.6	20.8	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: QPSK @ 36 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.1	34.6	22.5	30.0	Note (1)
5787.5	-12.6	34.6	22.0	30.0	Note (1)
5840.0	-13.5	34.6	21.1	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 16QAM @ 72 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.2	34.6	22.4	30.0	Note (1)
5787.5	-12.8	34.6	21.8	30.0	Note (1)
5840.0	-13.7	34.6	20.9	30.0	Note (1)

Note (1): No Limit for Point to Point Application

Modulation: 64QAM @ 108 Mb/s, Power Setting: -10 dBm

Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
5735.0	-12.1	34.6	22.5	30.0	Note (1)
5787.5	-12.9	34.6	21.7	30.0	Note (1)
5840.0	-13.5	34.6	21.1	30.0	Note (1)

Note (1): No Limit for Point to Point Application

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

4.8.1. 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

4.8.2. 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)(5), 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)

4.8.3. Test Data

Frequency (MHz)	Maximum Conducted Peak Power at the Antenna Terminal (dBm)	Maximum Antenna Gain (dBi)	Maximum Measured Total EIRP (dBm)	Laboratory's Recommended Minimum RF Safety Distance r (cm)
5845	26.1	34.6	60.7	306

Note 1: **RF EXPOSURE DISTANCE LIMITS:** $r = (PG/4\Pi S)^{1/2} = (EIRP/4\Pi S)^{1/2}$
Limits for General Population/Uncontrolled Exposure: $S = 1.0\ mW/cm^2$

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	**Compliance with FCC Rules**
Minimum calculated separation distance between antenna and persons required: 3.06 meters	Manufacturer' instruction for separation distance between antenna and persons required: 3.1 meters
Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement	Antenna is required to be professionally installed

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

4.9.1. 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)).

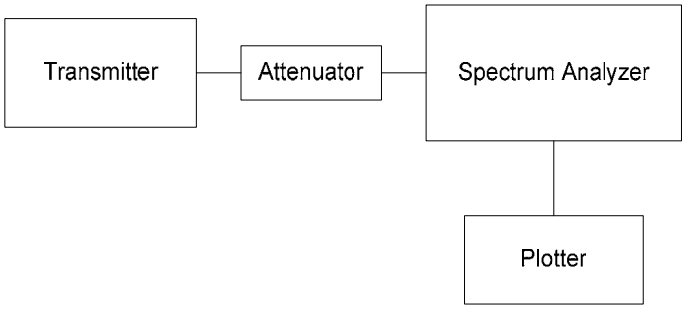
4.9.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005"

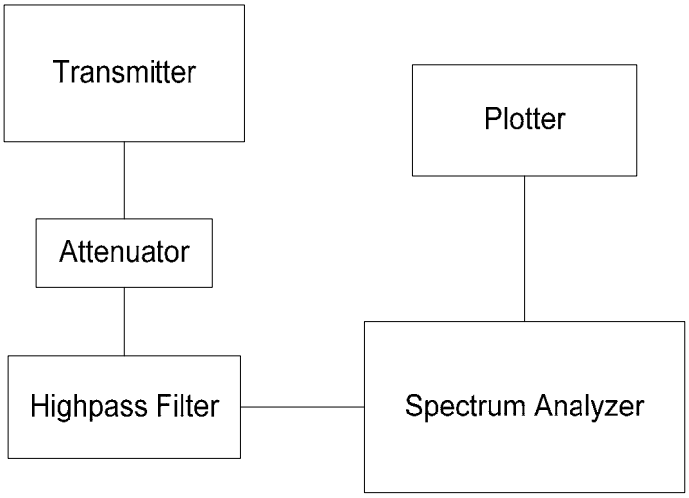
RF antenna conducted test: Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band *as measured with a 100 kHz RBW.*

4.9.3. Test Arrangement

For Conducted Band-edge Emissions Measurements



For Conducted Spurious Emissions Measurements



4.9.4. Test Equipment List

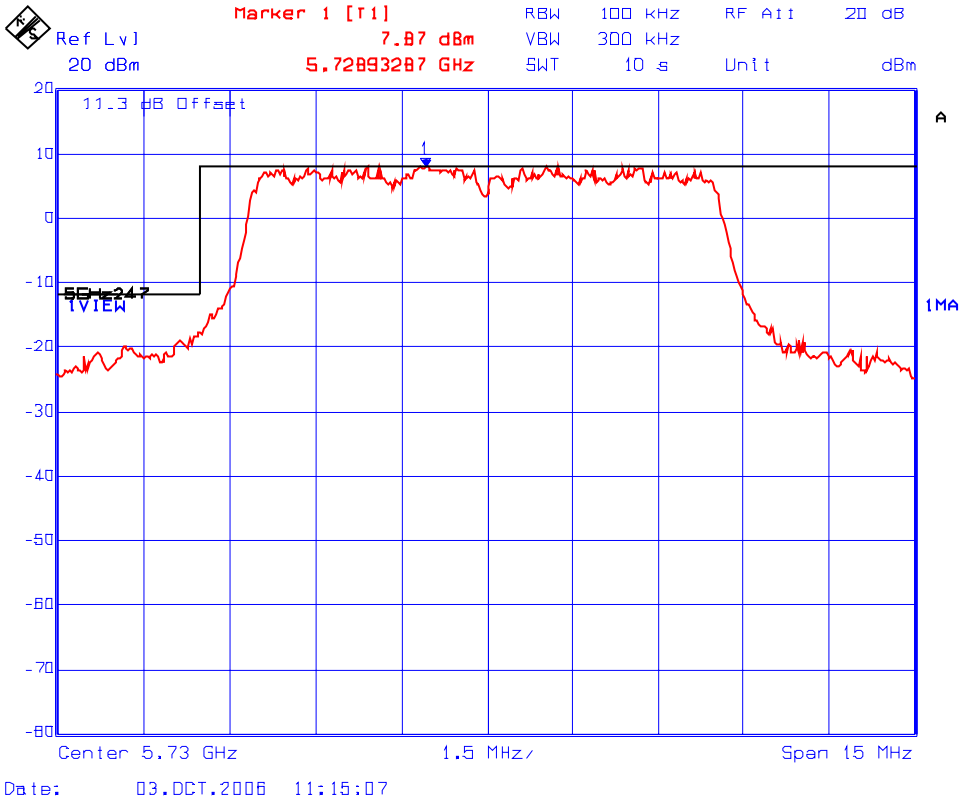
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

4.9.5. Test Data

4.9.5.1. Transmitter Band-edge Conducted Spurious Emissions wrt. 10 MHz Channel Spacing

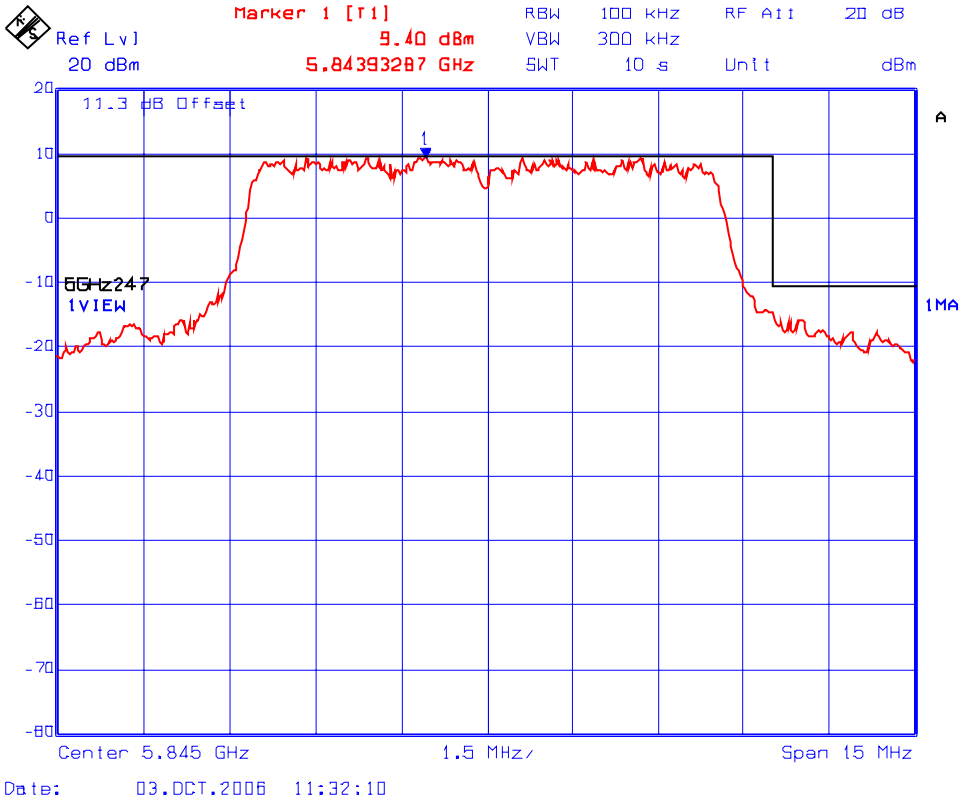
Conforms. Refer to Plots # 39 to 46 for details of Measurements

Plot # 39: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Lowest Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5 Mb/s



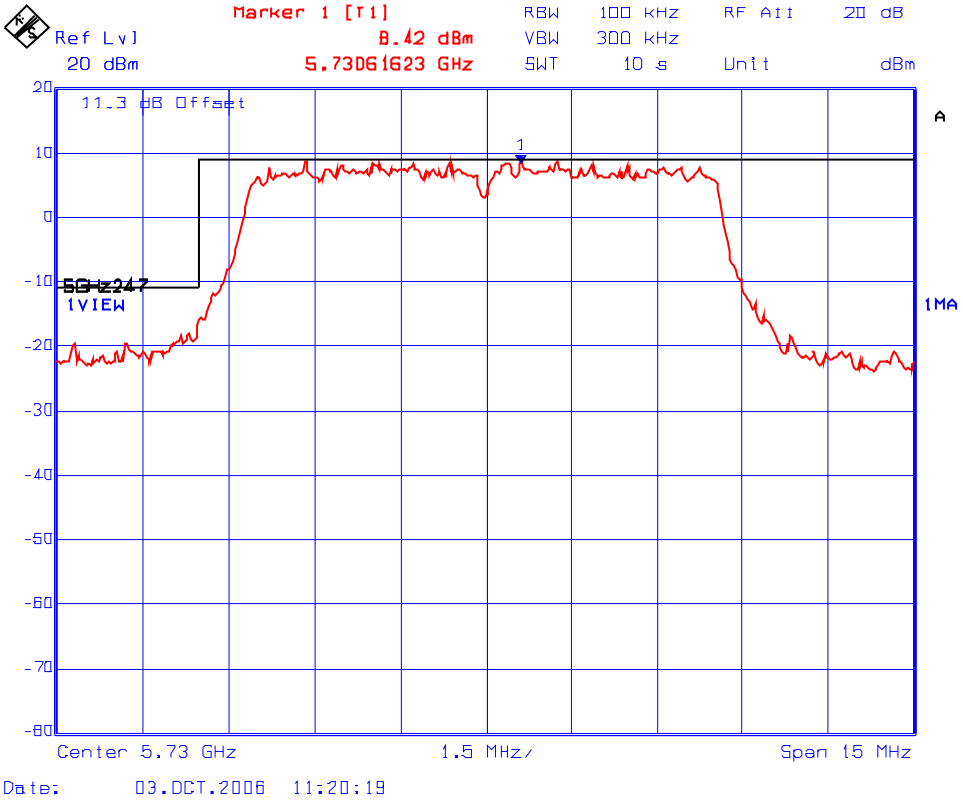
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 40: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Highest Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5 Mb/s



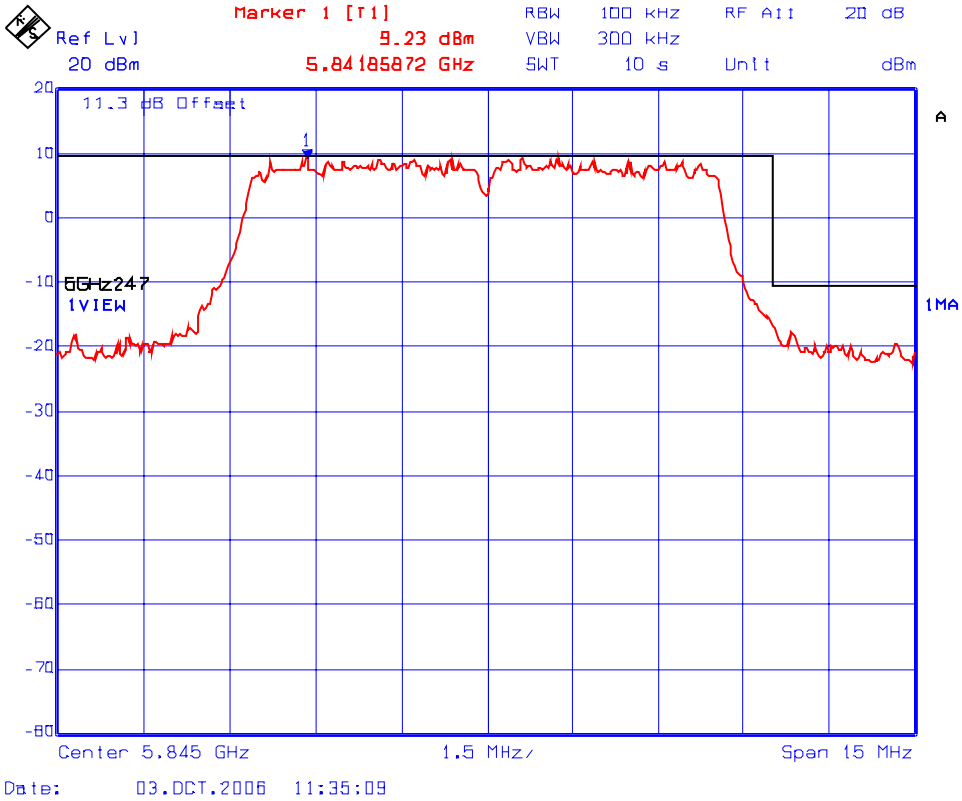
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 41: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Lowest Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 9 Mb/s



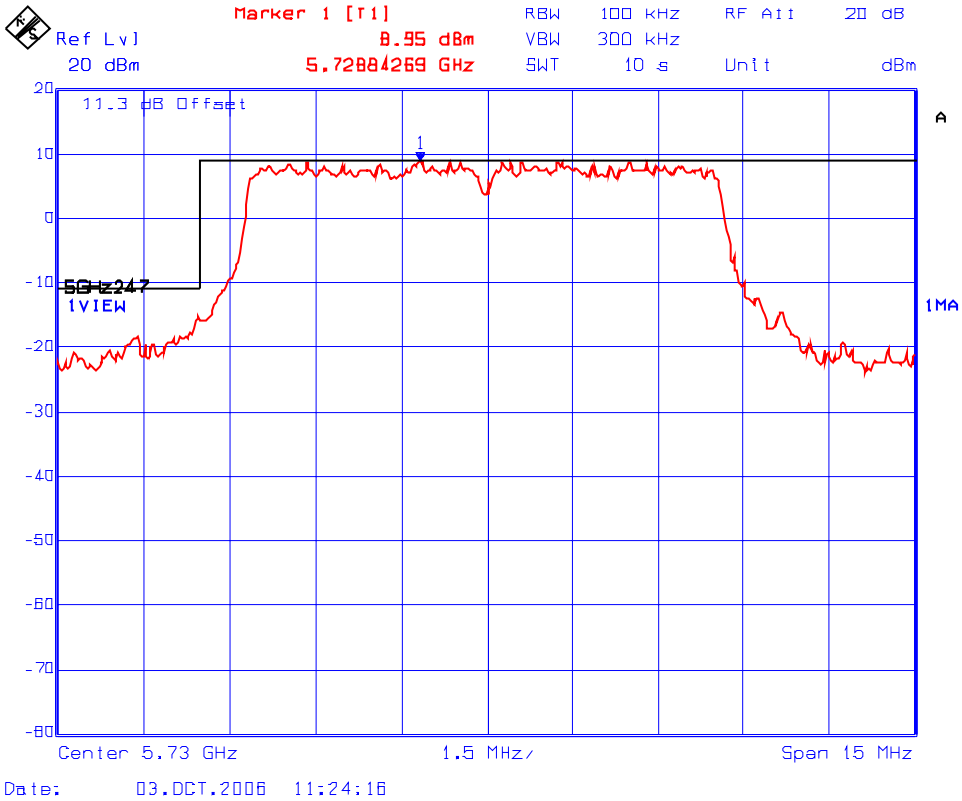
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 42: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Highest Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 9 Mb/s



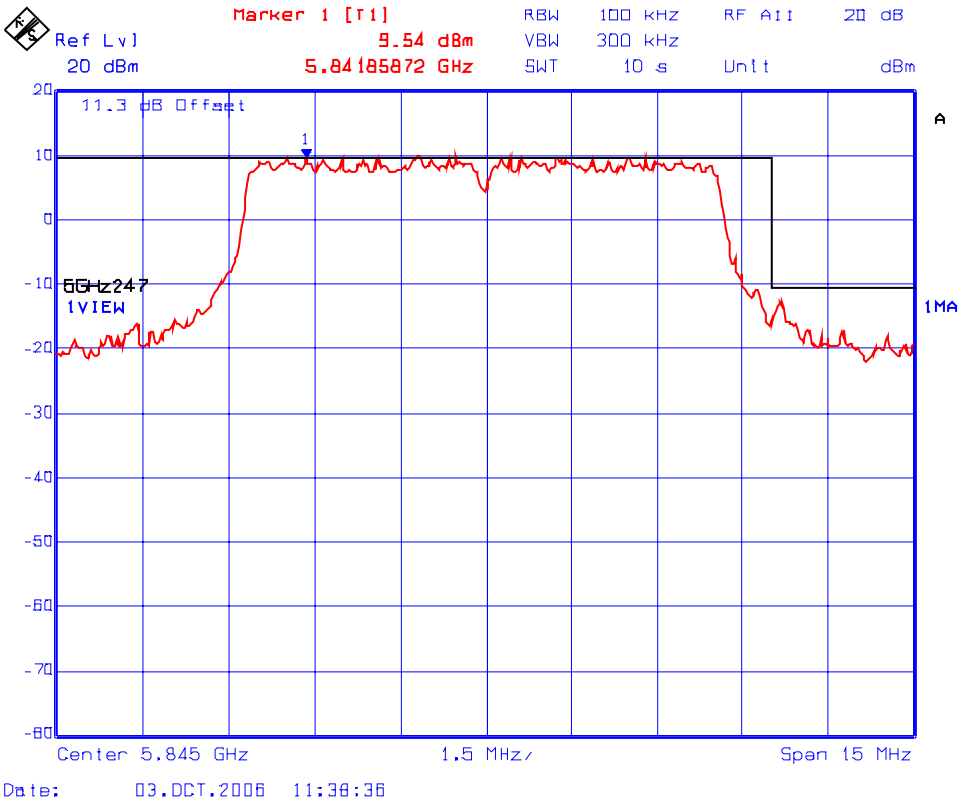
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 43: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Lowest Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 18 Mb/s



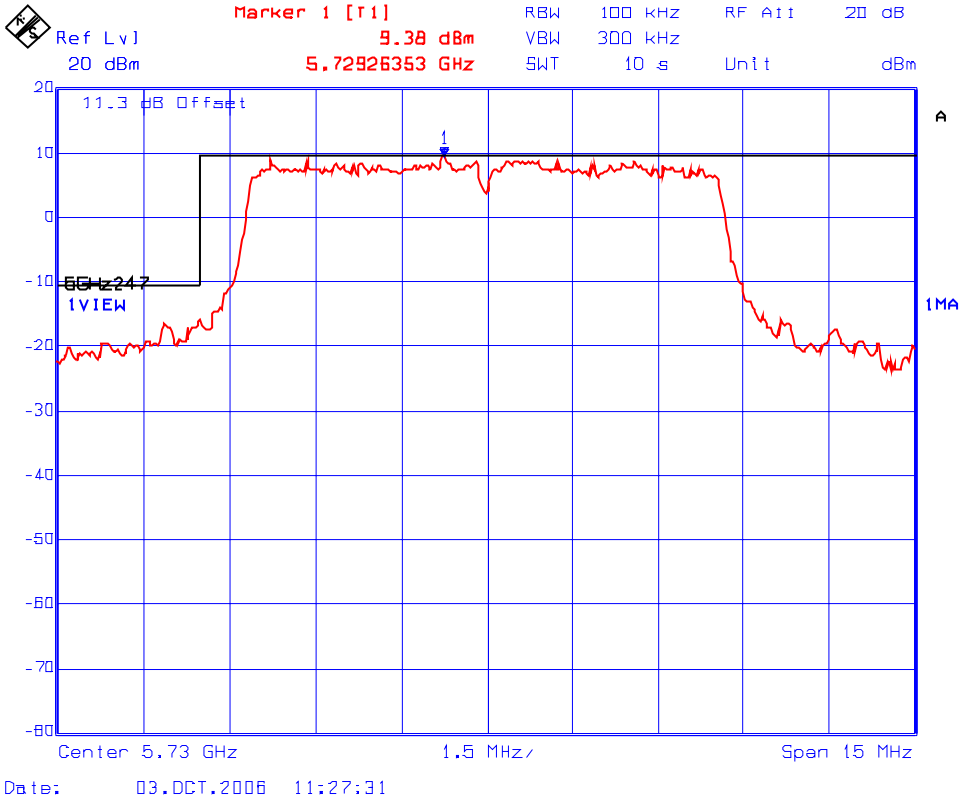
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 44: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Highest Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 18 Mb/s



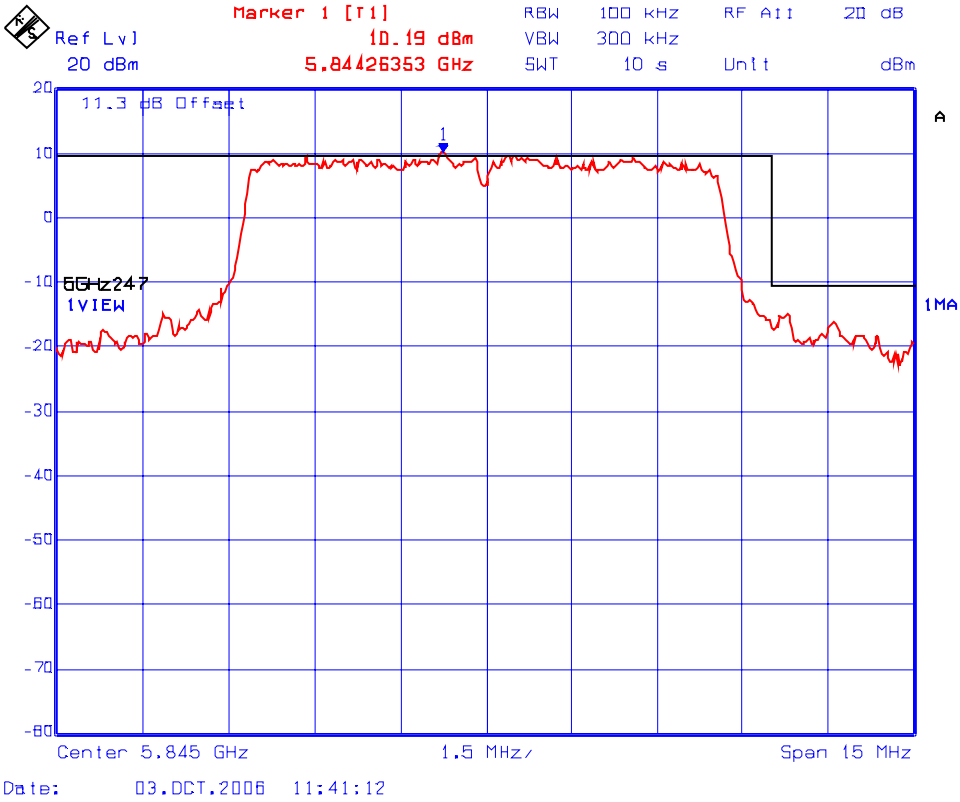
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 45: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Lowest Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 27 Mb/s



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

Plot # 46: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing – Highest Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 27 Mb/s

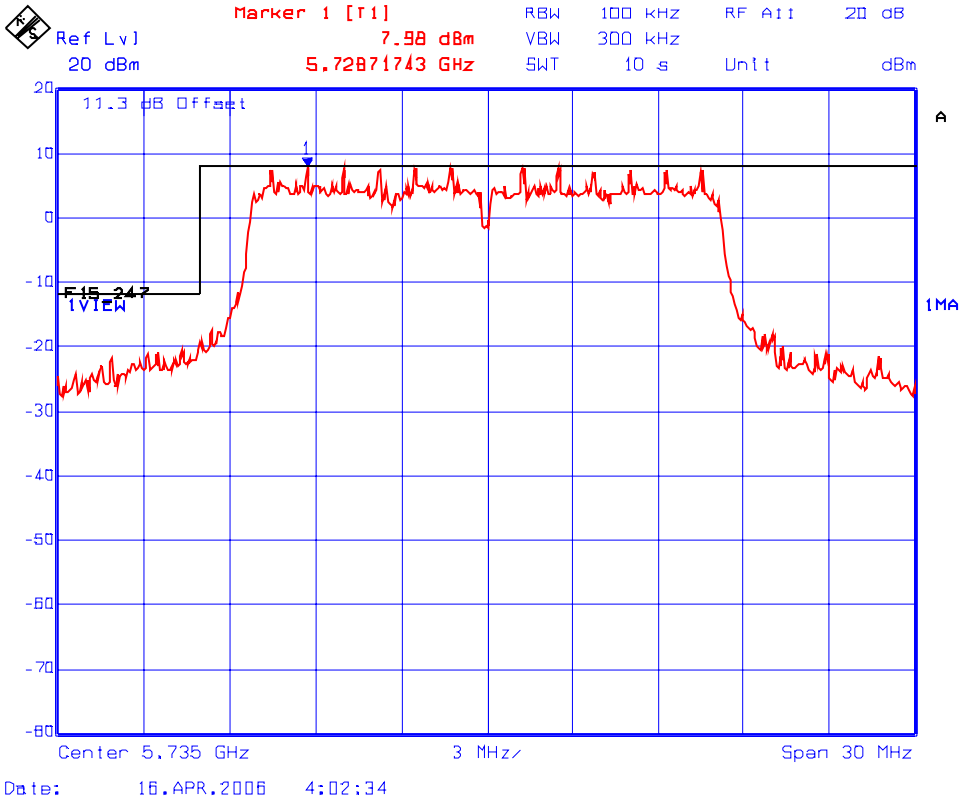


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

4.9.5.2. Transmitter Band-edge Conducted Spurious Emissions wrt. 20 MHz Channel Spacing

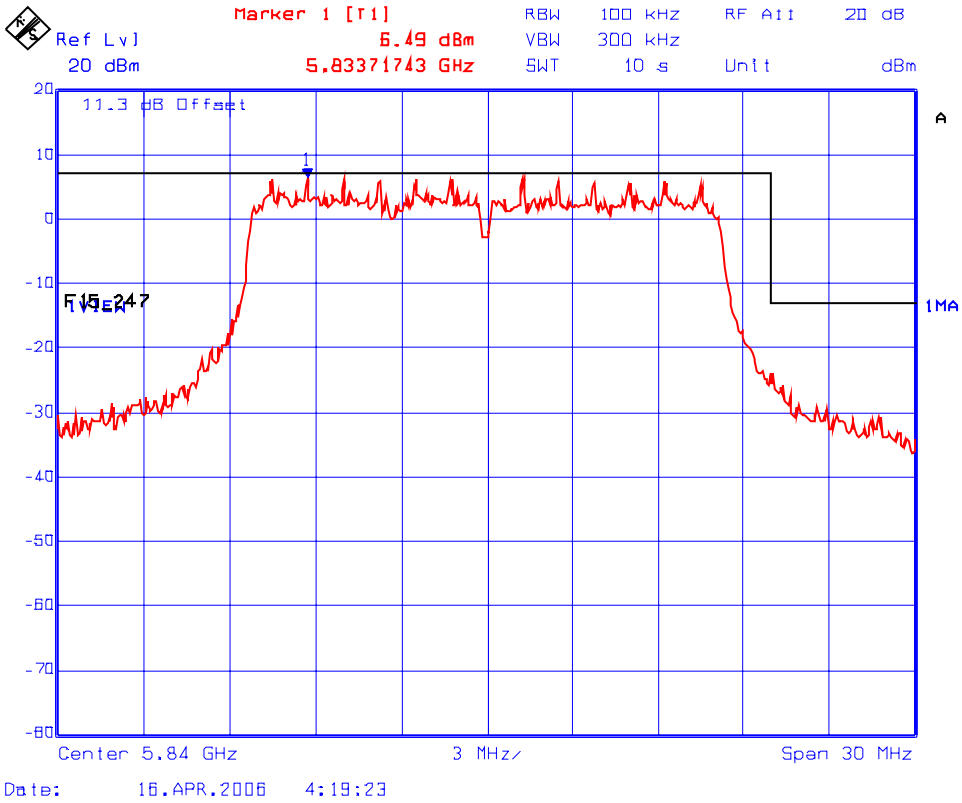
Conforms. Refer to Plots # 47 to 54 for details of Measurements

Plot # 47: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Lowest Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



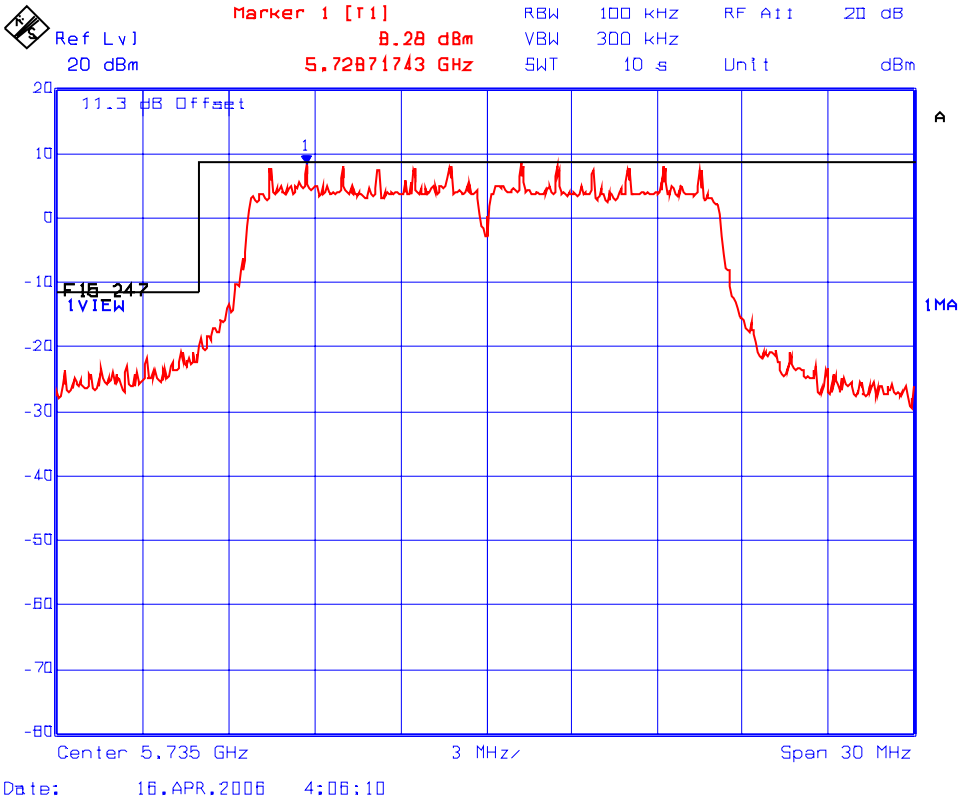
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 48: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Highest Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



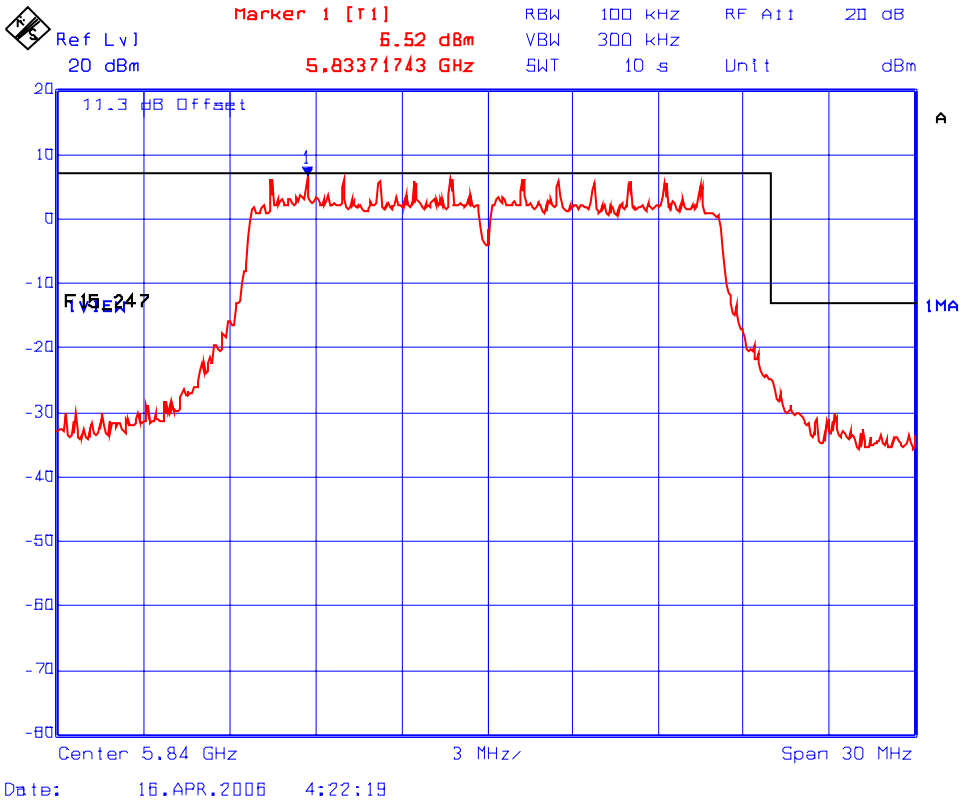
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 49: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Lowest Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s



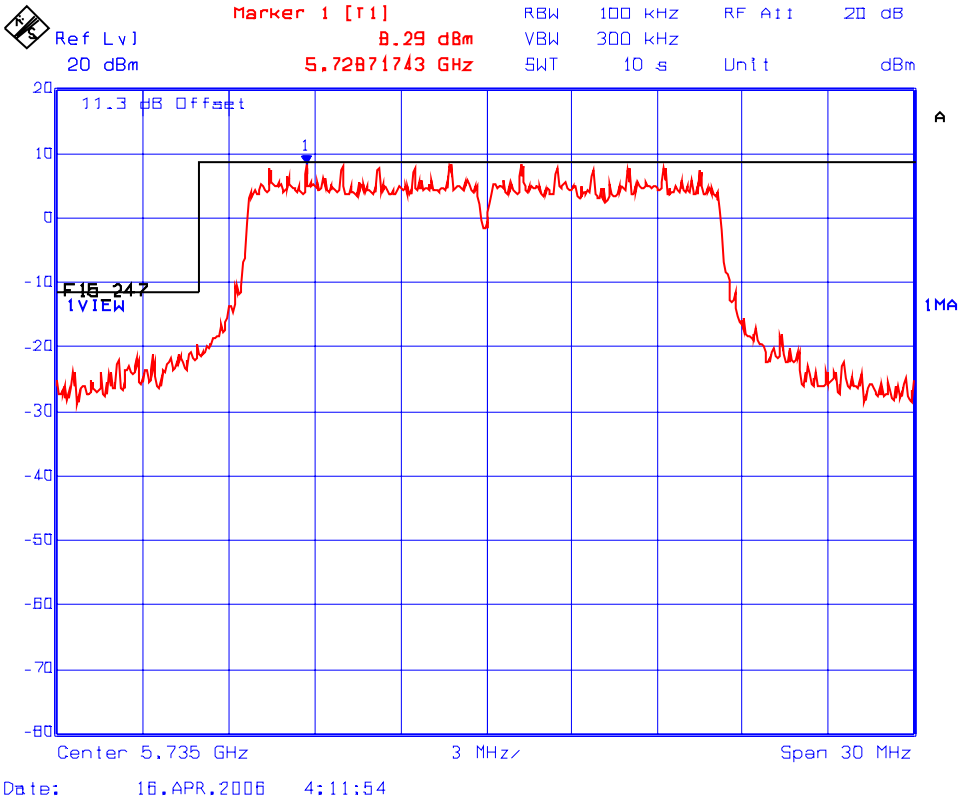
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 50: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Highest Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s



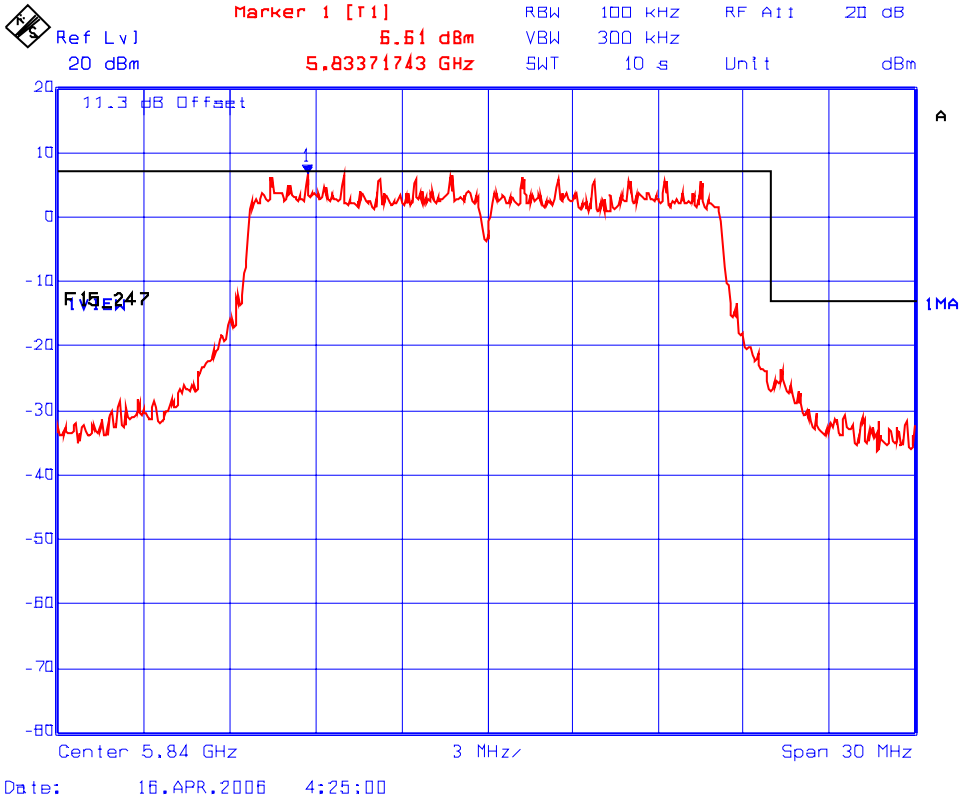
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 51: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Lowest Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 36Mb/s



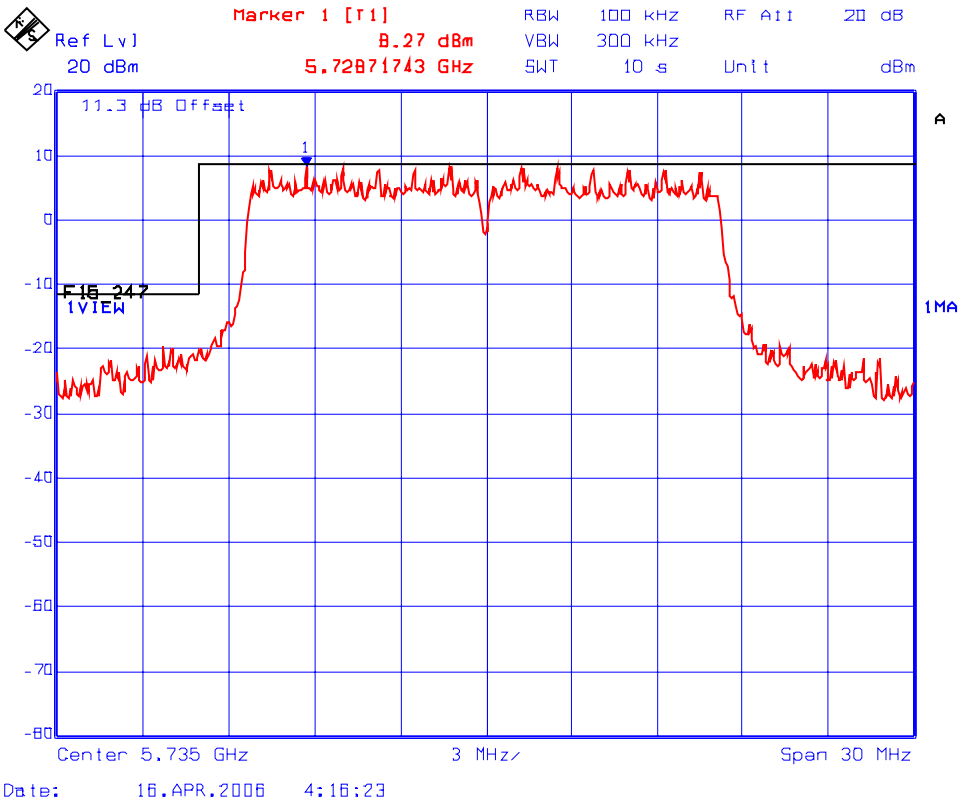
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 52: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Highest Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 36Mb/s



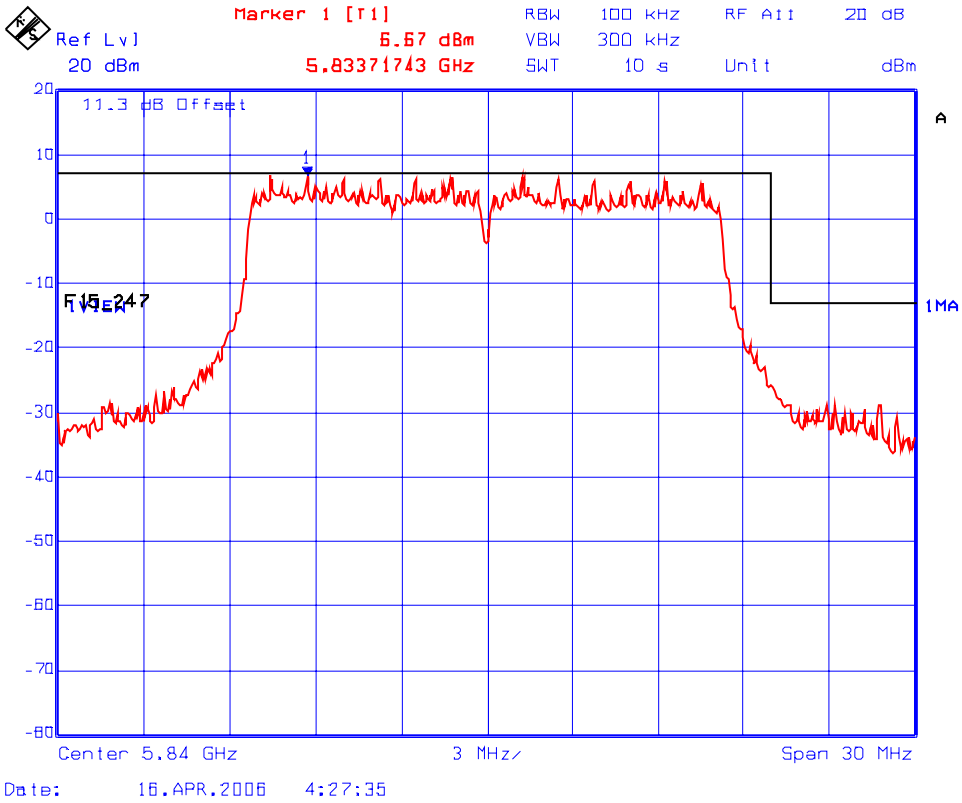
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 53: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Lowest Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 54Mb/s



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

Plot # 54: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing – Lowest Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 54Mb/s

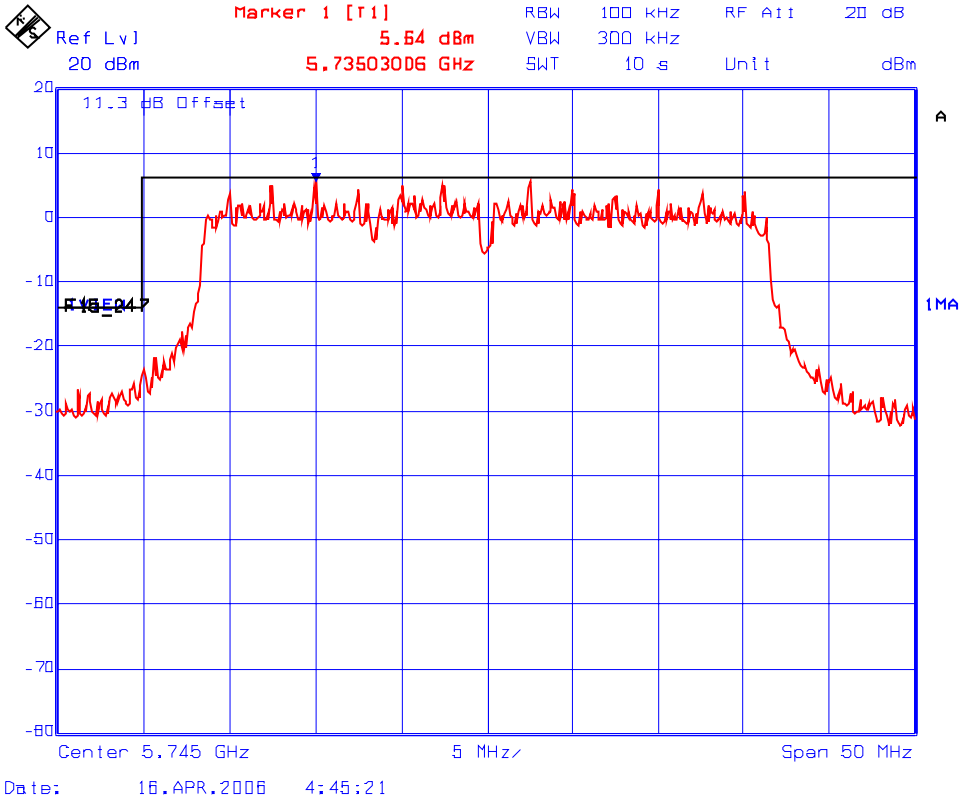


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

4.9.5.3. Transmitter Band-edge Conducted Spurious Emissions wrt. 40 MHz Channel Spacing

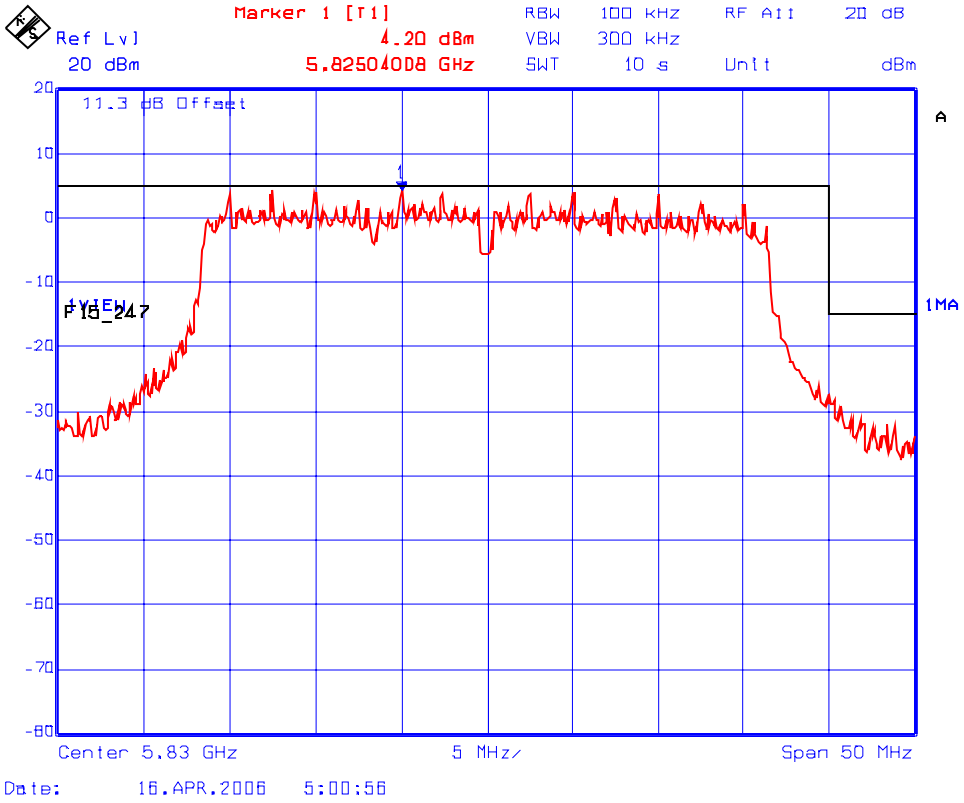
Conforms. Refer to Plots # 55 to 62 for details of Measurements

Plot # 55: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Lowest Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



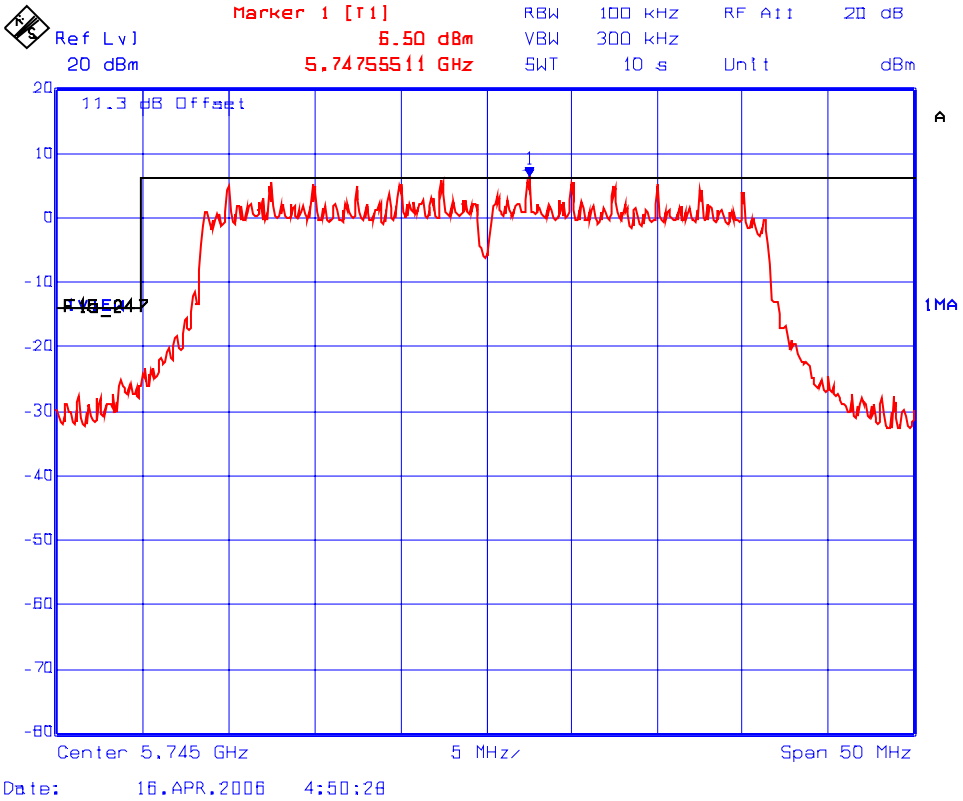
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 56: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Highest Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



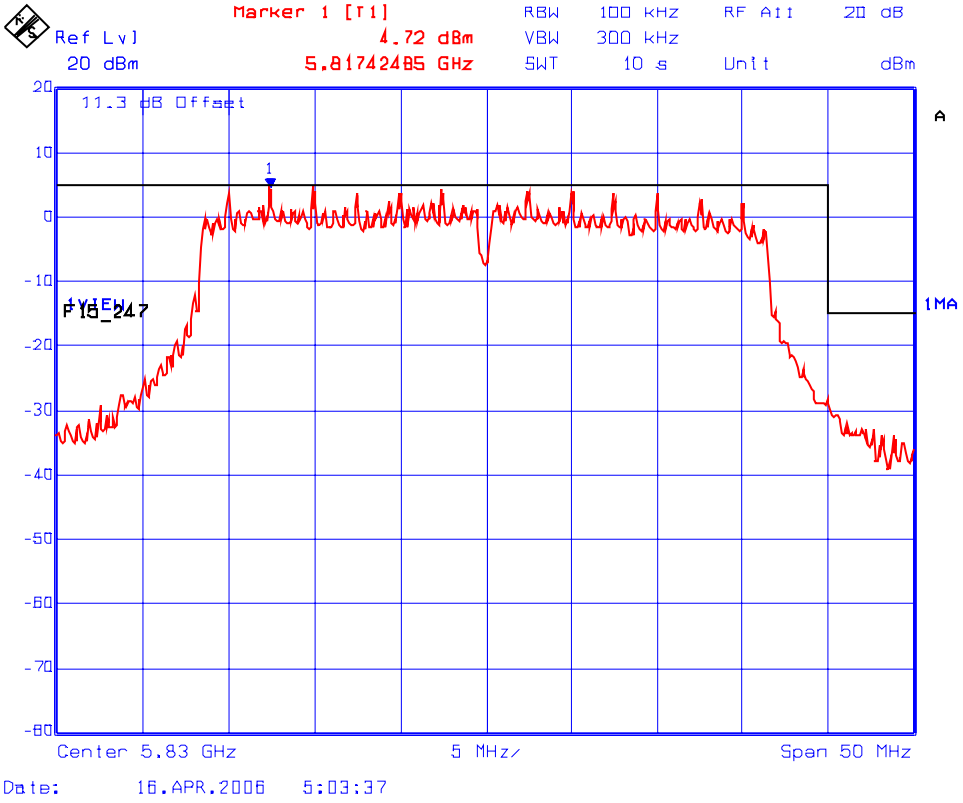
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 57: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Lowest Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 36Mb/s



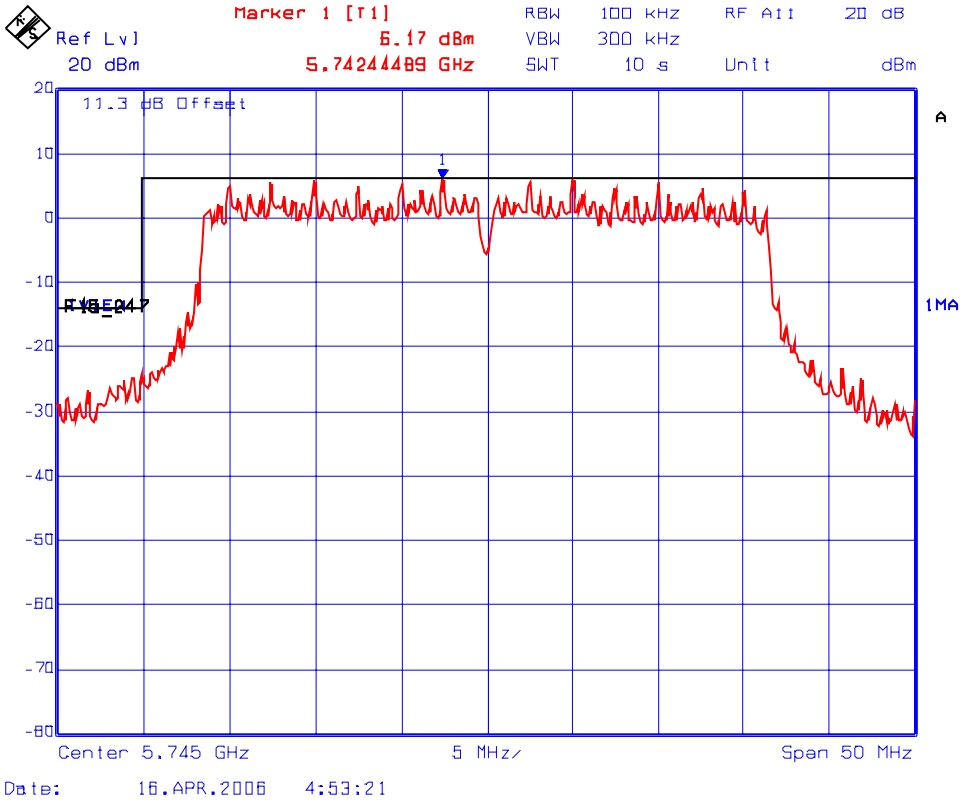
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 58: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Highest Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 36Mb/s



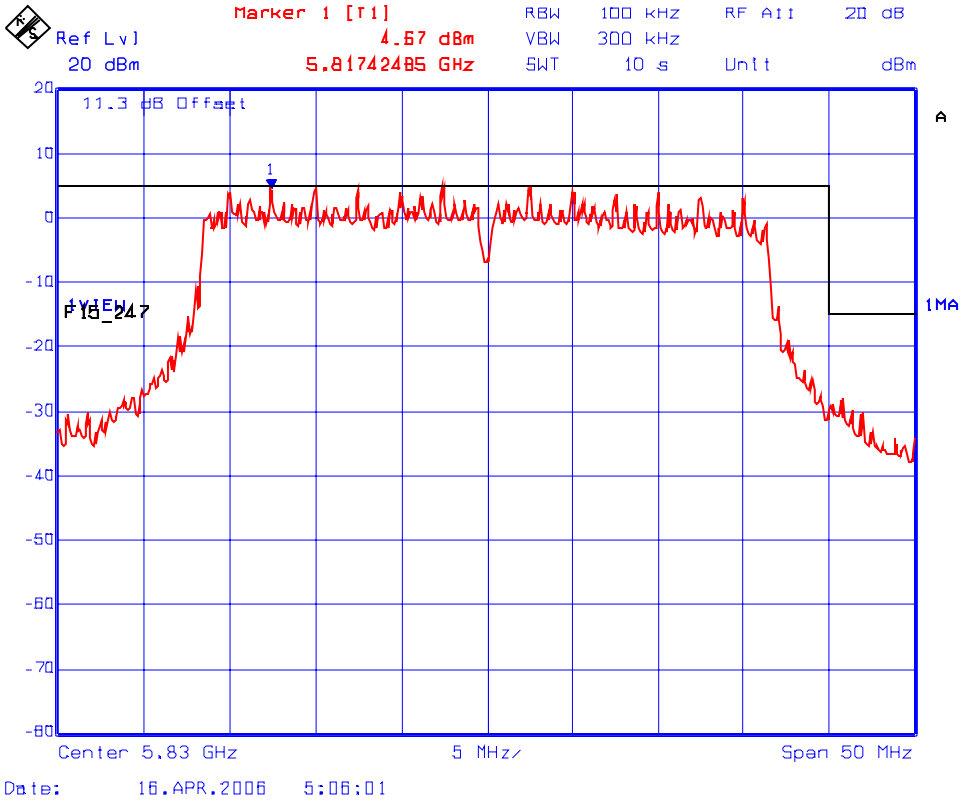
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 59: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Lowest Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 72Mb/s



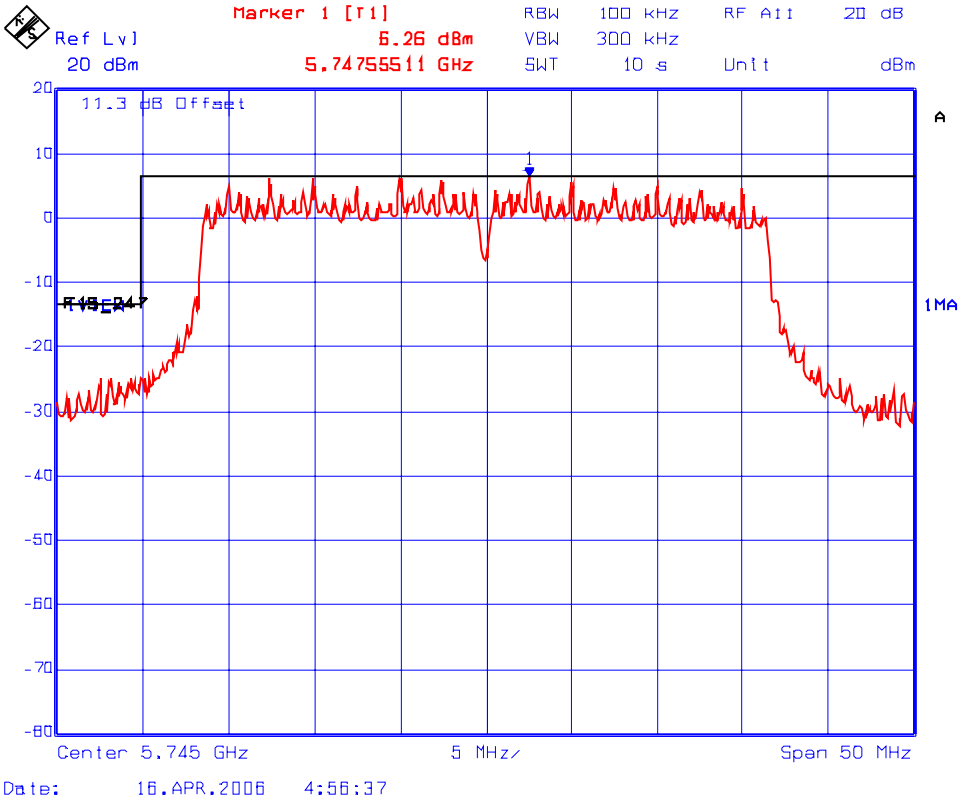
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 60: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Highest Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 72Mb/s



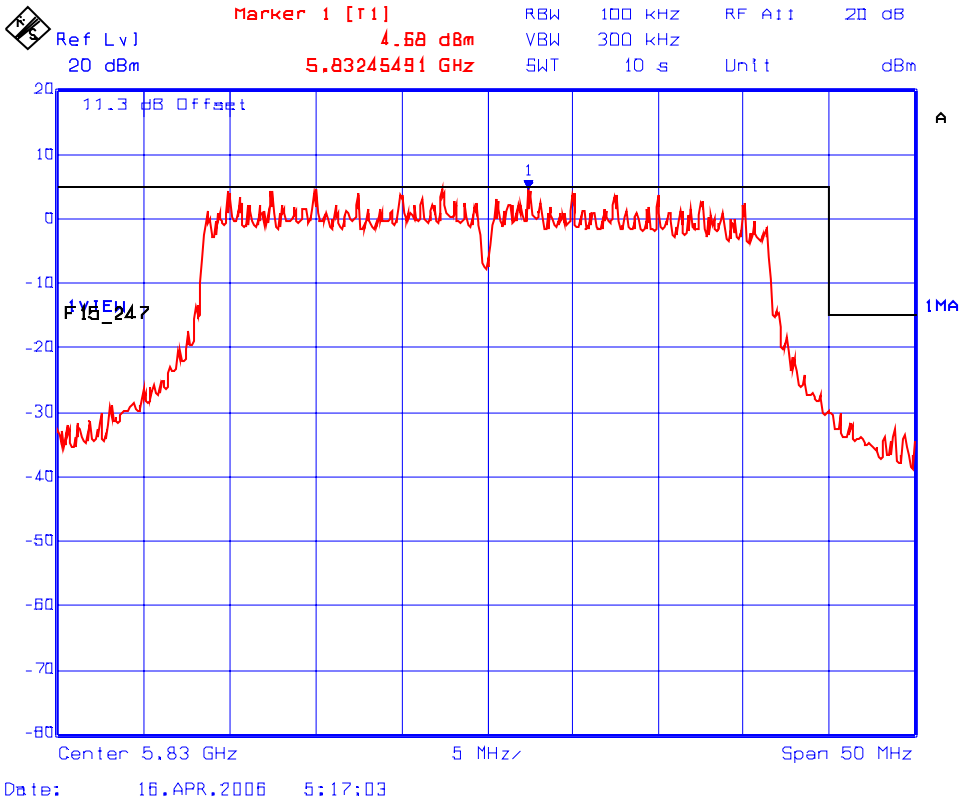
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 61: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Lowest Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 108Mb/s



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

Plot # 62: Transmitter Band-Edge Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing – Lowest Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 108Mb/s

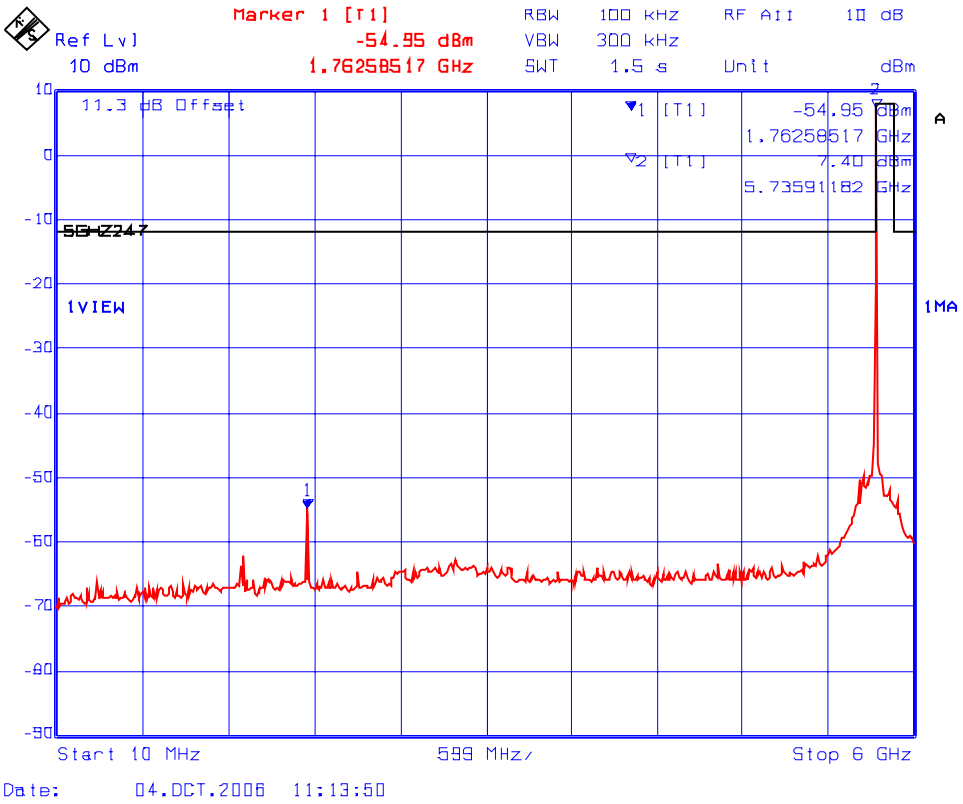


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

4.9.5.4. Transmitter Conducted Spurious Emissions wrt. 10 MHz Channel Spacing

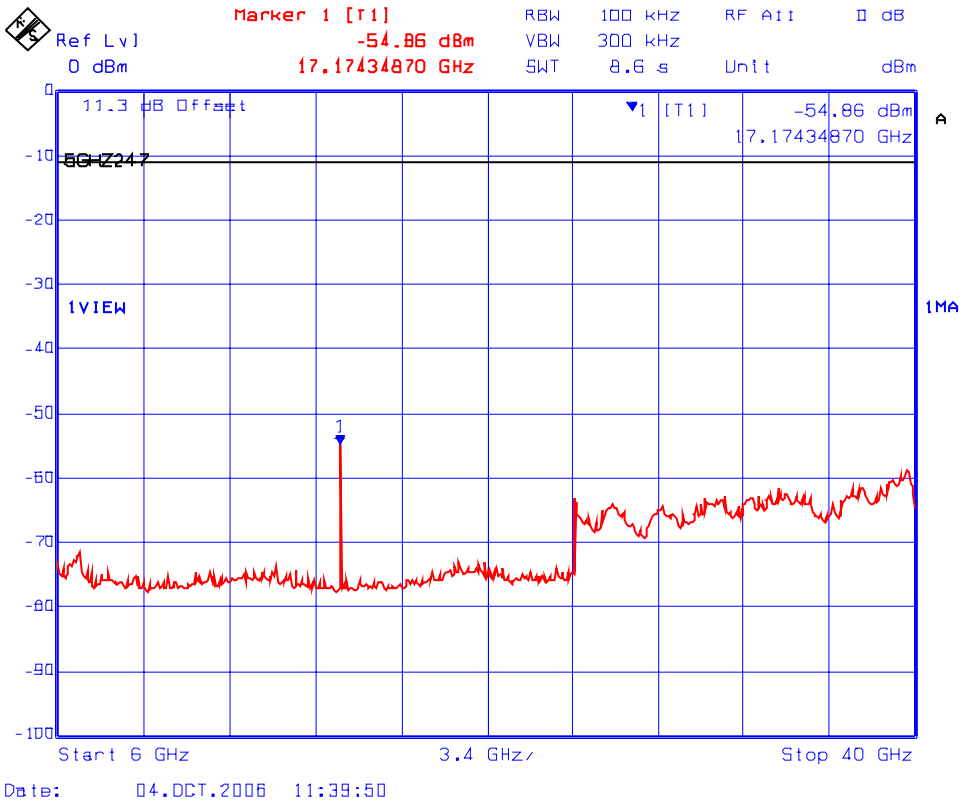
Note: Since the output power and bandwidth the rf signal with all different modulations were found to be the same, the
Transmitter Conducted Spurious Emissions with the modulation of BPSK @ 4.5 Mb/s was chosen to be tested to represent for all other modulations.

Plot # 63(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



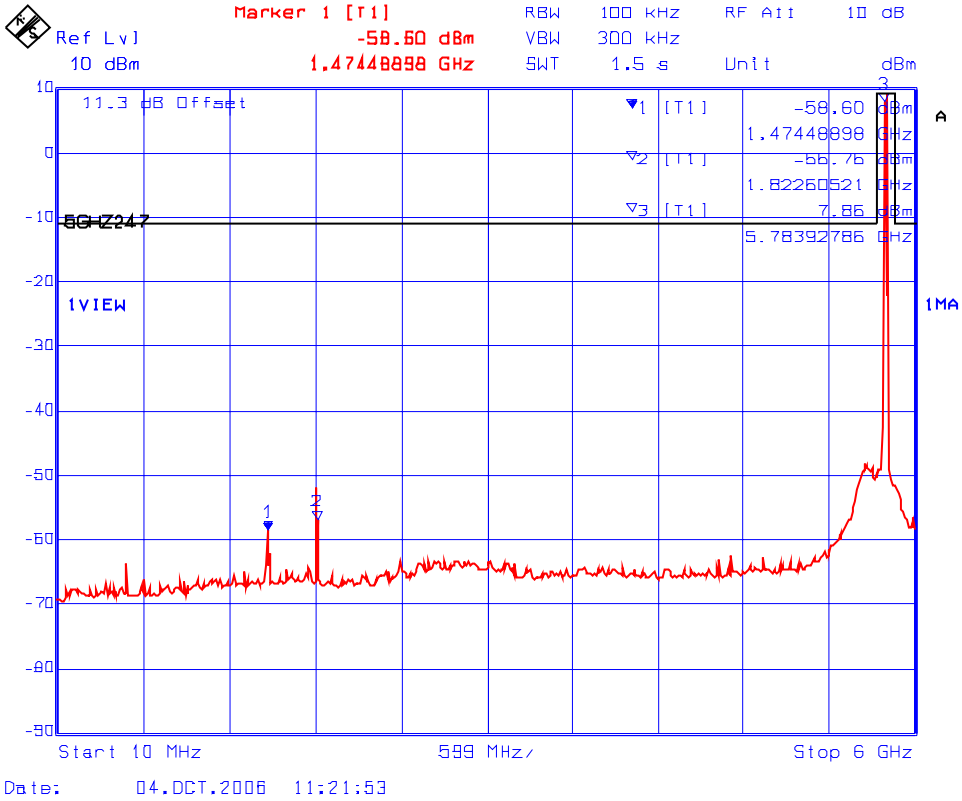
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 63(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



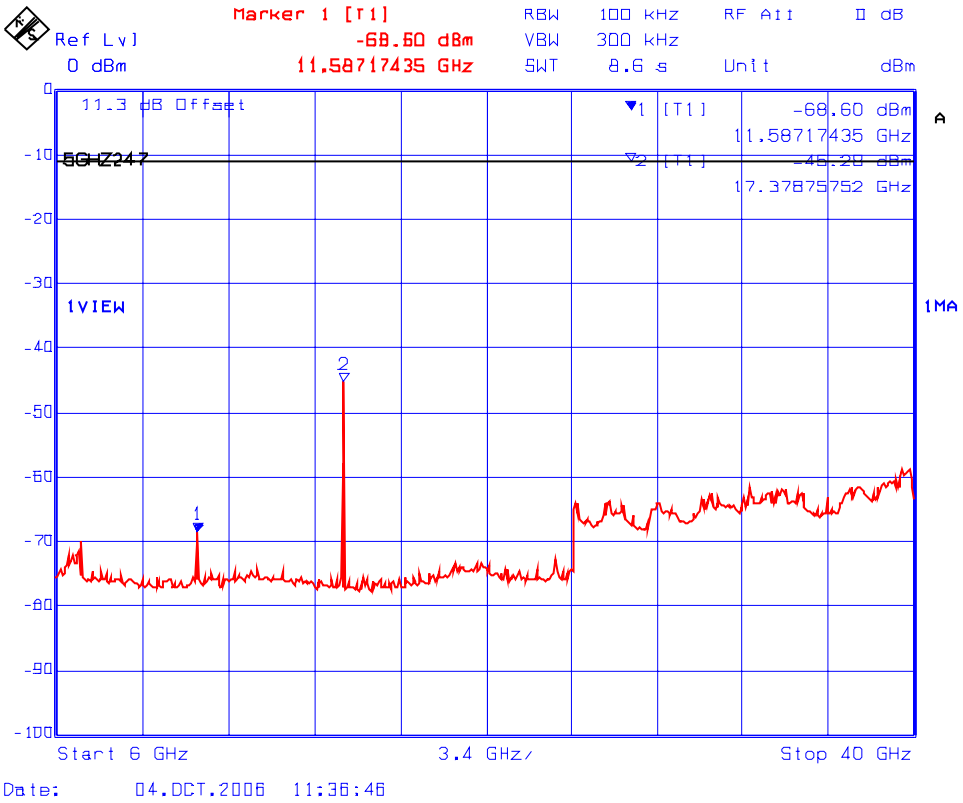
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 64(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



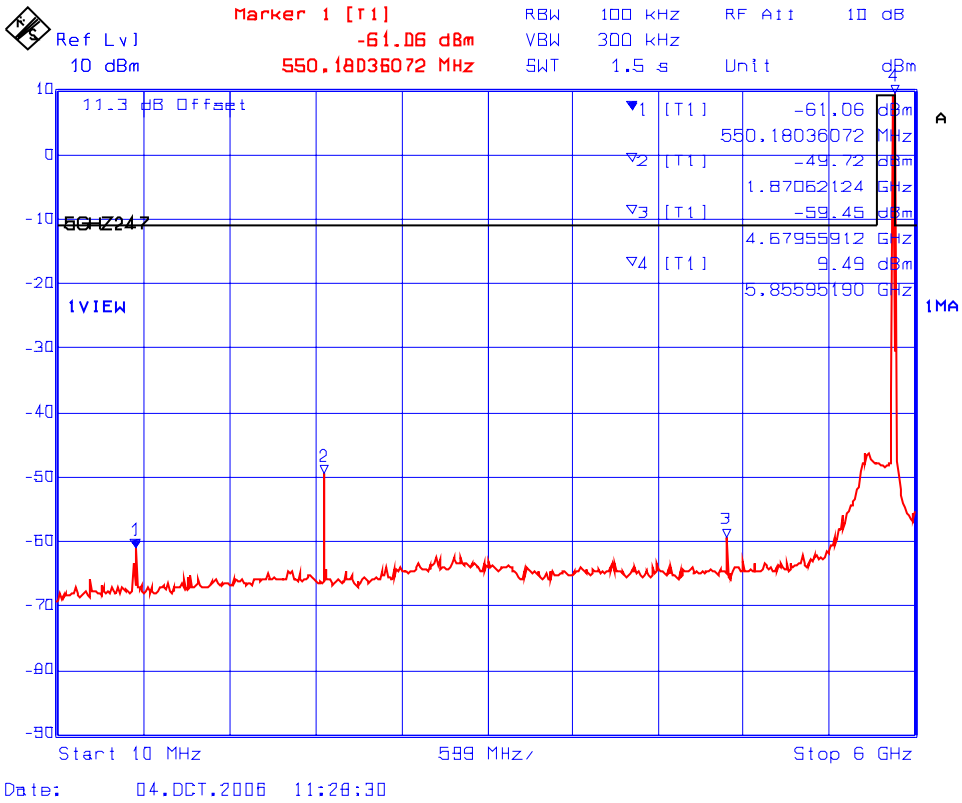
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 64(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



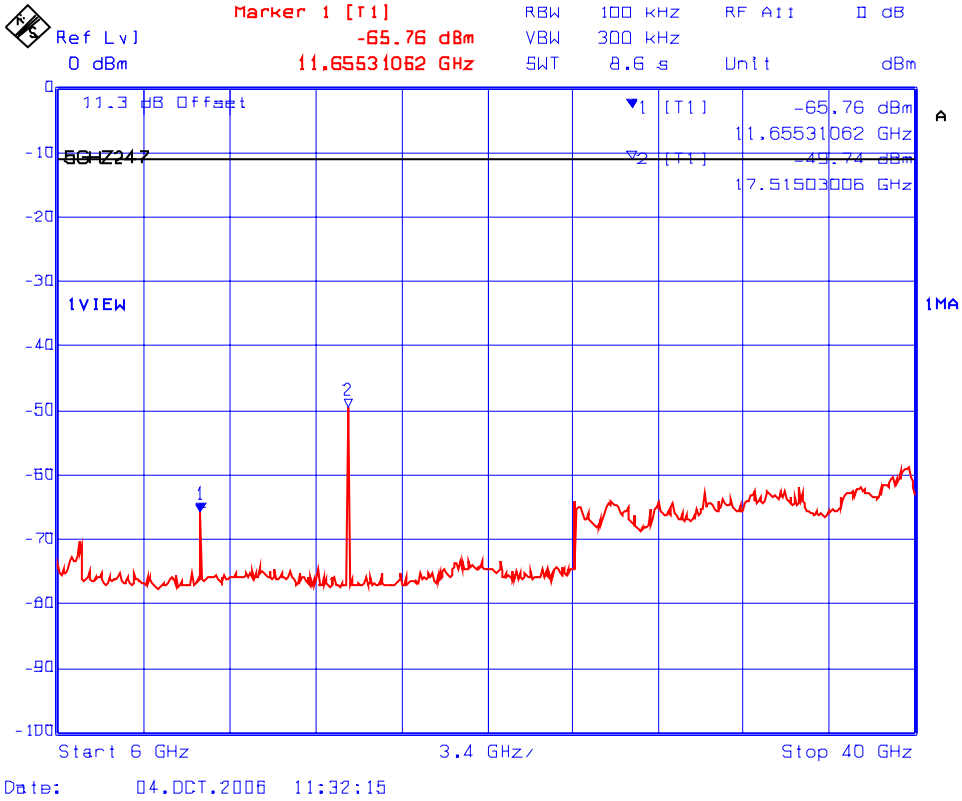
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 65(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



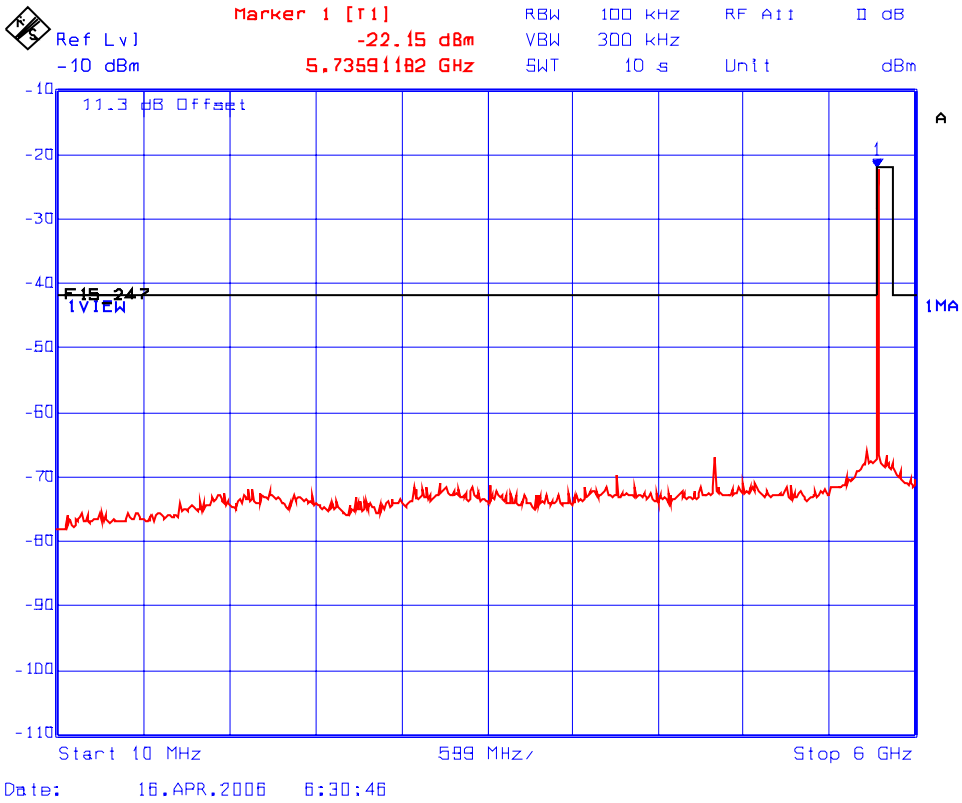
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 65(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 4.5Mb/s



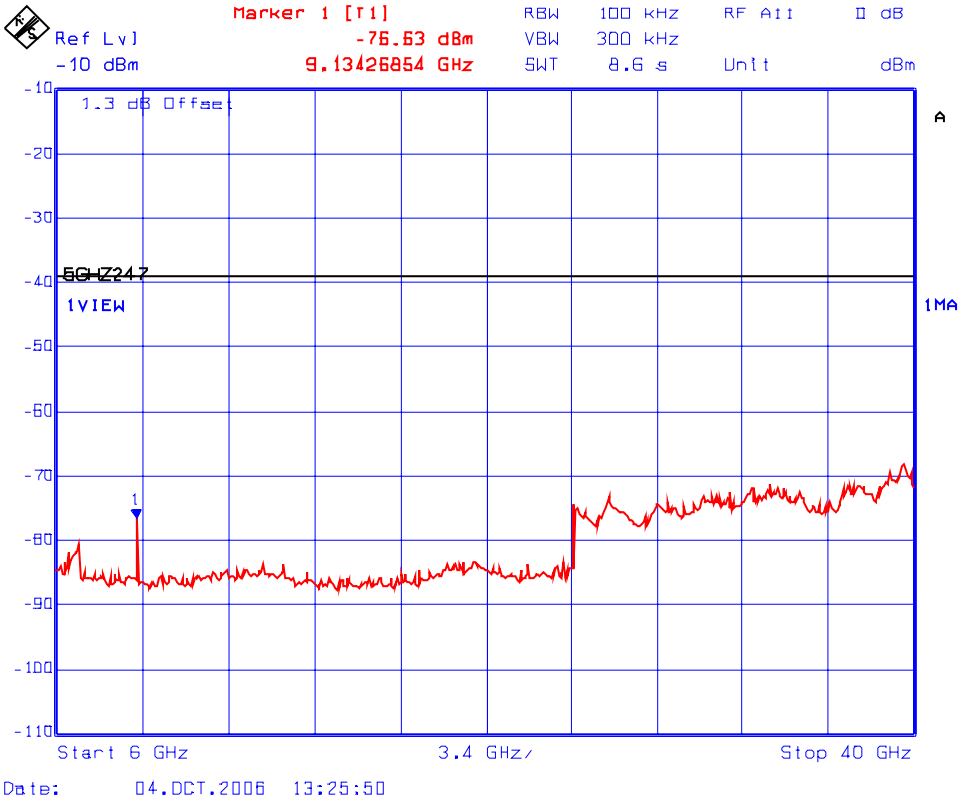
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 66(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5730 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s



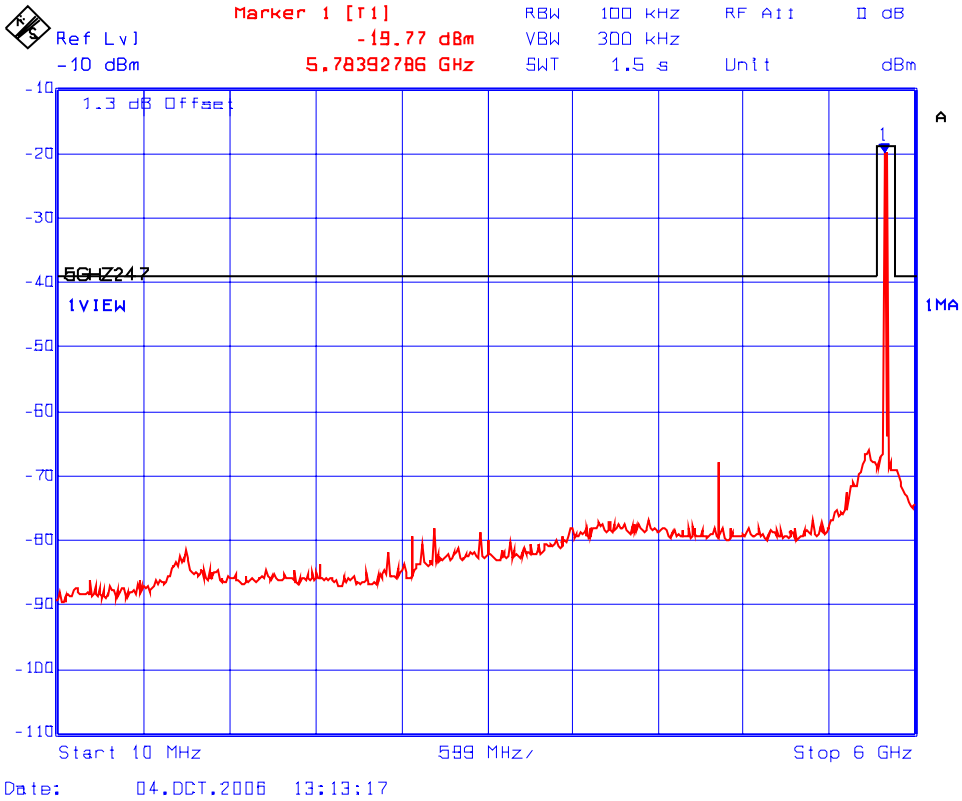
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 66(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5730 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s



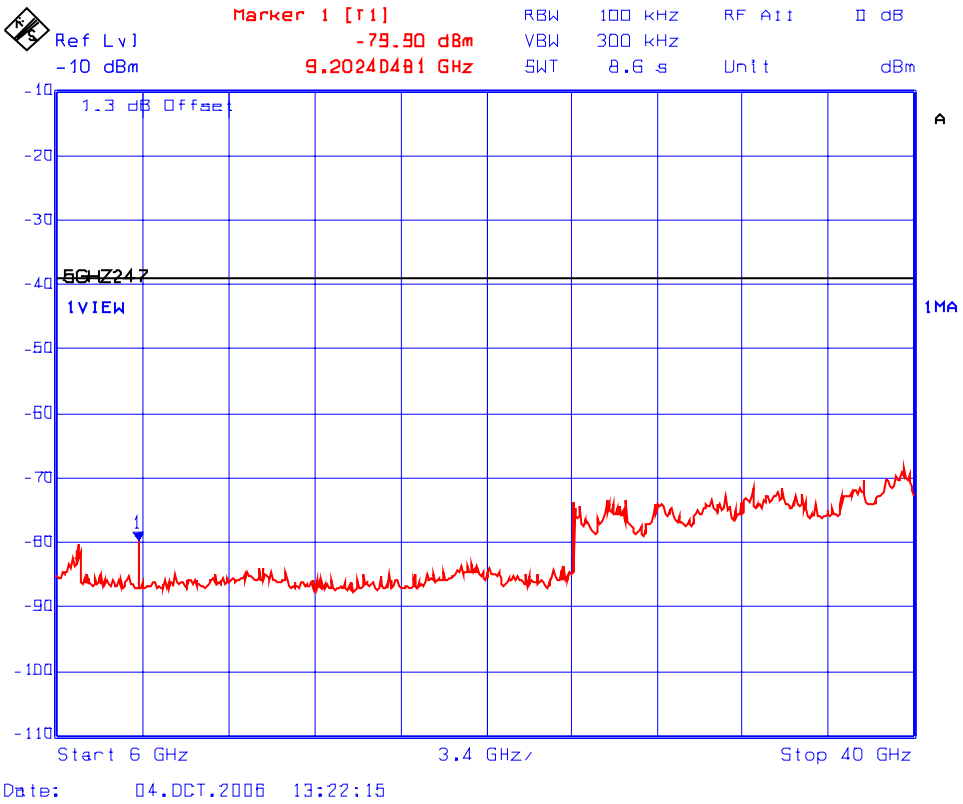
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 67(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s



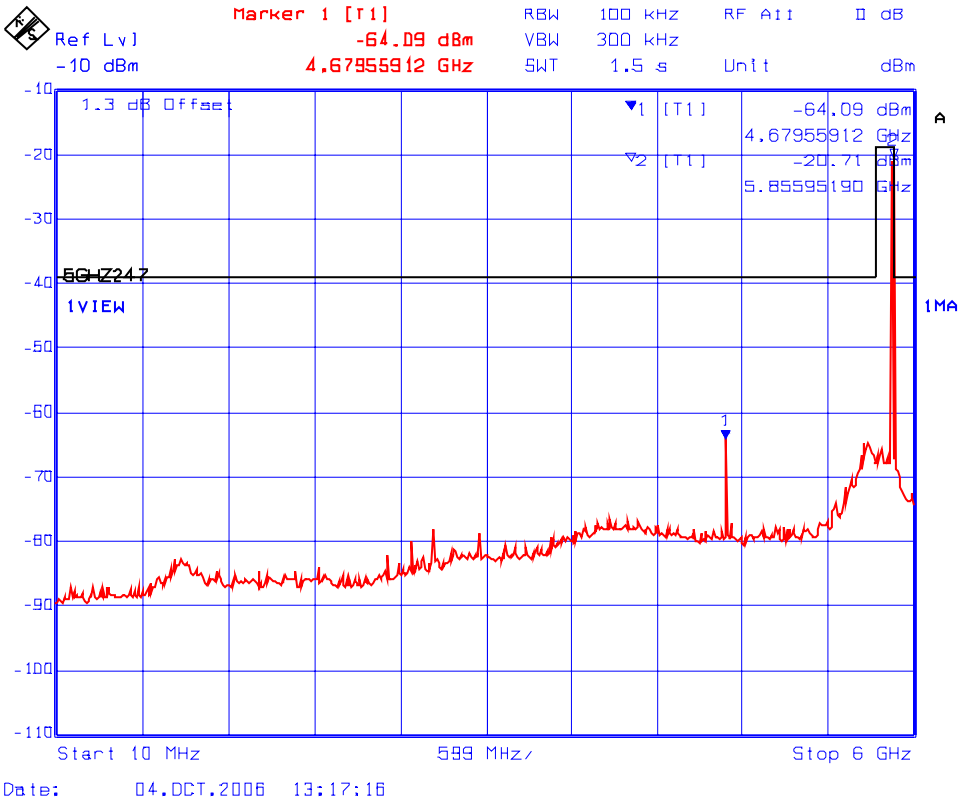
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 67(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s



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

Plot # 68(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5845 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s



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

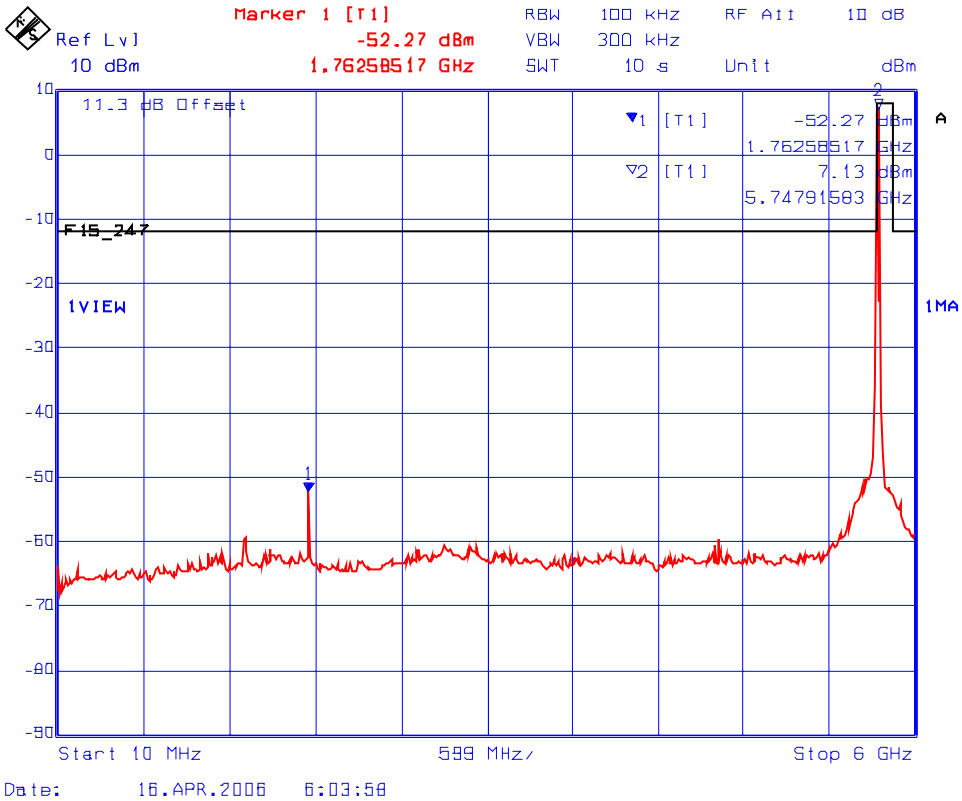
Plot # 68(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 10 MHz Channel Spacing - Frequency: 5845 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 4.5Mb/s

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

4.9.5.5. Transmitter Conducted Spurious Emissions wrt. 20 MHz Channel Spacing

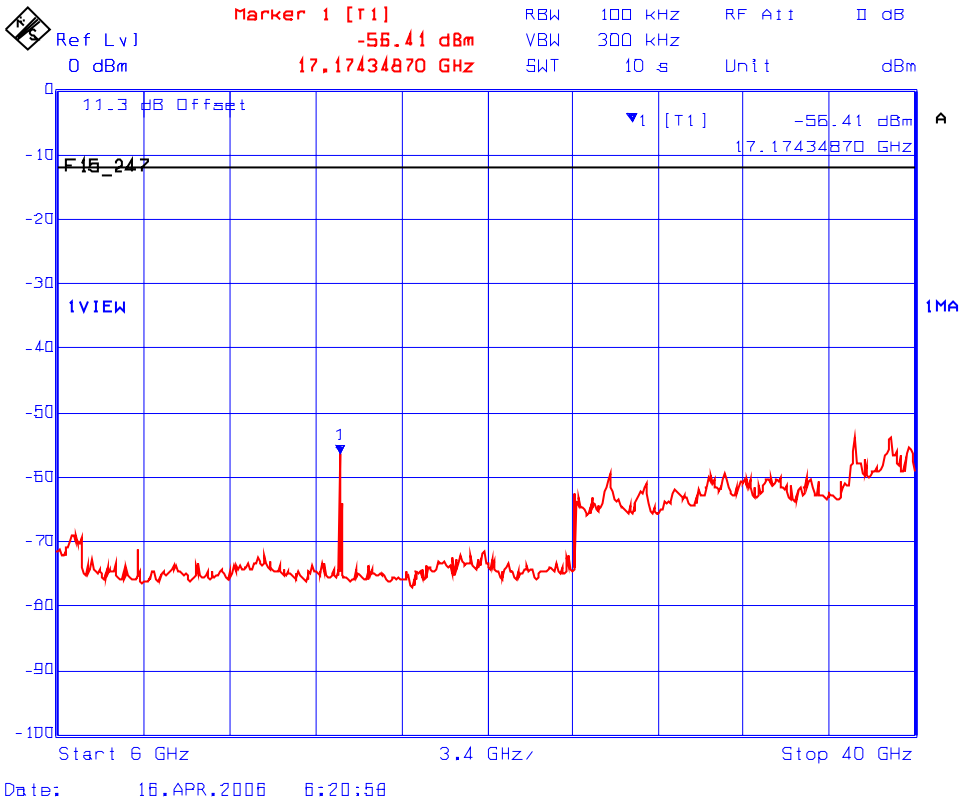
Note: Since the output power and bandwidth the rf signal with all different modulations were found to be the same, the
Transmitter Conducted Spurious Emissions with the modulation of BPSK @ 9 Mb/s was chosen to be tested to represent for all other modulations.

Plot # 69(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



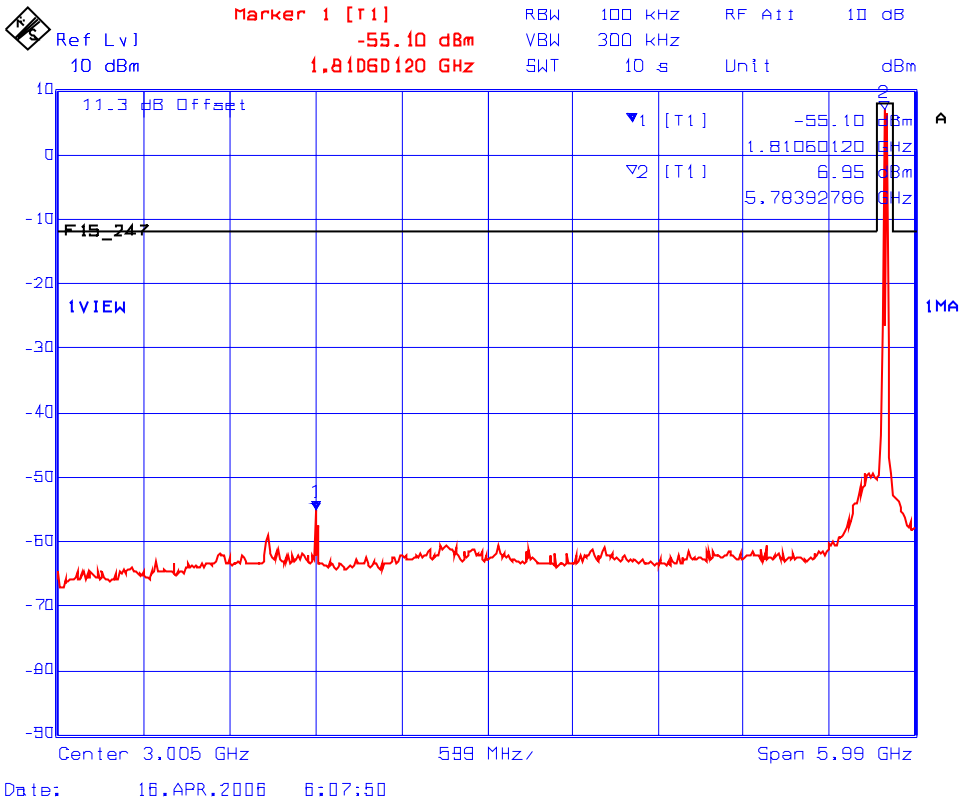
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 69(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



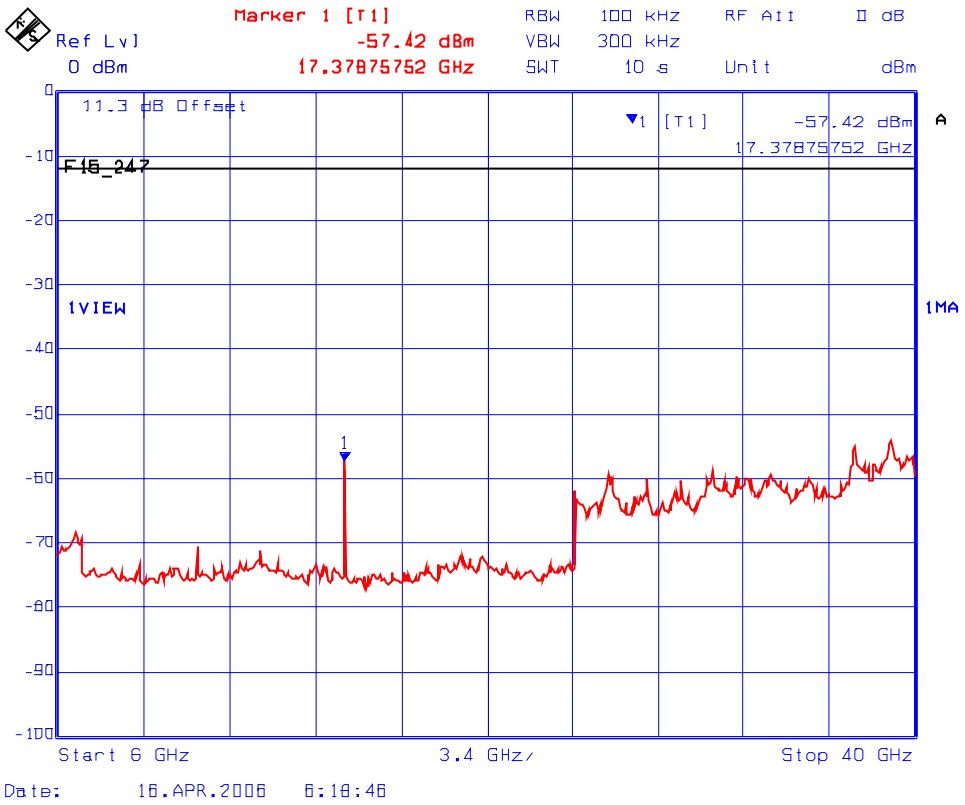
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 70(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



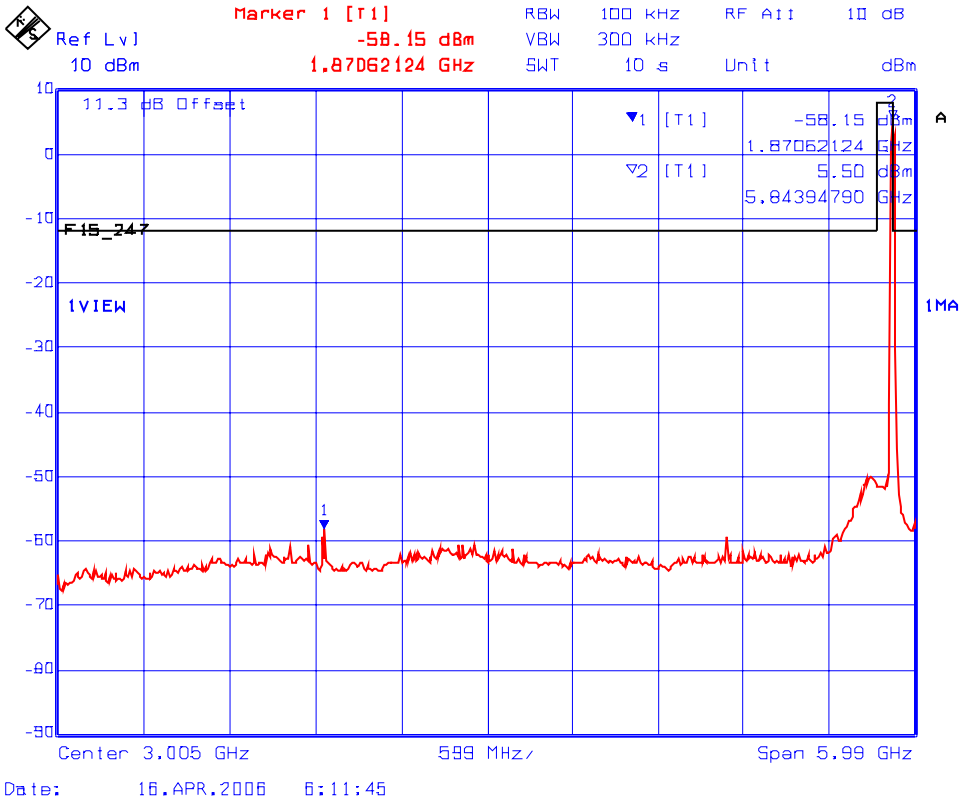
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 70(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



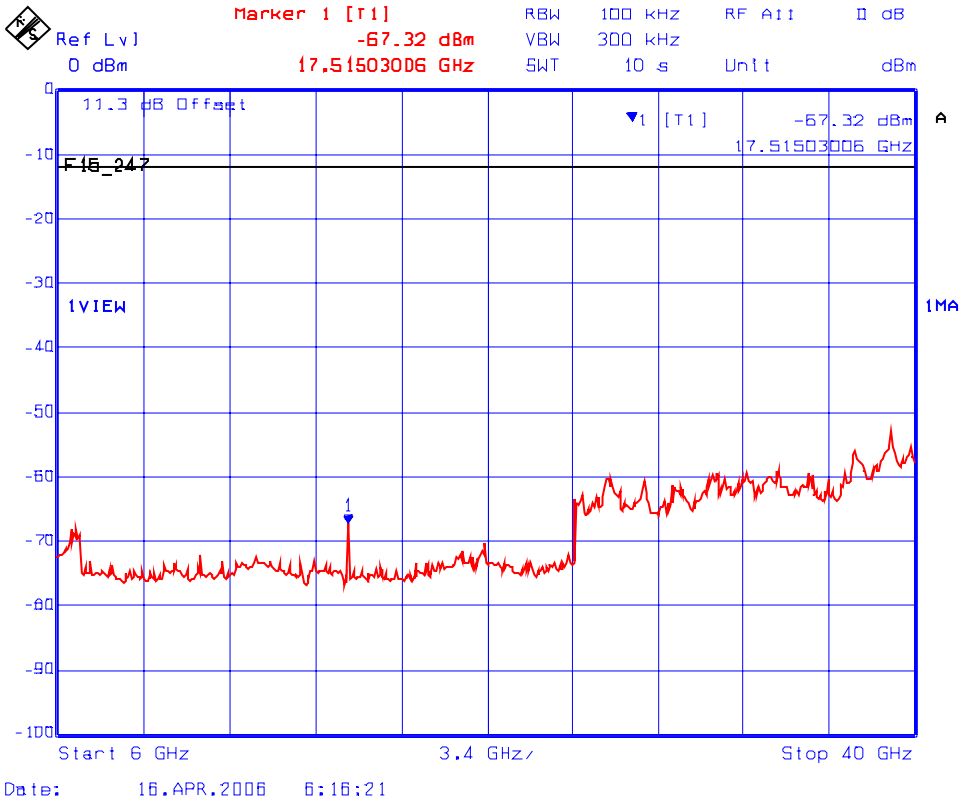
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 71(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



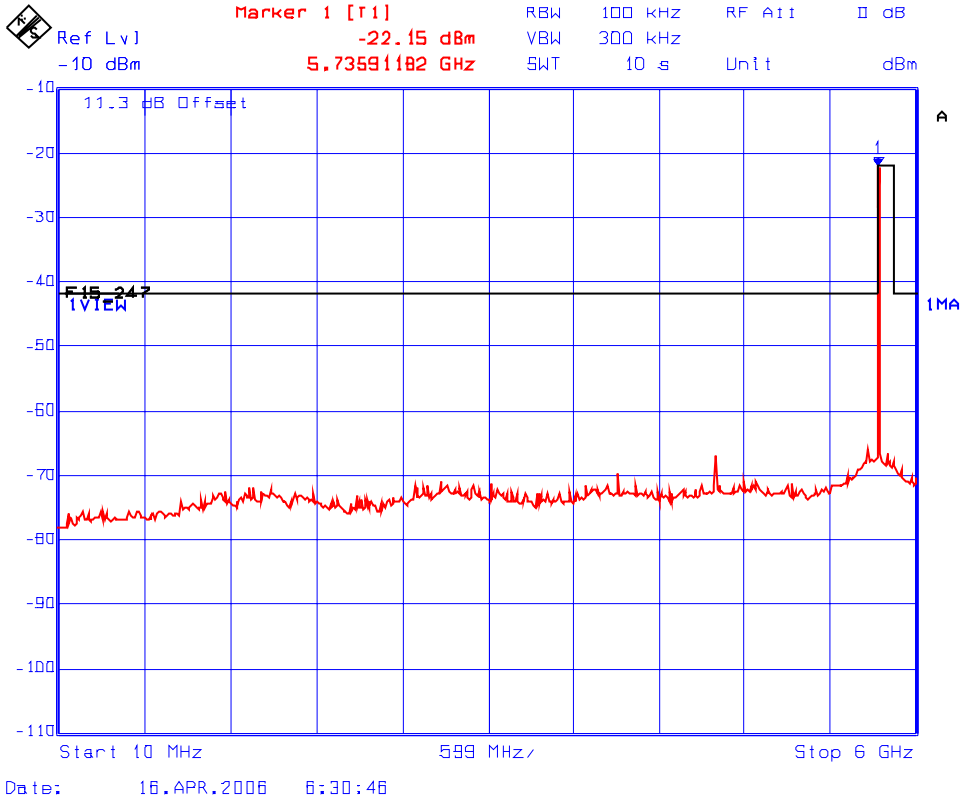
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 71(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



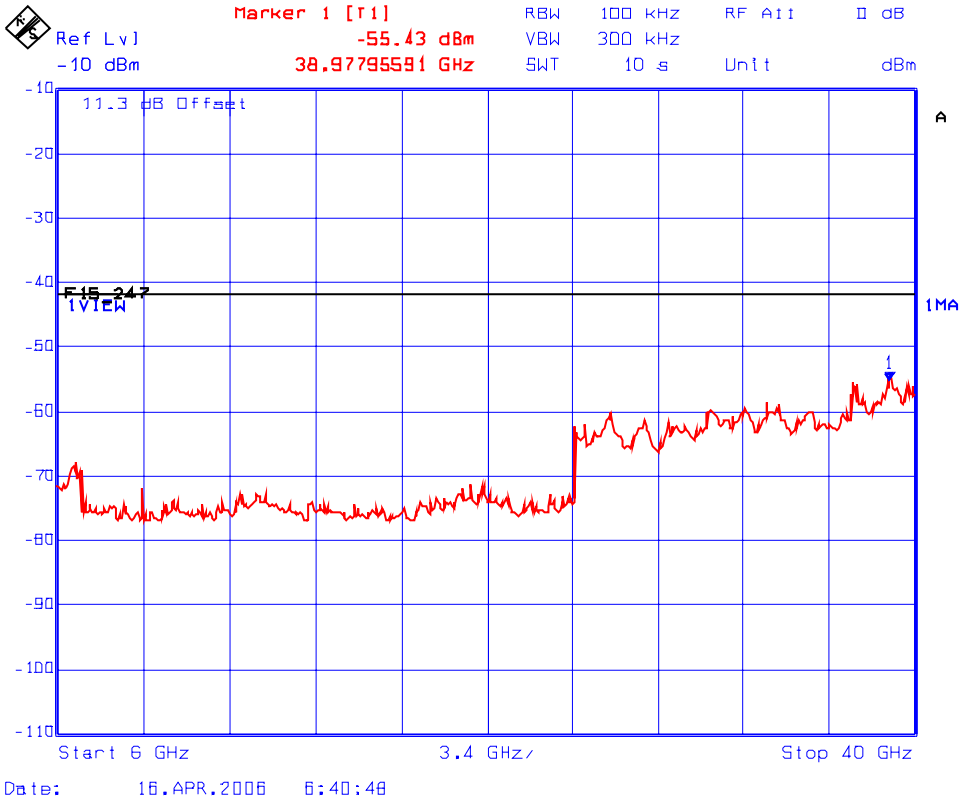
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 72(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5735 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s



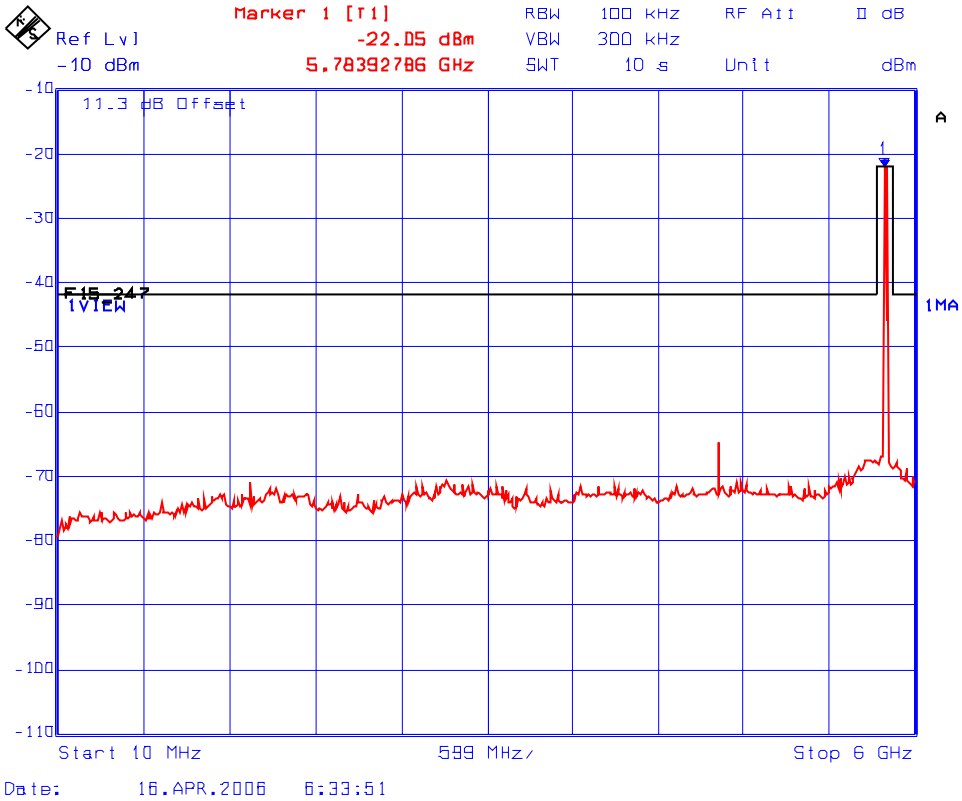
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 72(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5735 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s



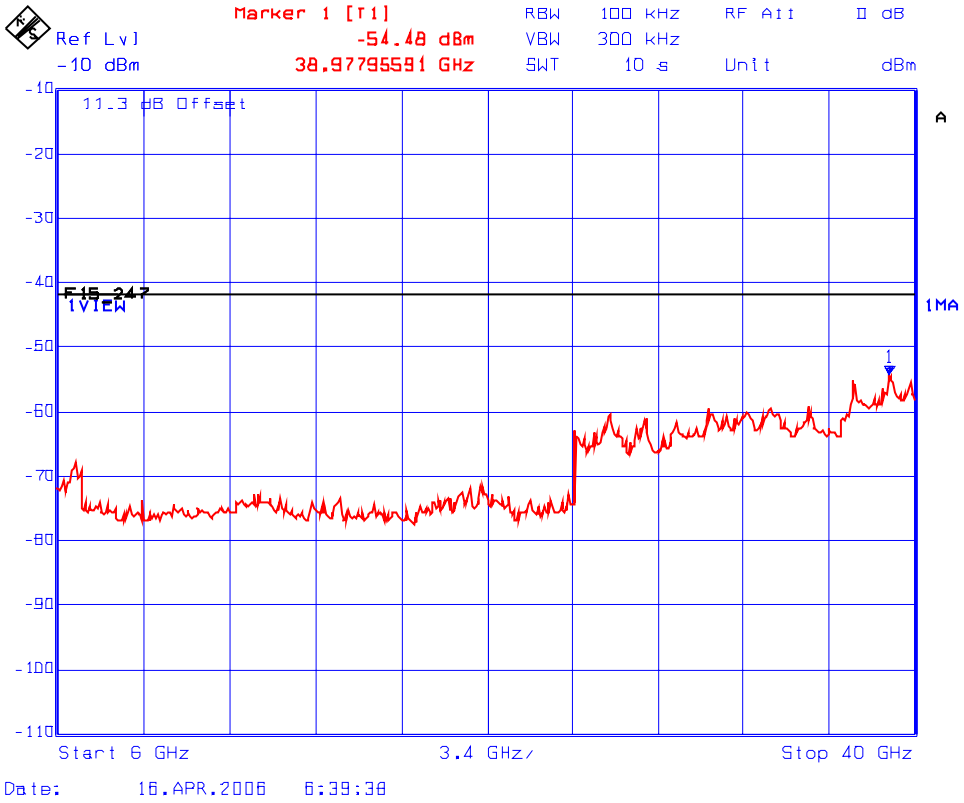
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 73(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s



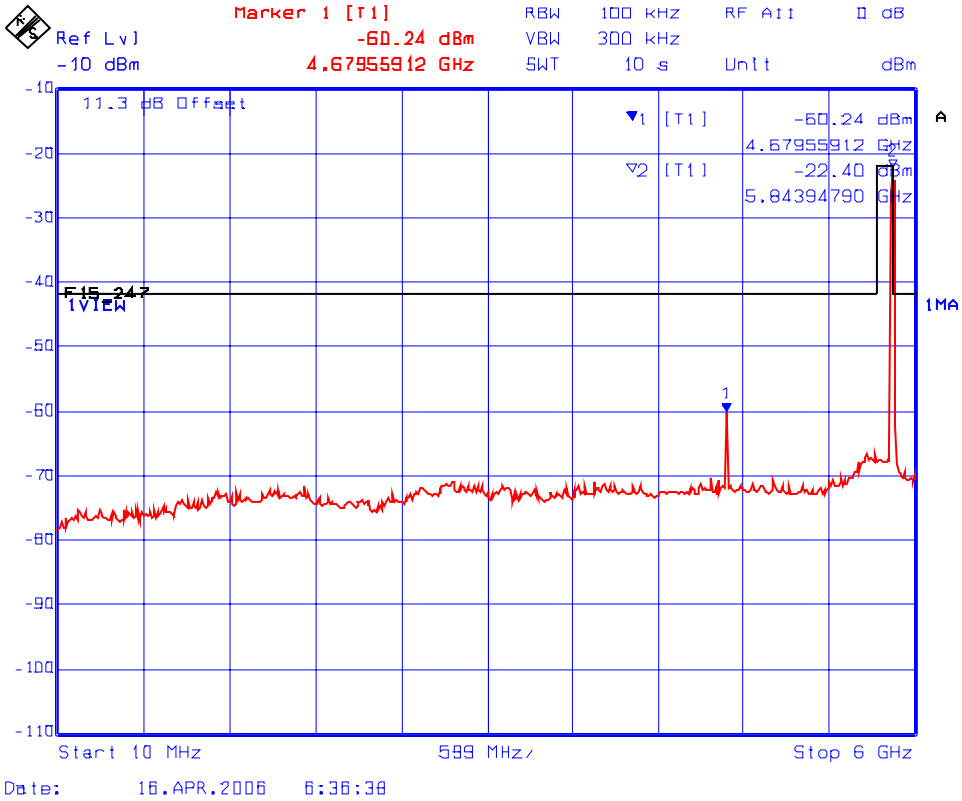
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 73(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s



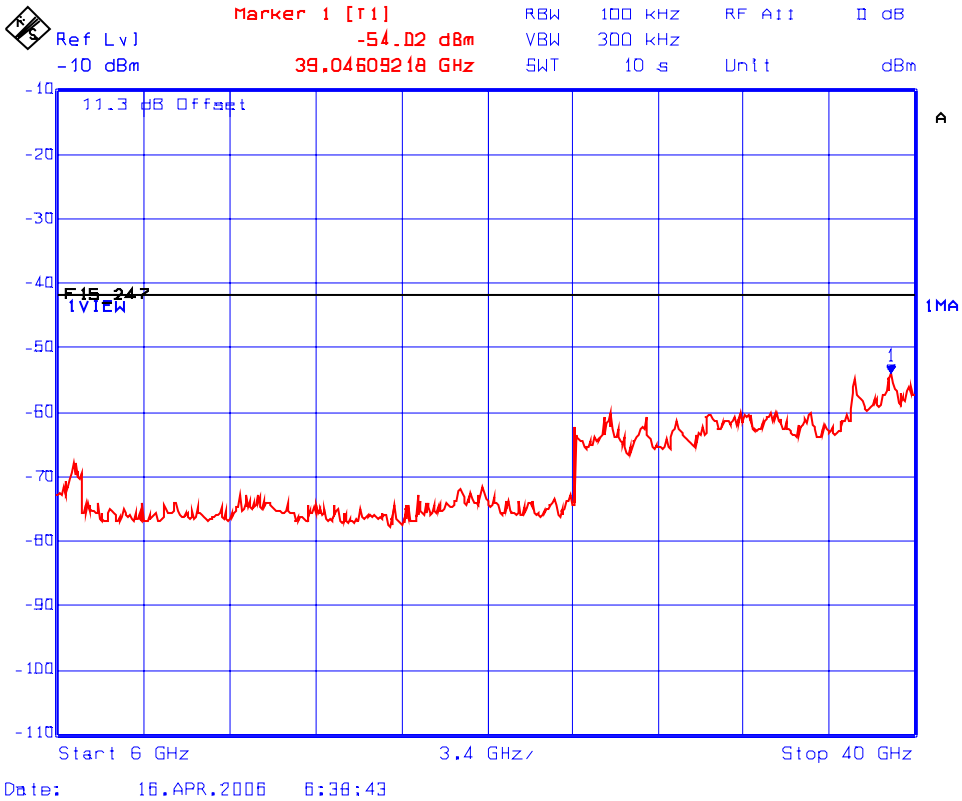
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 74(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5840 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s



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

Plot # 74(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 20 MHz Channel Spacing - Frequency: 5840 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 9Mb/s

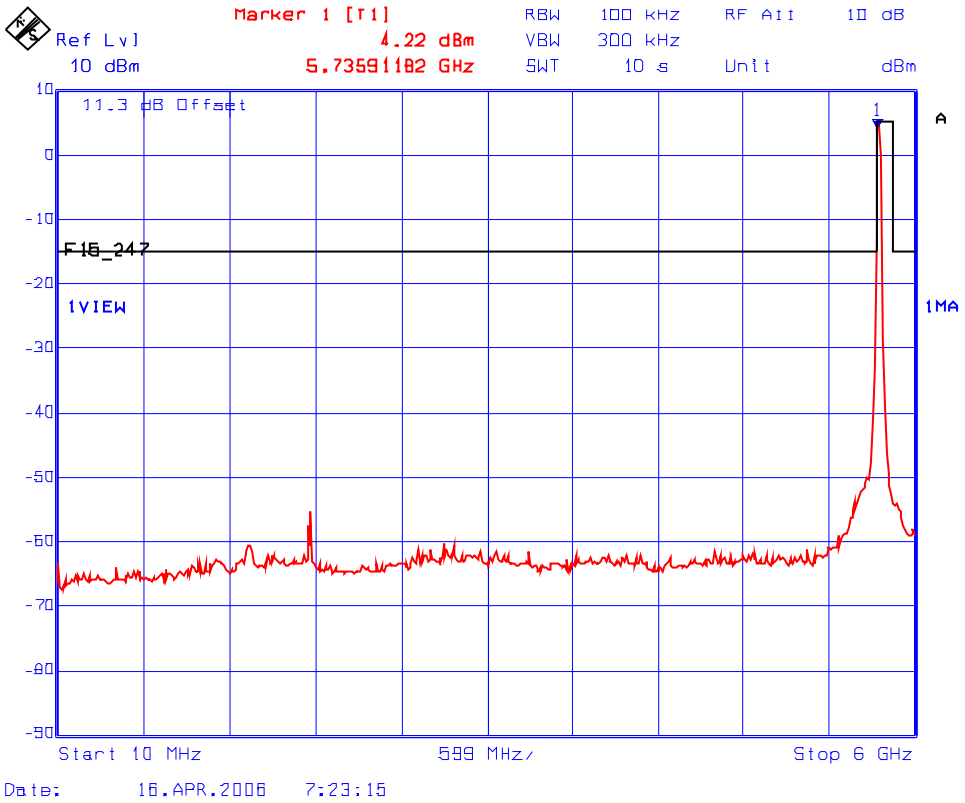


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

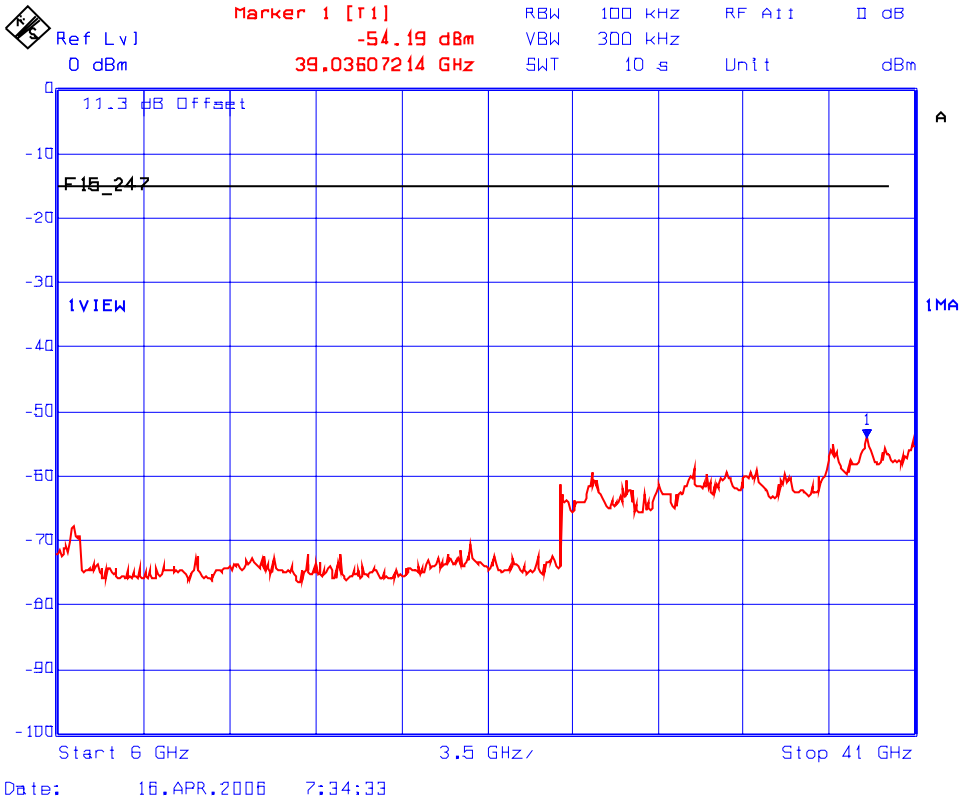
4.9.5.6. Transmitter Conducted Spurious Emissions wrt. 40 MHz Channel Spacing

Note: Since the output power and bandwidth the rf signal with all different modulations were found to be the same, the
Transmitter Conducted Spurious Emissions with the modulation of BPSK @ 18 Mb/s was chosen to be tested to represent for all other modulations.

Plot # 75(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s

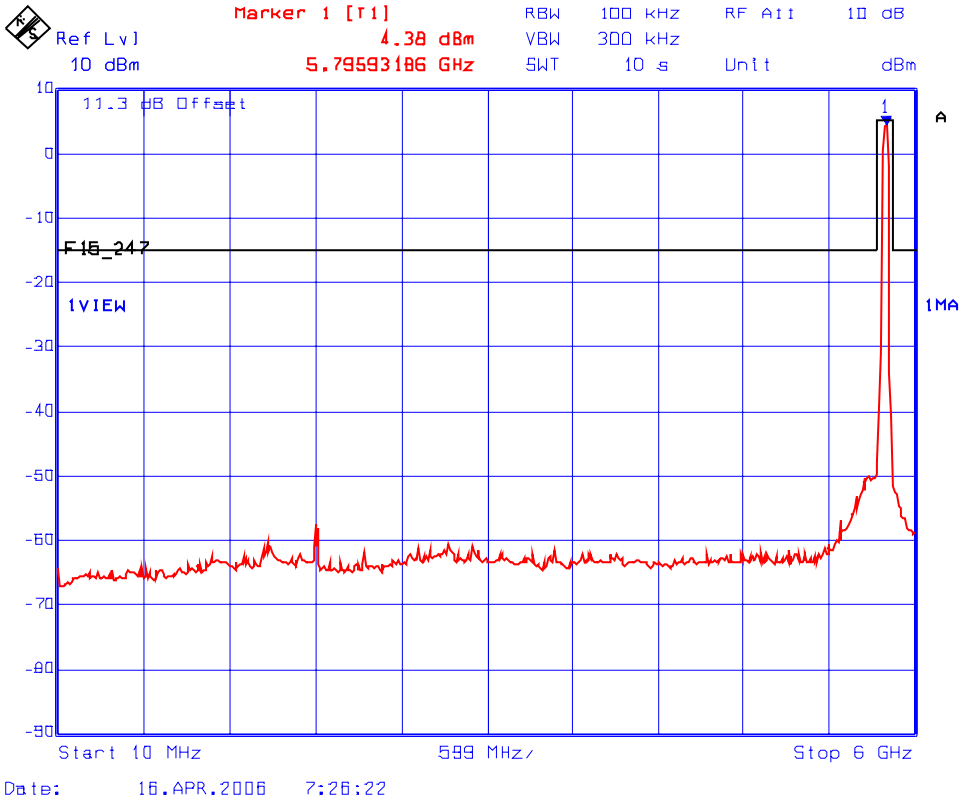


Plot # 75(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



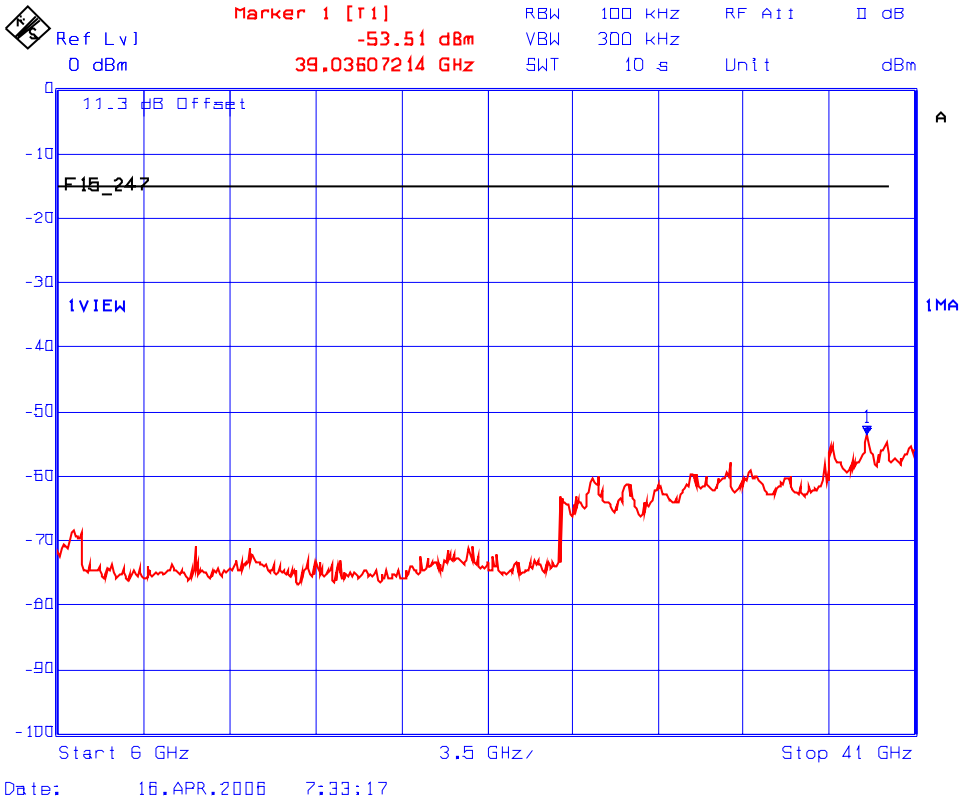
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 76(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



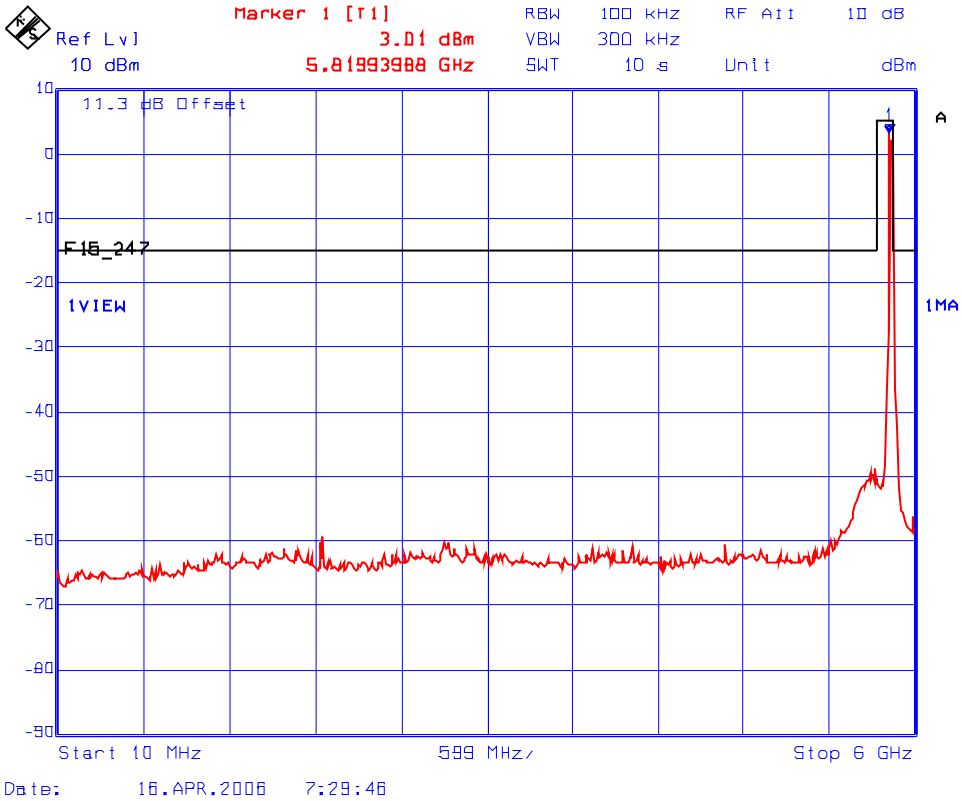
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 76(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



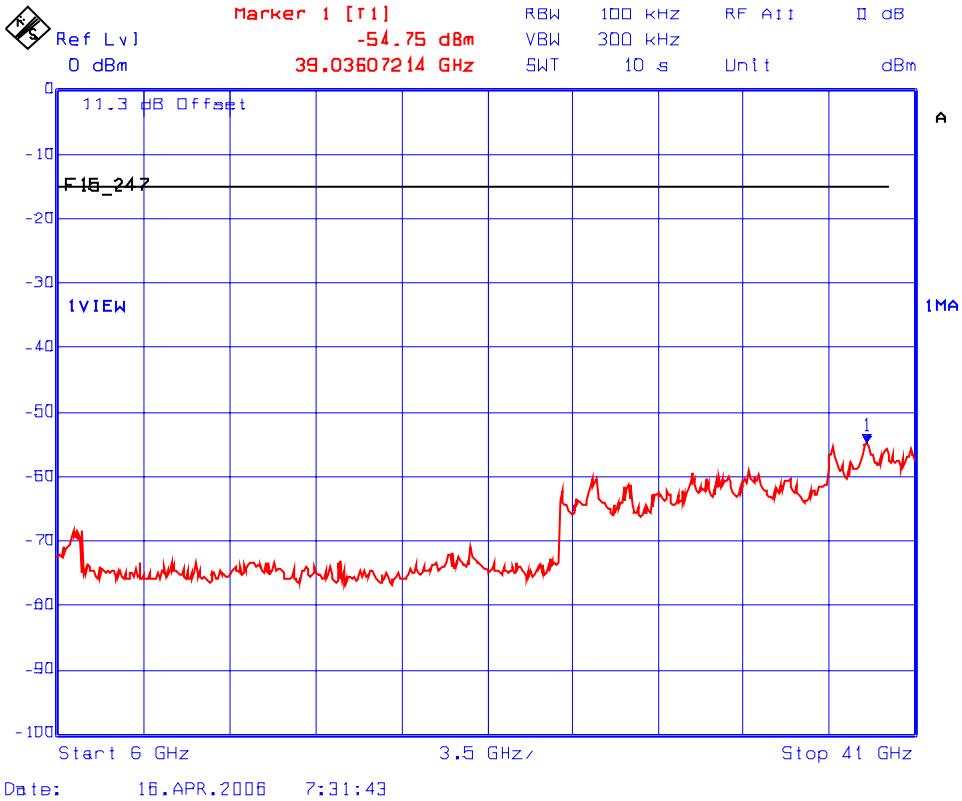
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 77(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



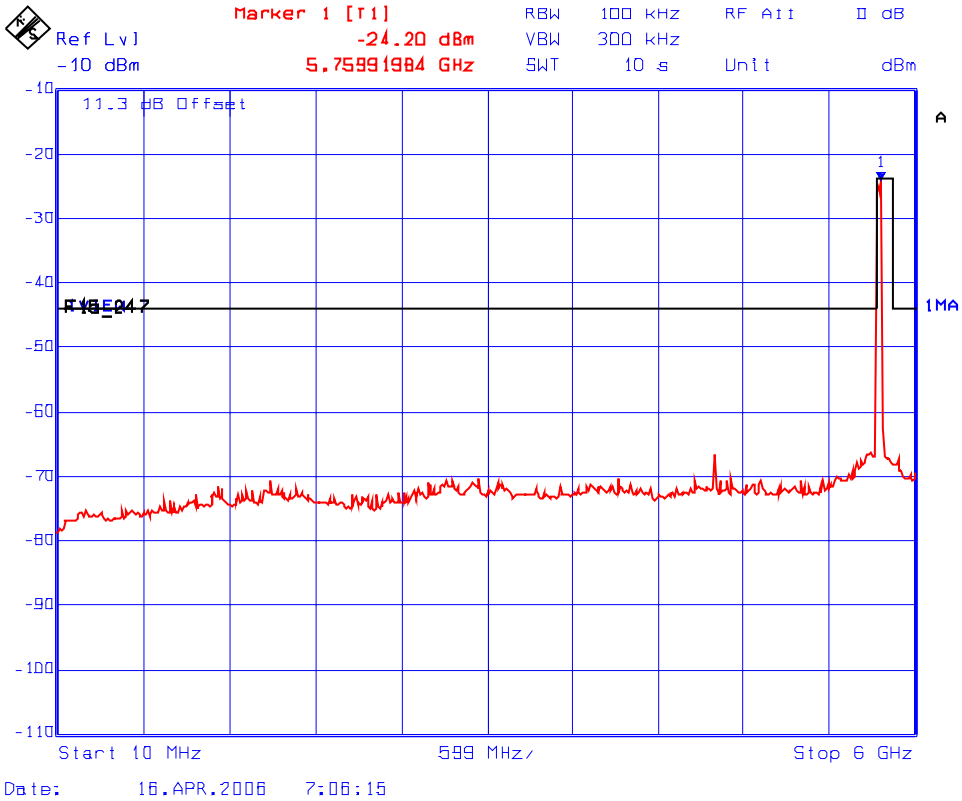
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 77(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s



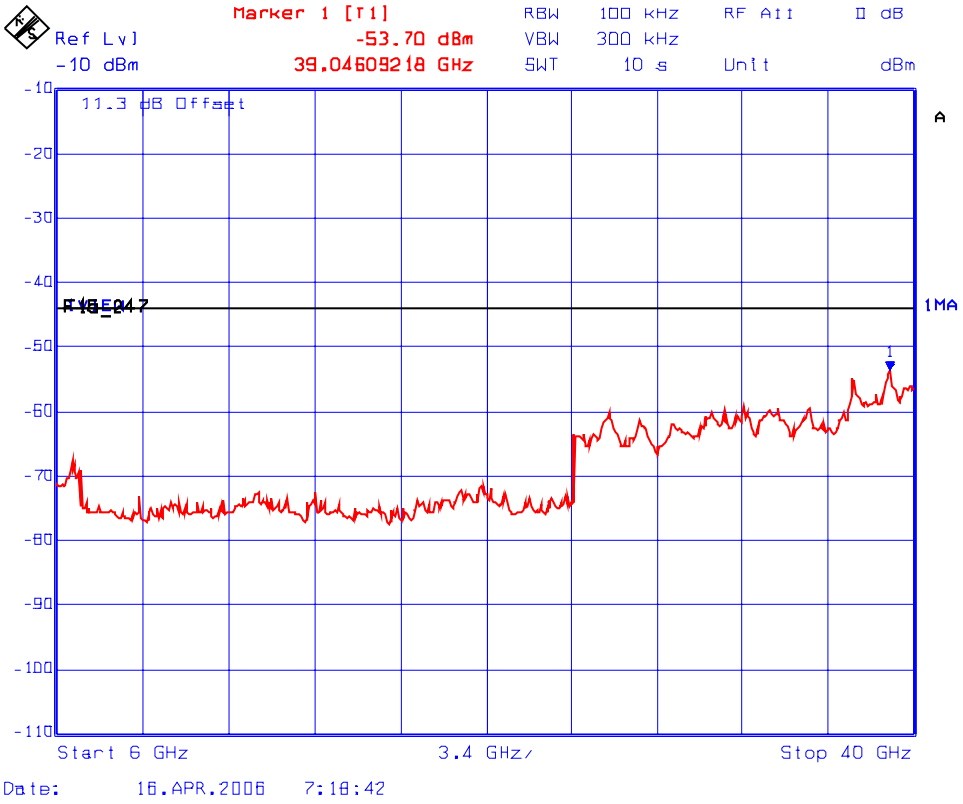
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 78(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5745 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 18Mb/s



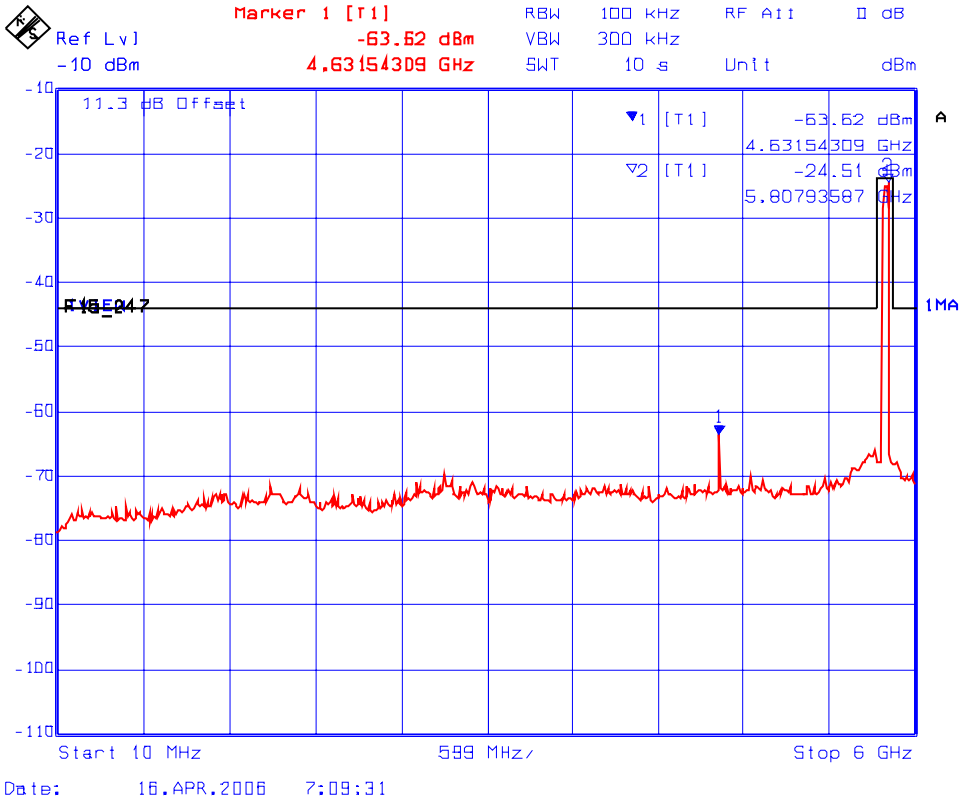
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 78(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5745 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 18Mb/s



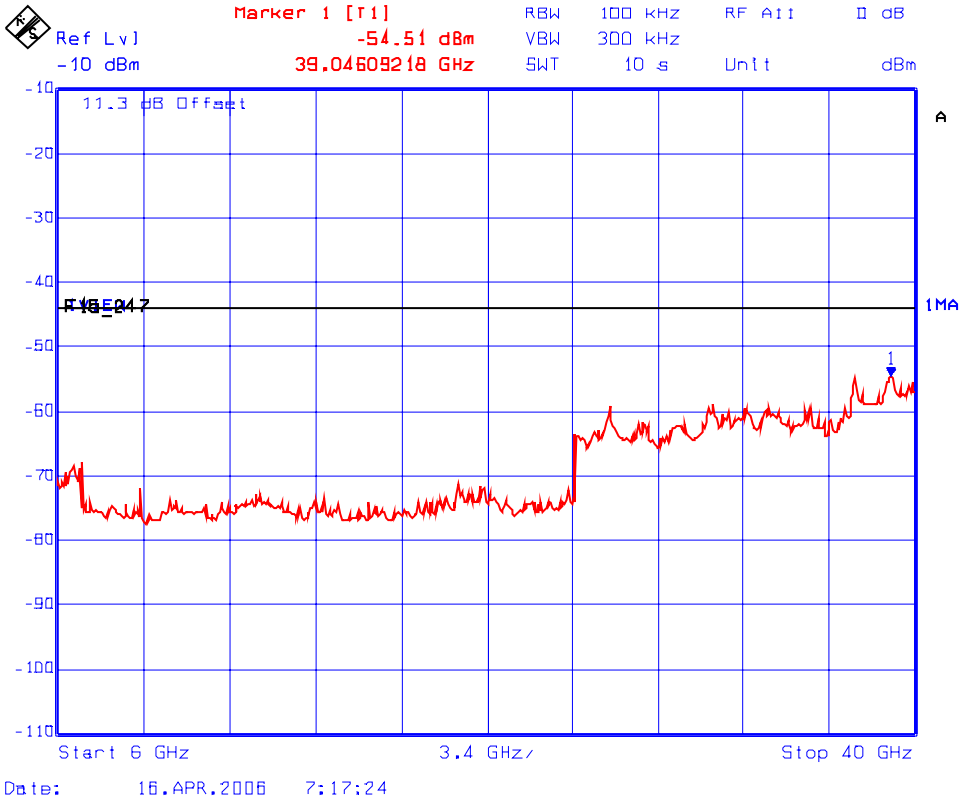
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 79(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 18Mb/s



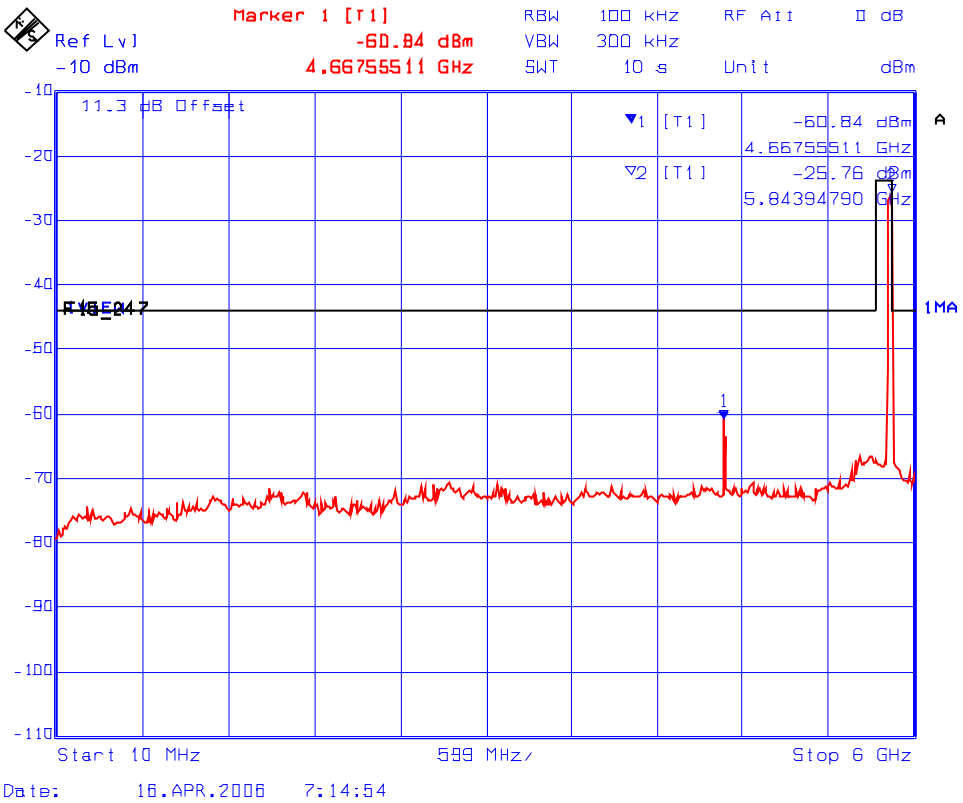
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 79(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5787.5 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 18Mb/s



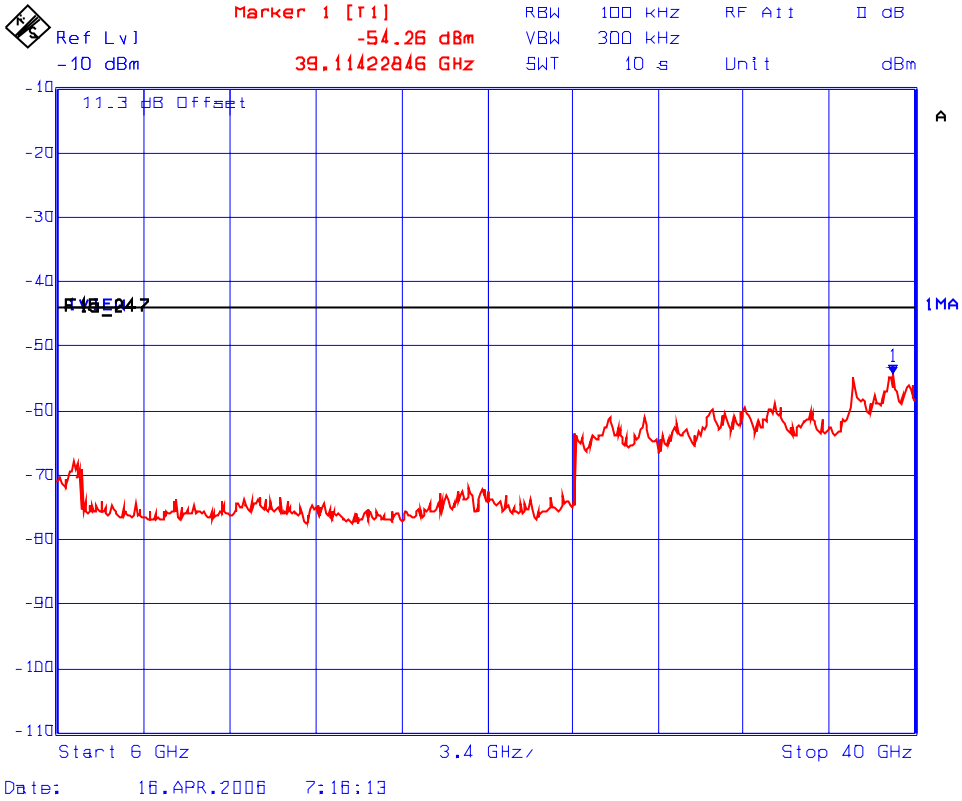
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 80(a): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5830 MHz, Power Setting: -10 dBm, Modulation: BPSK @ 18Mb/s



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

Plot # 80(b): Transmitter Spurious Conducted Emissions at Antenna Port wrt. 40 MHz Channel Spacing - Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



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

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

4.10.1. 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.

4.10.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005"

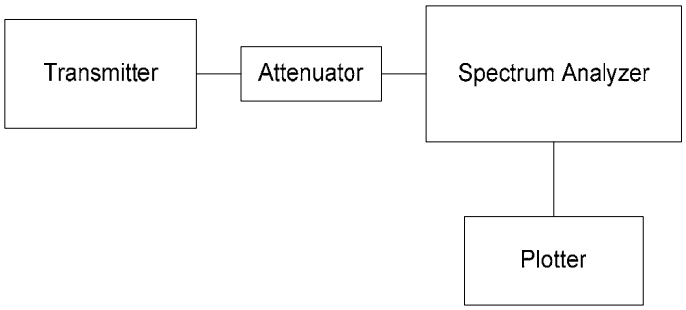
The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used. Use PSD Option 1 if Power output Option 1 was used. Use PSD Option 2 if power output Option 2 was used.

PSD Option 1:

Locate and zoom in on emission peak(s) within the passband. Set RBW = 3 kHz, VBW > RBW, sweep= (SPAN/3 kHz) e.g., for a span of 1.5 MHz, the sweep should be 1.5 x 106 ÷ 3 x103 = 500 seconds. The peak level measured must be no greater than + 8 dBm. If external attenuation is used, don't forget to add this value to the reading. Use the following guidelines for modifying the power spectral density measurement procedure when necessary.

- For devices with spectrum line spacing greater than 3 kHz no change is required.
- For devices with spectrum line spacing equal to or less than 3 kHz, the resolution bandwidth must be reduced below 3 kHz until the individual lines in the are resolved. The measurement data must then be normalized to 3 kHz by summing the power of all the individual spectral lines within a 3kHz band power units) to determine compliance.
- If the spectrum line spacing cannot be resolved on the available spectrum the noise density function on most modern conventional spectrum analyzers directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 35 dB for correction to 3 kHz.
- Should all the above fail or any controversy develop regarding accuracy measurement, the FCC Laboratory will use the HP 89440A Vector Signal for final measurement unless a clear showing can be made for a further alternate.

4.10.3. Test Arrangement



4.10.4. 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

4.10.5. Test Data

Test Method:	FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005, PSD Option 1

4.10.5.1. Test Configuration # 1: 10 MHz Channel Spacing

CHANNEL FREQUENCY (MHz)	MODULATION DATA RATE	RF POWER LEVEL IN 3 KHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	COMMENTS (PASS/FAIL)
5730.0	BPSK @ 4.5 Mb/s	5.7	8.0	-2.3	PASS
5730.0	QPSK @ 9 Mb/s	5.7	8.0	-2.3	PASS
5730.0	16QAM @ 18 Mb/s	5.7	8.0	-2.3	PASS
5730.0	64QAM @ 27 Mb/s	5.7	8.0	-2.3	PASS
5787.5	BPSK @ 4.5 Mb/s	5.8	8.0	-2.2	PASS
5787.5	QPSK @ 9 Mb/s	5.8	8.0	-2.2	PASS
5787.5	16QAM @ 18 Mb/s	5.8	8.0	-2.2	PASS
5787.5	64QAM @ 27 Mb/s	5.8	8.0	-2.2	PASS
5845.0	BPSK @ 4.5 Mb/s	5.8	8.0	-2.2	PASS
5845.0	QPSK @ 9 Mb/s	5.8	8.0	-2.2	PASS
5845.0	16QAM @ 18 Mb/s	5.8	8.0	-2.2	PASS
5845.0	64QAM @ 27 Mb/s	5.8	8.0	-2.2	PASS

Refer to Plots # 81 to 92 for details of measurements

4.10.5.2. Test Configuration # 2: 20 MHz Channel Spacing

CHANNEL FREQUENCY (MHz)	MODULATION DATA RATE	RF POWER LEVEL IN 3 KHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	COMMENTS (PASS/FAIL)
5735	BPSK @ 9 MHz	5.7	8.0	-2.3	PASS
5735	QPSK @ 18 Mb/s	5.7	8.0	-2.3	PASS
5735	16QAM @ 36 Mb/s	5.7	8.0	-2.3	PASS
5735	64QAM @ 54 Mb/s	5.7	8.0	-2.3	PASS
5787.5	BPSK @ 9 MHz	5.8	8.0	-2.2	PASS
5787.5	QPSK @ 18 Mb/s	5.8	8.0	-2.2	PASS
5787.5	16QAM @ 36 Mb/s	5.8	8.0	-2.2	PASS
5787.5	64QAM @ 54 Mb/s	5.8	8.0	-2.2	PASS
5840	BPSK @ 9 MHz	5.8	8.0	-2.2	PASS
5840	QPSK @ 18 Mb/s	5.8	8.0	-2.2	PASS
5840	16QAM @ 36 Mb/s	5.8	8.0	-2.2	PASS
5840	64QAM @ 54 Mb/s	5.8	8.0	-2.2	PASS

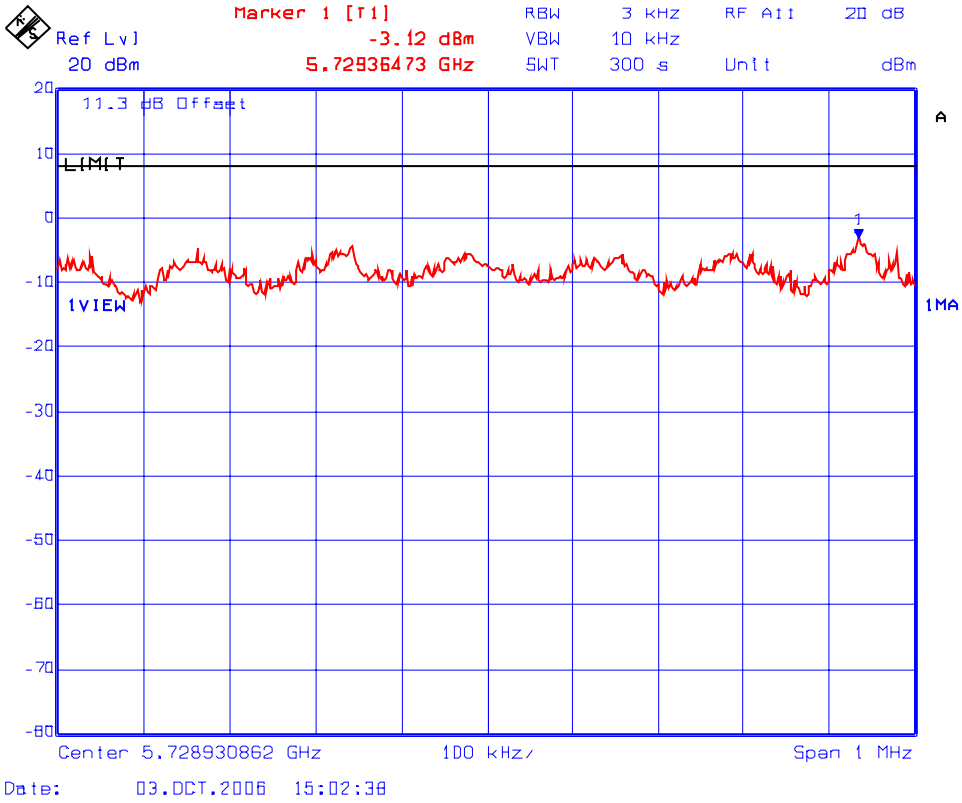
Refer to Plots # 93 to 104 for details of measurements

4.10.5.3. Test Configuration #3: 40 MHz Channel Spacing

CHANNEL FREQUENCY (MHz)	MODULATION DATA RATE	RF POWER LEVEL IN 3 KHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	COMMENTS (PASS/FAIL)
5745	BPSK @ 18 MHz	5.7	8.0	-2.3	PASS
5745	QPSK @ 36 Mb/s	5.7	8.0	-2.3	PASS
5745	16QAM @ 72 Mb/s	5.7	8.0	-2.3	PASS
5745	64QAM @ 108 Mb/s	5.7	8.0	-2.3	PASS
5787.5	BPSK @ 18 MHz	5.8	8.0	-2.2	PASS
5787.5	QPSK @ 36 Mb/s	5.8	8.0	-2.2	PASS
5787.5	16QAM @ 72 Mb/s	5.8	8.0	-2.2	PASS
5787.5	64QAM @ 108 Mb/s	5.8	8.0	-2.2	PASS
5830	BPSK @ 18 MHz	5.8	8.0	-2.2	PASS
5830	QPSK @ 36 Mb/s	5.8	8.0	-2.2	PASS
5830	16QAM @ 72 Mb/s	5.8	8.0	-2.2	PASS
5830	64QAM @ 108 Mb/s	5.8	8.0	-2.2	PASS

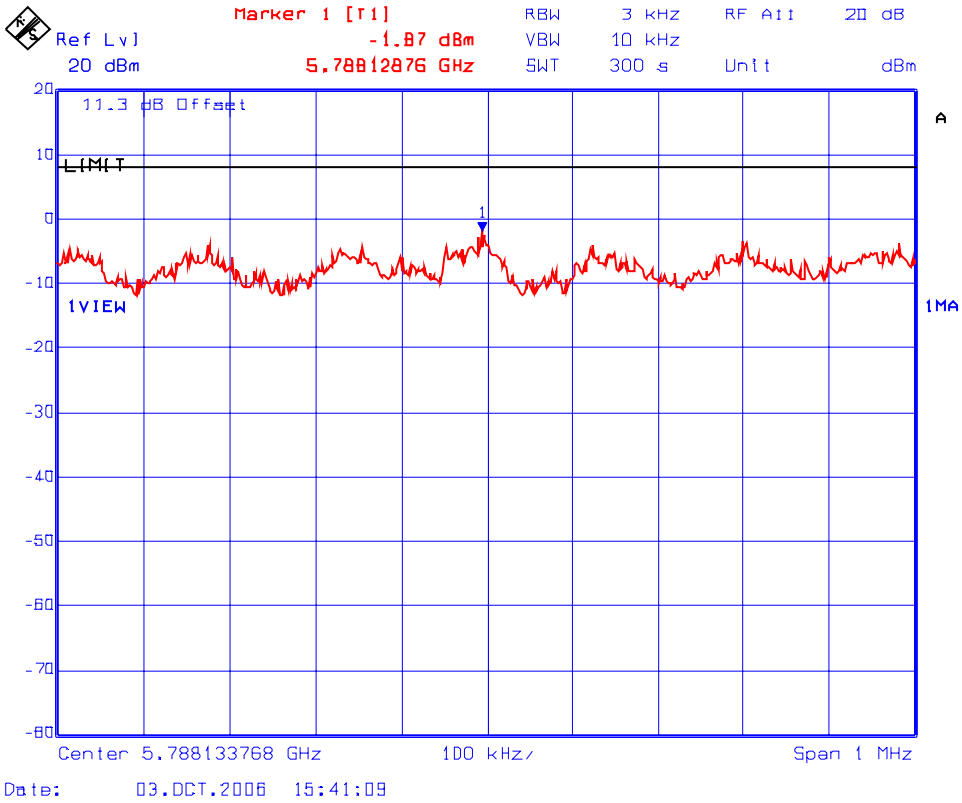
Refer to Plots # 105 to 116 for details of measurements

Plot # 81: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5Mb/s



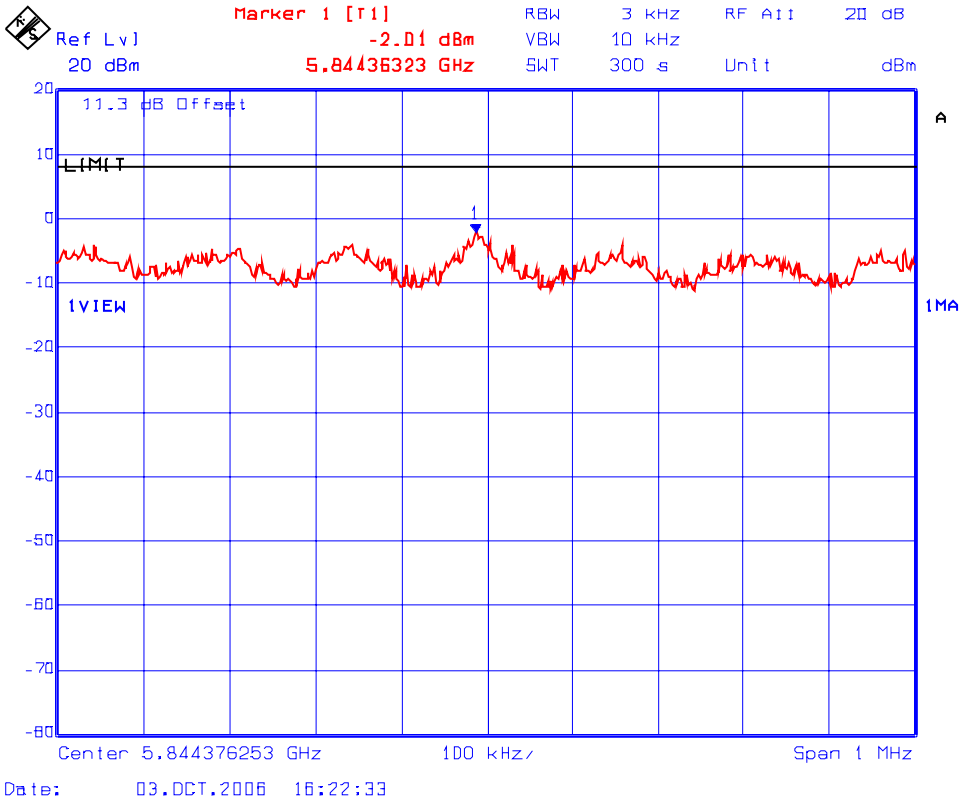
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 82: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5Mb/s



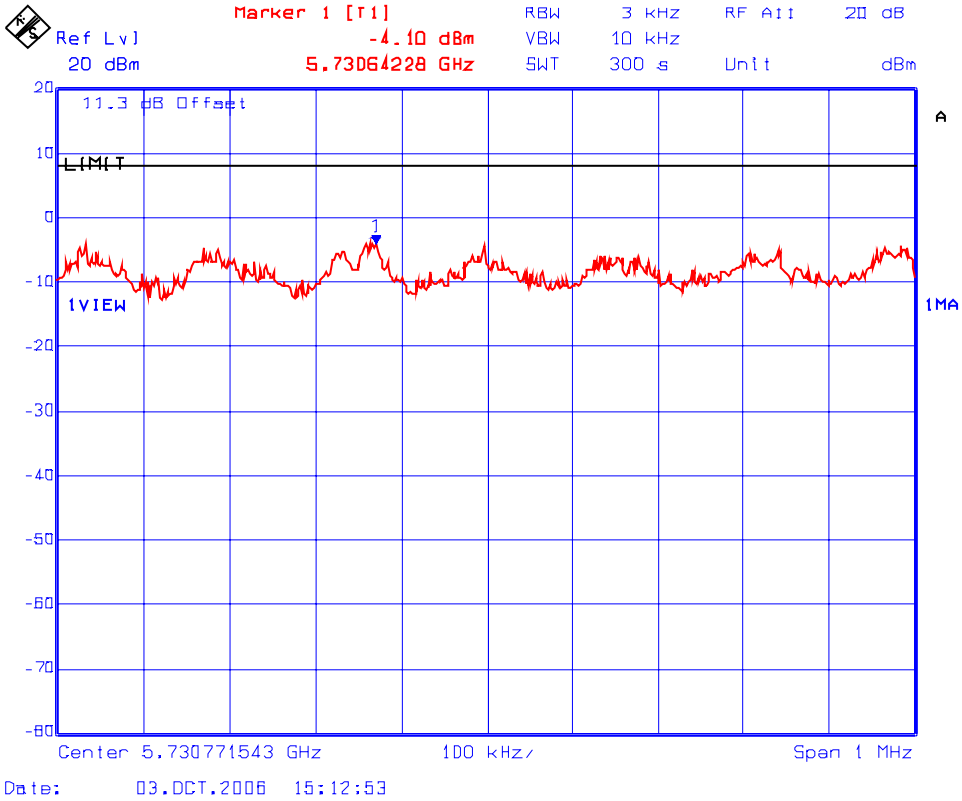
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 83: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5Mb/s



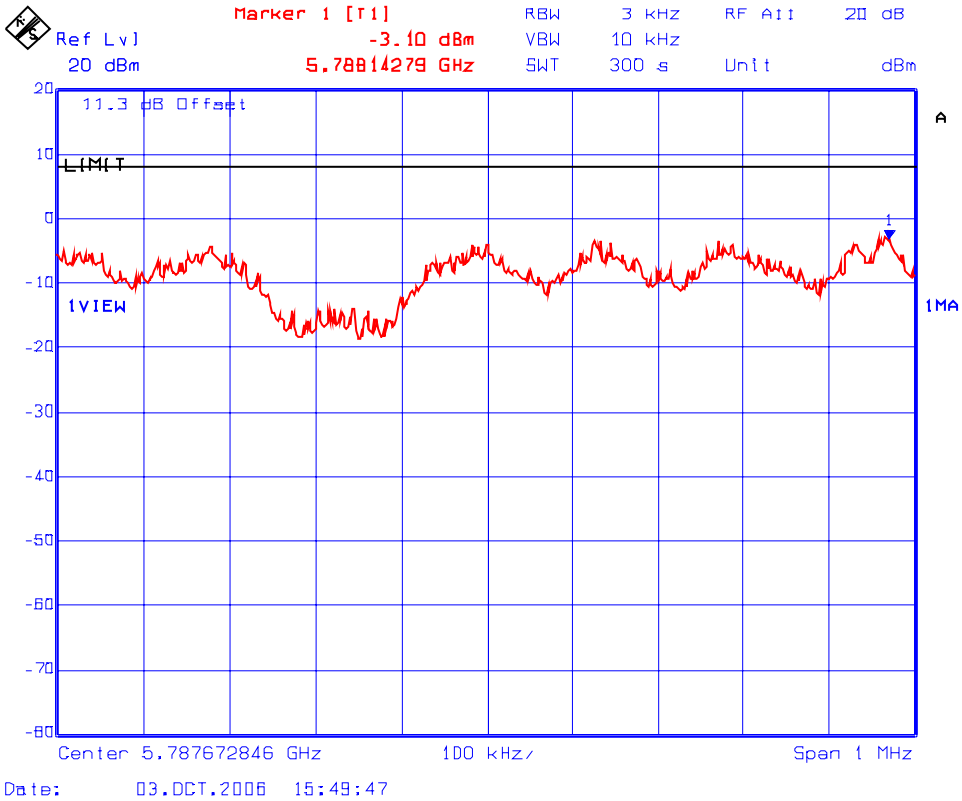
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 84: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9Mb/s



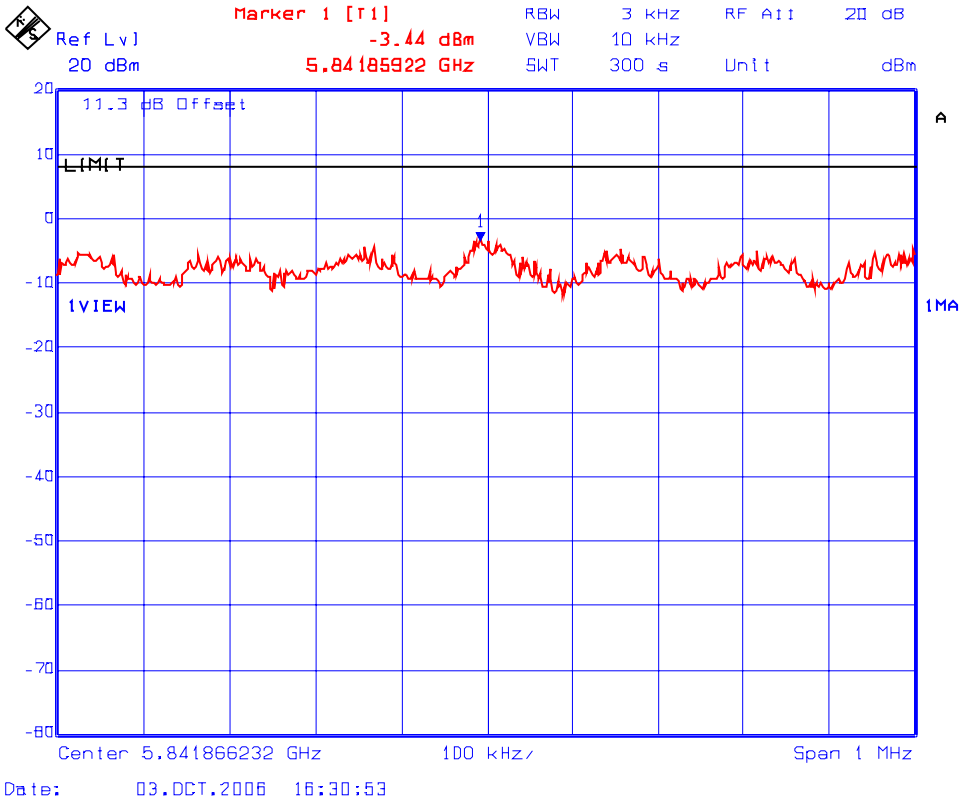
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 85: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: QPSK @9Mb/s



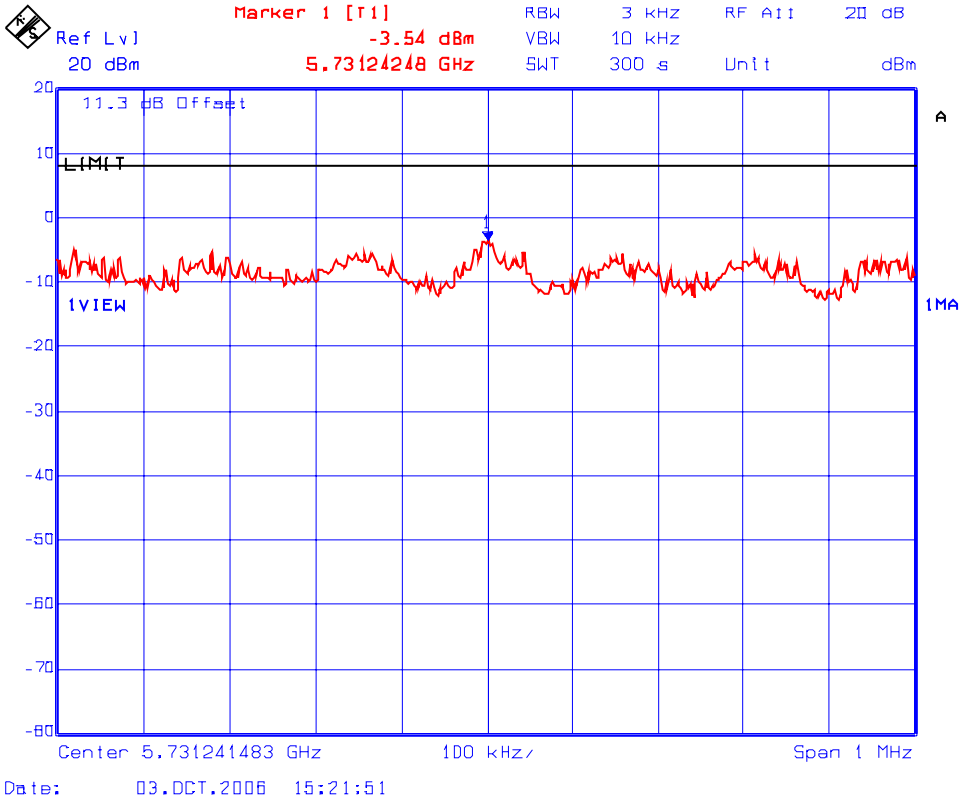
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 86: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: QPSK @9Mb/s



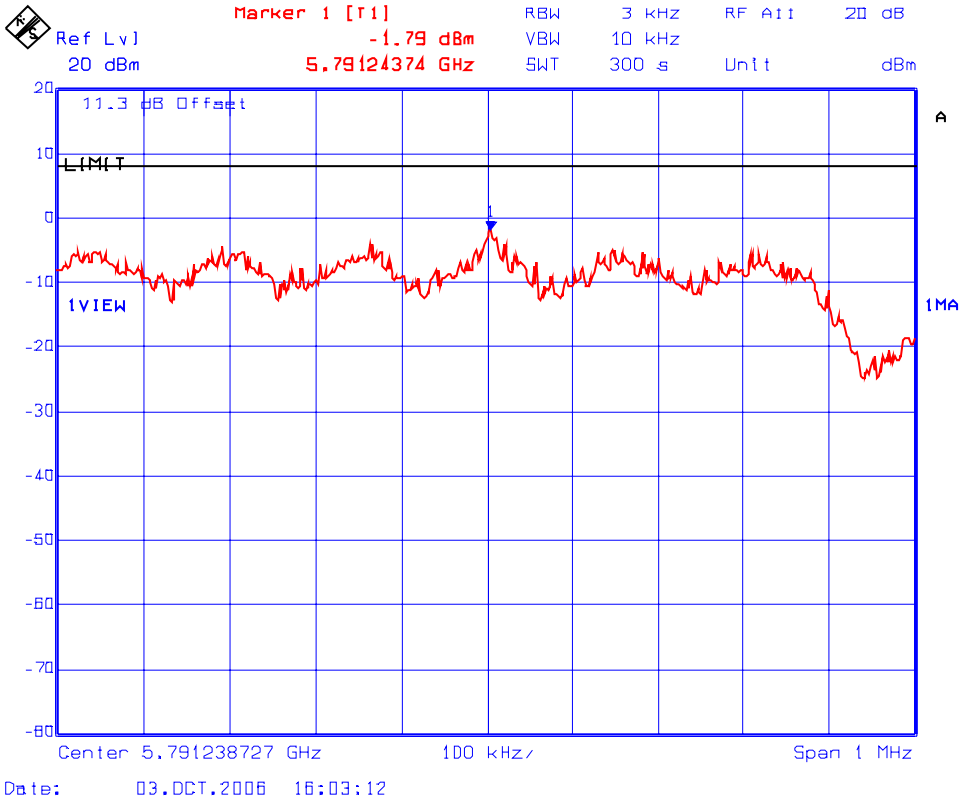
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 87: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18Mb/s



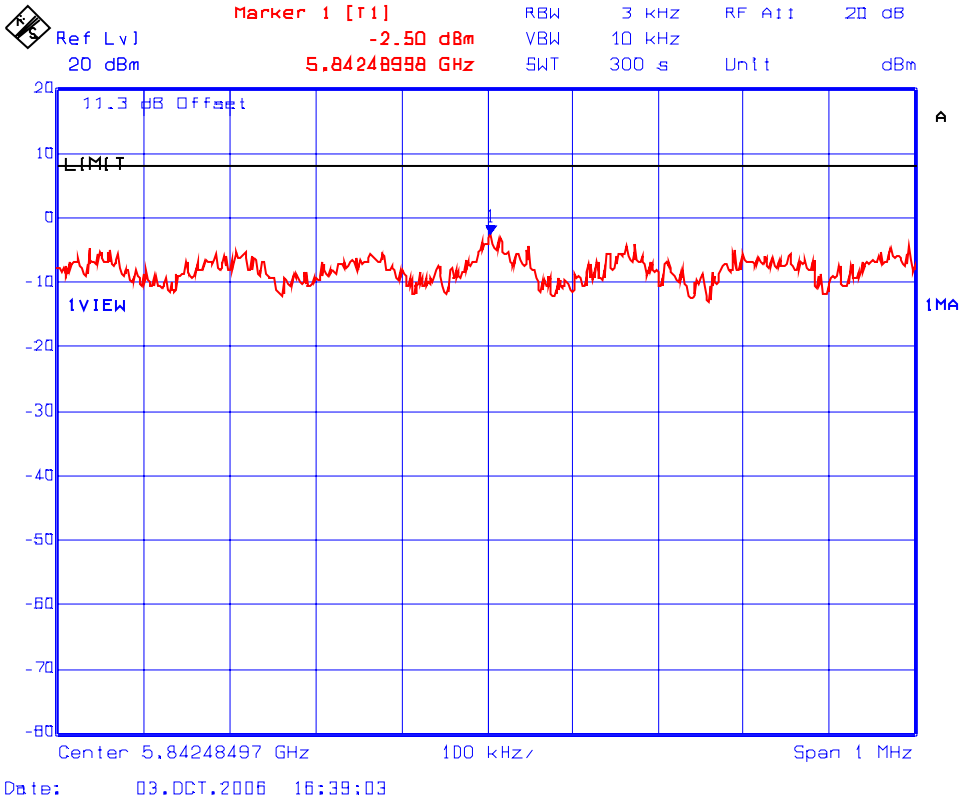
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 88: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s



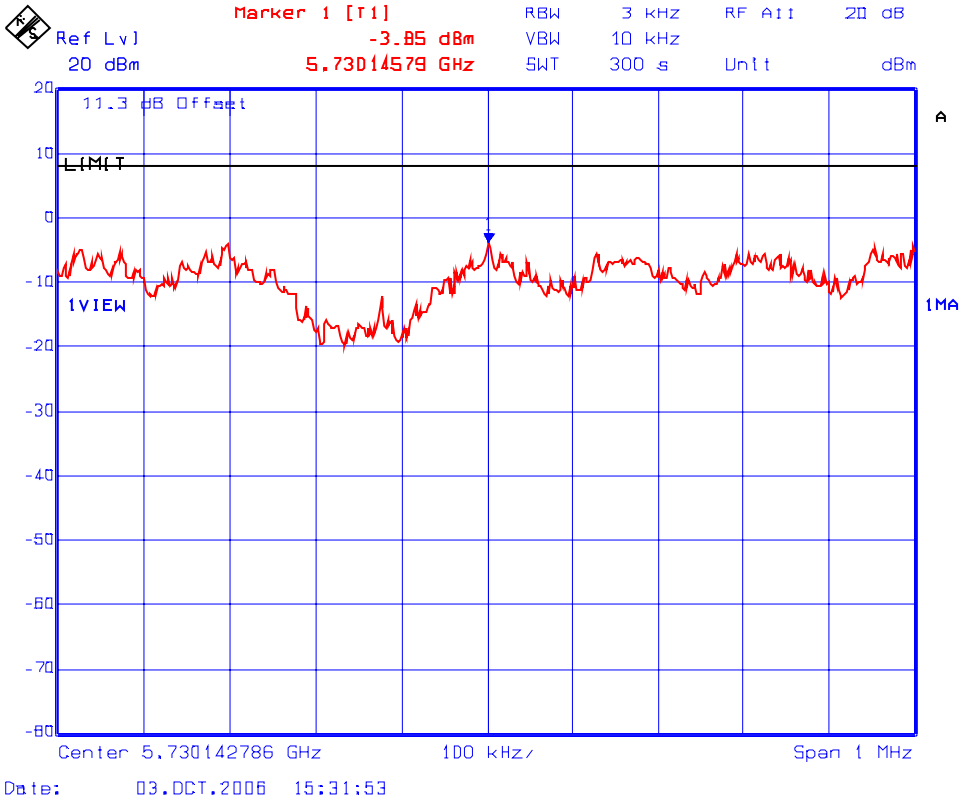
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 89: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18Mb/s



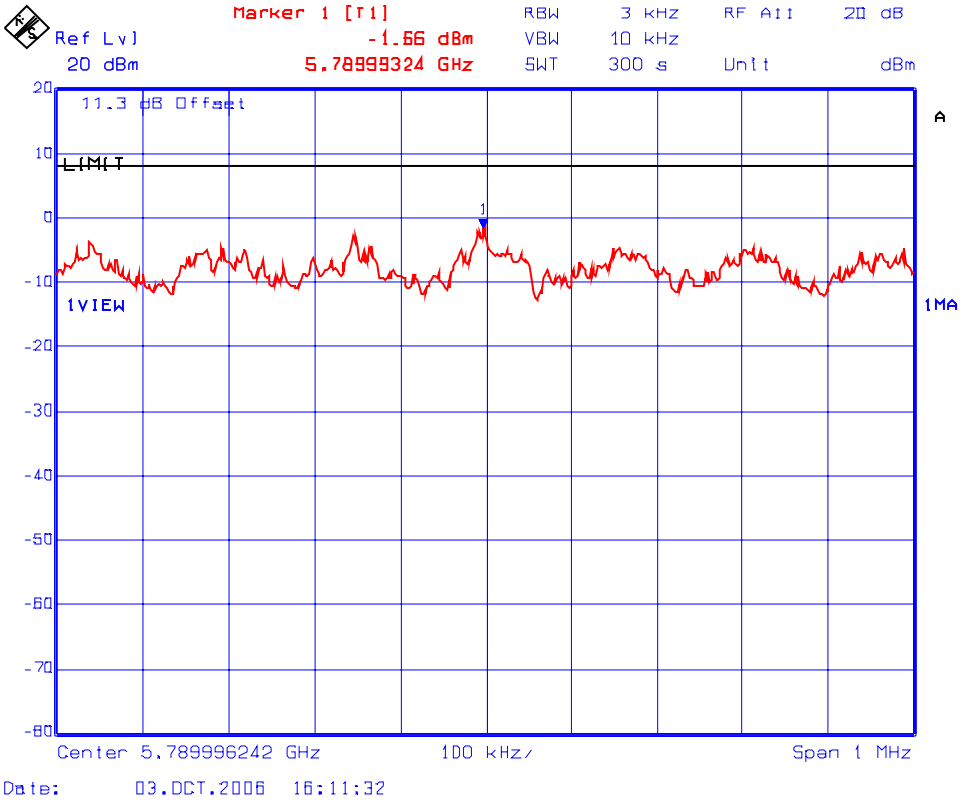
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 90: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27Mb/s



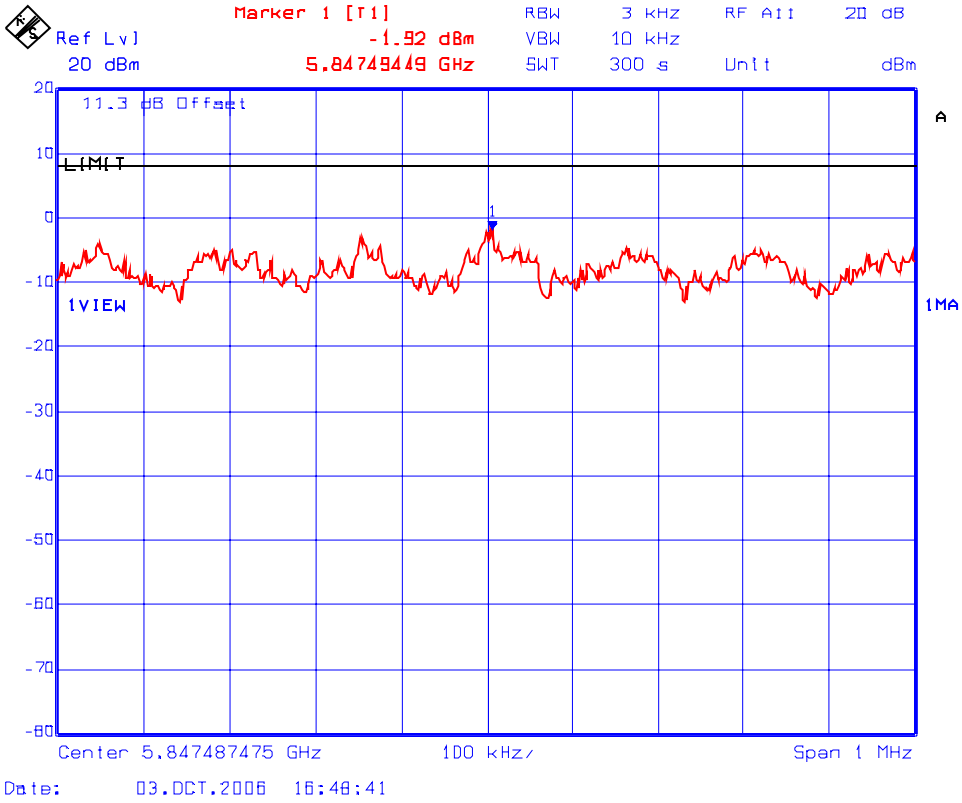
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 91: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s



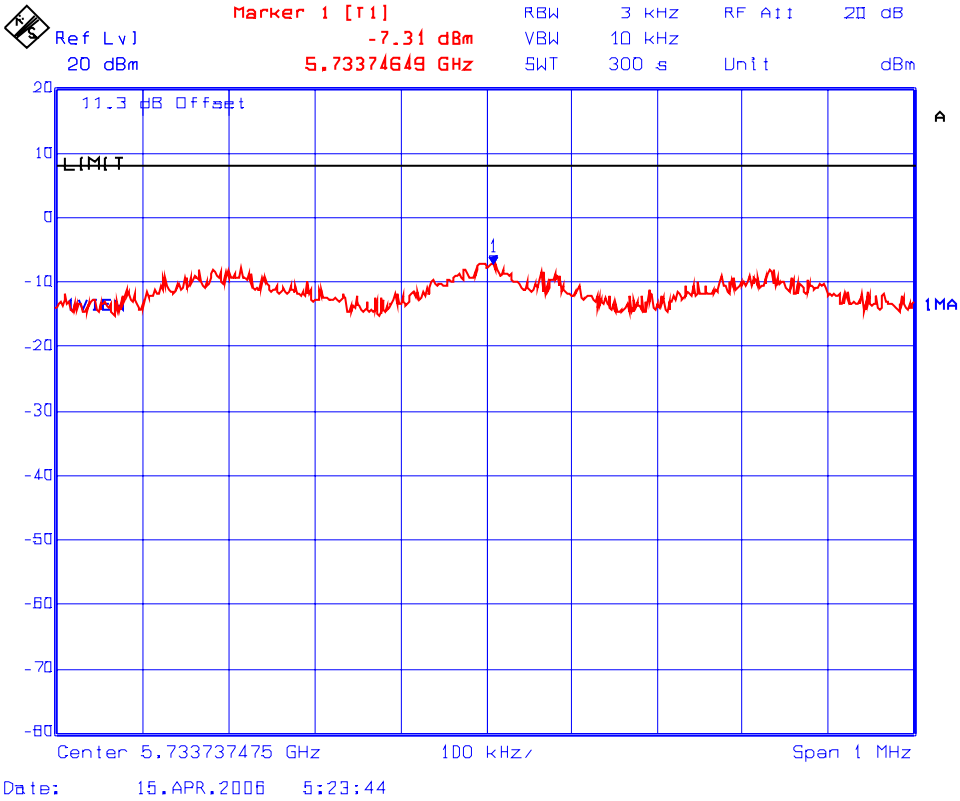
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 92: Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5845 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27Mb/s



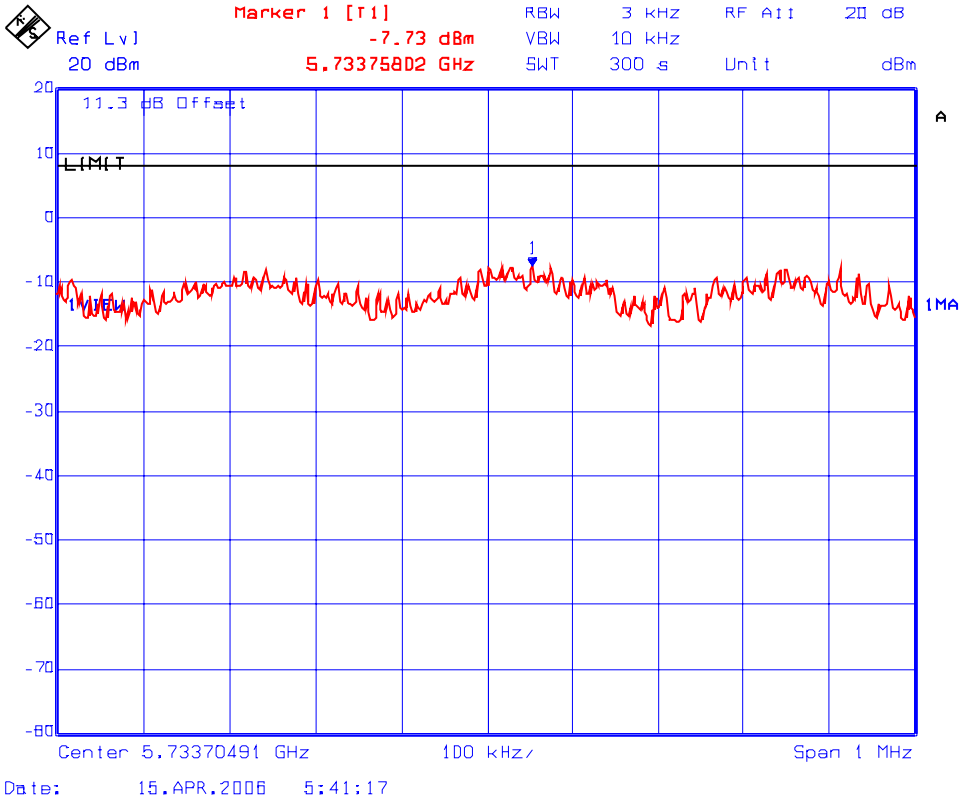
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 93: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



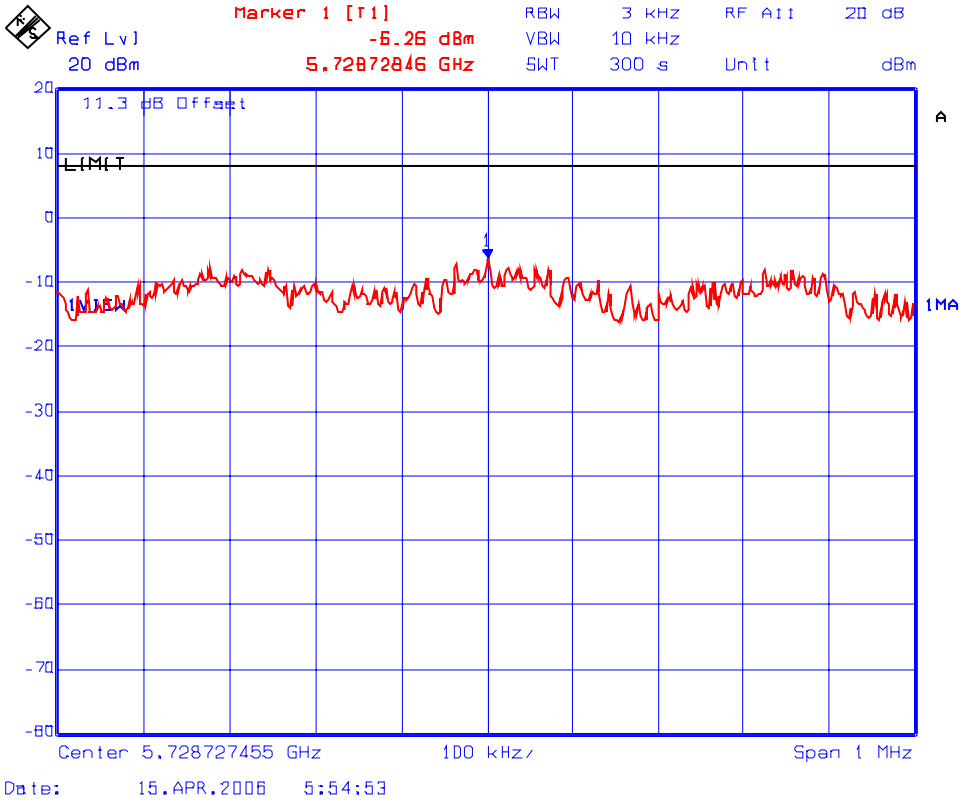
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 94: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s



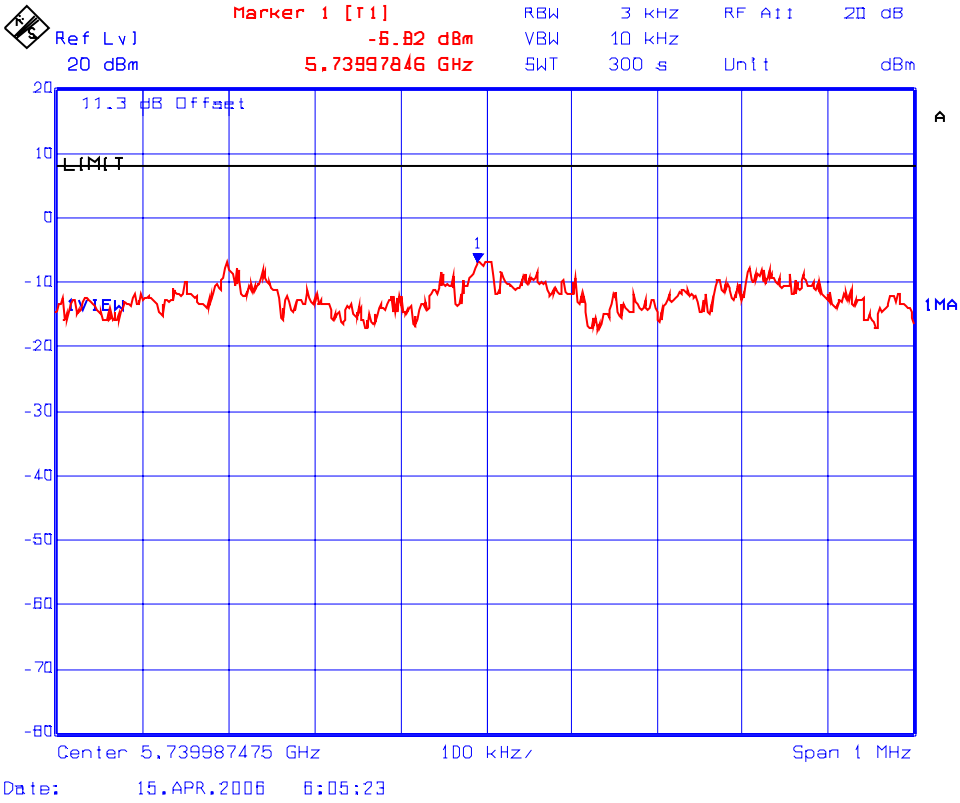
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 95: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 36 Mb/s



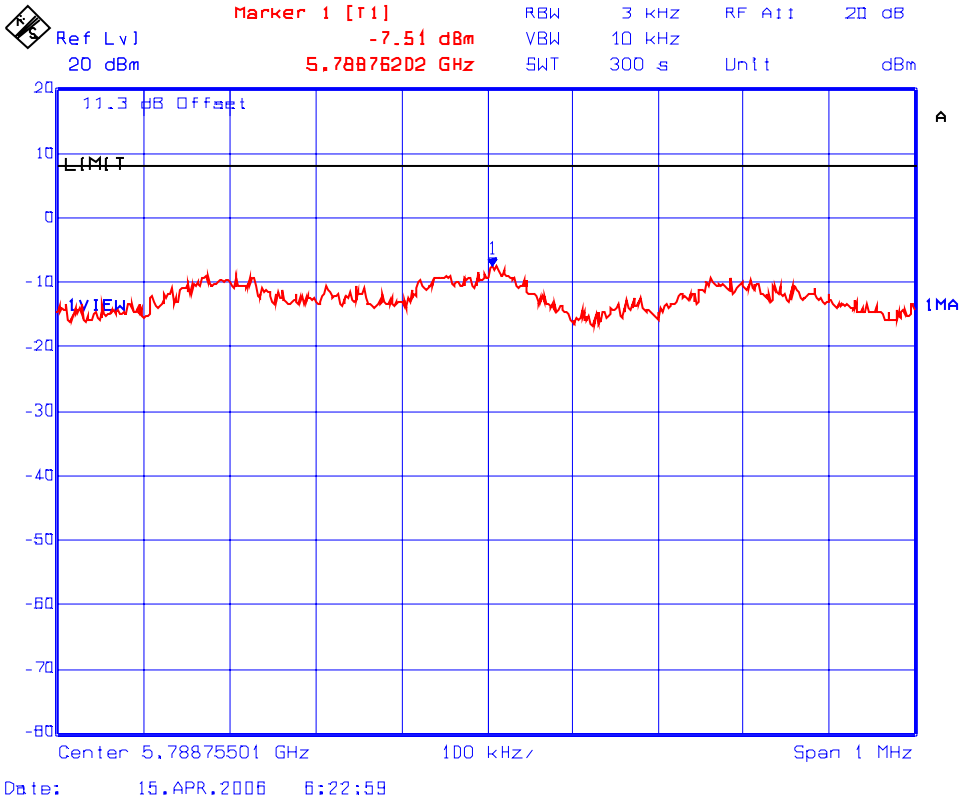
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 96: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 54Mb/s



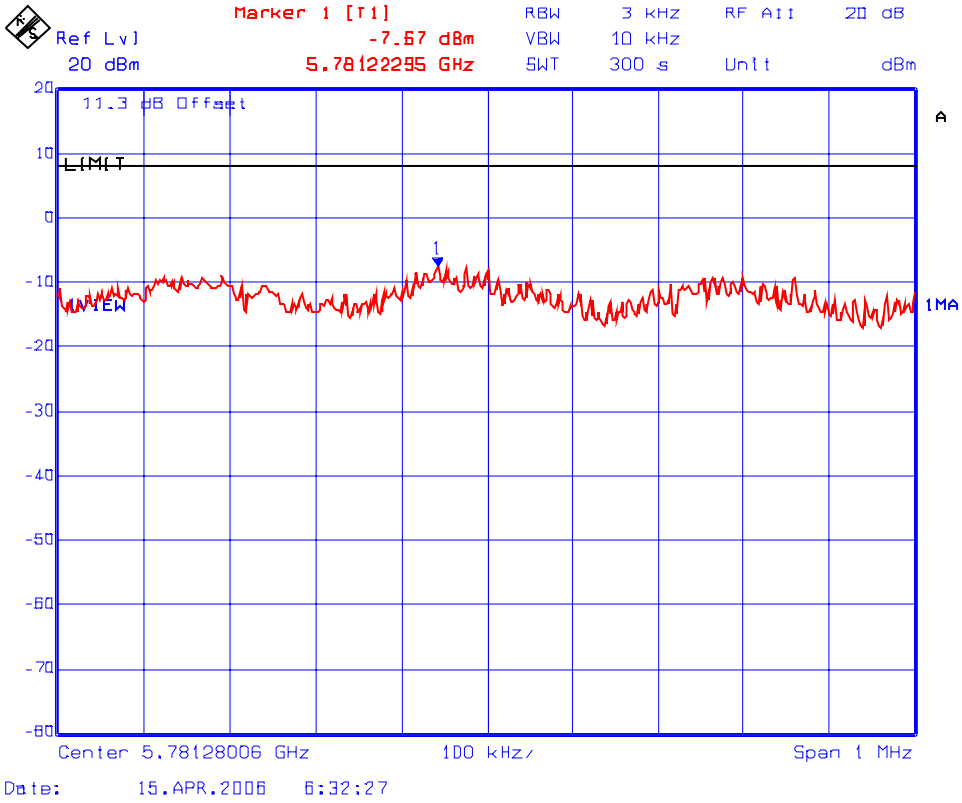
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 97: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



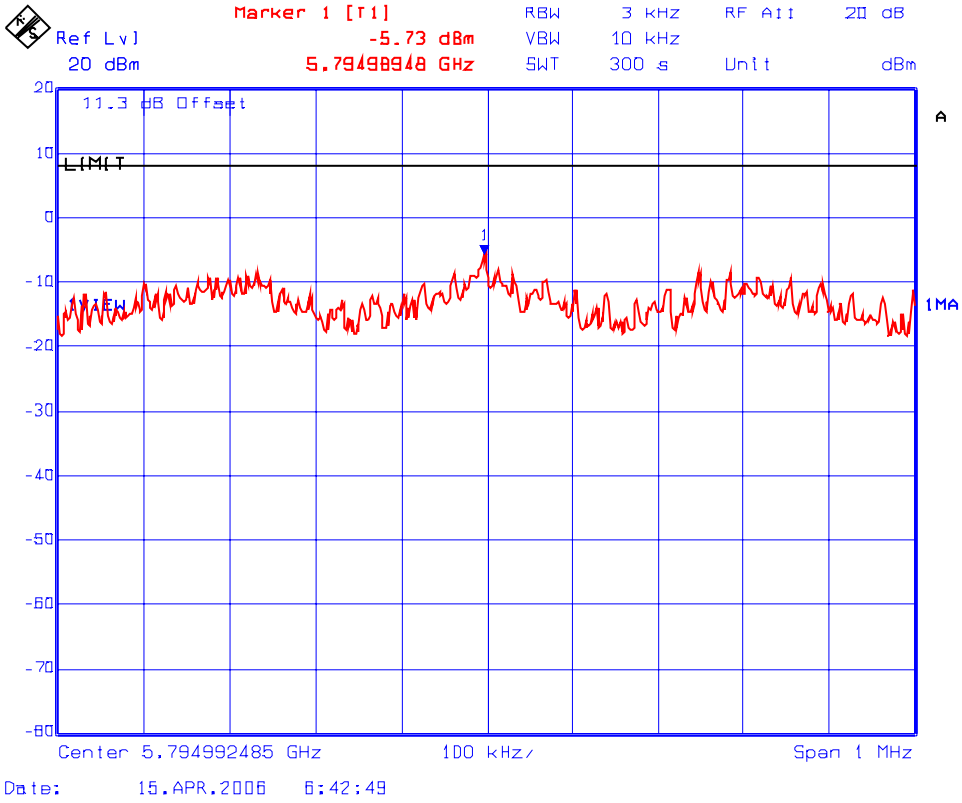
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 98: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s



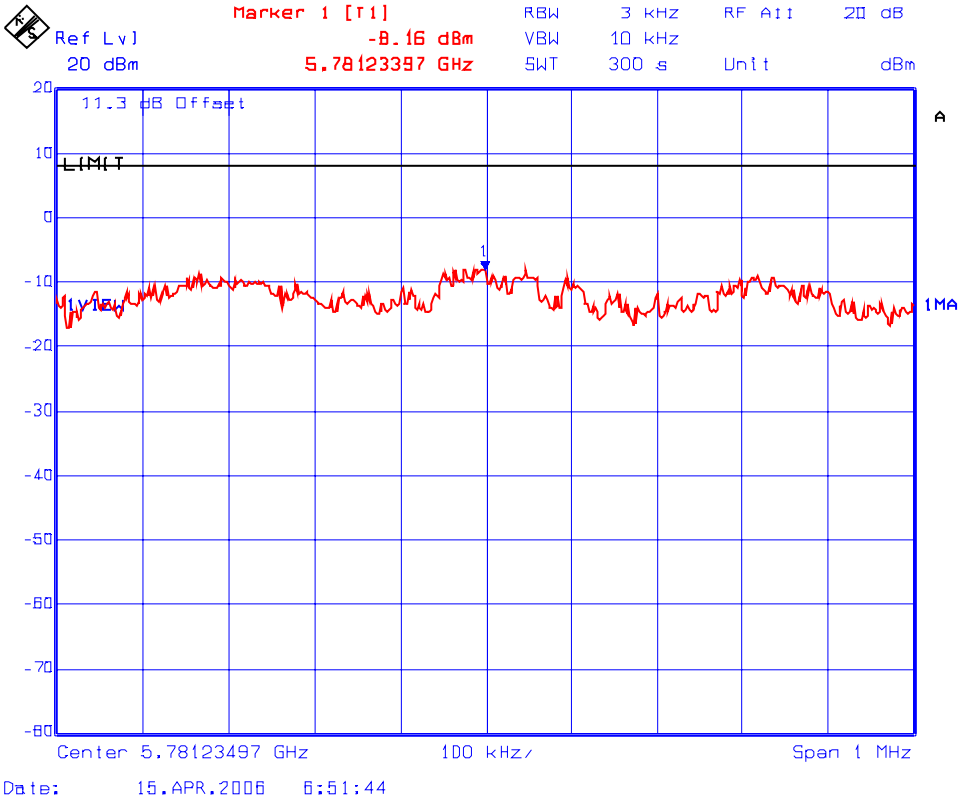
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 99: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 36Mb/s



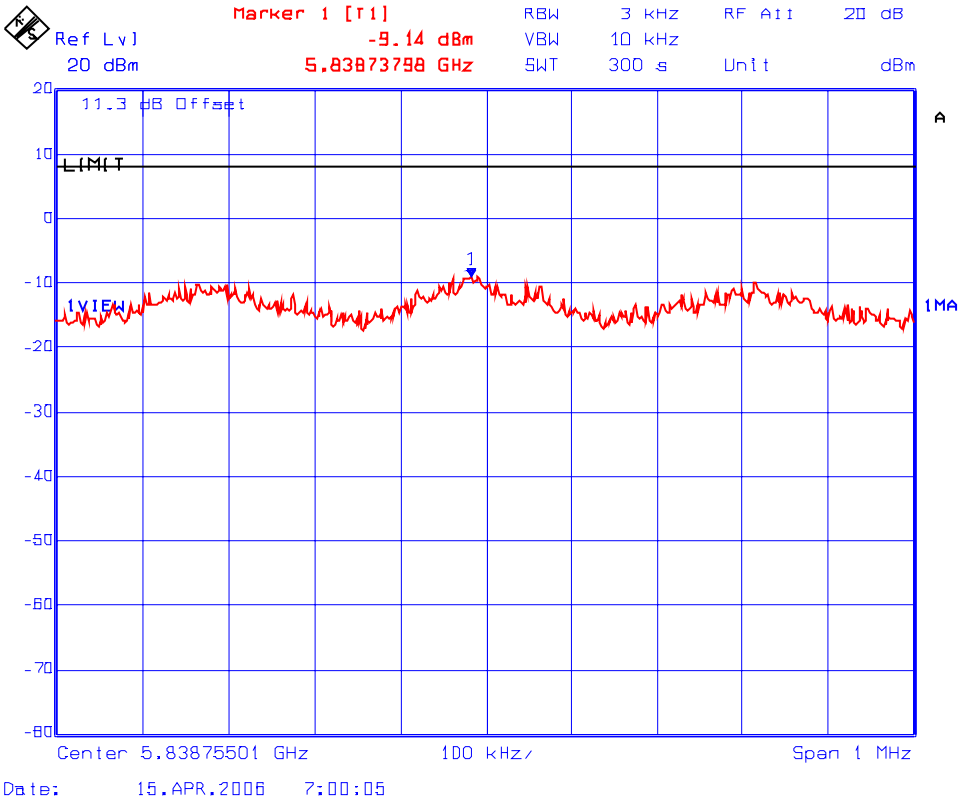
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 100: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 54Mb/s



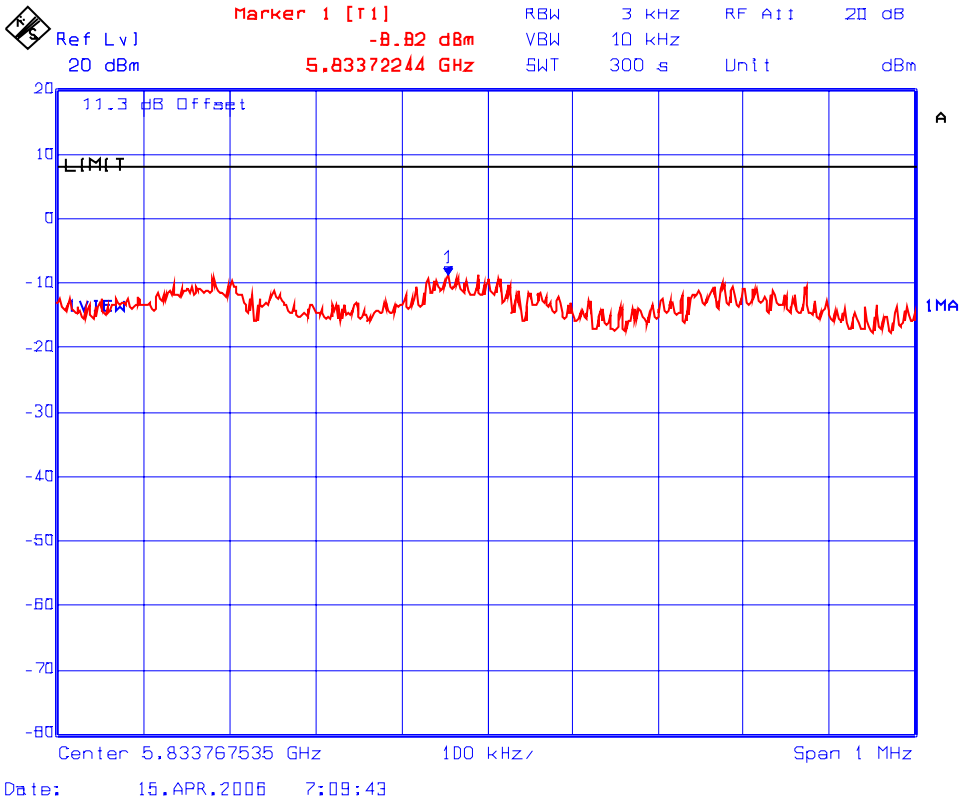
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 101: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 9Mb/s



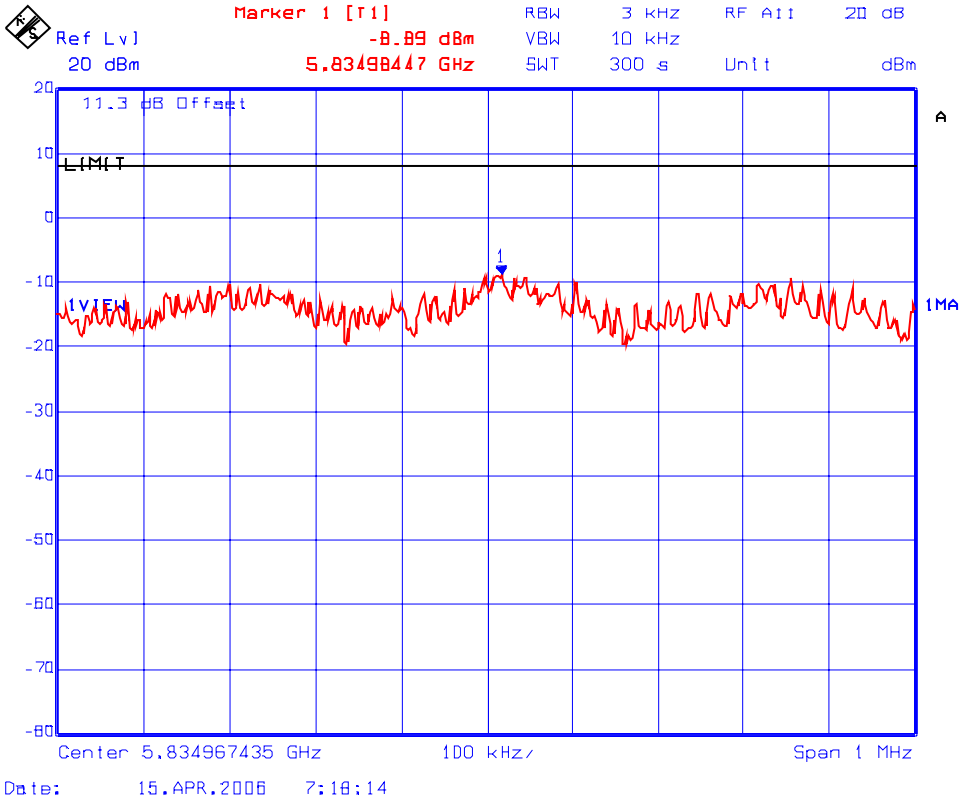
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 102: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 18Mb/s

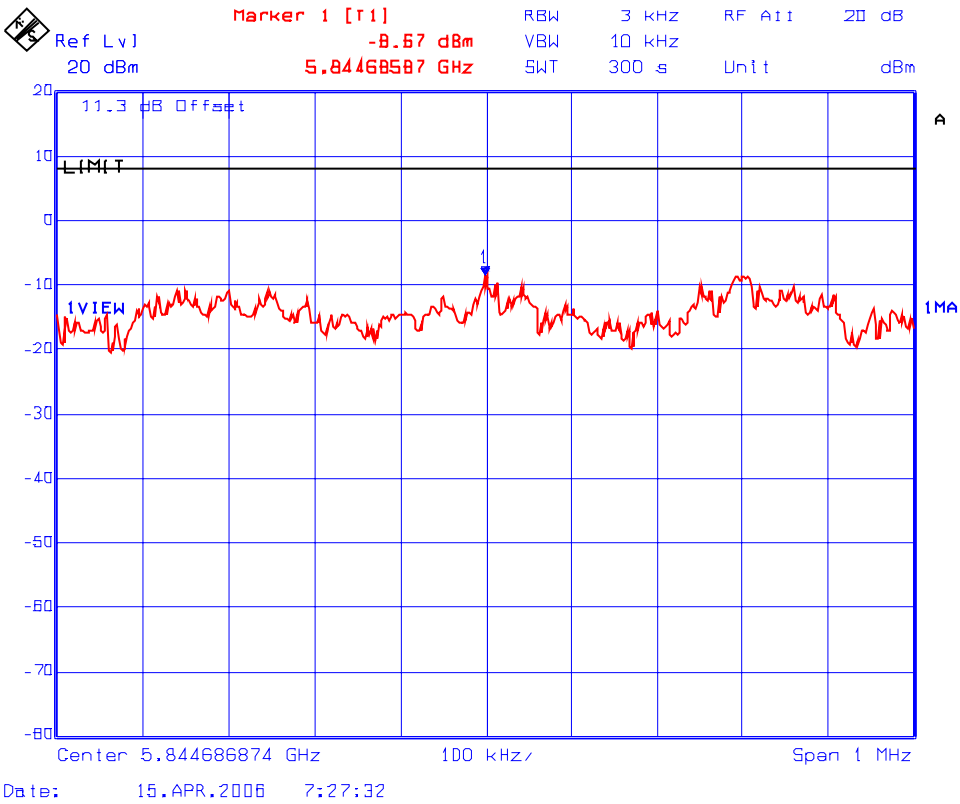


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 103: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 36Mb/s

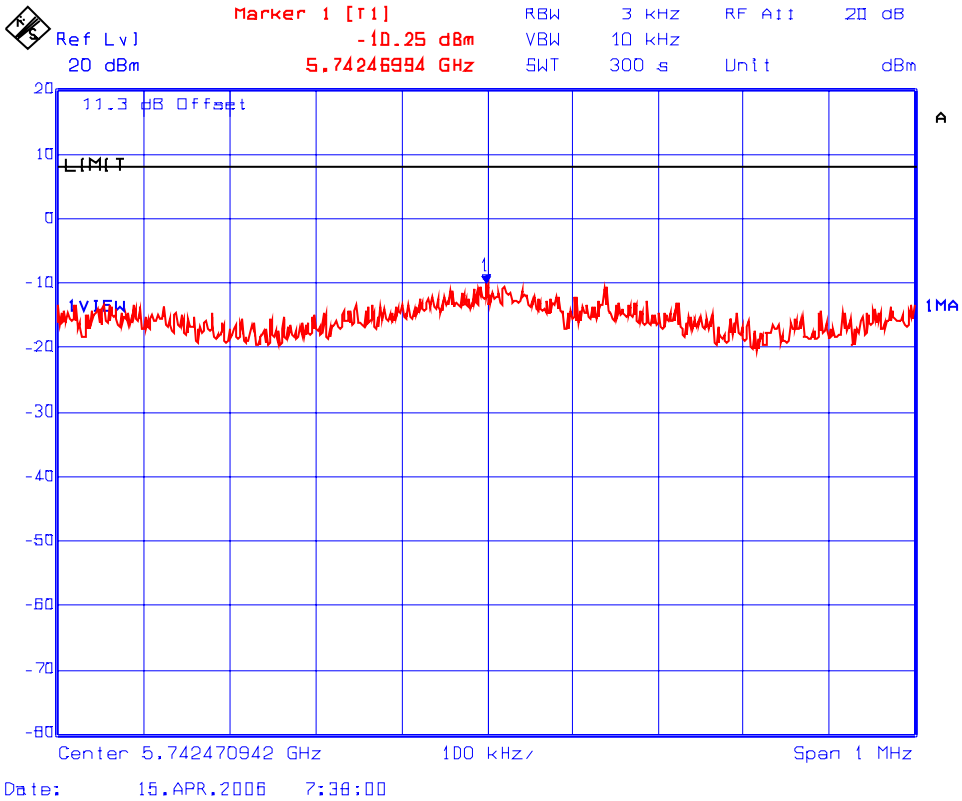


Plot # 104: Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @ 54Mb/s



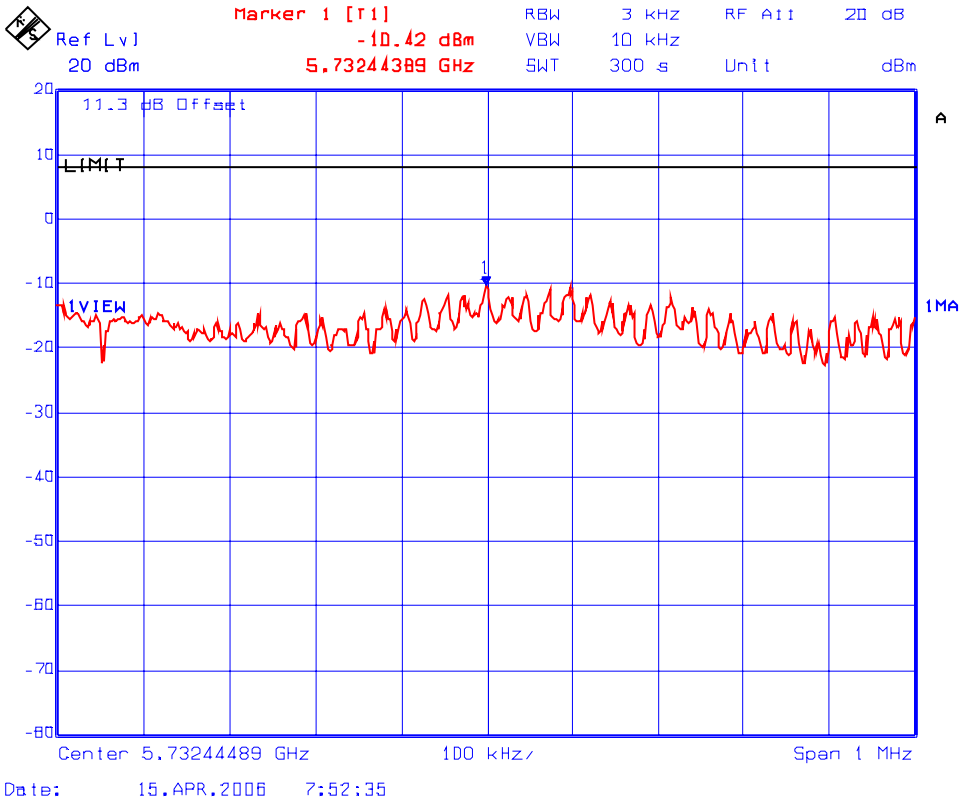
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 105: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: BPSK @ 18Mb/s



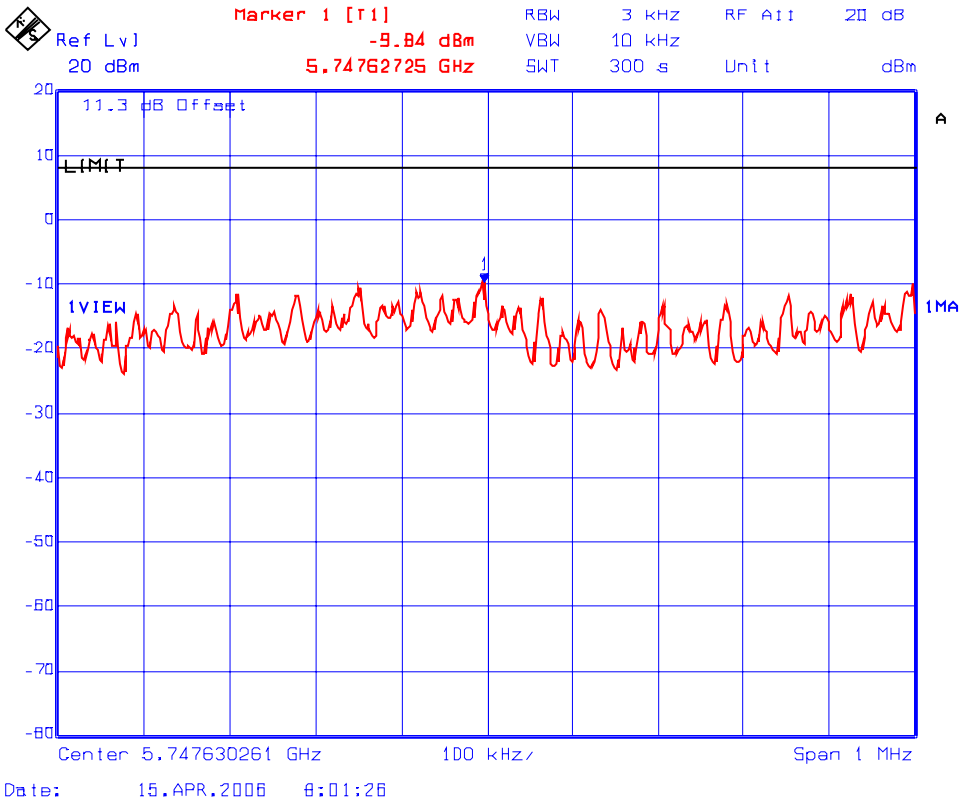
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 106: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: QPSK @ 36Mb/s

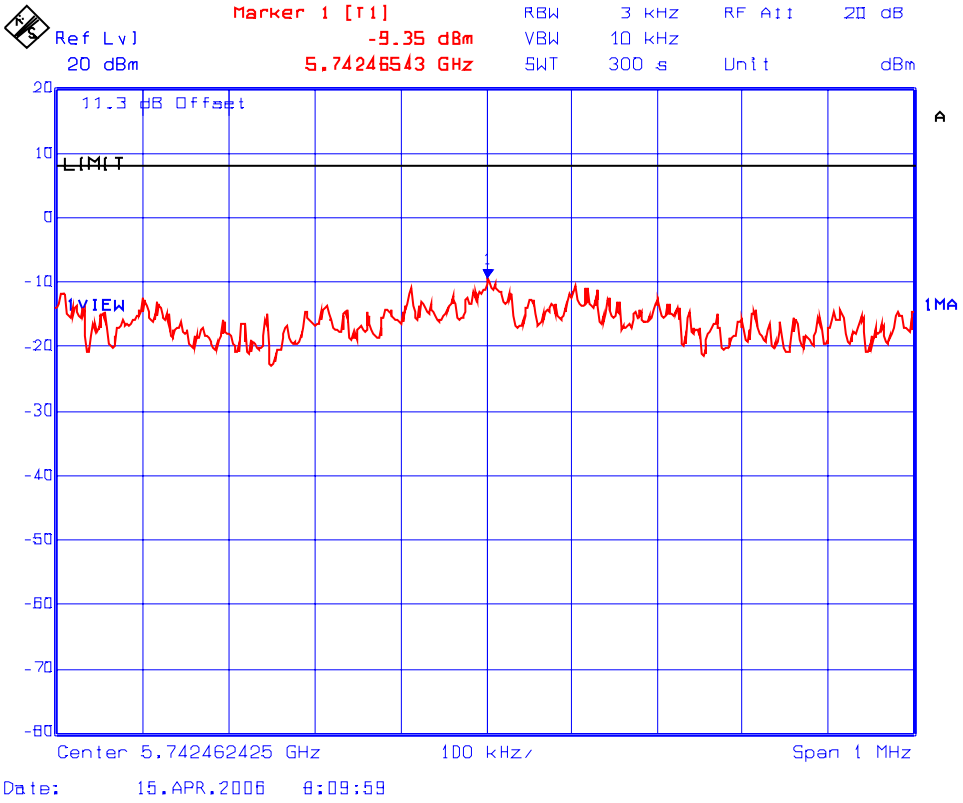


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 107: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: 16QAM @ 72Mb/s

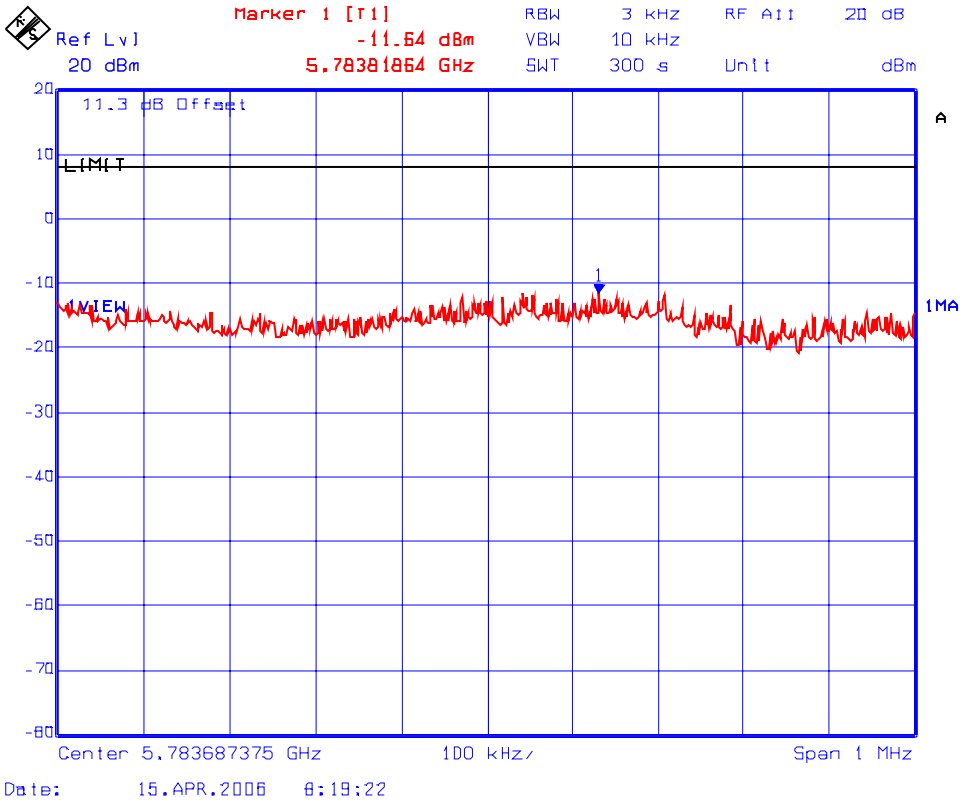


Plot # 108: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108Mb/s



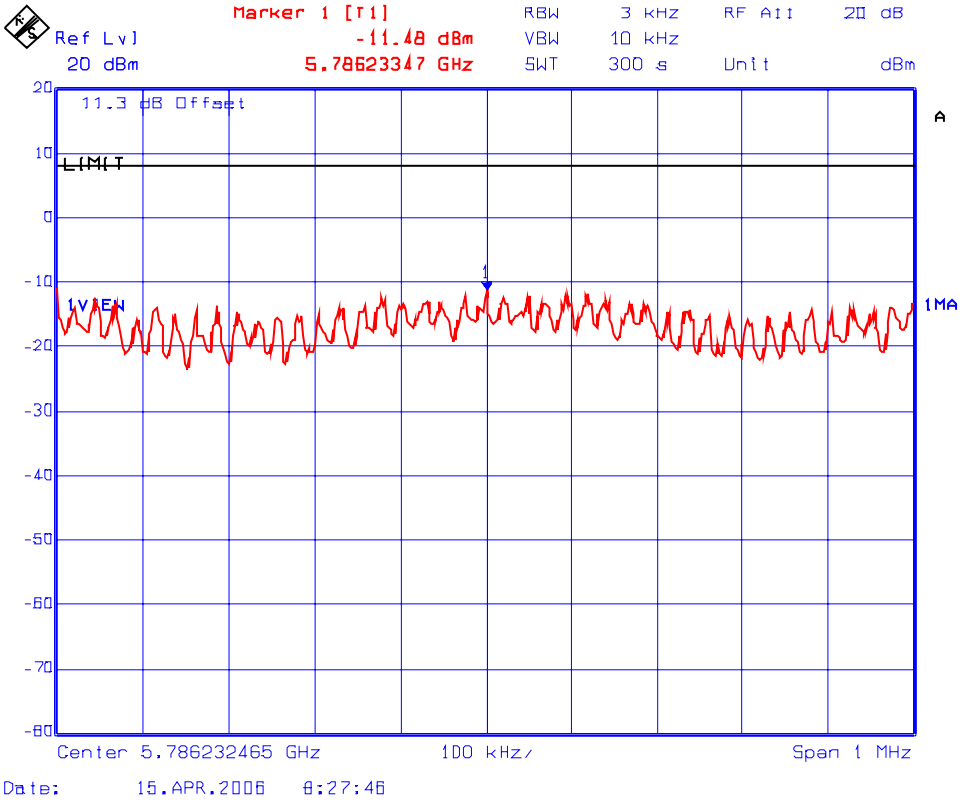
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 109: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: BPSK @18Mb/s



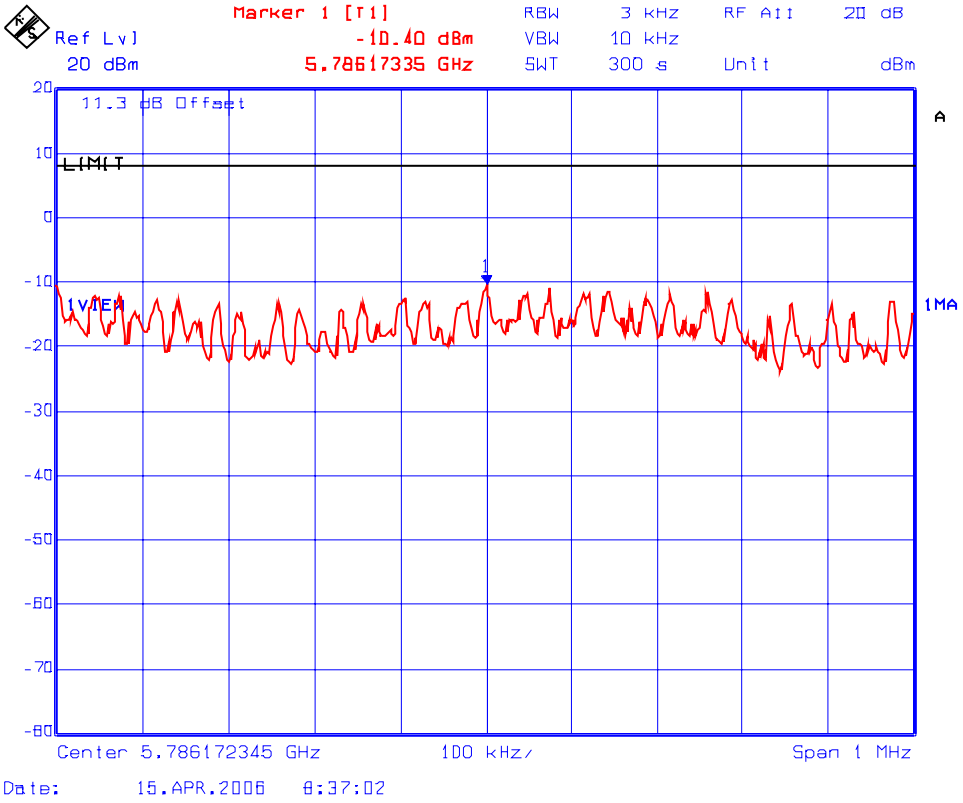
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 110: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: QPSK @36Mb/s



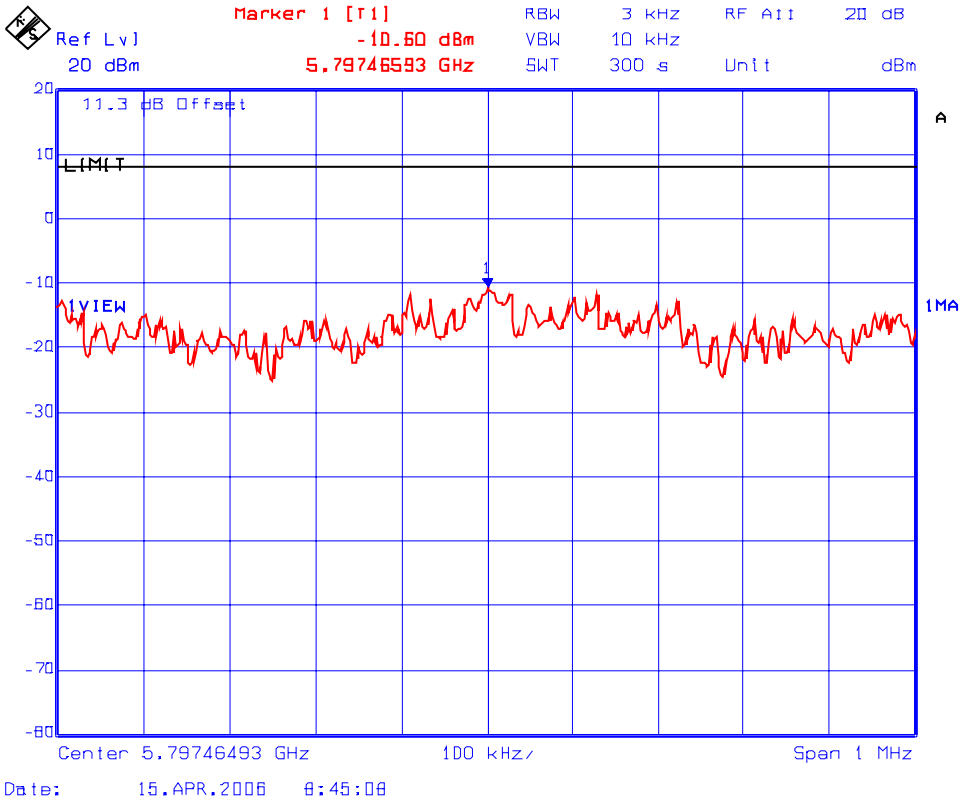
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 111: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 16QAM@72Mb/s



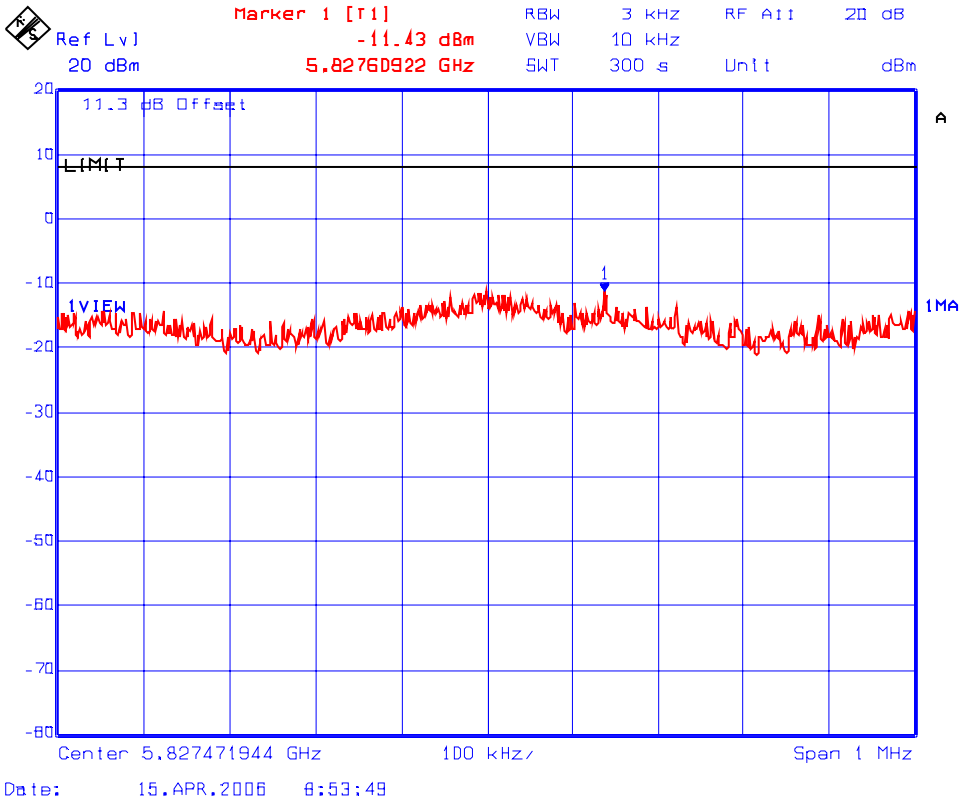
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 112: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Freq.: 5787.5 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108Mb/s



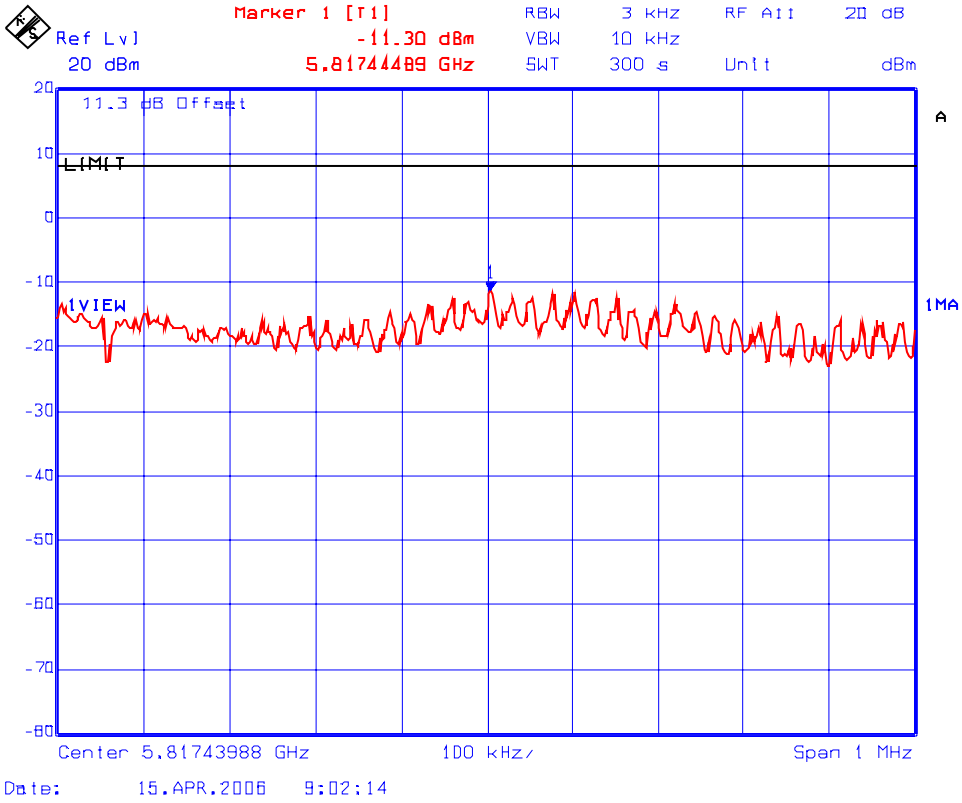
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 113: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: BPSK @18Mb/s

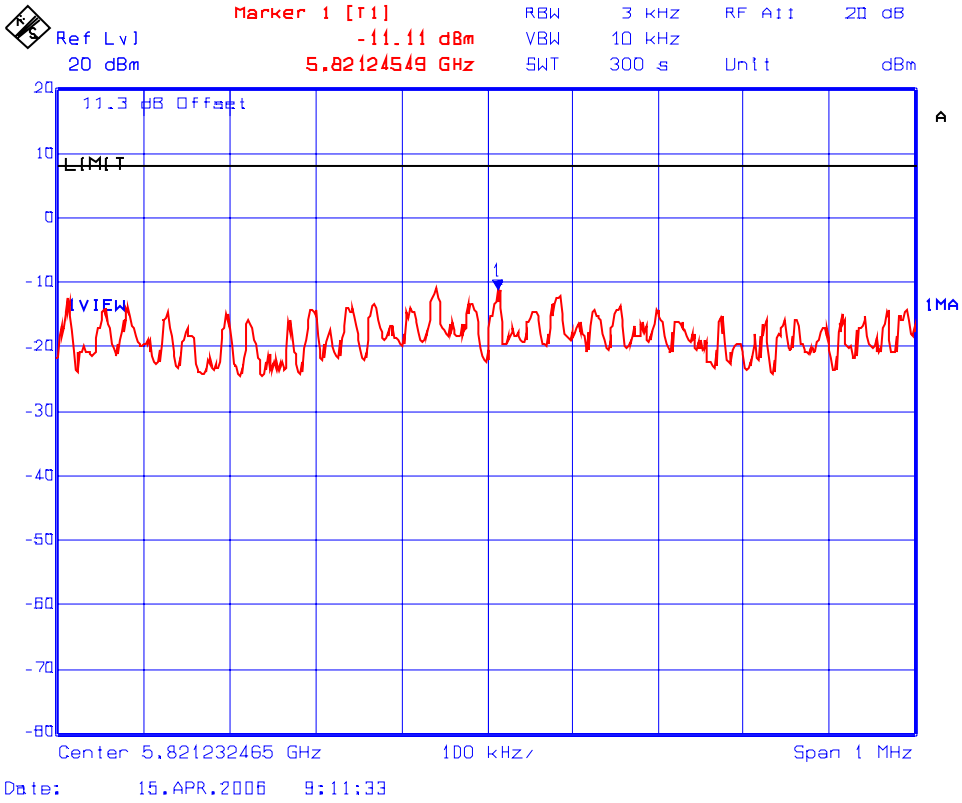


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 114: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: QPSK @36Mb/s

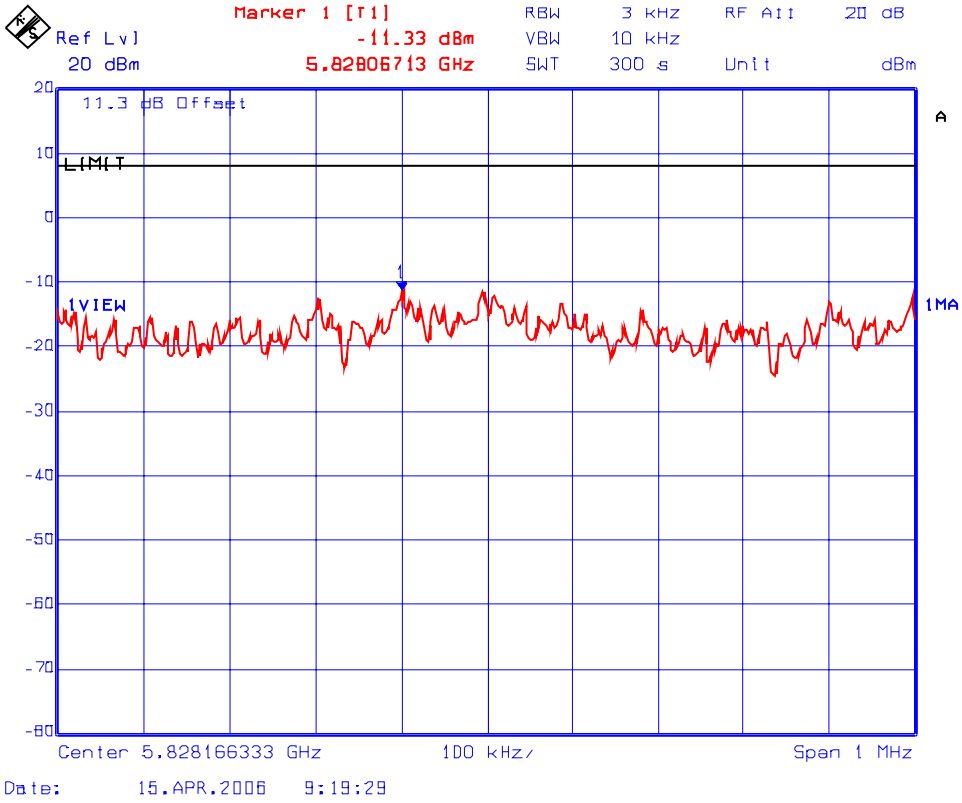


Plot # 115: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: 16QAM @72Mb/s



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

Plot # 116: Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108Mb/s



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

4.11. TRANSMITTER BAND-EDGE & SPURIOUS EMISSIONS (RADIATED @ 3 METERS), FCC CFR 47, PARA. 15.247(D), 15.209 & 15.205

4.11.1. 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. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

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

4.11.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005" and Ultratech Test Procedures, File # ULTR P003-2004 and ANSI C63.4 for measurement methods

Radiated emission test: Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

4.11.3. 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

4.11.4. Photographs of Test Setup

Refer to the Photographs #3 to #6 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

4.11.5. Test Data

Notes:

(1) As we notice that the rf output powers, 6 dB Bandwidths and Band-edge Emissions are very much the same with all different modulations. Therefore, the radiated emissions with the modulation of 64QAM will be tested for each Channel Spacing to represent for all other modulations.

(2) The radiated band-edge and out-of-band spurious emissions were measured from the Model AN-80i with the highest gain of antenna in each family as below:

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi

4.11.5.1. Transmitter Radiated Band-edge Spurious Emissions

Conforms. Please refer to Plots # 117((a),(b),(c)&(d) to # 128((a),(b),(c)&(d) for detailed measurements of band-edge conducted emissions.

4.11.5.2. Transmitter Radiated Spurious Emissions

4.11.5.2.1.1. Test Configuration #1: Model AN-80i with MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi (highest gain in MTI Flat Panel Antenna Family) – Channel Spacing: 10 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s

4.11.5.2.1.1.1. Carrier Frequency of 5735 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.1.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.1.3. Carrier Frequency of 5840 MHz (Highest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.2. Test Configuration #2: Model AN-80i with MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi (highest gain in MTI Flat Panel Antenna Family) – Channel Spacing: 20 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s

4.11.5.2.1.2.1. Carrier Frequency of 5735 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.2.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.2.3. Carrier Frequency of 5840 MHz (Highest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.3. Test Configuration #3: Model AN-80i with MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi (highest gain in MTI Flat Panel Antenna Family) – Channel Spacing: 40 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s

4.11.5.2.1.3.1. Carrier Frequency of 5745 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.3.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.3.3. Carrier Frequency of 5830 MHz (Highest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.4. Test Configuration #4: Model AN-80i with Radio Waves, Parabolic Antenna, Redline P/N: 48-00033-00, Radio Waves P/N: SP4-5.2, Antenna Gain: 34.6 dBi (highest gain in Radio Waves Parabolic Antenna Family) – Channel Spacing: 10 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s

4.11.5.2.1.4.1. Carrier Frequency of 5735 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.4.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.4.3. Carrier Frequency of 5840 MHz (Highest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.5. Test Configuration #5: Model AN-80i with Radio Waves, Parabolic Antenna, Redline P/N: 48-00033-00, Radio Waves P/N: SP4-5.2, Antenna Gain: 34.6 dBi (highest gain in Radio Waves Parabolic Antenna Family) – Channel Spacing: 20 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s

4.11.5.2.1.5.1. Carrier Frequency of 5735 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.5.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.5.3. Carrier Frequency of 5840 MHz (Highest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.6. Test Configuration #6: Model AN-80i with Radio Waves, Parabolic Antenna, Redline P/N: 48-00033-00, Radio Waves P/N: SP4-5.2, Antenna Gain: 34.6 dBi (highest gain in Radio Waves Parabolic Antenna Family) – Channel Spacing: 40 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s

4.11.5.2.1.6.1. Carrier Frequency of 5745 MHz (Lowest)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.6.2. Carrier Frequency of 5787.5 MHz (Middle)

Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

*Frequency in restricted frequency band.

4.11.5.2.1.6.3. Carrier Frequency of 5830 MHz (Highest)

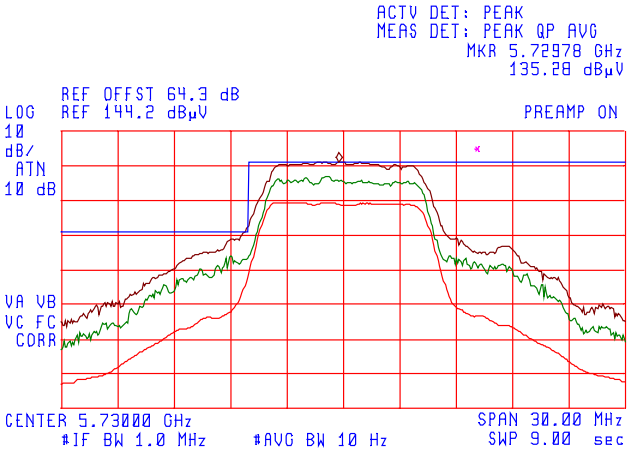
Frequency (MHz)	RF Peak Level (dBµV/m)	RF AVG Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.407 (dBµV/m	Margin (dB)	Pass/ Fail
30 – 40,000	**	**	H	54.0	68.2	**	Pass
** The radiated emissions from the transmitter were scanned from 30 MHz to 40 GHz and no significant emissions were found in this band (all spurious an harmonic emissions form the transmitter were more than 20 dB below the FCC Limits 15.209 or 15.407 whatever it is applicable)							

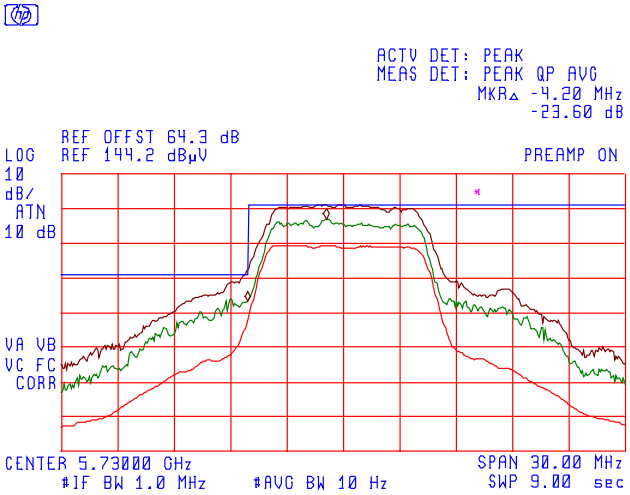
*Frequency in restricted frequency band.

Plot # 117(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.60 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 135.28dBuV/m – 23.60 dB= 111.68dBuV/m (limit 115.28dBuV/m)

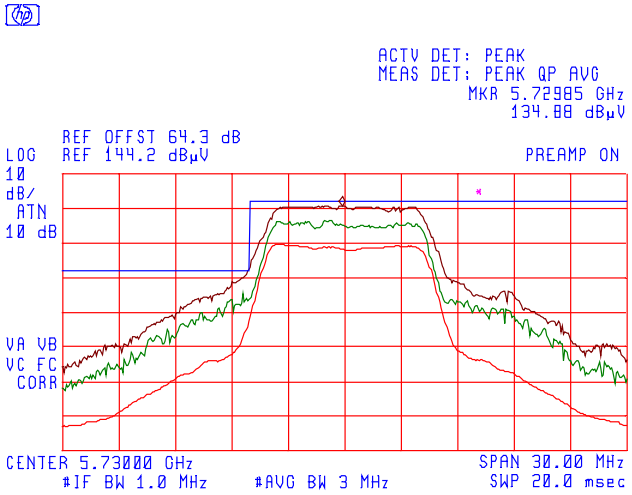


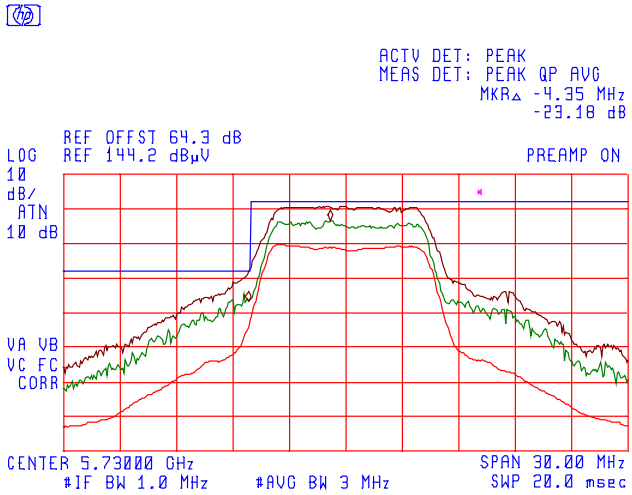


Plot # 117(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.18 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 134.88dBuV/m – 23.18 dB= 111.70dBuV/m (limit 114.88dBuV/m)

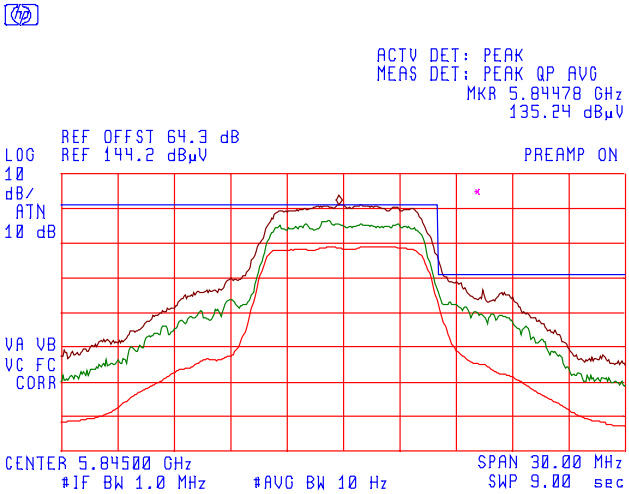


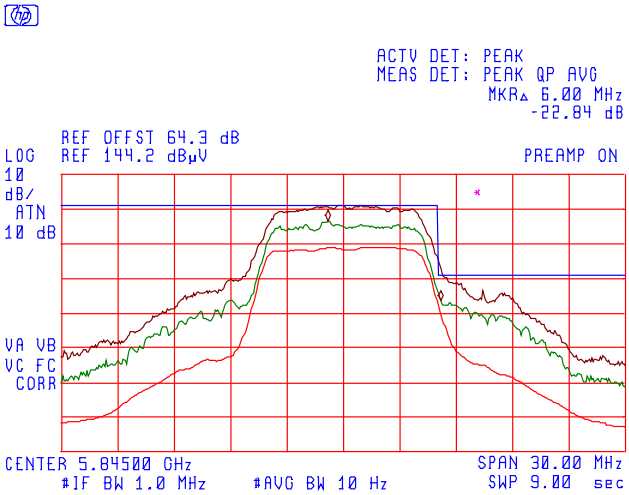


Plot # 117(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.84 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 135.24dBuV/m – 22.84 dB= 112.40dBuV/m (limit 115.24dBuV/m)

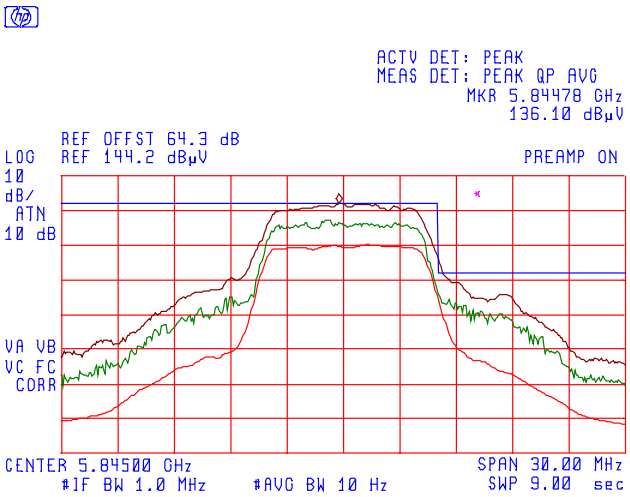


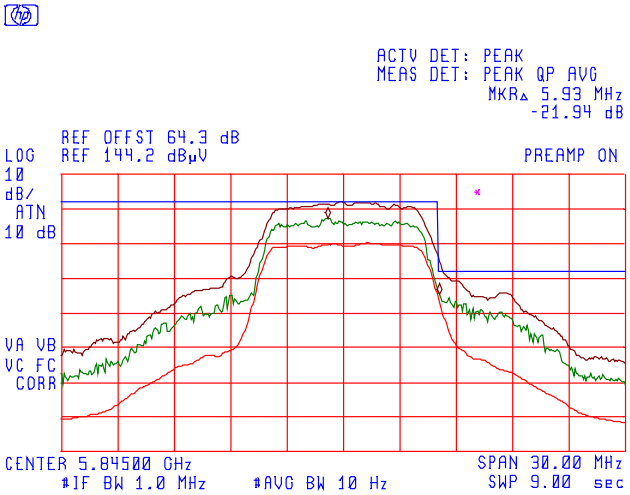


Plot # 117(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 21.94 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 136.10dBuV/m – 21.94 dB= 114.16dBuV/m (limit 116.10dBuV/m)

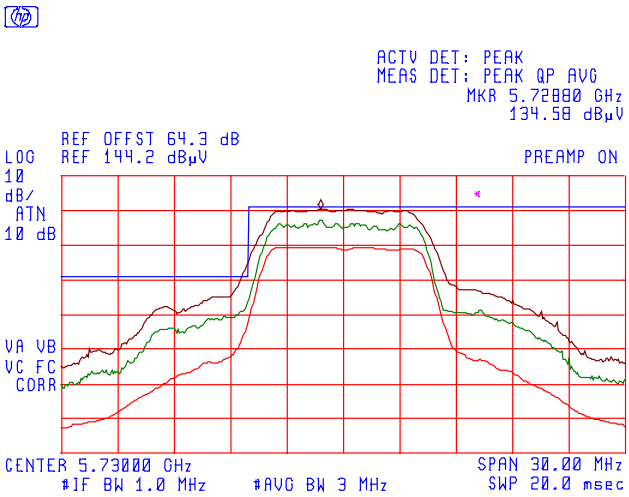


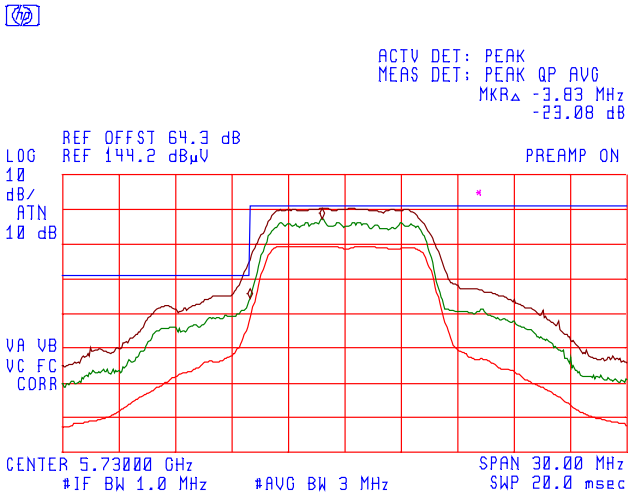


Plot # 118(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.08 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 134.58dBuV/m – 23.08 dB= 111.50dBuV/m (limit 114.38dBuV/m)



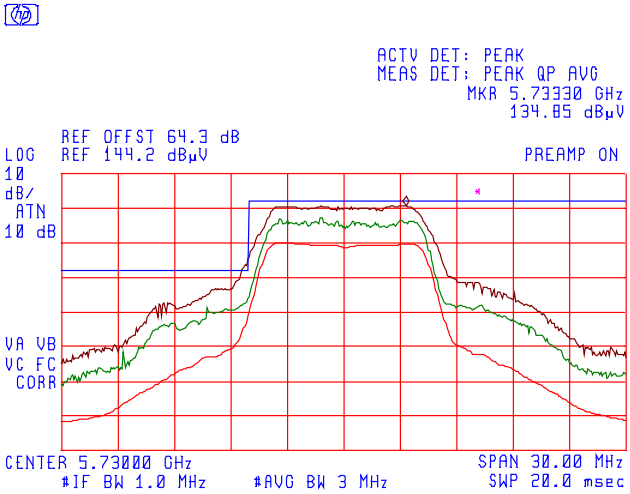


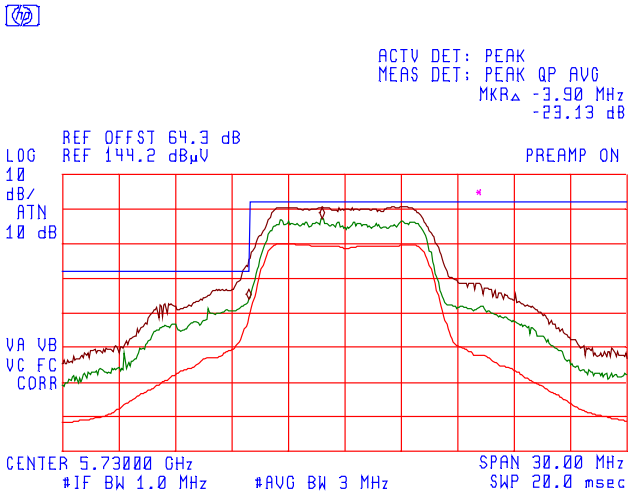
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 118(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.13 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 134.85dBuV/m – 23.13 dB= 111.72dBuV/m (limit 114.85dBuV/m)

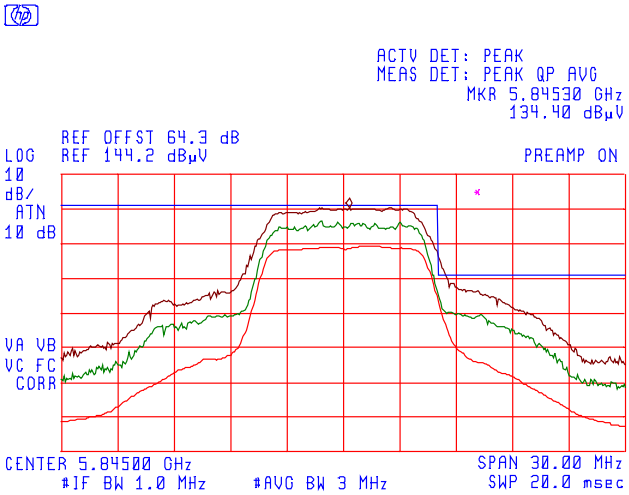


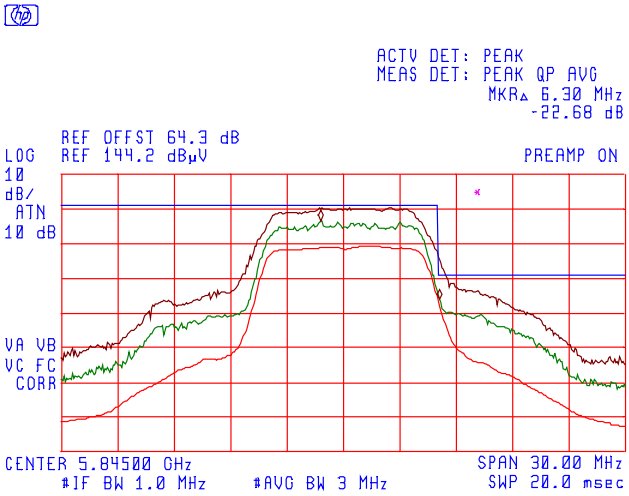


Plot # 118(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.68 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 134.40dBuV/m – 22.68 dB= 111.72dBuV/m (limit 114.40dBuV/m)

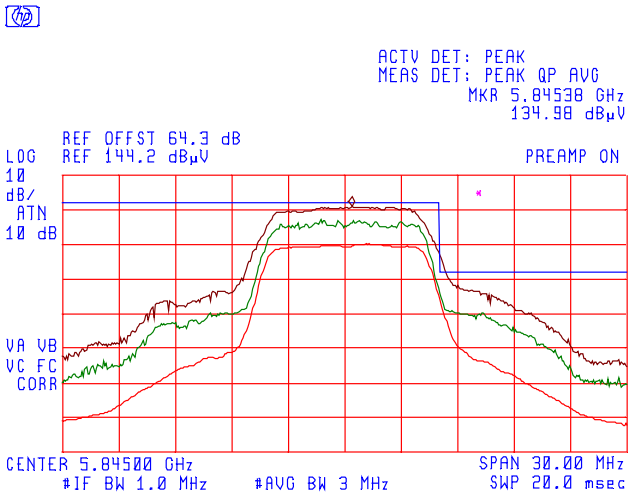


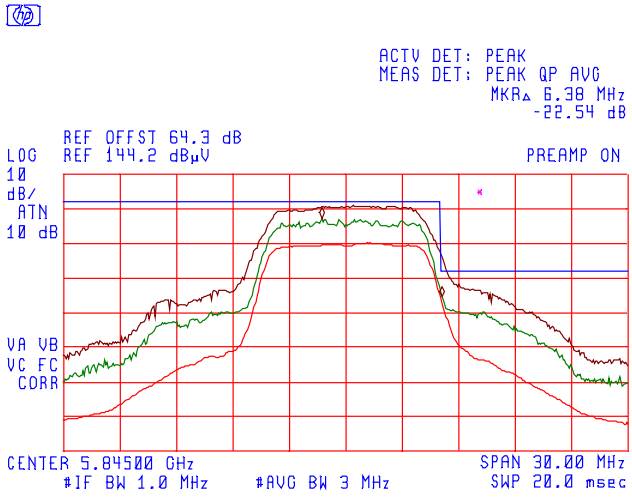


Plot # 118(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.54 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 134.98dBuV/m – 22.54 dB= 112.44dBuV/m (limit 114.98dBuV/m)



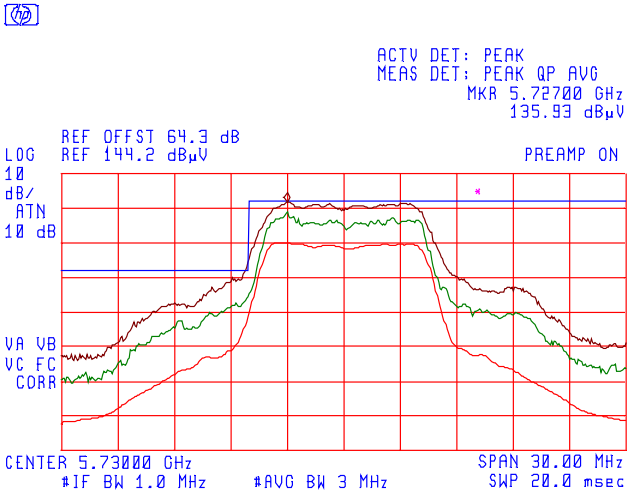


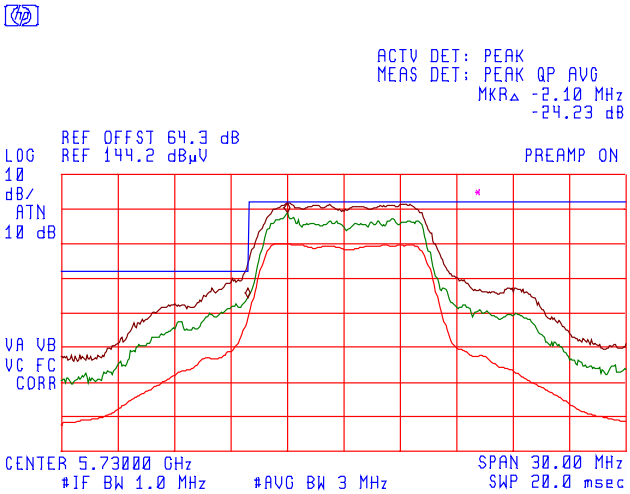
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 119(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.23 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 135.93dBuV/m – 24.23 dB= 111.70dBuV/m (limit 115.93dBuV/m)

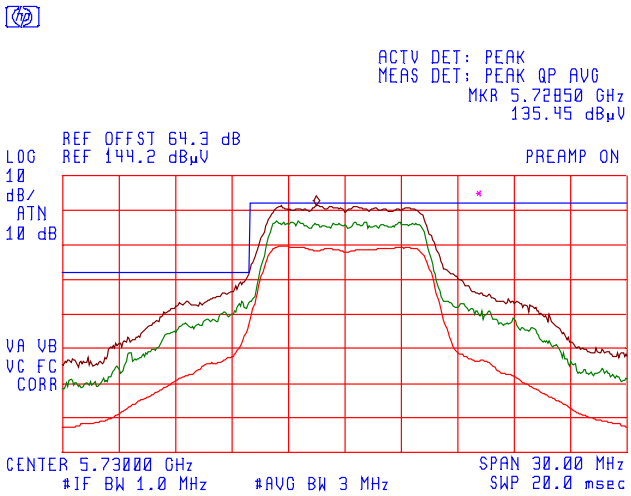


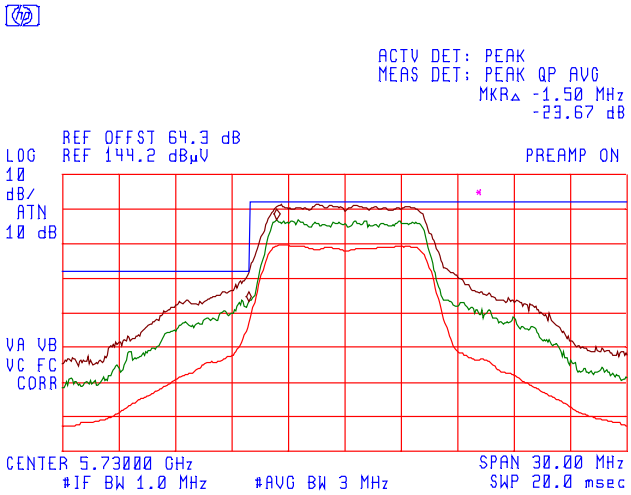


Plot # 119(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.67 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 135.45dBuV/m – 23.67 dB= 111.78dBuV/m (limit 115.45dBuV/m)

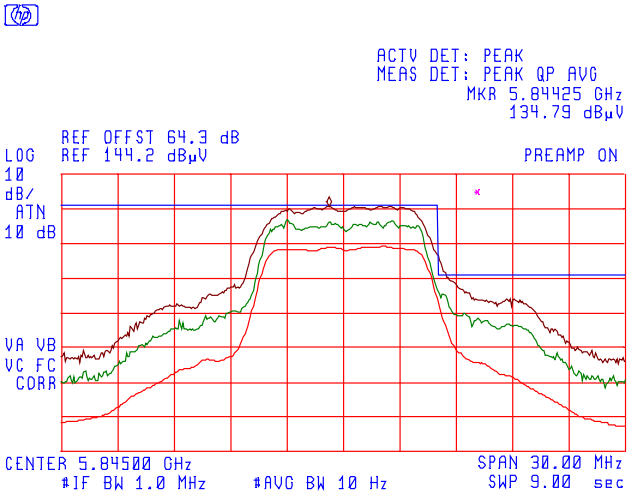


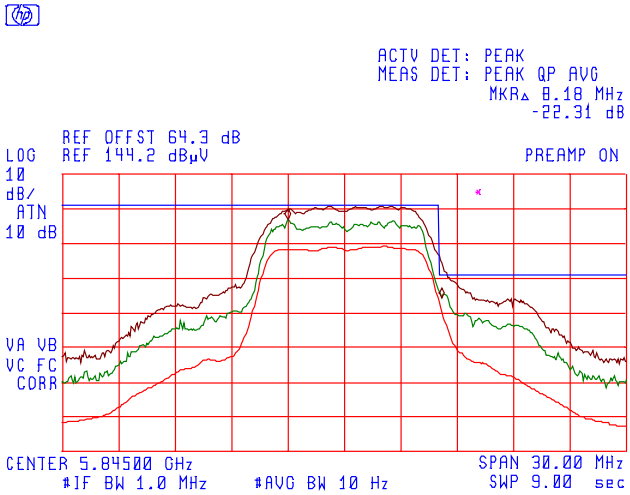


Plot # 119(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.31 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 134.79dBuV/m – 22.31 dB= 112.48dBuV/m (limit 114.79dBuV/m)



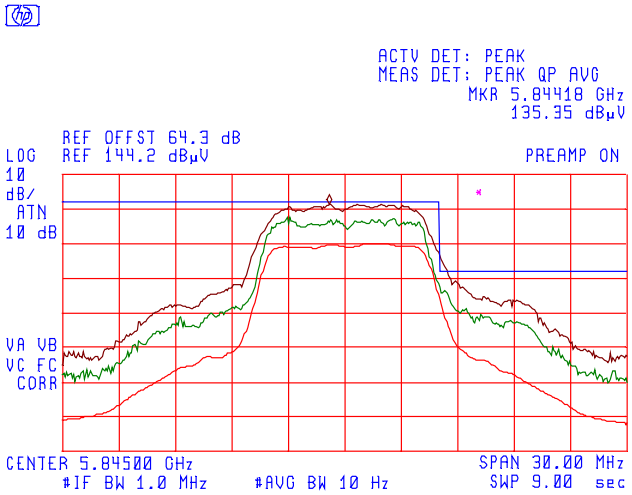


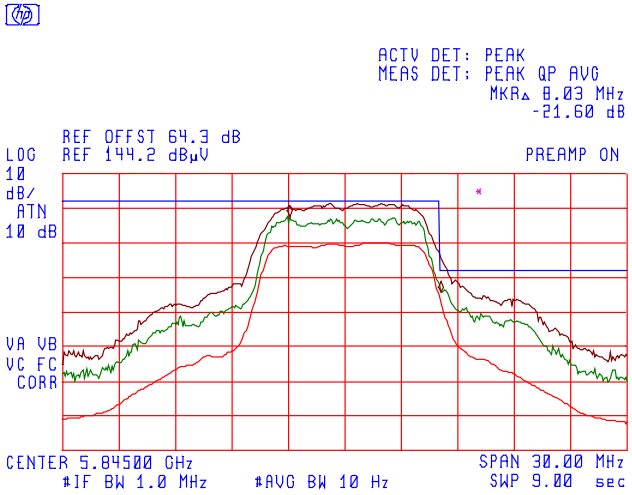
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 119(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 21.60 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 135.35dBuV/m – 21.60 dB= 113.75dBuV/m (limit 115.35dBuV/m)

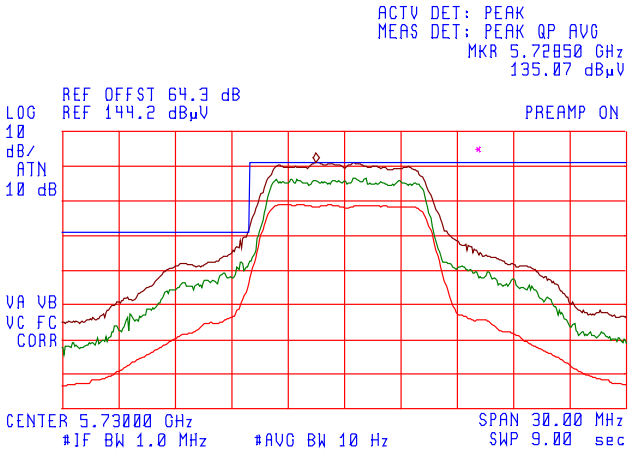


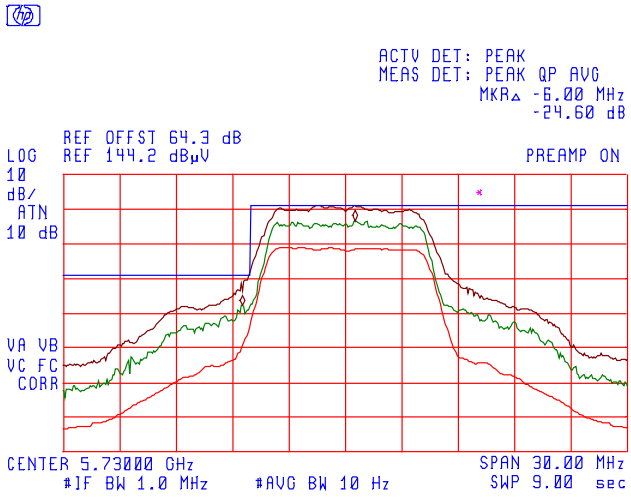


Plot # 120(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.60 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 135.07dBuV/m – 24.60 dB= 110.47dBuV/m (limit 115.07dBuV/m)

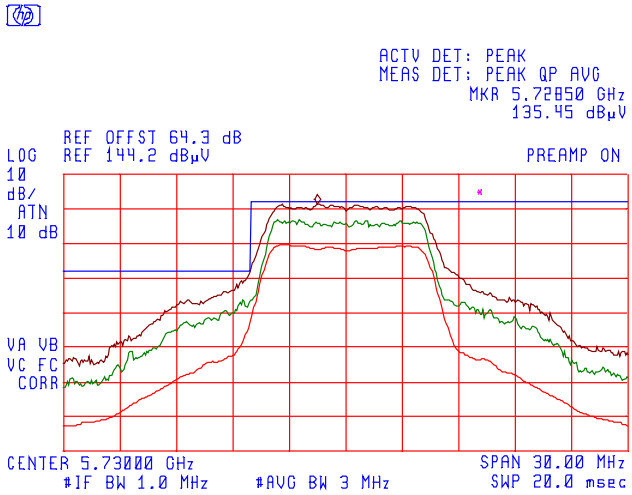


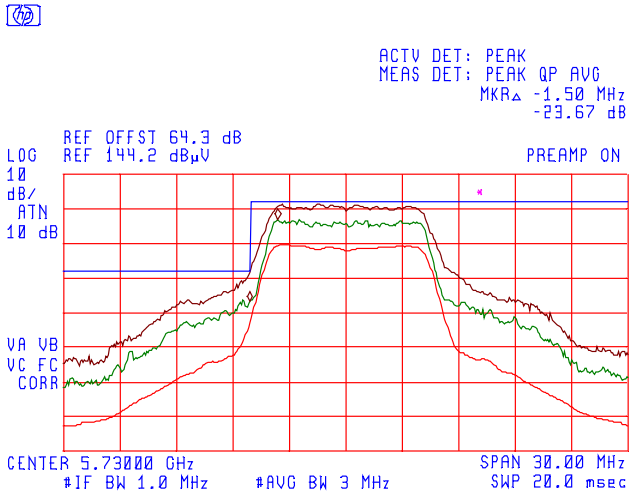


Plot # 120(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.67 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 135.45dBuV/m – 23.67 dB= 111.78dBuV/m (limit 115.45dBuV/m)



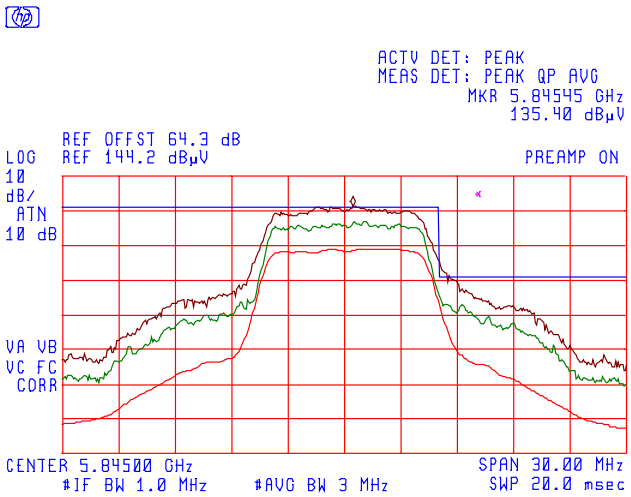


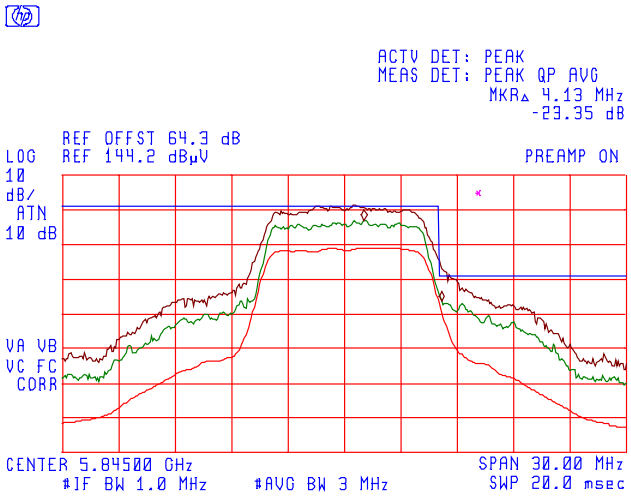
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 120(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.35 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 135.40dBuV/m – 23.35 dB= 112.05dBuV/m (limit 115.40dBuV/m)

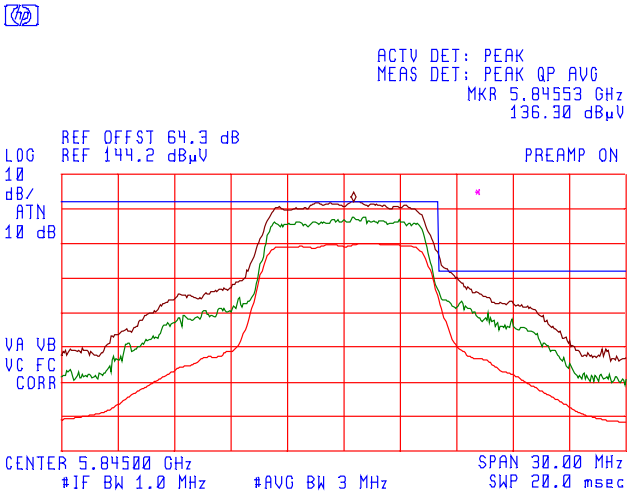


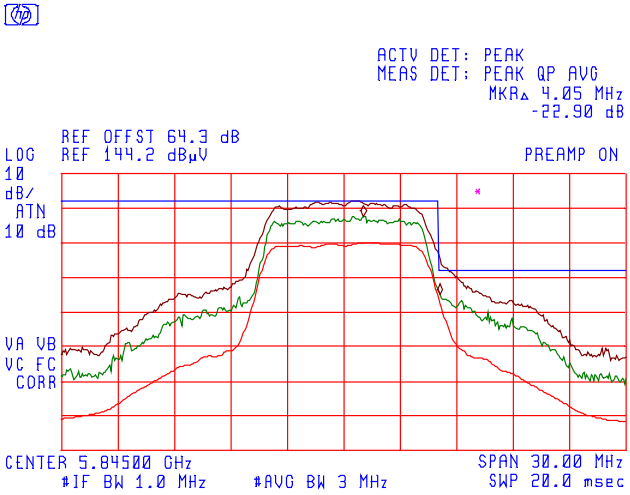


Plot # 120(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 10 MHz, Freq.: 5845 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.90 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 136.30dBuV/m – 22.90 dB= 113.40dBuV/m (limit 116.30dBuV/m)



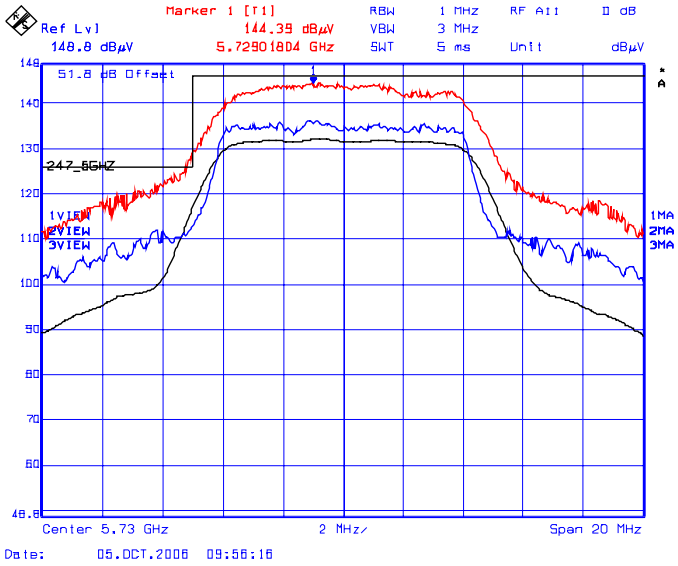


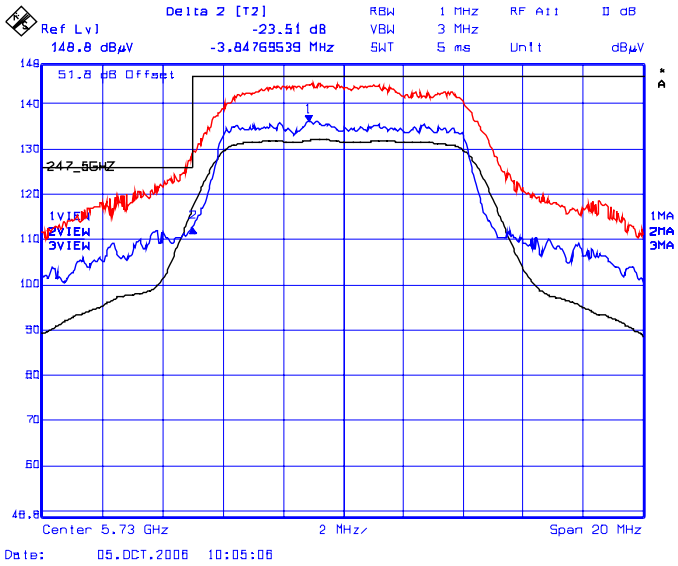
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 121(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.51 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 144.39dBuV/m – 23.51 dB= 120.88dBuV/m (limit 124.39dBuV/m)

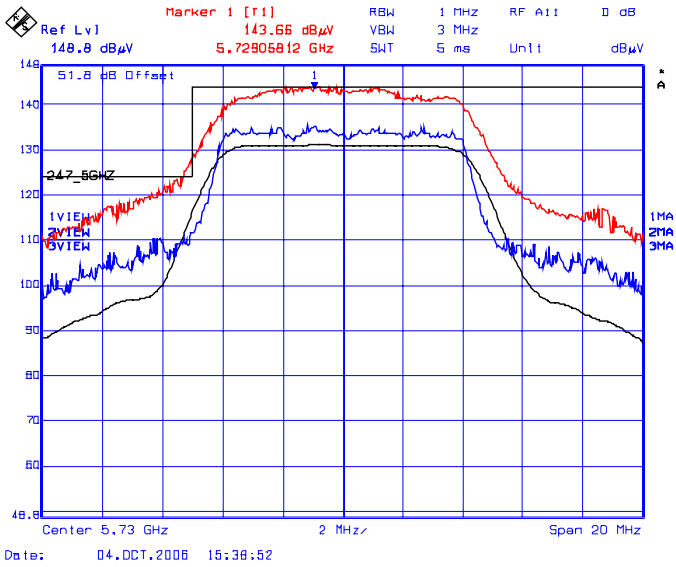


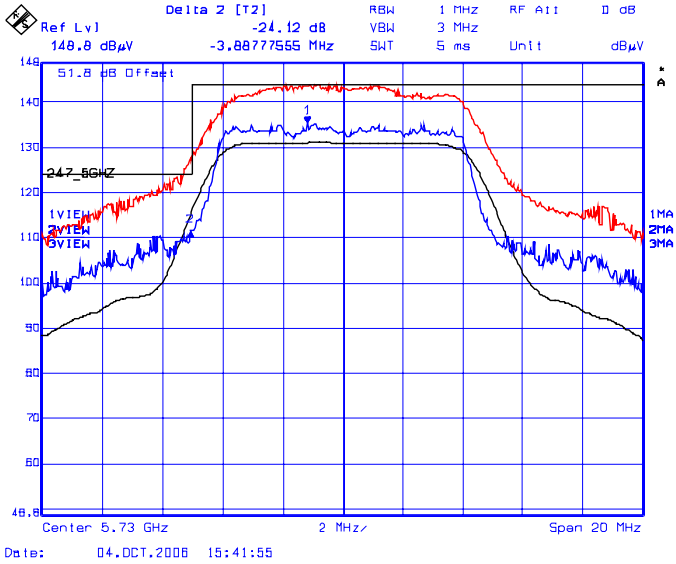


Plot # 121(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.12 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.66dBuV/m – 24.12 dB= 119.54dBuV/m (limit 123.66dBuV/m)

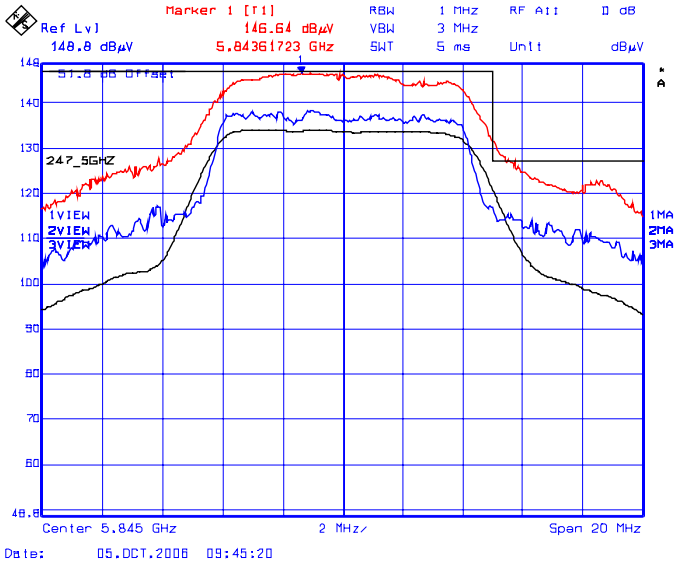


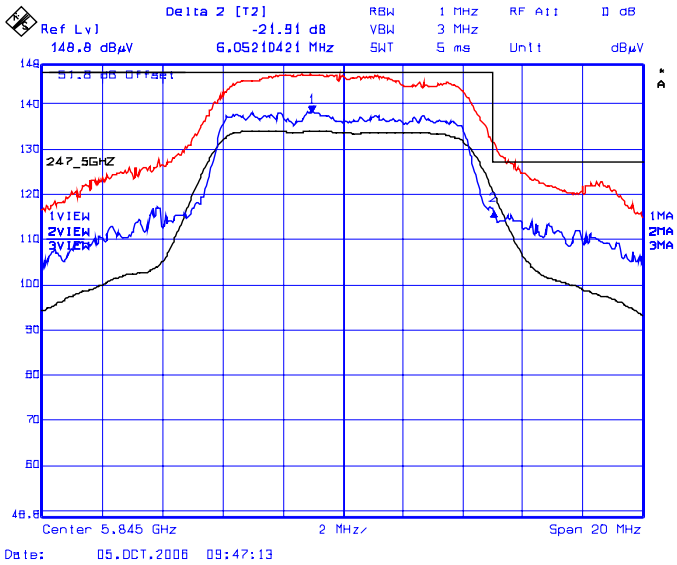


Plot # 121(c): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 21.91 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 146.64dBuV/m – 21.91 dB= 124.73dBuV/m (limit 126.64dBuV/m)

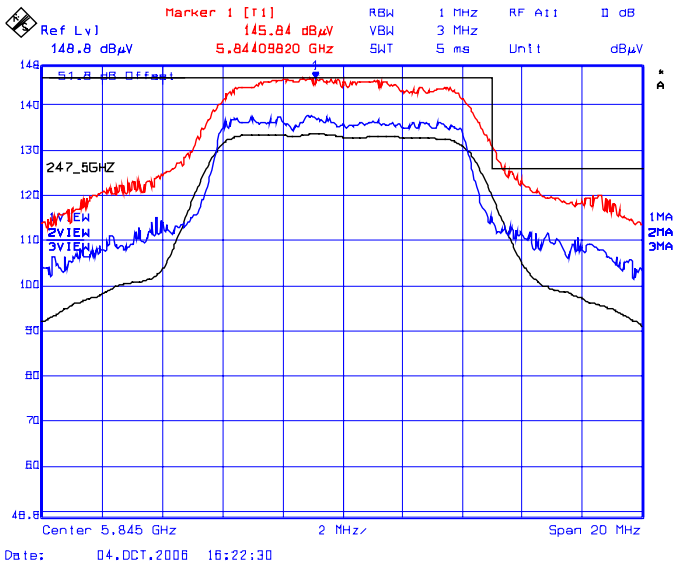


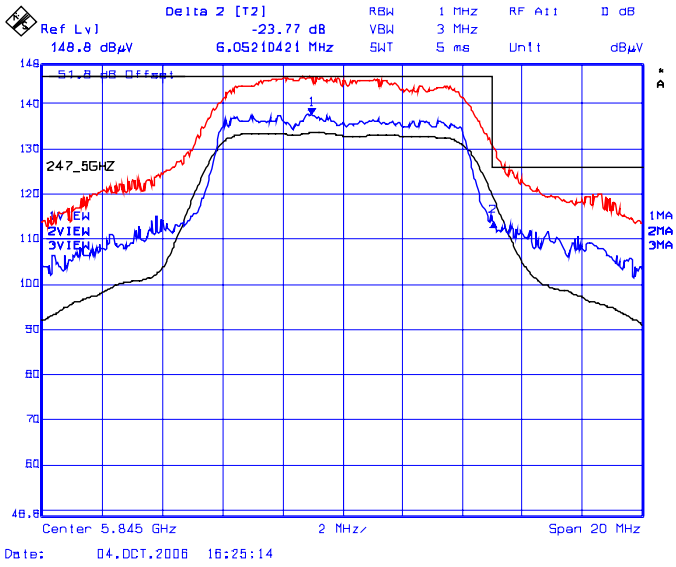


Plot # 121(d): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: BPSK @4.5 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.77 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 145.84dBuV/m – 23.77 dB= 122.07dBuV/m (limit 125.84dBuV/m)



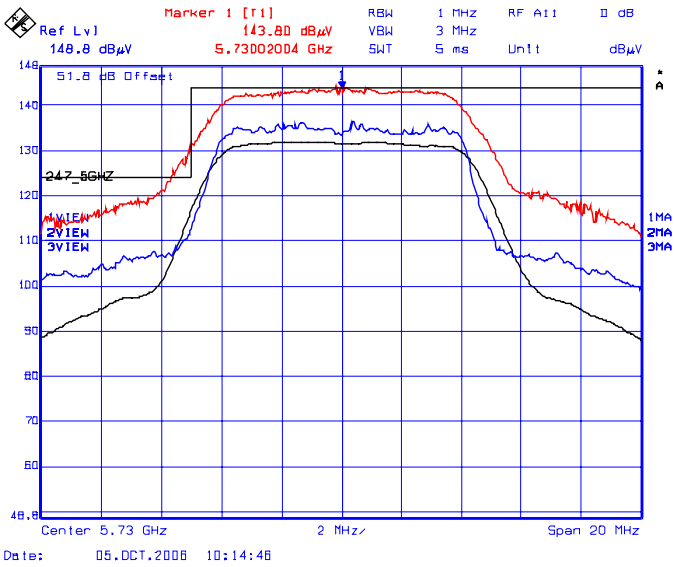


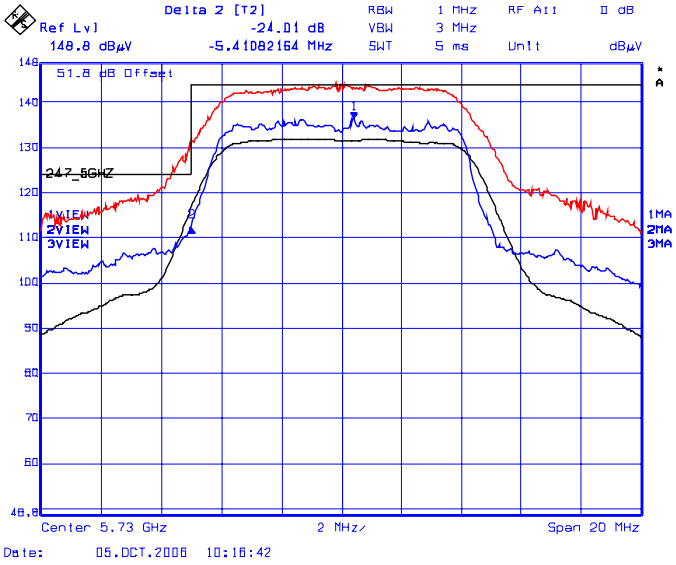
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 122(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.01 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.80dBuV/m – 24.01 dB= 119.79dBuV/m (limit 123.80dBuV/m)

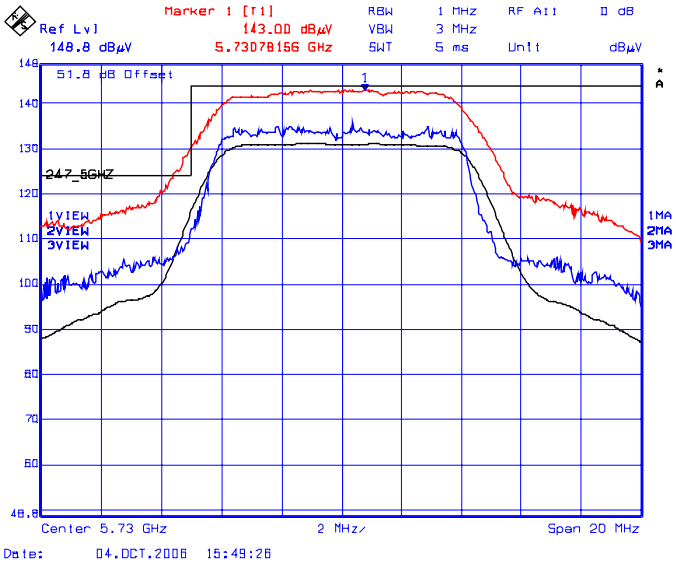


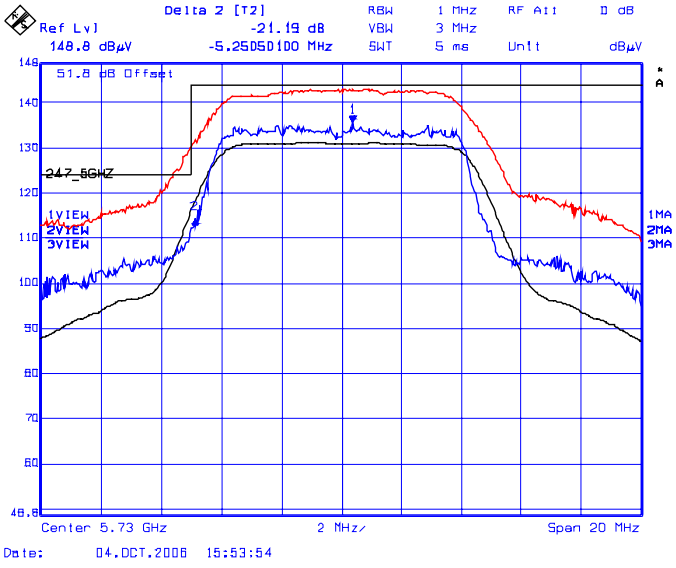


Plot # 122(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 21.19 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.00dBuV/m – 21.19 dB= 121.81dBuV/m (limit 123.00dBuV/m)



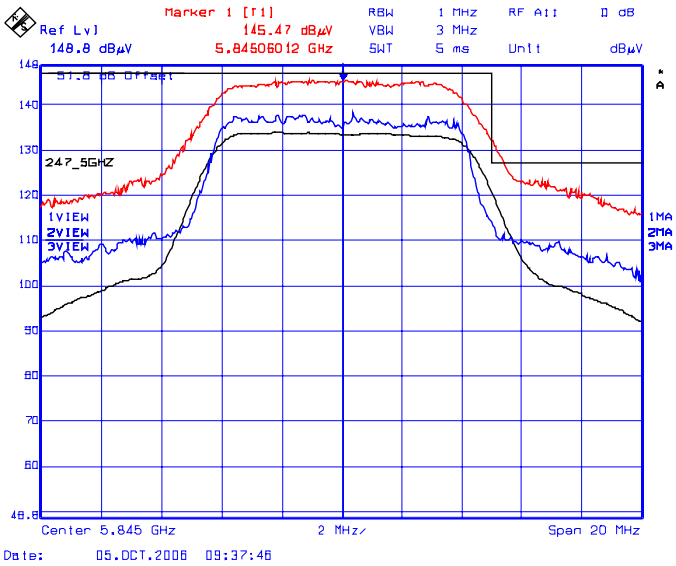


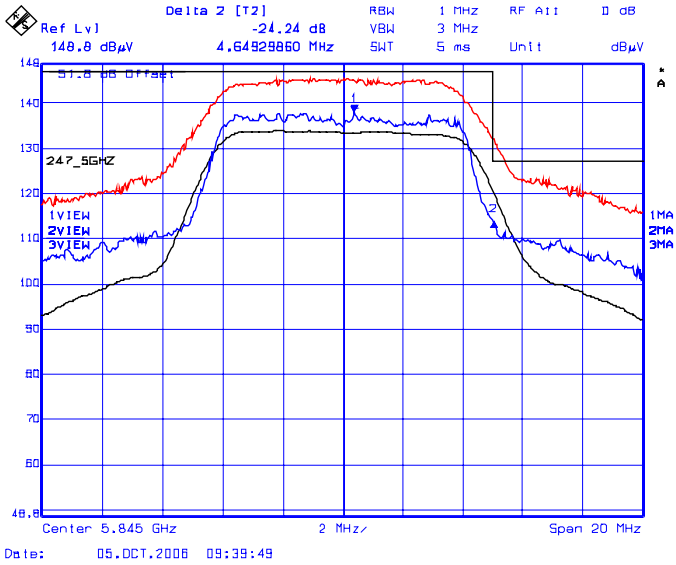
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 122(c): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.24 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 145.47dBuV/m – 24.24 dB= 121.23dBuV/m (limit 125.47dBuV/m)

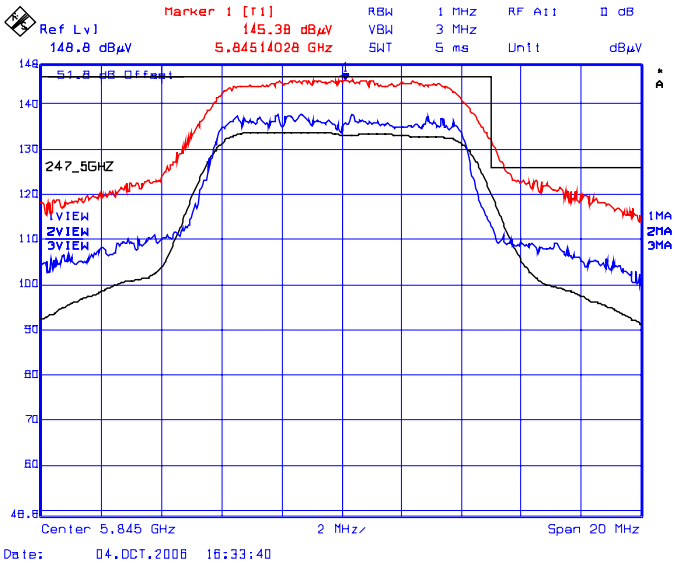


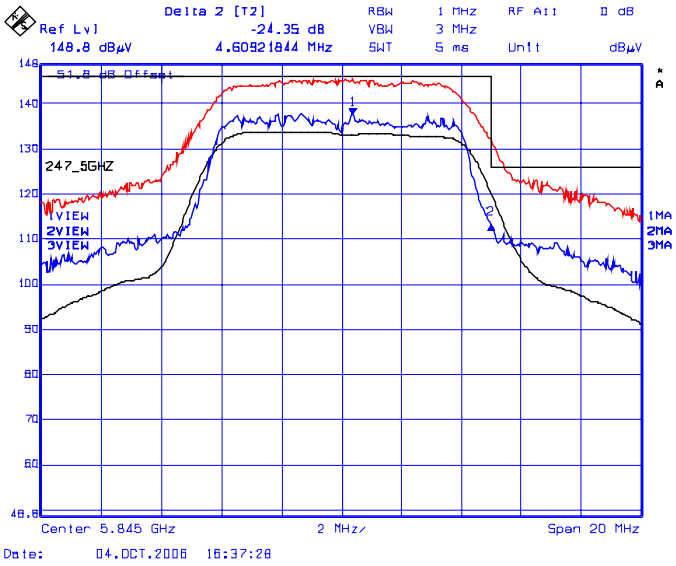


Plot # 122(d): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: QPSK @9 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.35 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 145.38dBuV/m – 24.35 dB= 121.03dBuV/m (limit 125.38dBuV/m)

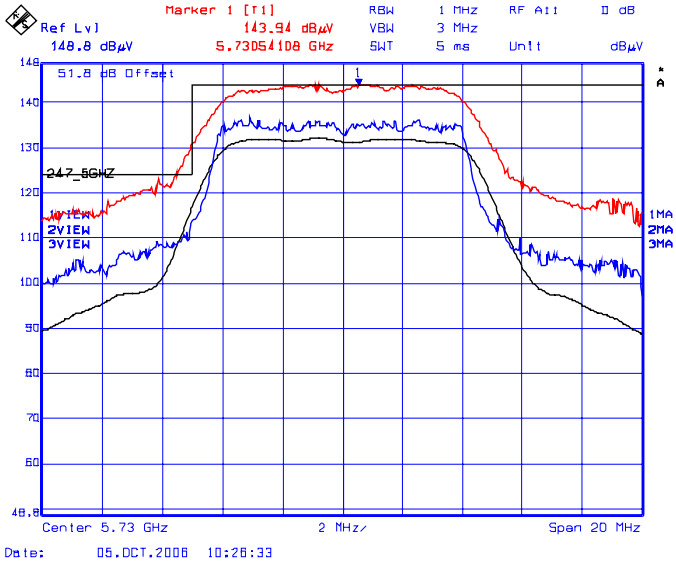


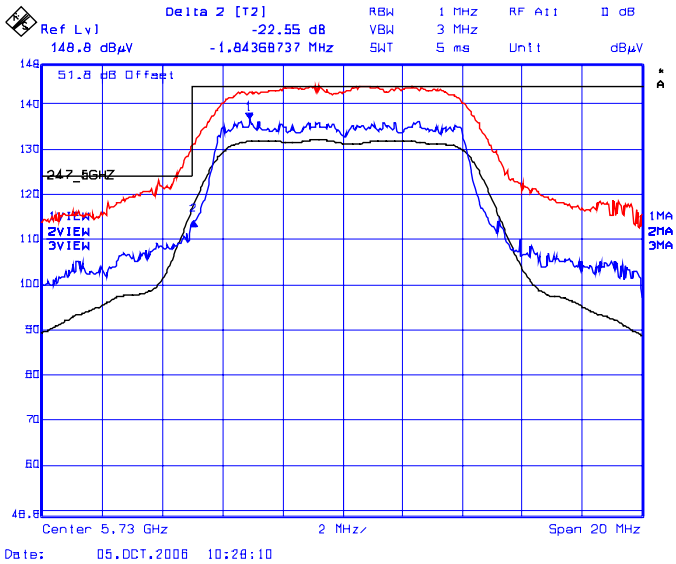


Plot # 123(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.55 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.94dBuV/m – 22.55 dB= 121.39dBuV/m (limit 123.94dBuV/m)

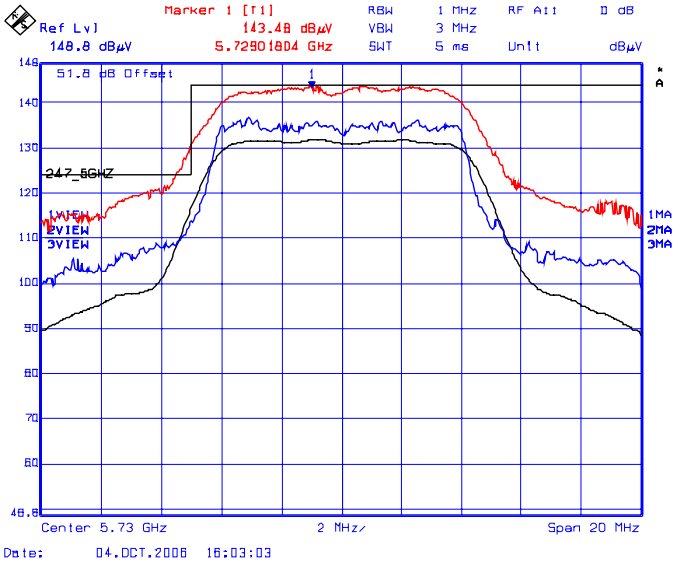


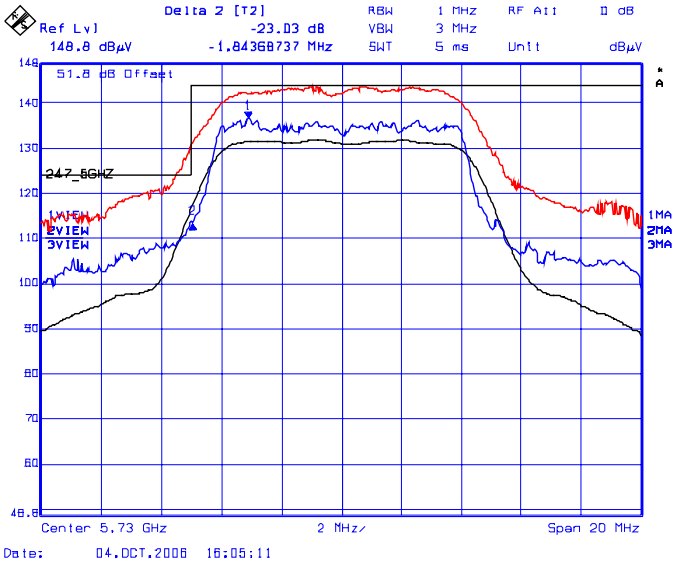


Plot # 123(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.03 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.48dBuV/m – 23.03 dB= 120.45dBuV/m (limit 123.48dBuV/m)

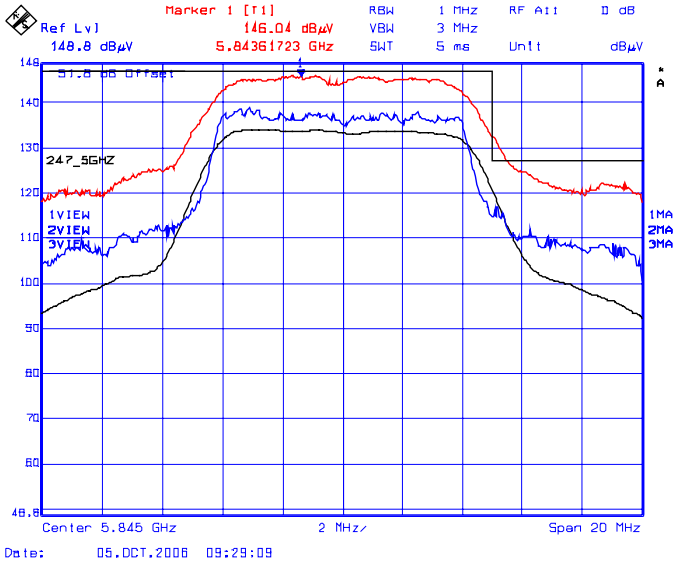


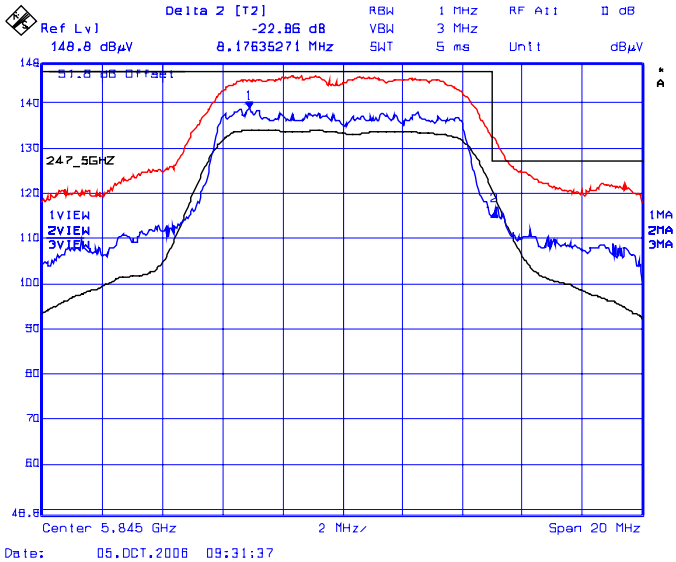


Plot # 123(c): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 22.86 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 146.04dBuV/m – 22.86 dB= 123.18dBuV/m (limit 126.04dBuV/m)

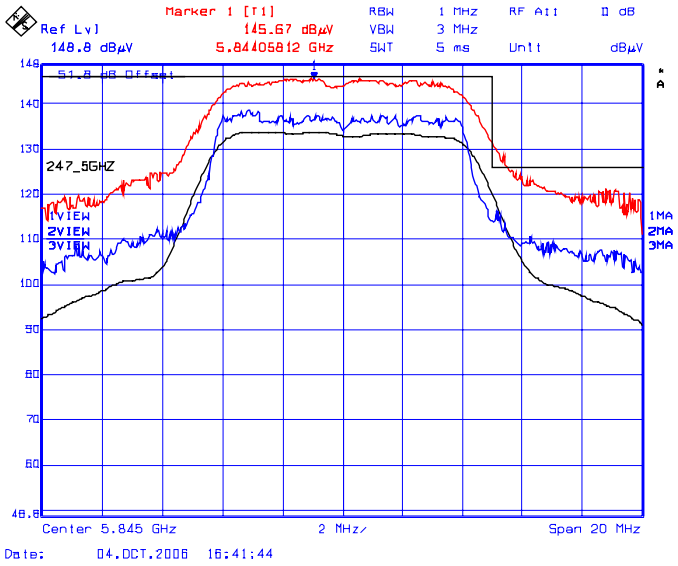


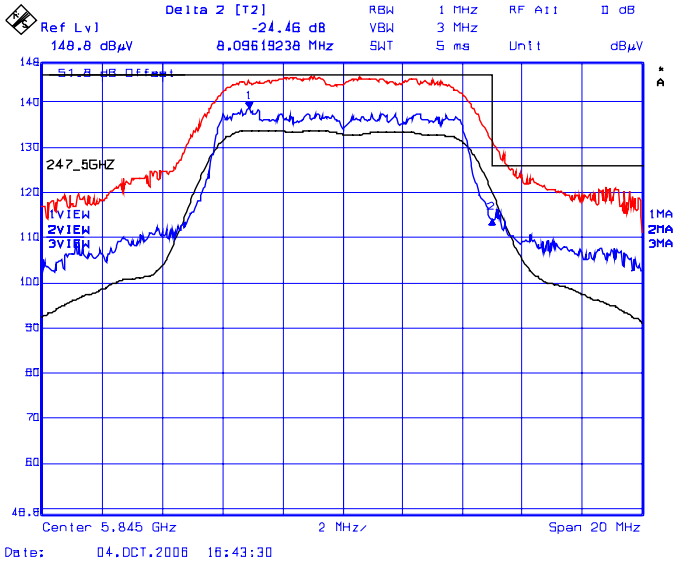


Plot # 123(d): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 16QAM @18 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.46 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 145.67dBuV/m – 24.46 dB= 121.21dBuV/m (limit 125.67dBuV/m)

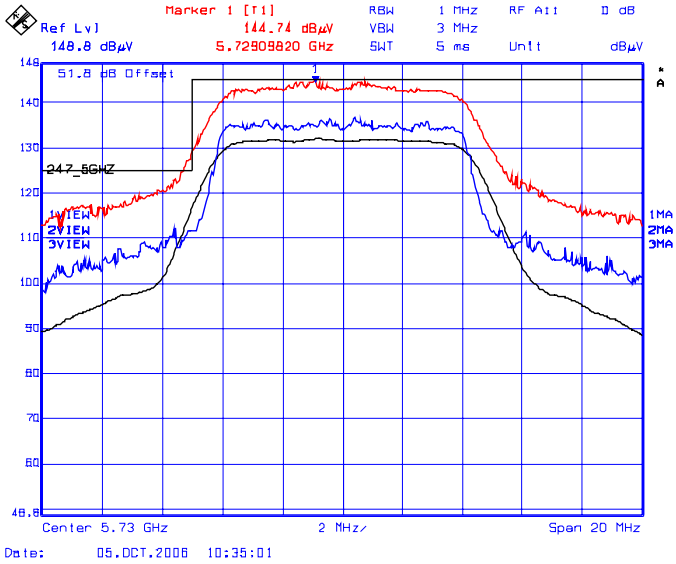


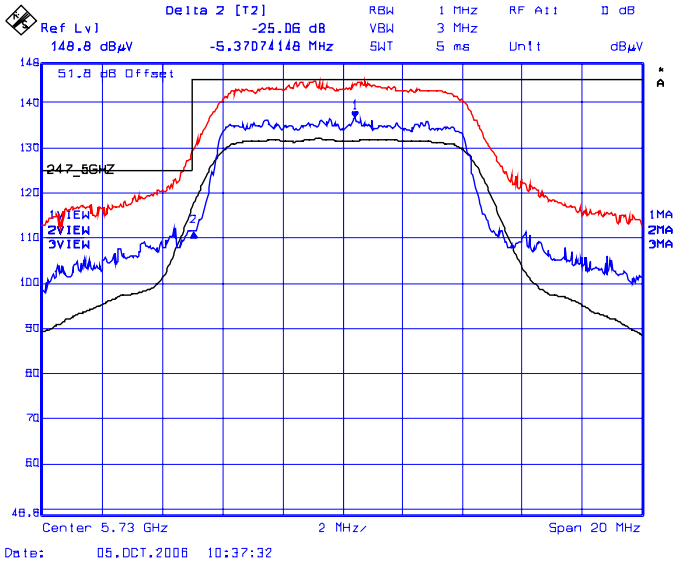


Plot # 124(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 25.06 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 144.74dBuV/m – 25.06 dB= 119.68dBuV/m (limit 124.74dBuV/m)

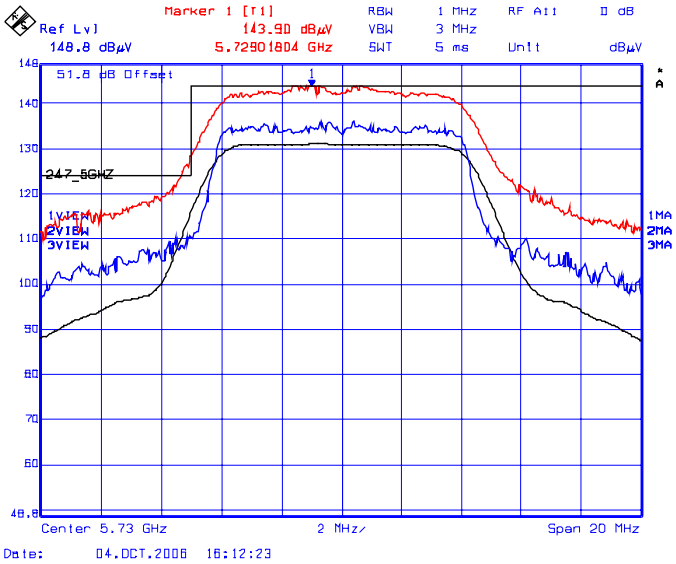


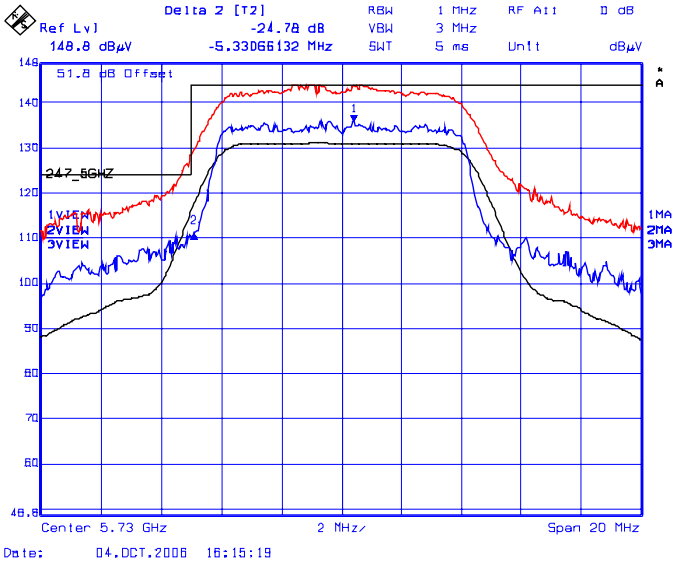


Plot # 124(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.78 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5725 MHz: 143.90dBuV/m – 24.78 dB= 119.12dBuV/m (limit 123.90dBuV/m)

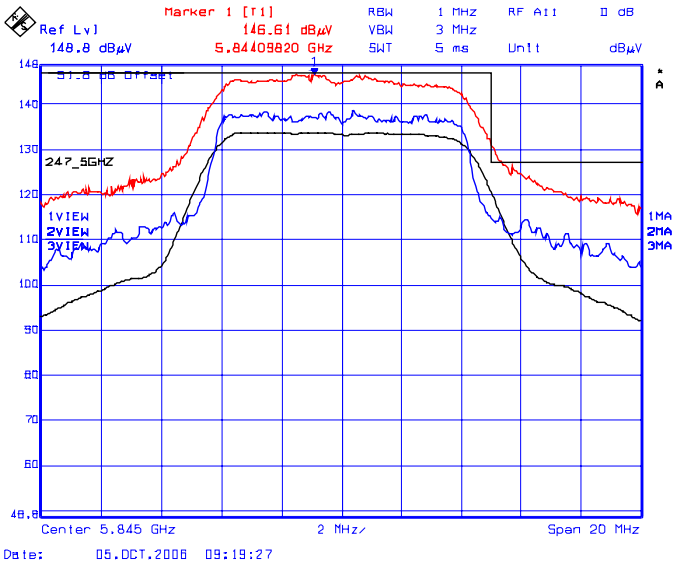


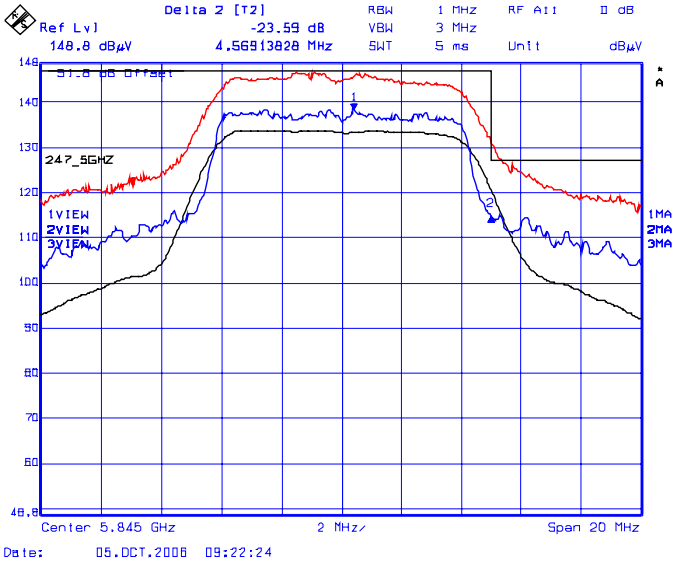


Plot # 124(c): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 23.59 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 146.61dBuV/m – 23.59 dB= 123.02dBuV/m (limit 126.61dBuV/m)

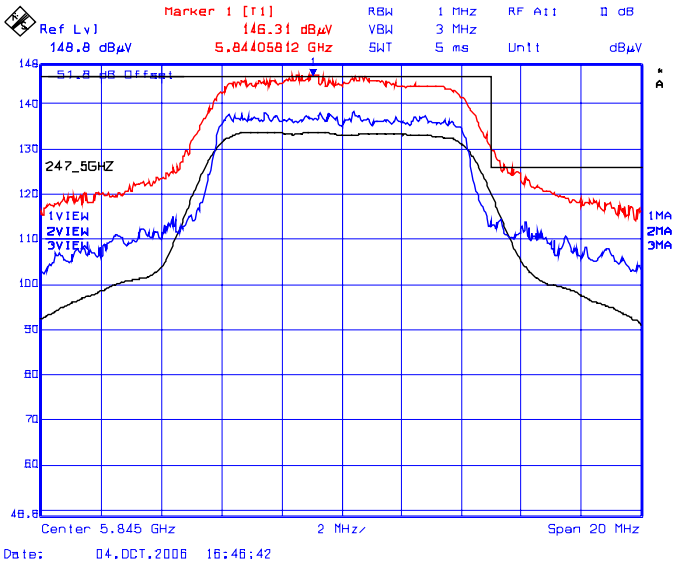


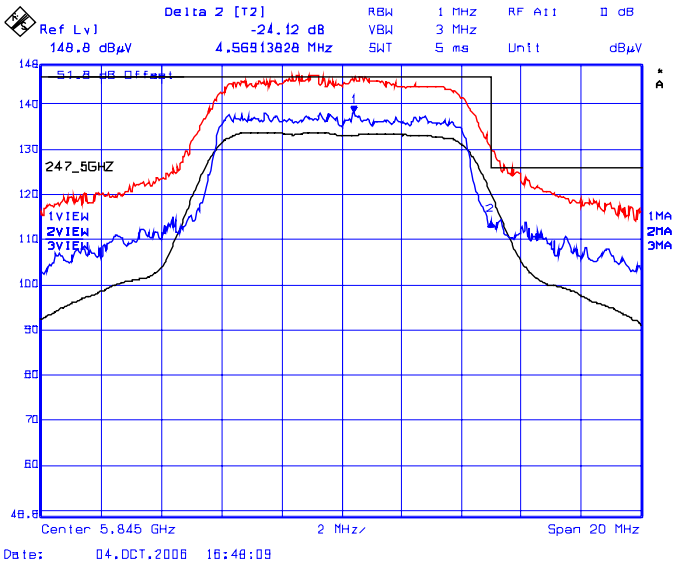


Plot # 124(d): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi.
- Channel Spacing: 10 MHz, Freq.: 5730 MHz, Power Setting: 20 dBm, Modulation: 64QAM @27 Mb/s

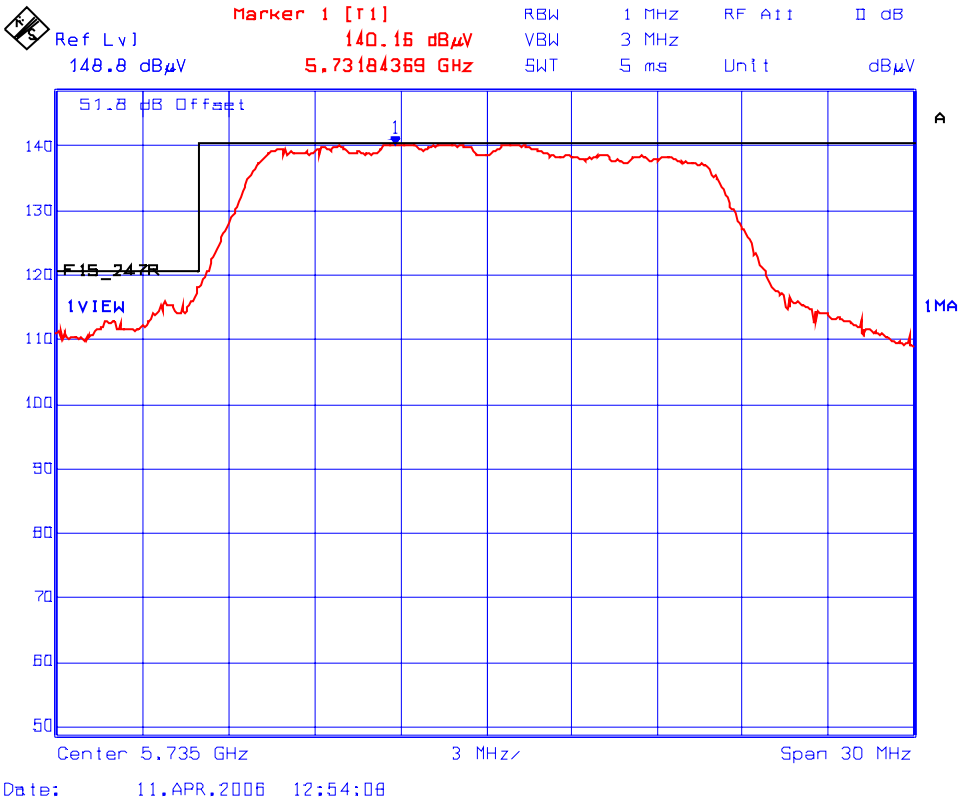
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 200 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): 24.12 dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Band-Edge Level at 5850 MHz: 146.31dBuV/m – 24.12 dB= 122.19dBuV/m (limit 126.31dBuV/m)





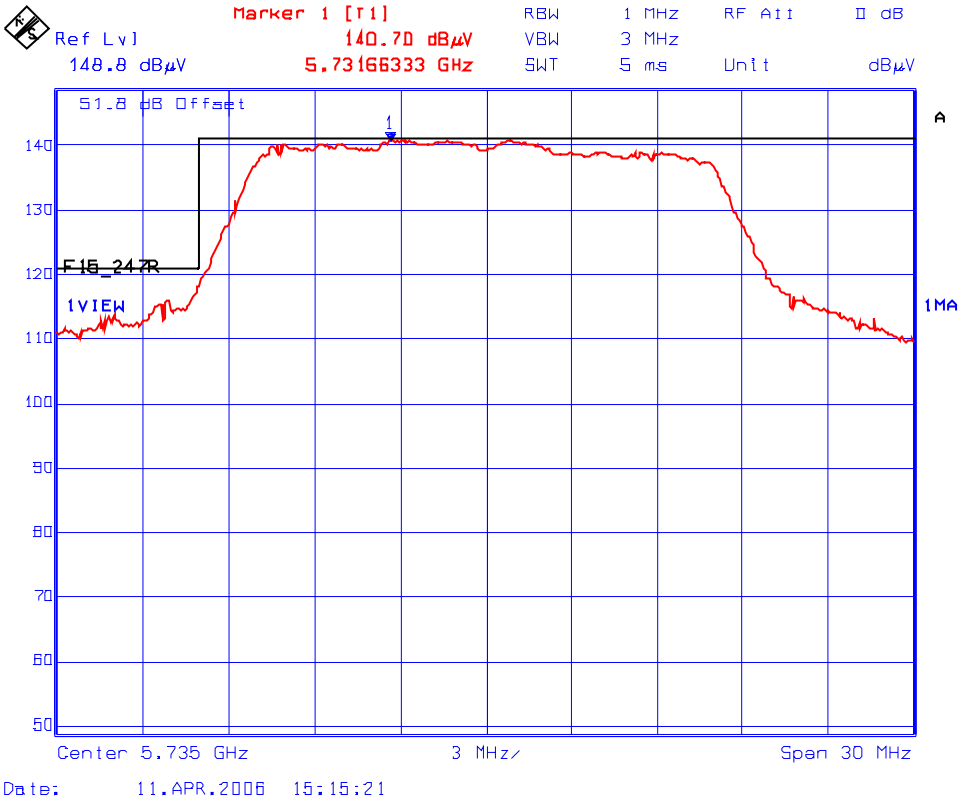
Plot # 125(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 20 MHz, Freq.: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



Plot # 125(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

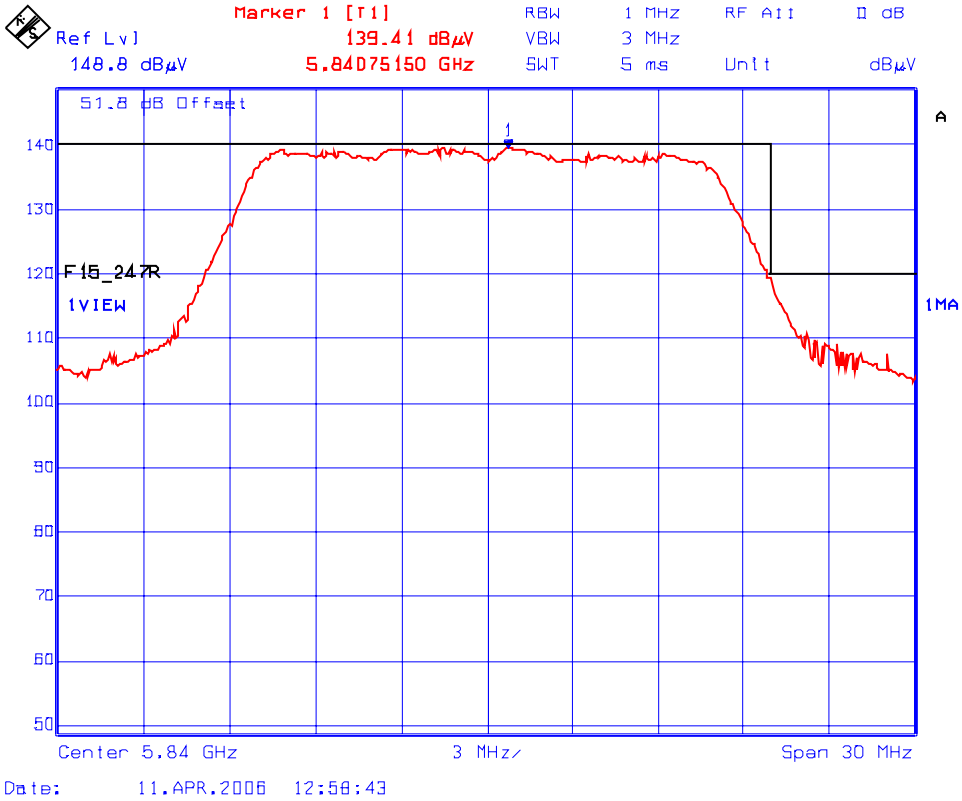
- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 20 MHz, Freq.: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



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

Plot # 125(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

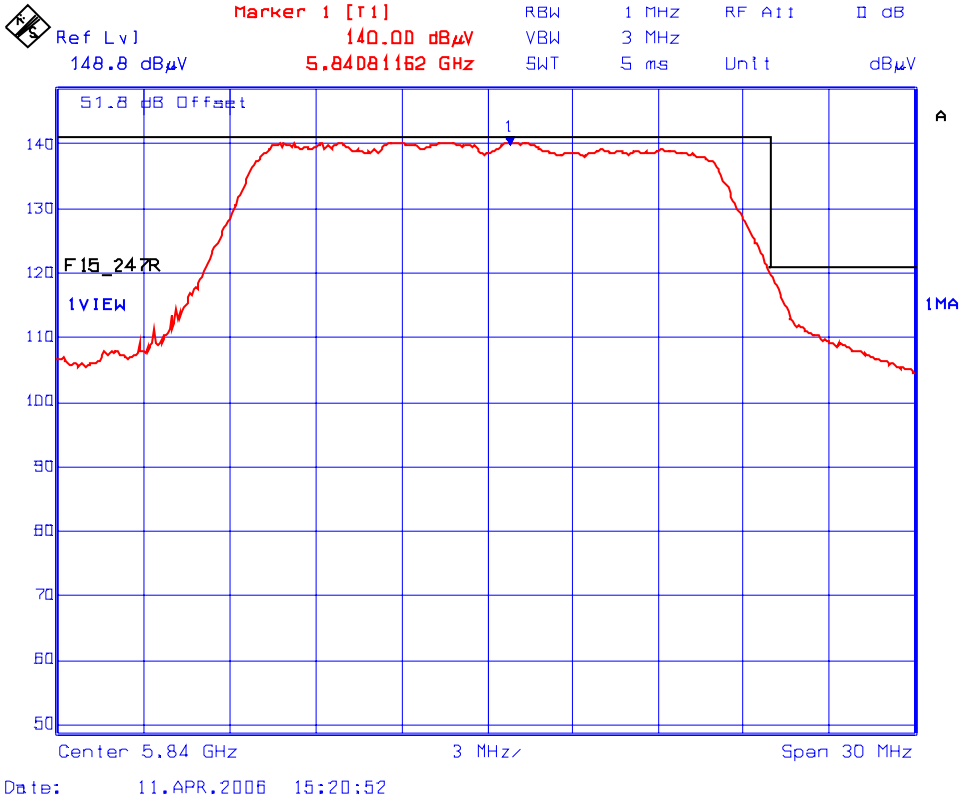
- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 20 MHz, Freq.: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



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

Plot # 125(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

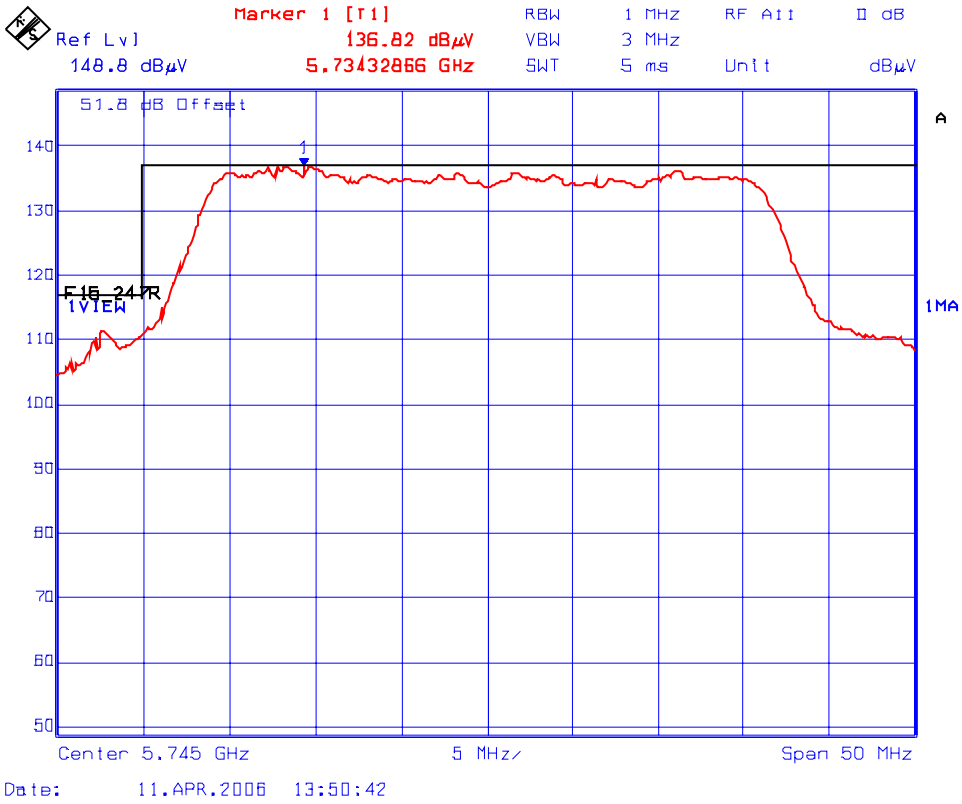
- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 20 MHz, Freq.: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



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

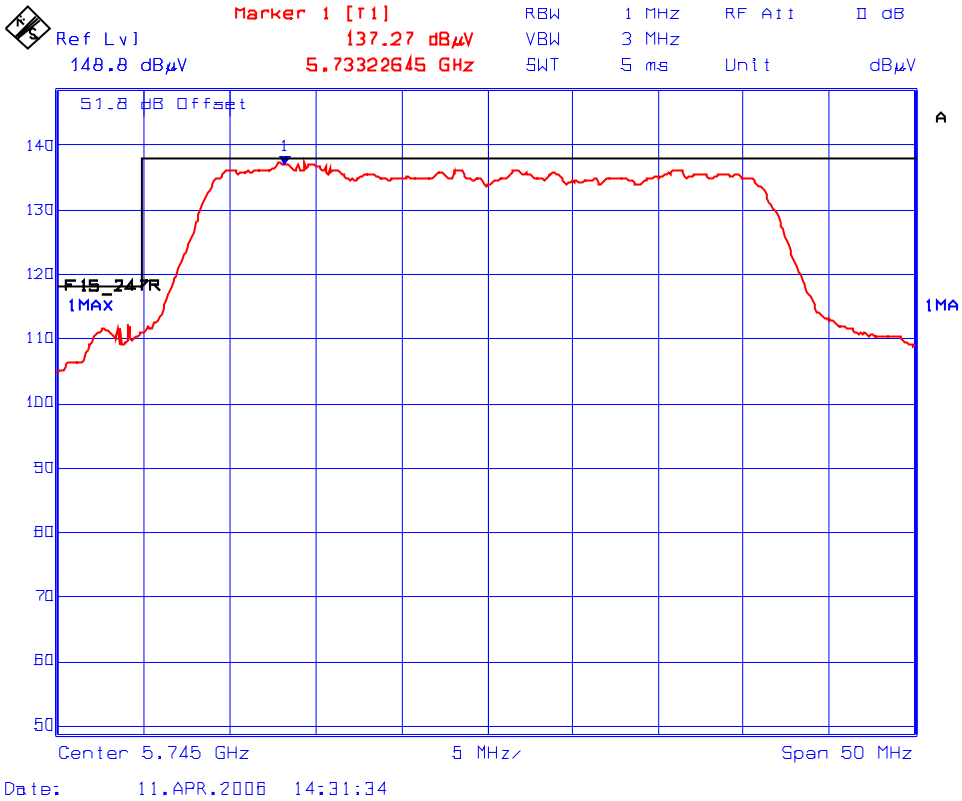
Plot # 126(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 40 MHz, Freq.: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



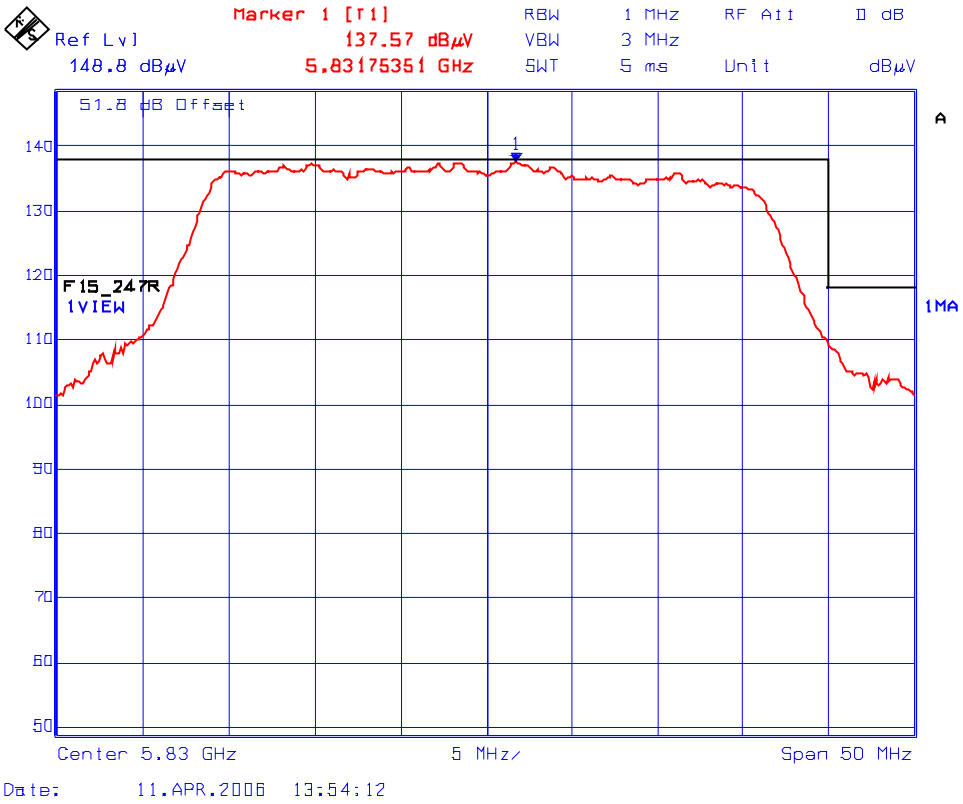
Plot # 126(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 40 MHz, Freq.: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



Plot # 126(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

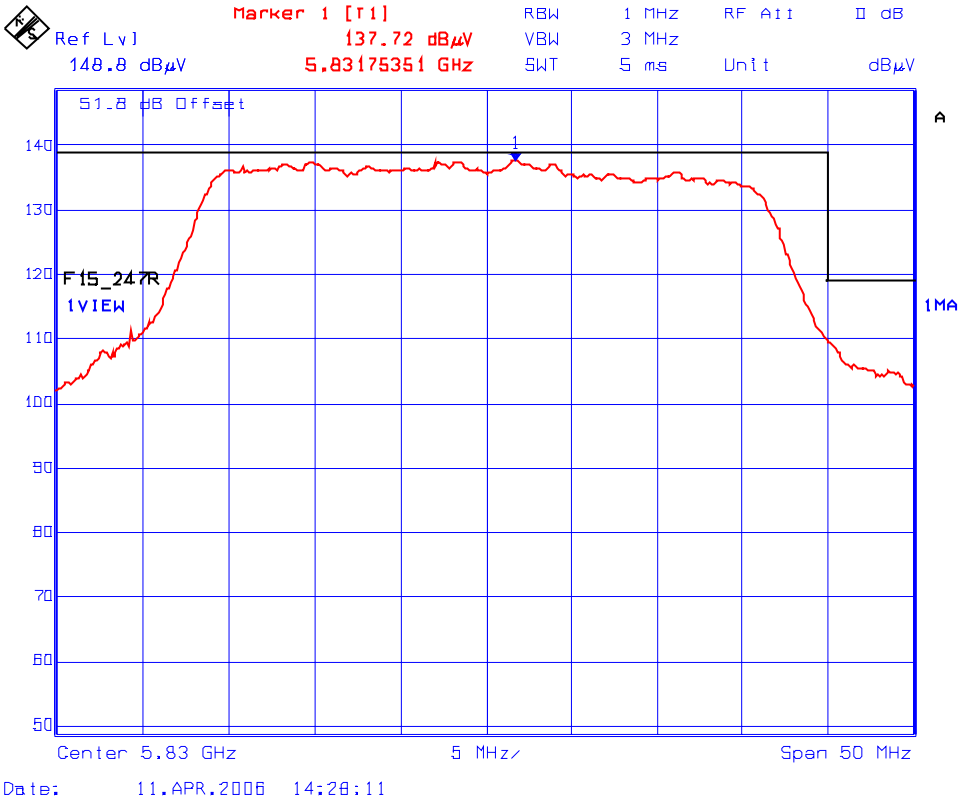
- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 40 MHz, Freq.: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



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

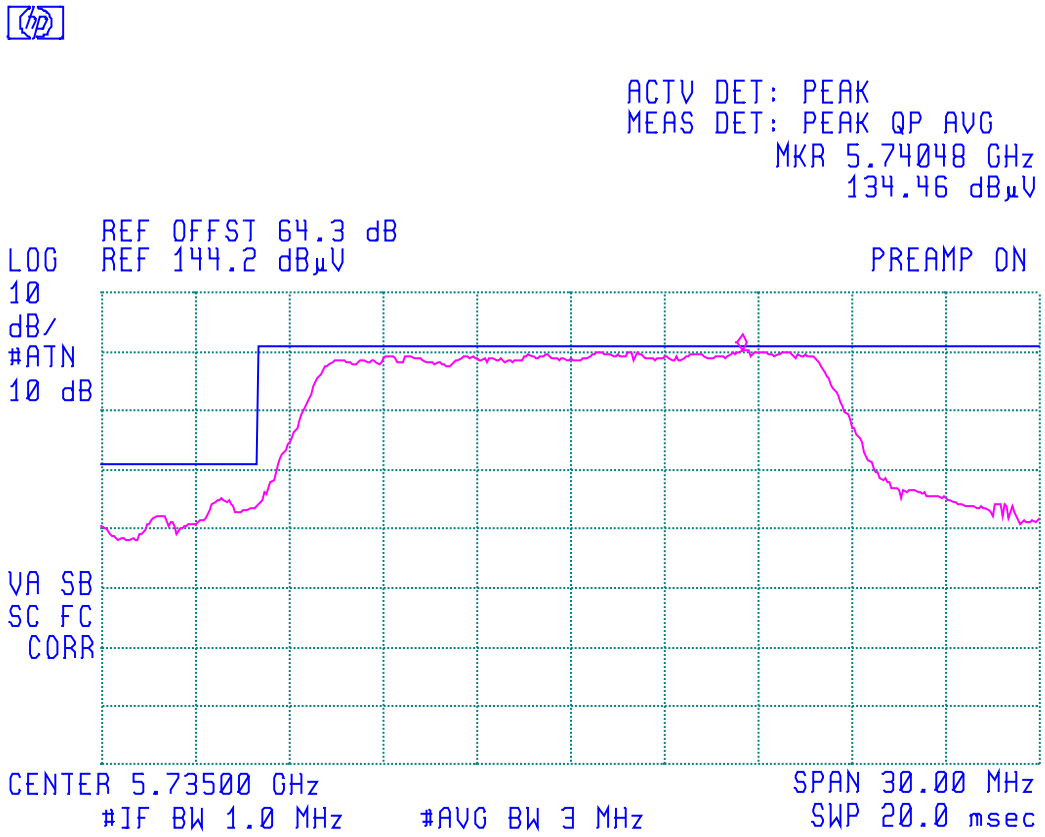
Plot # 126(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #1: MTI Wireless Edge, Flat Panel Antenna, Redline P/N: 48-00024-00, MTI P/N: MT-486001/A, Antenna Gain: 28 dBi
- Channel Spacing: 40 MHz, Freq.: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



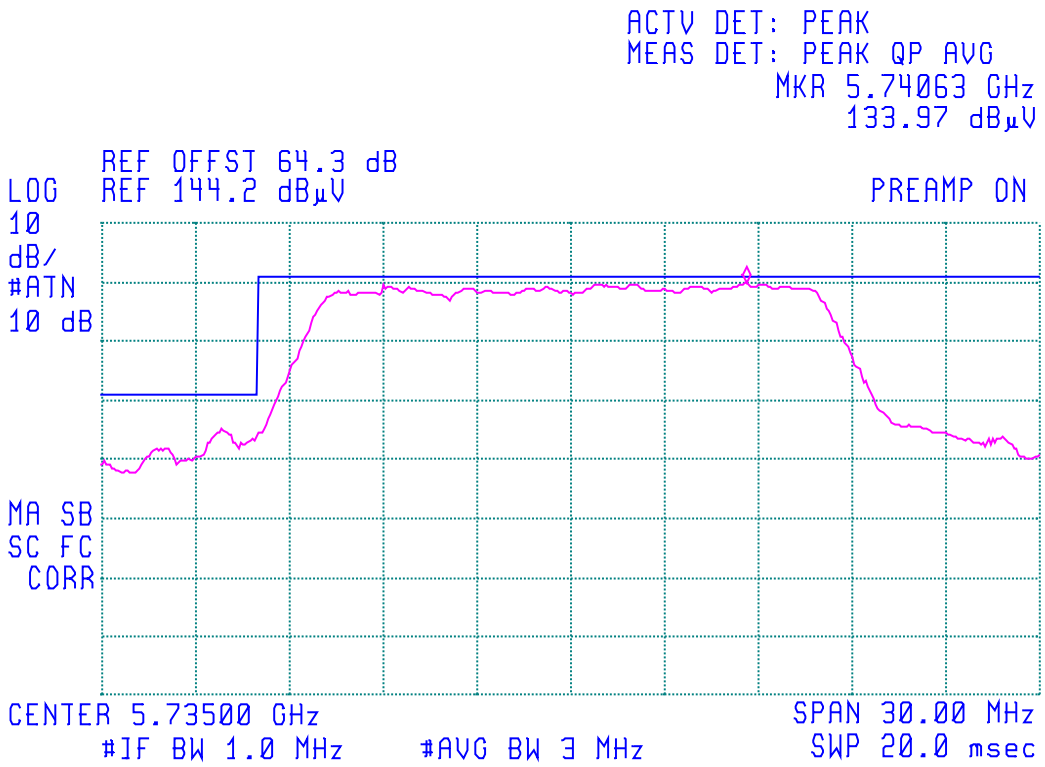
Plot # 127(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 20 MHz, Freq.: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



Plot # 127(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

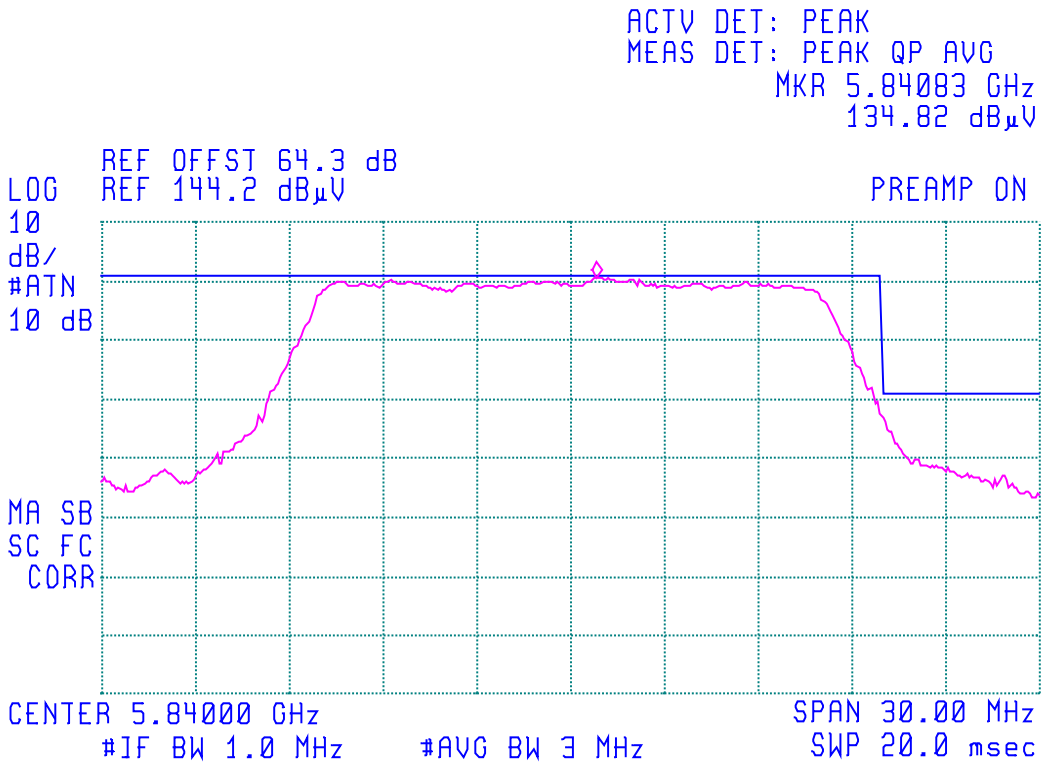
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 20 MHz, Freq.: 5735 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



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

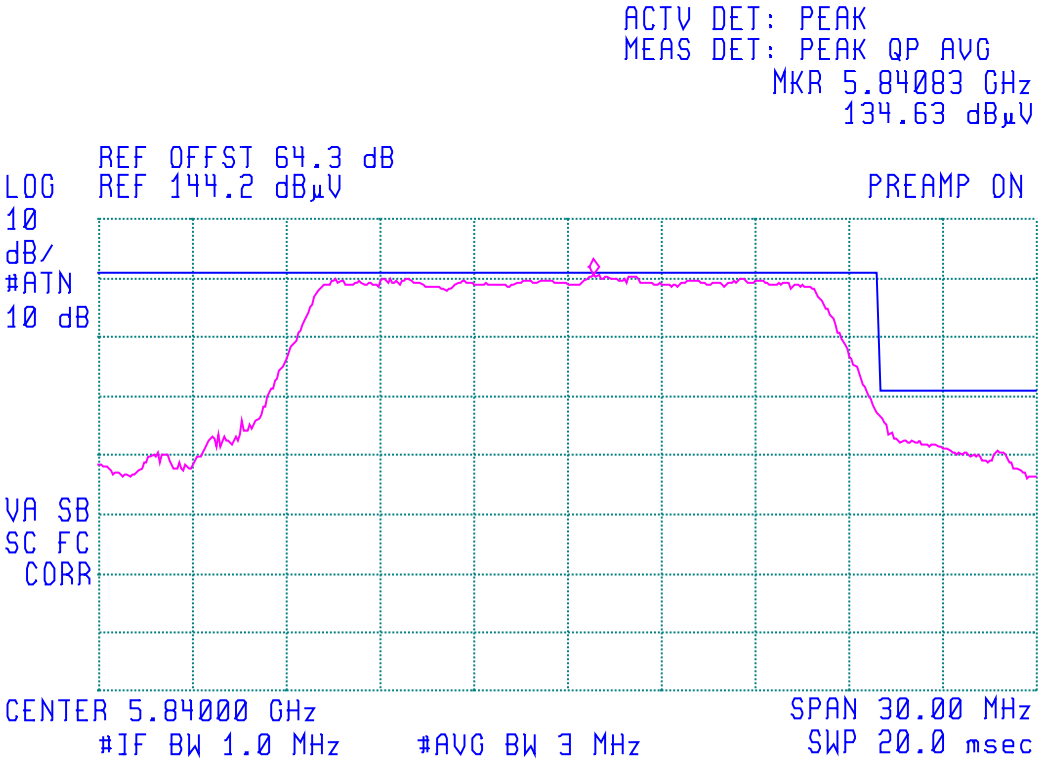
Plot # 127(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 20 MHz, Freq.: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



Plot # 127(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

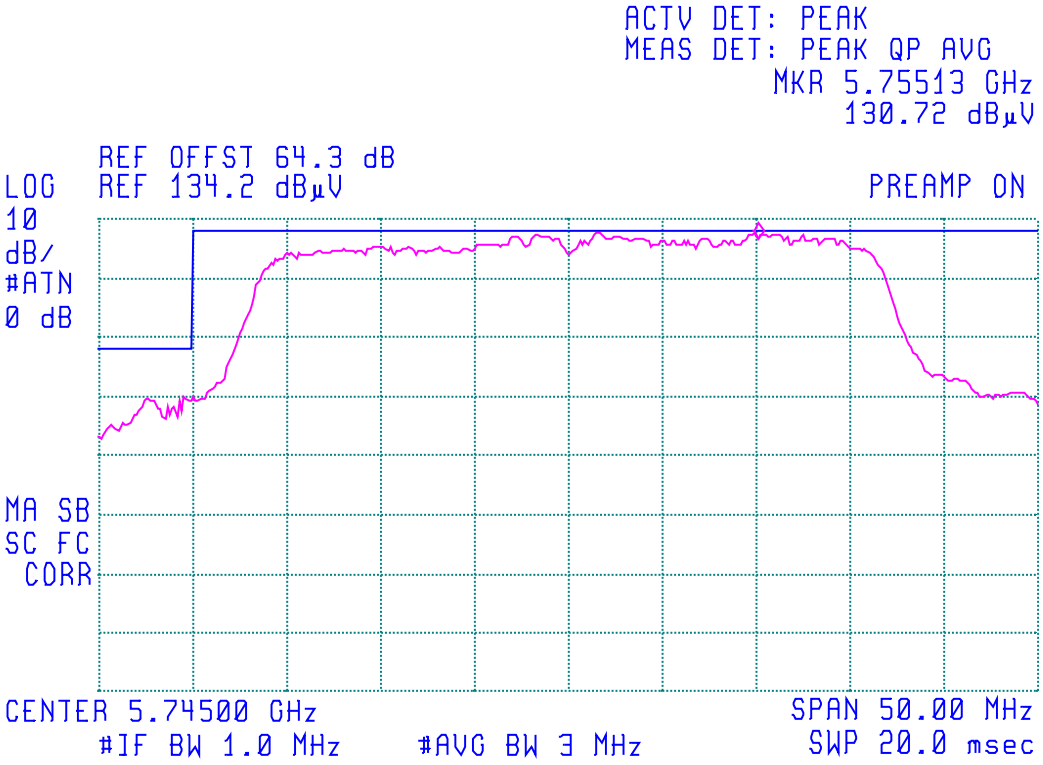
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 20 MHz, Freq.: 5840 MHz, Power Setting: 20 dBm, Modulation: 64QAM @54 Mb/s



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

Plot # 128(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

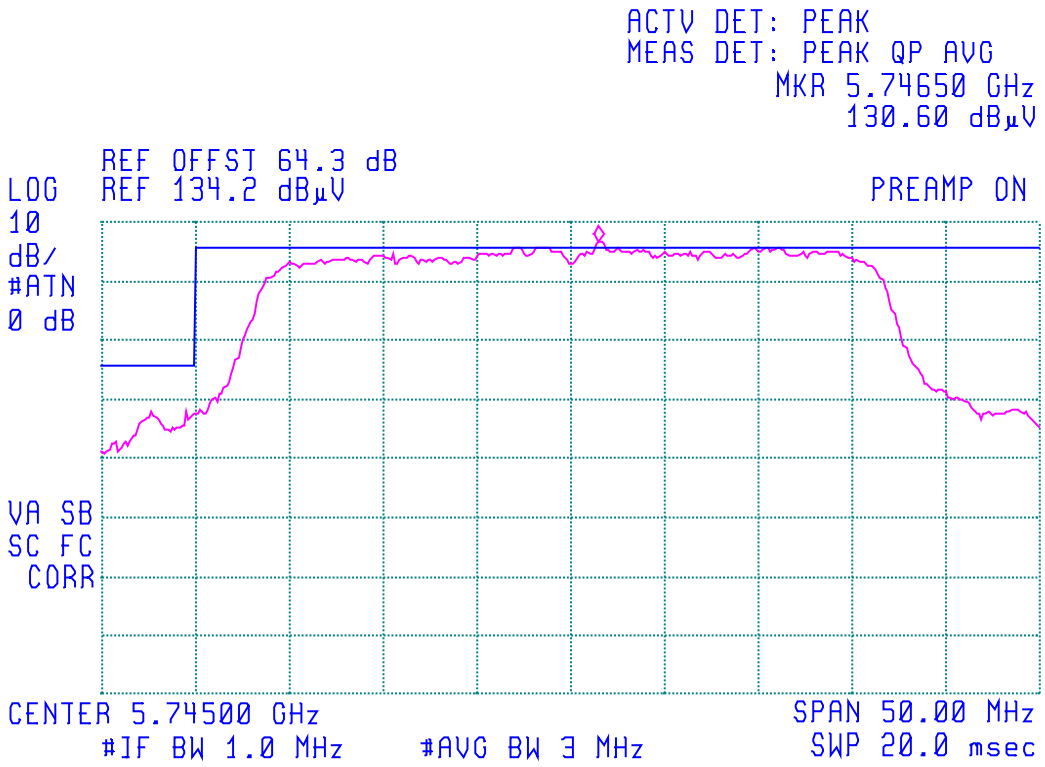
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 40 MHz, Freq.: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



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

Plot # 128(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

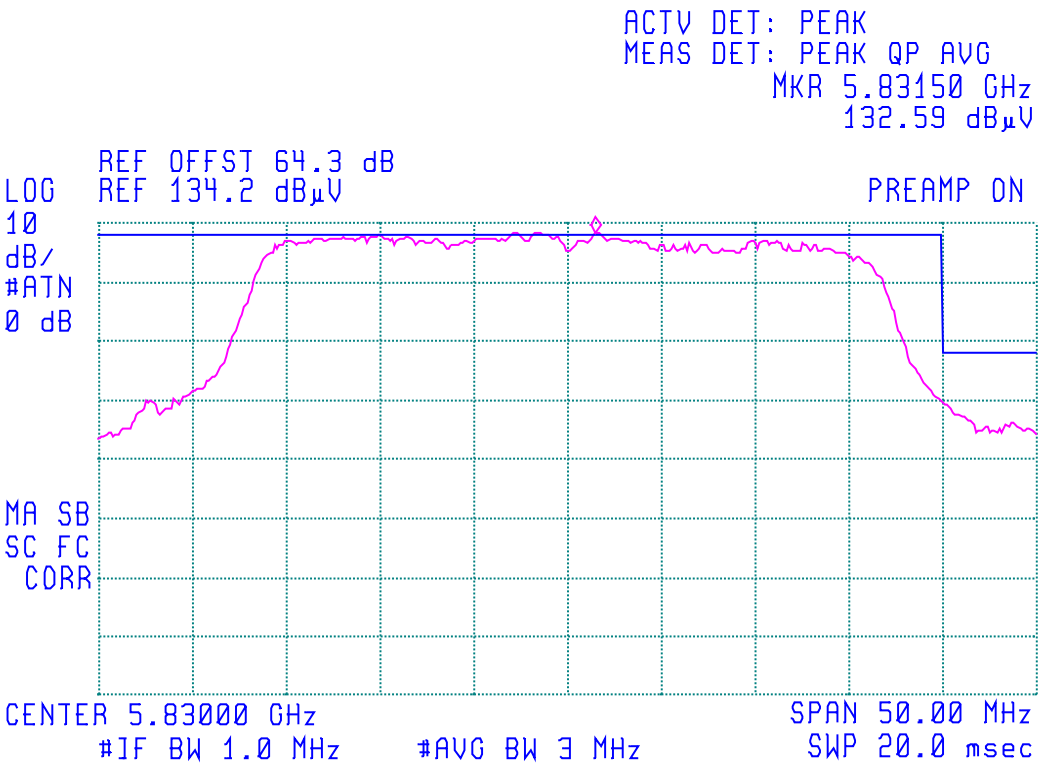
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 40 MHz, Freq.: 5745 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



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

Plot # 128(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

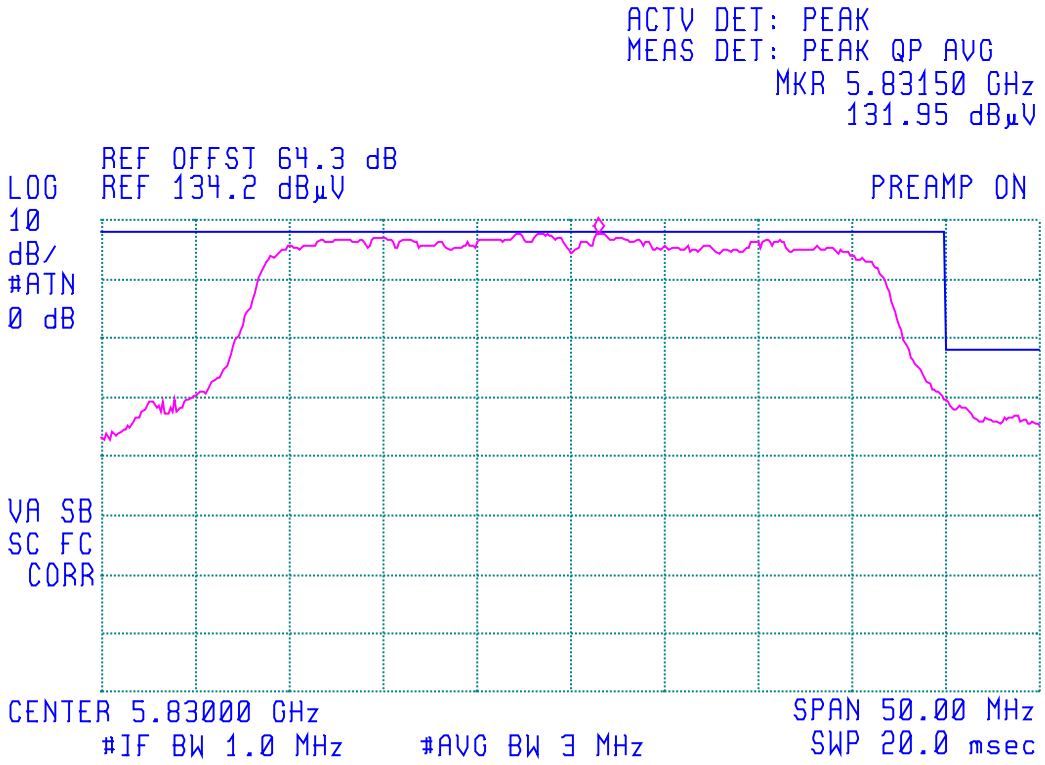
- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 40 MHz, Freq.: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



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

Plot # 128(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Highest gain antenna in family #2: Radio Waves, Parabolic Disk Antenna, Redline P/N: 48-00033-00 , Radio Waves P/N: MTI P/N:SP4-5.2, Antenna Gain: 34.6 dBi
- Channel Spacing: 40 MHz, Freq.: 5830 MHz, Power Setting: 20 dBm, Modulation: 64QAM @108 Mb/s



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

EXHIBIT 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34

5.1. 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 $\Gamma_1 = 0.03$ LISN VRC $\Gamma_R = 0.8$(9 kHz) 0.2 (30 MHz) Uncertainty limits $20\text{Log}(1 \pm \Gamma_1\Gamma_R)$	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:

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

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

5.2. 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 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

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

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