ENGINEERING TEST REPORT

Broadband Wireless Ethernet Bridge

(5, 10, 20 & 40 MHz Channel Bandwidths)

Model No.: RDL-2000

FCC ID: QC8-RDL2000

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.: RCI199_FCC15C

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: August 18, 2010	
Report Prepared by: Dharmajit Solanki Issued Date: August 18, 2010	Tested by: Mr.Hung Trinh, RFI Technologist Test Dates: June 08 to July 30, 2010

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

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FCC	VCCI	Industry Canada / Industrie Canada Approved Test Facility	NVLAP	BSMI	Korea KCC-RRL
91038	1309	46390-2049	NVLAP Lab Code 200093-0	SL2-IN-E-1119R	CA2049

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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 RDL-2000 is only used for Point to Point application • The Model RDL-2000 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	2009	Code of Federal Regulations – Telecommunication
ANSI C63.4	2009	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
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
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 Presentation at TCBC	Oct. 2009	802.11 a/b/g/n Device Testing

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. Rod Cronin Director, Product Line Management Phone #: 905-479-8344 (ext. 2377) Fax #: 905-479-5331 Email Address: rcronin@redlinecommunications.com

MANUFACTURER:	
Name:	Redline Communications Inc.
Address:	302 Town Centre Blvd. Markham, Ontario Canada, L3R 0E8
Contact Person:	Mr. Robert Williams Senior Vice President, Operations and Engineering Phone #: 905-479-8344 (ext. 2358) Fax #: 905-479-5331 Email Address: rwilliams@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 Ethernet Bridge
Model Name or Number	RDL-2000
Serial Number	Prototype
Type of Equipment	Spatial Multiplexing “MIMO 2x2” systems with or without cyclic delay diversity
Input Power Supply Type	48Vdc from an external power PoE (power over the Ethernet Port), made by Cincon Electronics, Model: TR60A-POE-L, AC IN: 100-240V, 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:	48Vdc from an external power PoE (power over the Ethernet Port), made by Cincon Electronics, Model: TR60A-POE-L, AC IN: 100-240V, 50/60 Hz
Maximum RF Output Power Rating (Conducted): • **(Channel BW: 5 MHz):** • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	 • 29.38 dBm • 29.51 dBm • 29.64 dBm • 29.96 dBm
Operating Frequency Range: • **(Channel BW: 5 MHz):** • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	 • 5730 – 5845 MHz • 5735 – 5840 MHz • 5740 – 5835 MHz • 5750 – 5825 MHz
RF Output Impedance:	50 Ohms
Duty Cycle:	100% maximum
6 dB Bandwidth: • **(Channel BW: 5 MHz):** • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	 • 4.80 MHz • 8.97 MHz • 17.87 MHz • 36.92 MHz
Modulation Type: • **(Channel BW: 5 MHz):** • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	 • BPSK 1/2 @ 3.2Mb/s, QPSK 3/4 @ 9.7 Mb/s 16QAM 3/4 @ 19.5 Mb/s and 64QAM 5/6 @ 32.5 Mb/s • BPSK 1/2 @ 6.5Mb/s, QPSK 3/4 @ 19.5Mb/s 16QAM 3/4 @ 39 Mb/s and 64QAM 5/6 @ 65 Mb/s • BPSK 1/2 @ 13 Mb/s, QPSK 3/4 @ 39 Mb/s 16QAM 3/4 @ 78 Mb/s and 64QAM 5/6 @ 130 Mb/s • BPSK 1/2 @ 30 Mb/s, QPSK 3/4 @ 90 Mb/s 16QAM 3/4 @ 180 Mb/s and 64QAM 5/6 @ 300 Mb/s
Emission Designation: • **(Channel BW: 5 MHz):** • **(Channel BW: 10 MHz):** • **(Channel BW: 20 MHz):** • **(Channel BW: 40 MHz):**	 • 4M8GXW • 9M0GXW • 17M9GXW • 36M9GXW
Antenna Installation:	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

Antenna Connector Type:	[ ] BNC [ ] N [x] TNC [ ] SMA [ ] Integral [ ] Other, Specify:

Antenna Description (if more than one antenna, provide a list of all the antennas to be used with the device):.	
Manufacturer:	Redline
Type:	14-inch, 8 degree, 23dBi flat panel antenna, 4.9 - 5.8 GHz, dual-polarization
Model:	A2308MFD
Frequency Range:	4.9-5.8GHz
Impedance:	50ohm
Gain (dBi):	23
Manufacturer:	Redline
Type:	2 foot, 6 degree, 29dBi parabolic antenna, 4.9 - 5.8 GHz, dual-polarization
Model:	A2FT2906LTPD
Frequency Range:	4.9-5.8GHz
Impedance:	50ohm
Gain (dBi):	29
Manufacturer:	Redline
Type:	3 foot, 4 degree, 32dBi parabolic antenna, 4.9 - 5.8 GHz, dual-polarization
Model:	A3FT3204LTPD
Frequency Range:	4.9-5.8GHz

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	2	TNC	RF Shielded Coax TNC/N < 3m	Yes
2	Ethernet Port	1	RJ45	CAT 5e (Shielded) up to 91m	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:	IBM
Model Name or Number:	Type 2373
FCC Certification	FCC DoC
Serial Number:	N/A
Connected to EUT's Port:	Ethernet Port • Non-shielded RJ-45 cable from Laptop PC to POE Adaptor • Shielded RJ-45 cable from AC/DC Power Adaptor to EUT

1.7. TEST SETUP BLOCK DIAGRAM

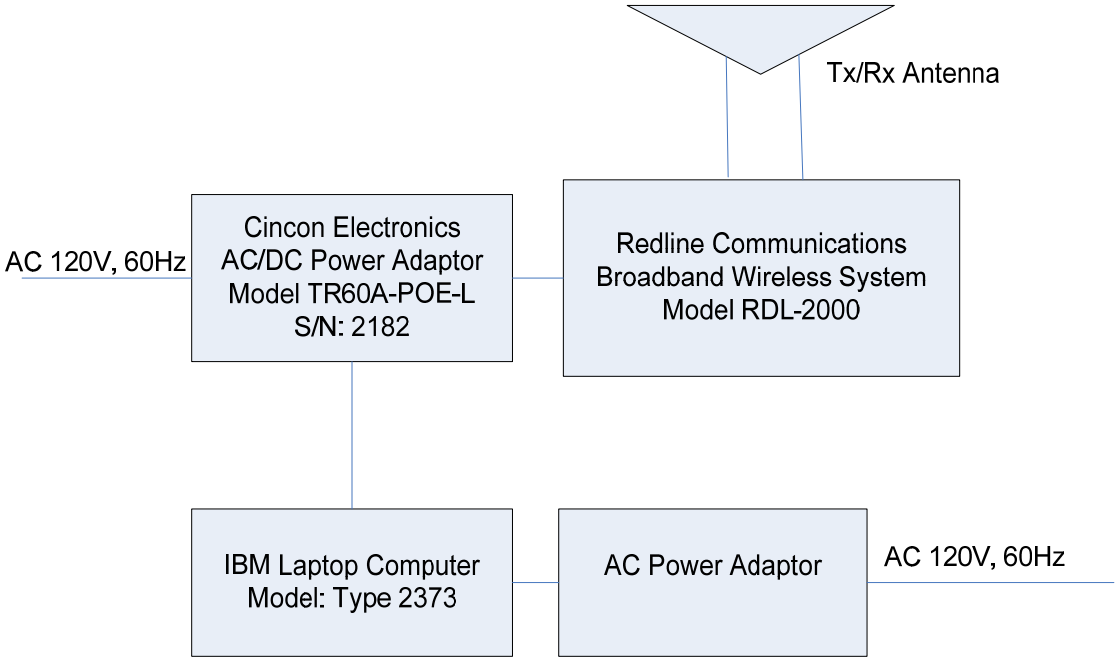


EXHIBIT 2. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

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, 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 (Redline A2308MFD & A3FT3204LTPD)

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:	 • As specified in Sec 1.3; Maximum O/P Power Rating • 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.: IC2049A-3). Last Date of Site Calibration: May 01, 2011.

3.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.107 & 15.207	Class B - AC Power Conducted Emissions on Tx	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", ULTR-P001-2004, ULTR-P002-2004 and ULTR-P003-2004.

4.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement. 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 "TNC" type connector. The device and it's antenna are required to be professionally installed. Refer to the Antenna Installation Manual.
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 antennas specified in Sec1.3.

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:

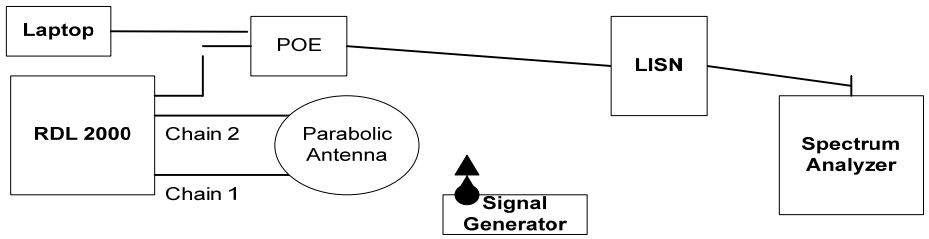
	CLASS B LIMITS		
Test Frequency Range (MHz)	**Quasi-Peak (dBµV)**	**Average* (dBµV)**	**Measuring Bandwidth**
0.15 to 0.5	66 to 56*	56 to 46*	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 to 5	56	46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
5 to 30	60	50	RBW = 9 kHz VBW ≥ 9 kHz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



4.5.4. Test Equipment List

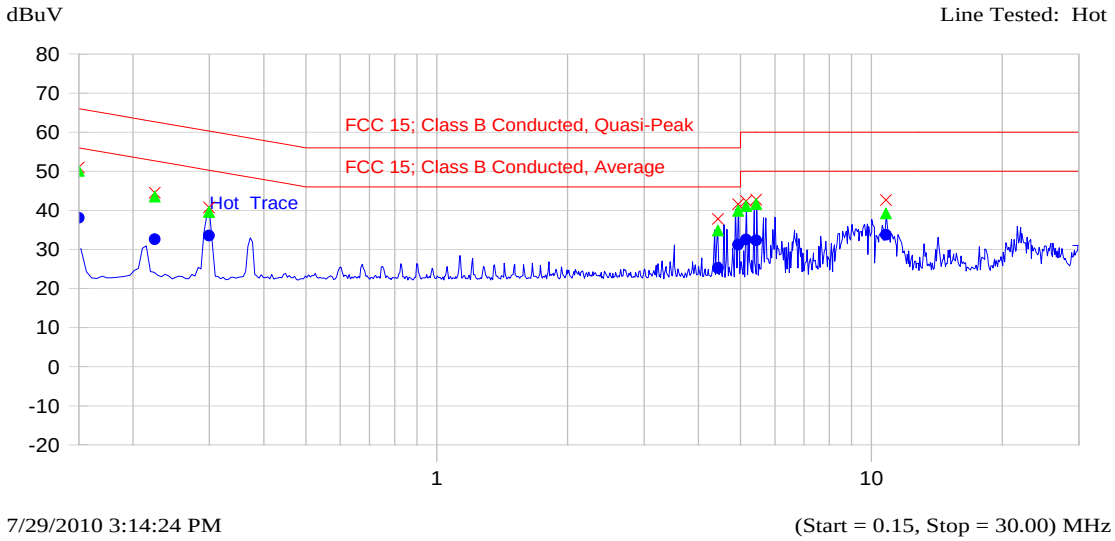
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Calibration Due Date
LISN	EMCO	3825/2	8907-1531	10 kHz – 100 MHz	May 30, 2011
Spectrum Analyzer	Hewlett Packard	8546A	3650A00371	9 kHz – 6.5 GHz	January 25, 2011
Transient Limiter	Pasternack	PE7010-20	-	DC – 2 GHz 20dB attenuation	January 04, 2011

4.5.5. Test Data

Plot # 1: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT

Description: Line Voltage:120Vac
Test Mode: Transmiter
Setup Name: FCC 15 Class B
Customer Name: REDLINE COMMUNICATIONS INC
Project Number: RCI-199Q
Operator Name: QUAN KHAI NGO
EUT Name: Broadband Wireless Ethernet Bridge 802.11a:5.725-5.85GHz
Date Created: 7/29/2010 2:50:35 PM

Current Graph



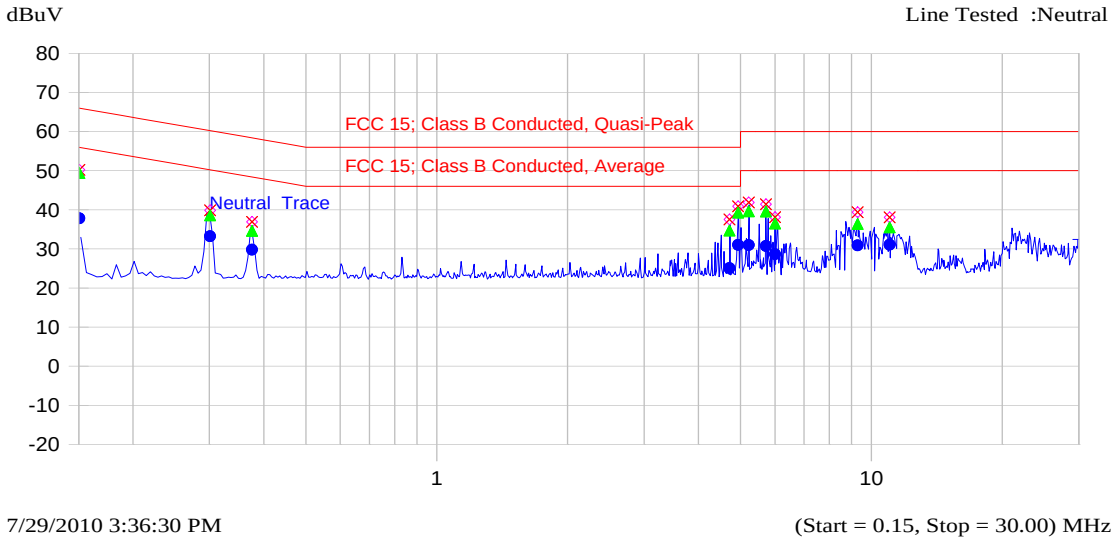
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.150	51.0	50.1	-15.9	38.1	-17.9	Hot Trace
0.224	44.5	43.5	-20.3	32.6	-21.2	Hot Trace
0.299	40.8	39.6	-22.0	33.6	-18.1	Hot Trace
4.433	37.8	34.9	-21.1	25.2	-20.8	Hot Trace
4.933	41.5	39.9	-16.1	31.2	-14.8	Hot Trace
5.145	42.4	41.1	-18.9	32.5	-17.5	Hot Trace
5.432	42.8	41.6	-18.4	32.3	-17.7	Hot Trace
10.792	42.6	39.2	-20.8	33.7	-16.3	Hot Trace

Plot # 2: AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT PLOT

Description: Line Voltage:120Vac
Test Mode :Transmitter
Setup Name: FCC 15 Class B
Customer Name: REDLINE COMMUNICATIONS INC
Project Number: RCI-199Q
Operator Name: QUAN KHAI NGO
EUT Name: Broadband Wireless Ethernet Bridge 802.11a:5.725-5.85GHz
Date Created: 7/29/2010 2:50:35 PM

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.151	50.2	49.4	-16.6	37.8	-18.2	Neutral Trace
0.301	39.9	38.6	-23.0	33.2	-18.4	Neutral Trace
0.376	36.9	34.6	-24.9	29.8	-19.7	Neutral Trace
4.716	37.5	34.7	-21.3	25.1	-20.9	Neutral Trace
4.933	40.9	39.3	-16.7	31.0	-15.0	Neutral Trace
5.218	41.9	39.6	-20.4	31.0	-19.0	Neutral Trace
5.720	41.4	39.5	-20.5	30.7	-19.3	Neutral Trace
6.004	38.1	36.5	-23.5	28.7	-21.3	Neutral Trace
9.295	39.3	36.3	-23.7	30.9	-19.1	Neutral Trace
11.009	38.0	35.5	-24.5	31.0	-19.0	Neutral Trace

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.

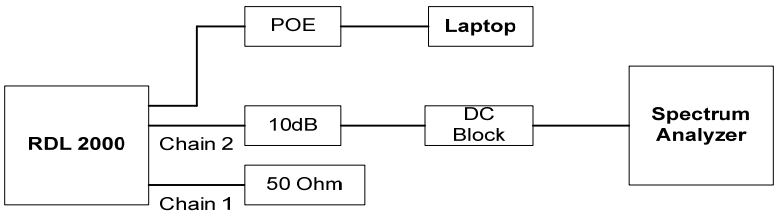
As per MIMO measurement guidelines 6dB BW shall be measured for individual Transmitter Chains without combiner and record them separately. Both individual measurements must comply with limits.

4.6.2. Method of Measurements

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

Measurements performed with the spectrum analyzer's resolution bandwidth RBW = 1 MHz & VBW = 3 MHz, SW = 10s (worst case).

4.6.3. Test Arrangement



4.6.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Calibration Due-Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz with external mixer	August 10, 2010
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	N/A
Attenuator	Narda	4768-10	-	DC - 40 GHz	N/A

4.6.5. Test Data

4.6.5.1. Test Configuration #1: Channel Spacing 5 MHz

Channel (5MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	6dB BW Chain 1 (MHz)	6dB BW Chain 2 (MHz)	Limit (kHz)
1	5730	64QAM 5/6	32.5	4.46	4.48	Min 500
12	5785	64QAM 5/6	32.5	4.50	4.50	Min 500
24	5845	64QAM 5/6	32.5	4.46	4.52	Min 500
1	5730	16QAM 3/4	19.5	4.50	4.50	Min 500
12	5785	16QAM 3/4	19.5	4.48	4.46	Min 500
24	5845	16QAM 3/4	19.5	4.50	4.46	Min 500
1	5730	QPSK 3/4	9.7	4.48	4.80	Min 500
12	5785	QPSK 3/4	9.7	4.48	4.50	Min 500
24	5845	QPSK 3/4	9.7	4.48	4.48	Min 500
1	5730	BPSK 1/2	3.2	4.48	4.50	Min 500
12	5785	BPSK 1/2	3.2	4.48	4.48	Min 500
24	5845	BPSK 1/2	3.2	4.48	4.48	Min 500

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

4.6.5.2. Test Configuration #1: Channel Spacing 10 MHz

Channel (5MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	6dB BW Chain 1 (MHz)	6dB BW Chain 2 (MHz)	Limit (kHz)
2	5735	64QAM 5/6	65	8.97	8.97	Min 500
12	5785	64QAM 5/6	65	8.97	8.97	Min 500
23	5840	64QAM 5/6	65	8.93	8.89	Min 500
2	5735	16QAM 3/4	39	8.97	8.97	Min 500
12	5785	16QAM 3/4	39	8.93	8.97	Min 500
23	5840	16QAM 3/4	39	8.97	8.97	Min 500
2	5735	QPSK 3/4	19.5	8.97	8.97	Min 500
12	5785	QPSK 3/4	19.5	8.97	8.97	Min 500
23	5840	QPSK 3/4	19.5	8.97	8.97	Min 500
2	5735	BPSK 1/2	6.5	8.93	8.89	Min 500
12	5785	BPSK 1/2	6.5	8.89	8.97	Min 500
23	5840	BPSK 1/2	6.5	8.93	8.93	Min 500

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

4.6.5.3. Test Configuration #2: Channel Spacing 20 MHz

Channel (5MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	6dB BW Chain 1 (MHz)	6dB BW Chain 2 (MHz)	Limit (kHz)
3	5740	64QAM 5/6	130	17.87	17.87	Min 500
12	5785	64QAM 5/6	130	17.87	17.87	Min 500
22	5835	64QAM 5/6	130	17.87	17.87	Min 500
3	5740	16QAM 3/4	78	17.79	17.87	Min 500
12	5785	16QAM 3/4	78	17.87	17.87	Min 500
22	5835	16QAM 3/4	78	17.87	17.87	Min 500
3	5740	QPSK 3/4	39	17.79	17.87	Min 500
12	5785	QPSK 3/4	39	17.87	17.87	Min 500
22	5835	QPSK 3/4	39	17.79	17.87	Min 500
3	5740	BPSK 1/2	13	17.87	17.79	Min 500
12	5785	BPSK 1/2	13	17.87	17.87	Min 500
22	5835	BPSK 1/2	13	17.87	17.87	Min 500

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

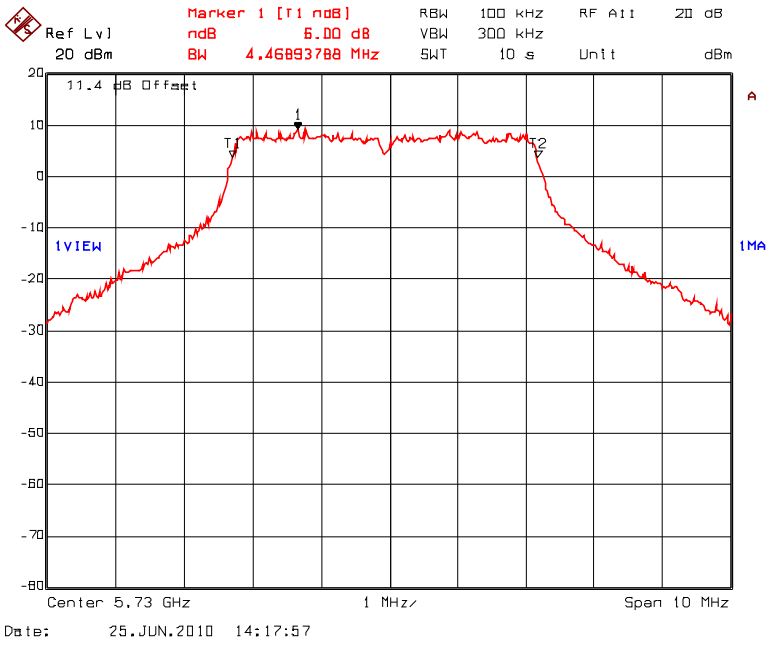
4.6.5.4. Test Configuration #3: Channel Spacing 40 MHz

Channel (5MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	6dB BW Chain 1 (MHz)	6dB BW Chain 2 (MHz)	Limit (kHz)
5	5750	64QAM 5/6	300	36.71	36.87	Min 500
12	5785	64QAM 5/6	300	36.92	36.71	Min 500
20	5825	64QAM 5/6	300	36.71	36.71	Min 500
5	5750	16QAM 3/4	180	36.71	36.71	Min 500
12	5785	16QAM 3/4	180	36.79	36.71	Min 500
20	5825	16QAM 3/4	180	36.71	36.71	Min 500
5	5750	QPSK 3/4	90	36.71	36.71	Min 500
12	5785	QPSK 3/4	90	36.92	36.87	Min 500
20	5825	QPSK 3/4	90	36.71	36.71	Min 500
5	5750	BPSK 1/2	30	36.55	36.71	Min 500
12	5785	BPSK 1/2	30	36.47	36.55	Min 500
20	5825	BPSK 1/2	30	36.39	36.71	Min 500

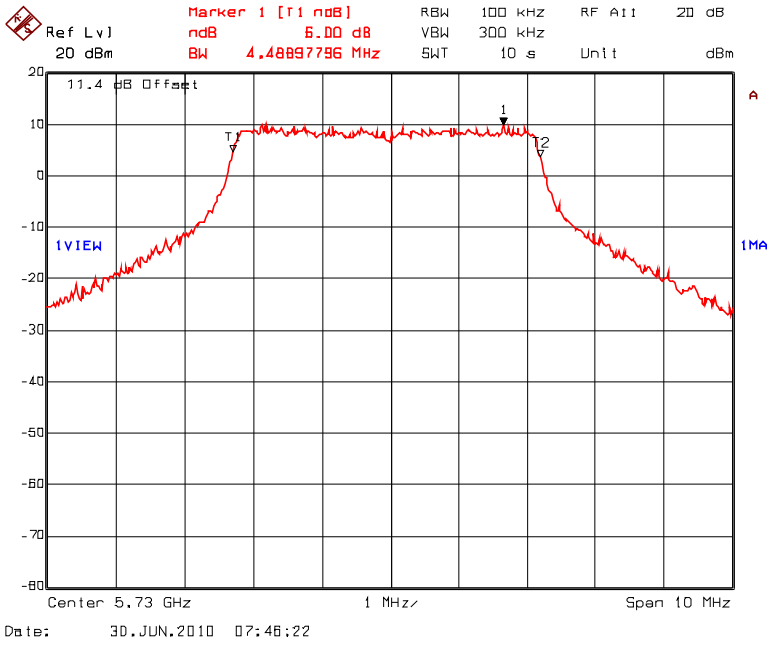
Refer to Plots # 39 to # 50 for details of measurements.

Plot #3: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: 64QAM 5/6 @ 32.5 Mb/s

CHAIN 1



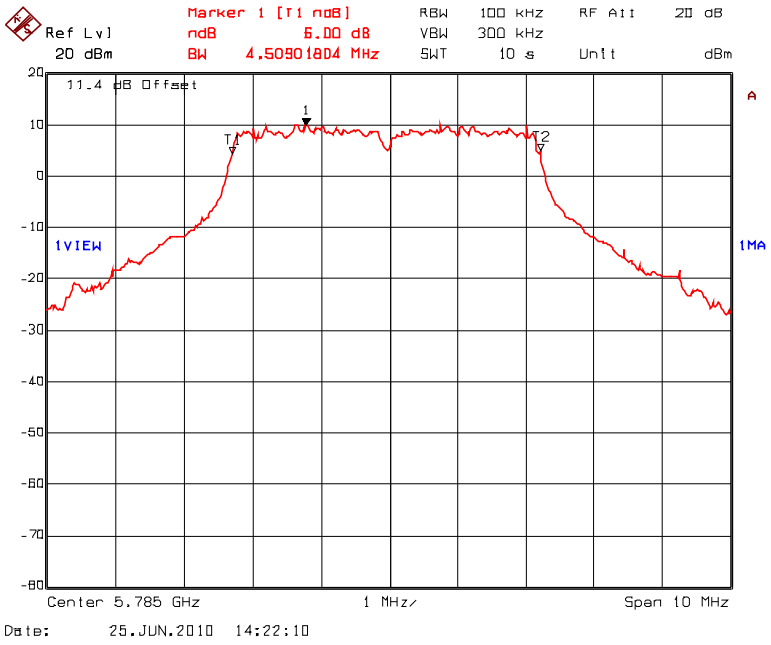
CHAIN 2



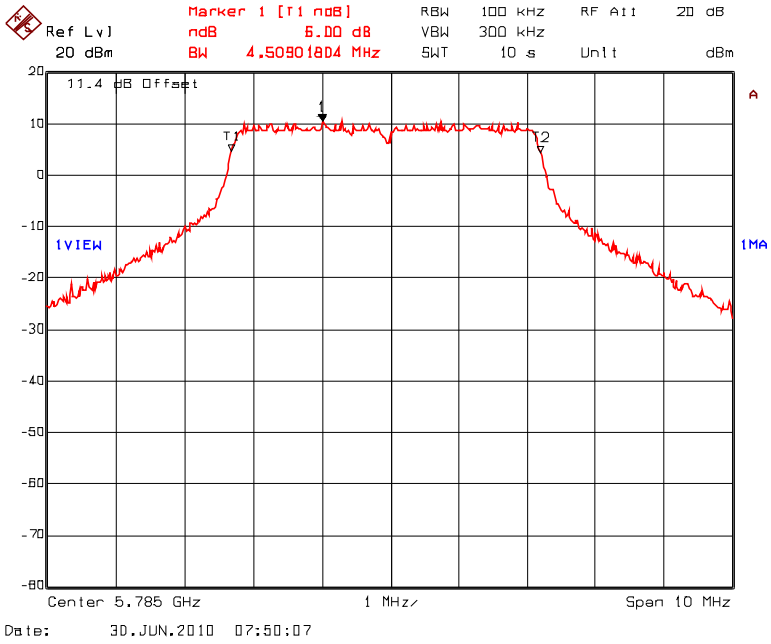
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #4: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 32.5 Mb/s

CHAIN 1



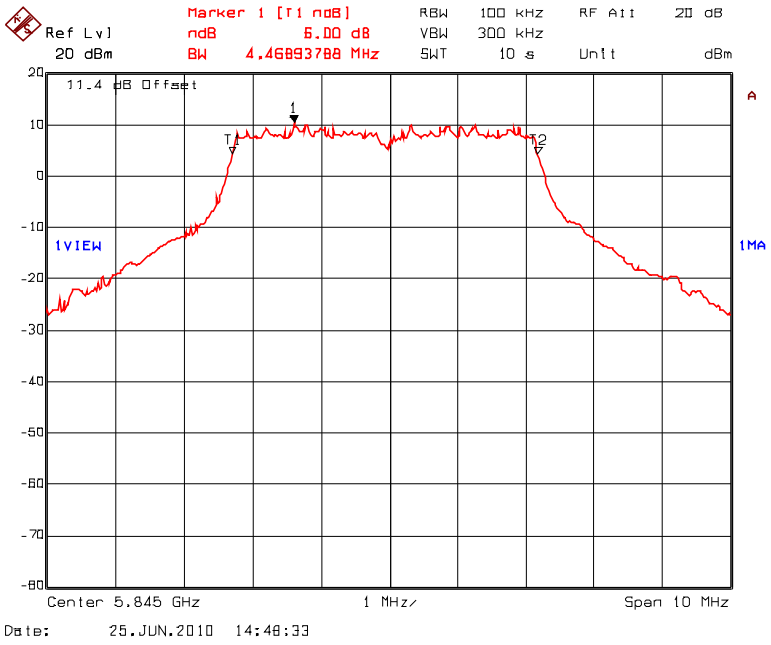
CHAIN 2



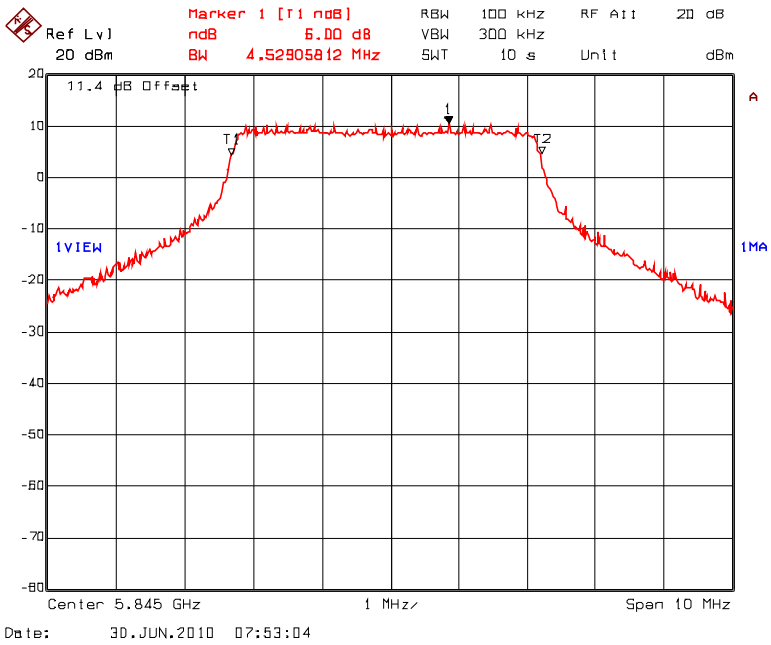
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #5: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: 64QAM 5/6 @ 32.5 Mb/s

CHAIN 1



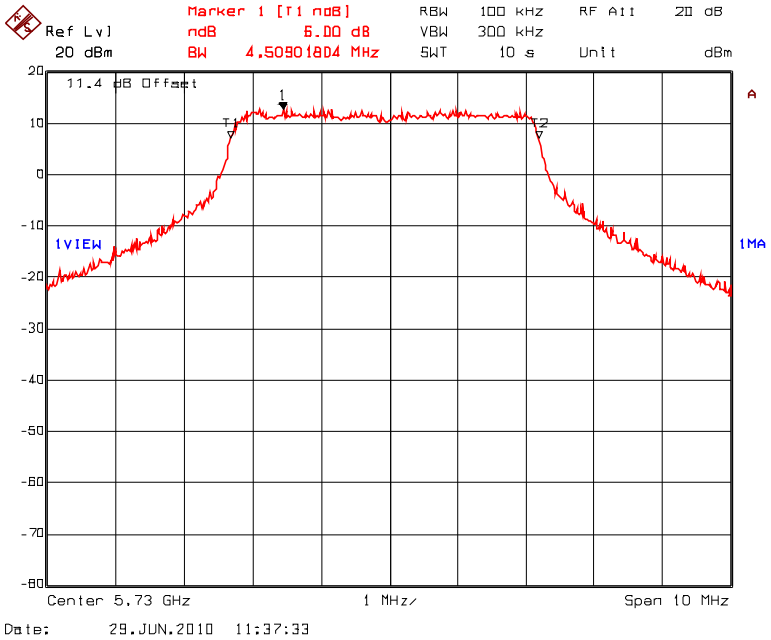
CHAIN 2



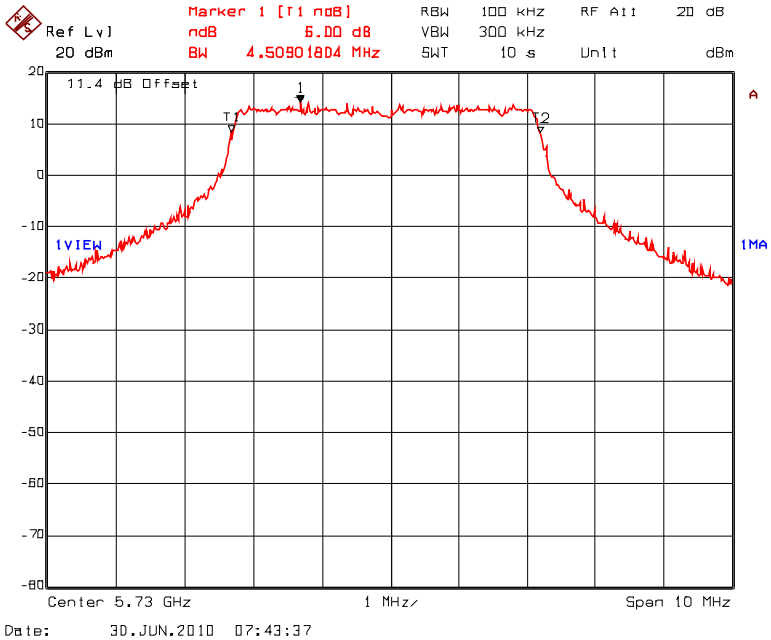
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #6: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: 16QAM 3/4 @ 19.5 Mb/s

CHAIN 1



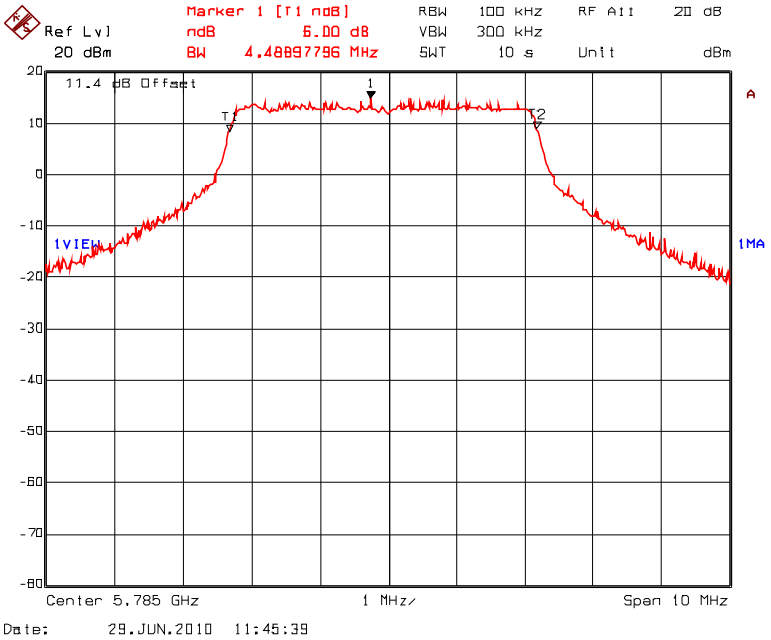
CHAIN 2



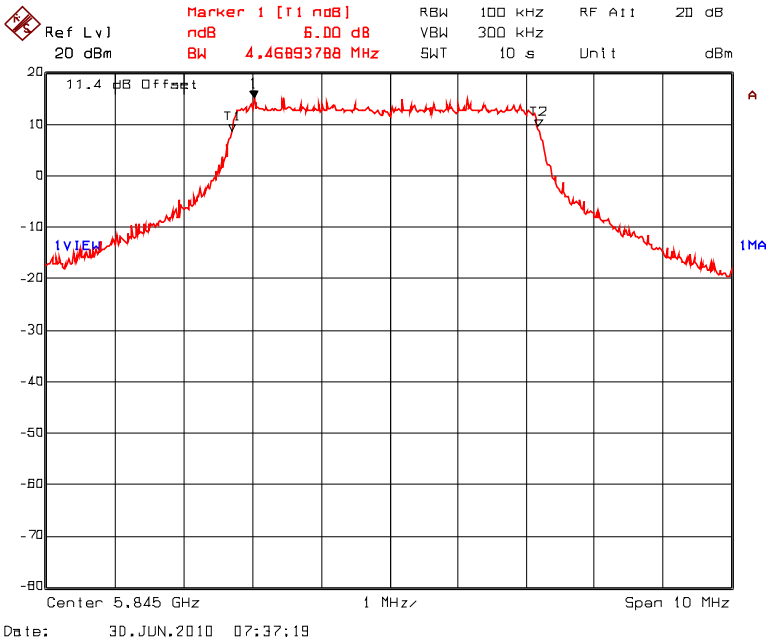
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #7: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 19.5 Mb/s

CHAIN 1



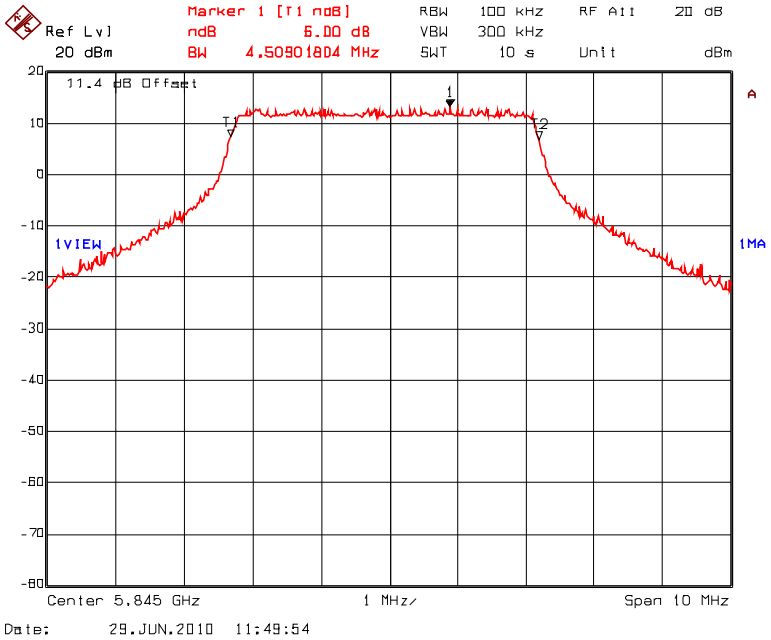
CHAIN 2



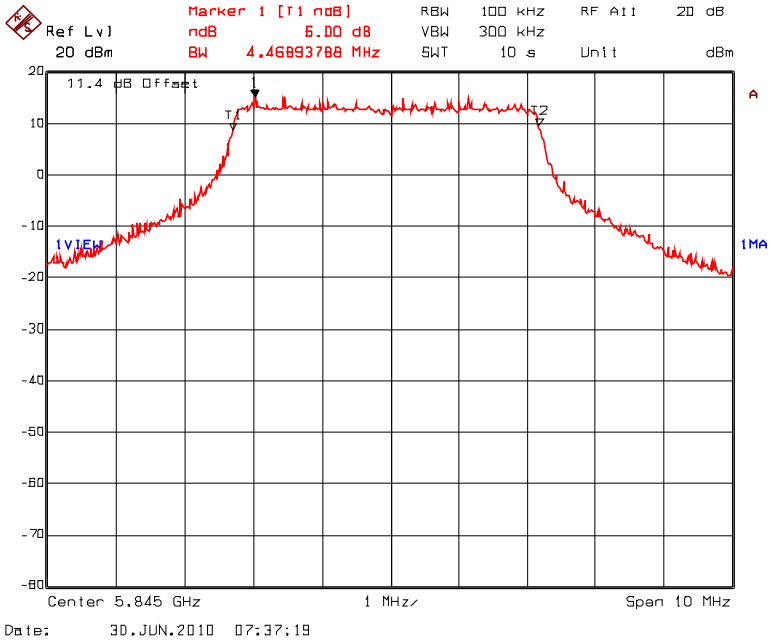
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #8: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: 16QAM 3/4 @ 19.5 Mb/s

CHAIN 1



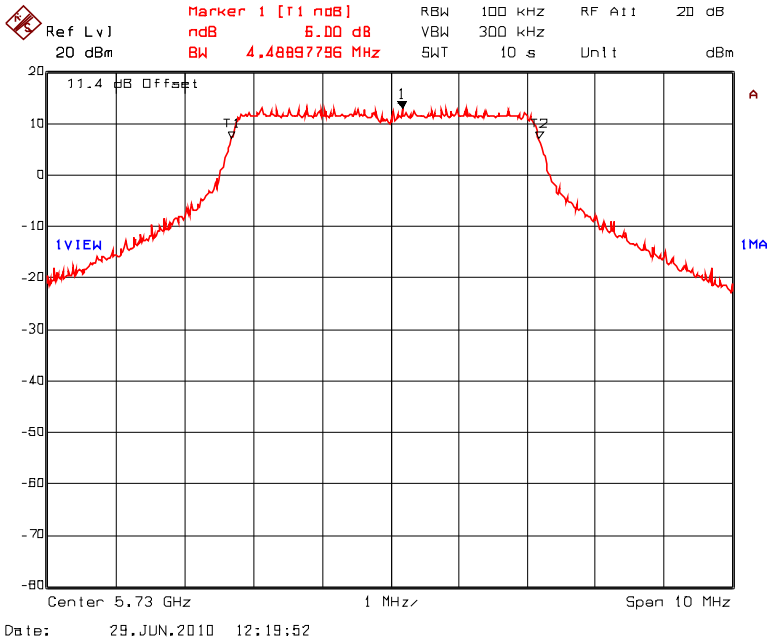
CHAIN 2



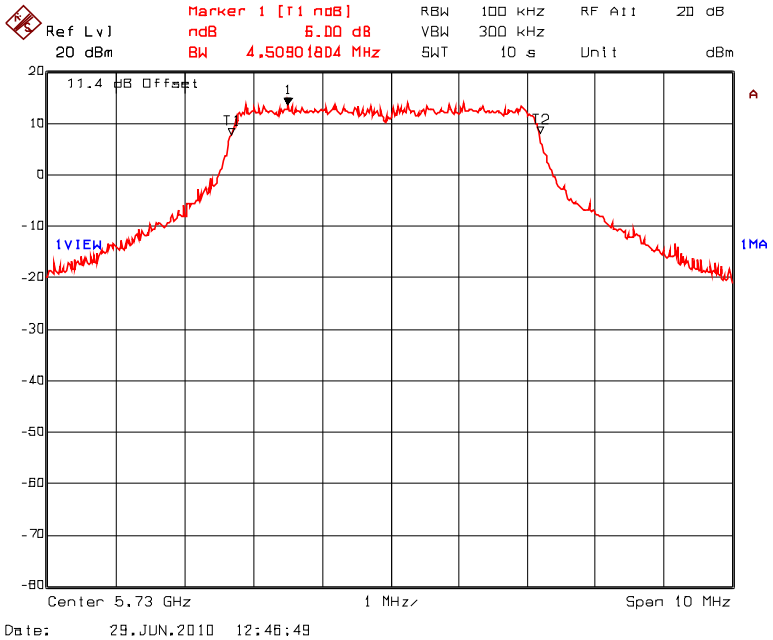
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #9: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: QPSK 3/4 @ 9.7 Mb/s

CHAIN 1



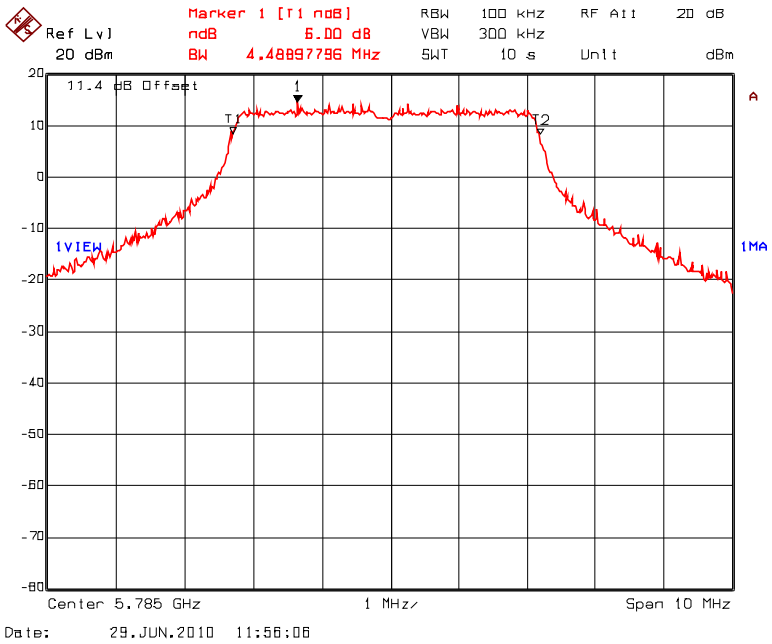
CHAIN 2



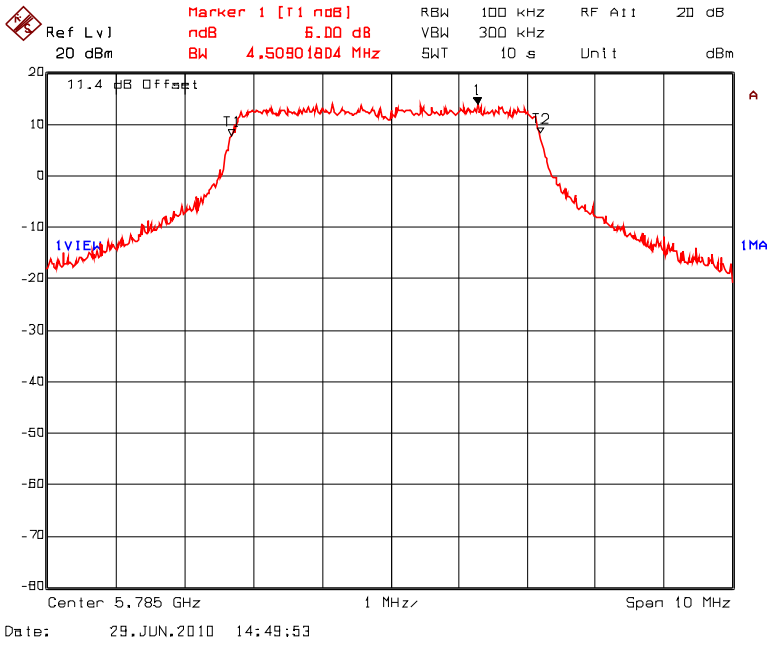
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #10: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 9.7 Mb/s

CHAIN 1



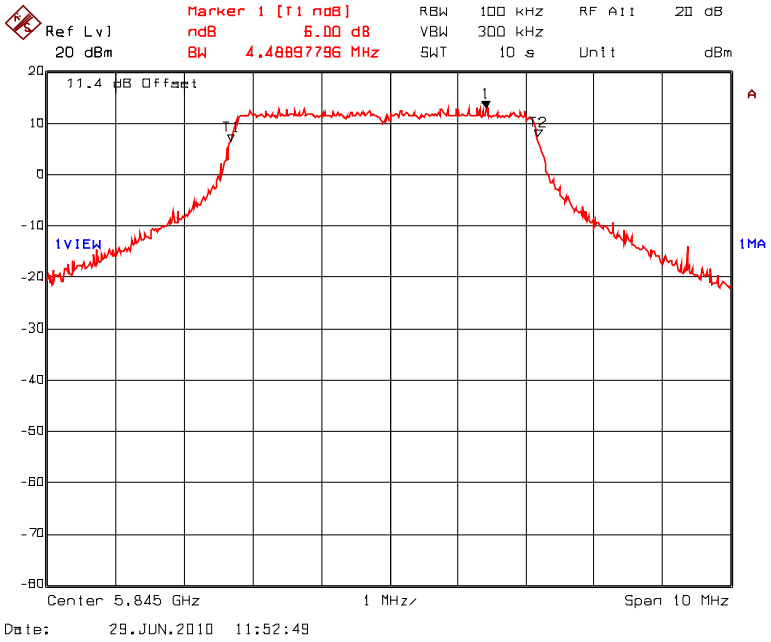
CHAIN 2



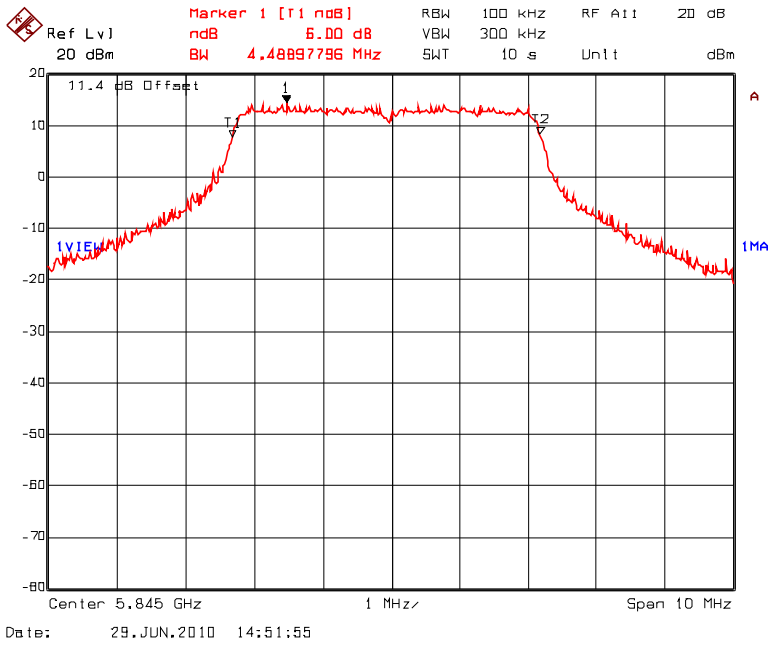
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #11: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: QPSK 3/4 @ 9.7 Mb/s

CHAIN 1



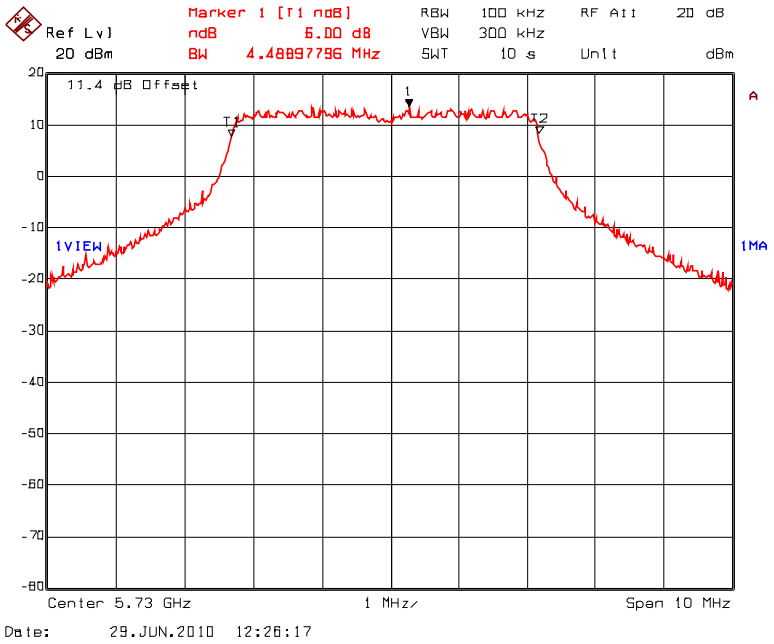
CHAIN 2



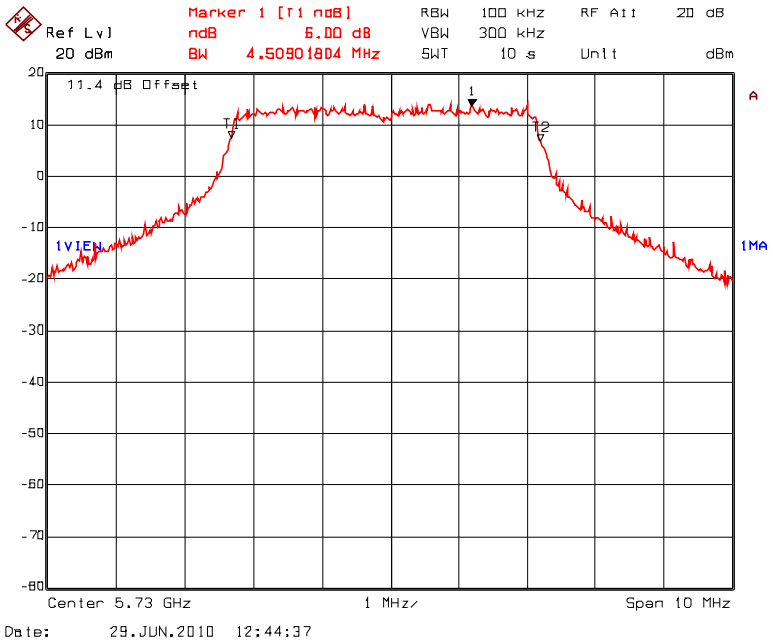
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #12: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



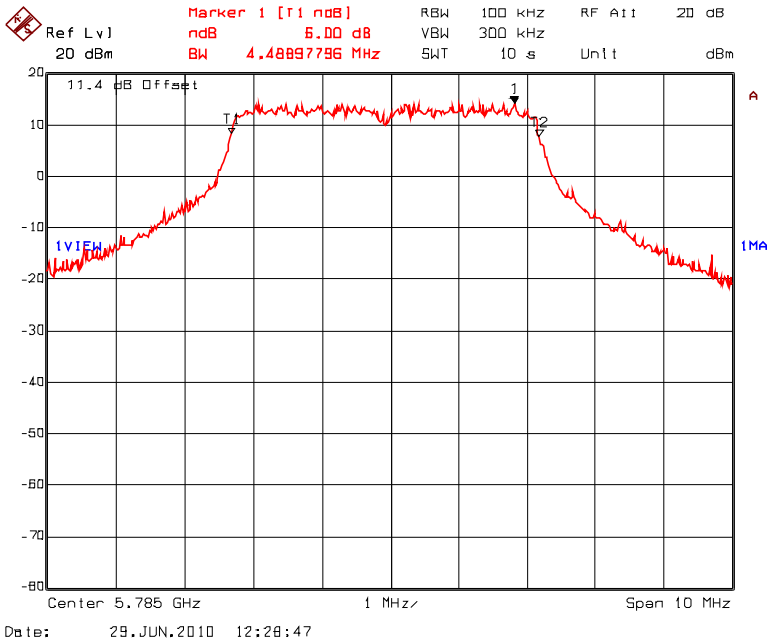
CHAIN 2



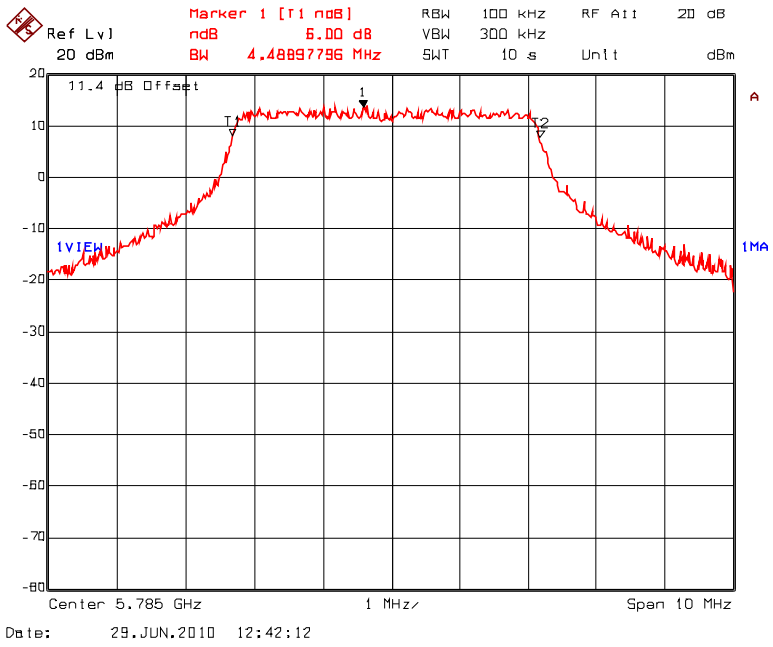
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #13: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



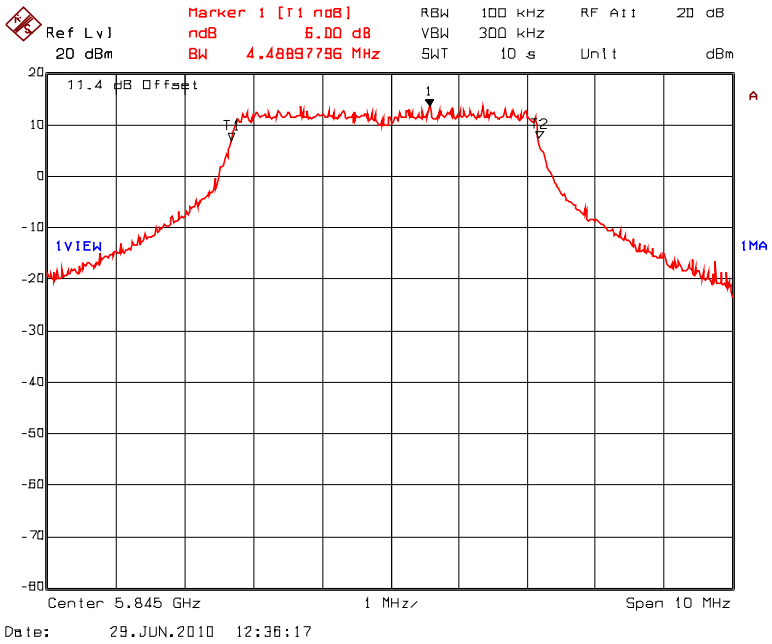
CHAIN 2



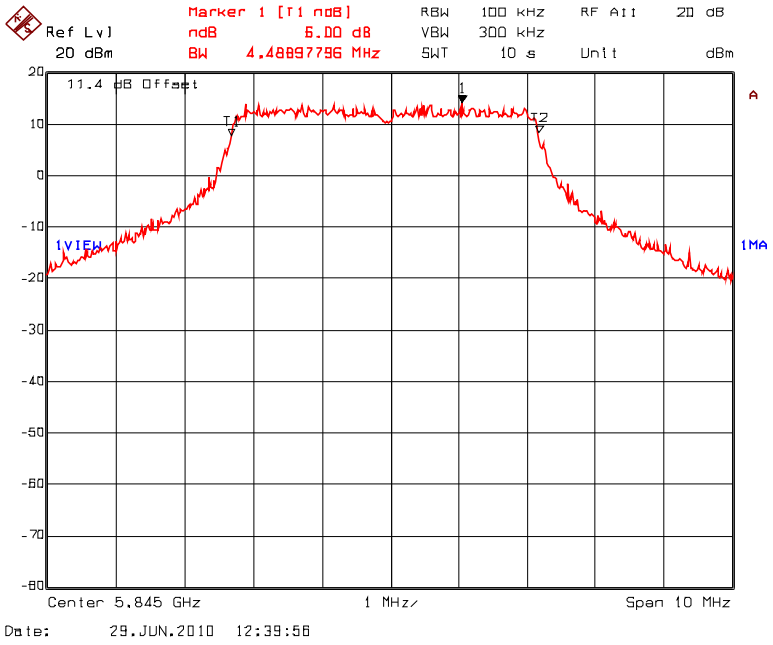
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #14: 6 dB Bandwidth wrt. 5 MHz Channel Spacing Operation Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



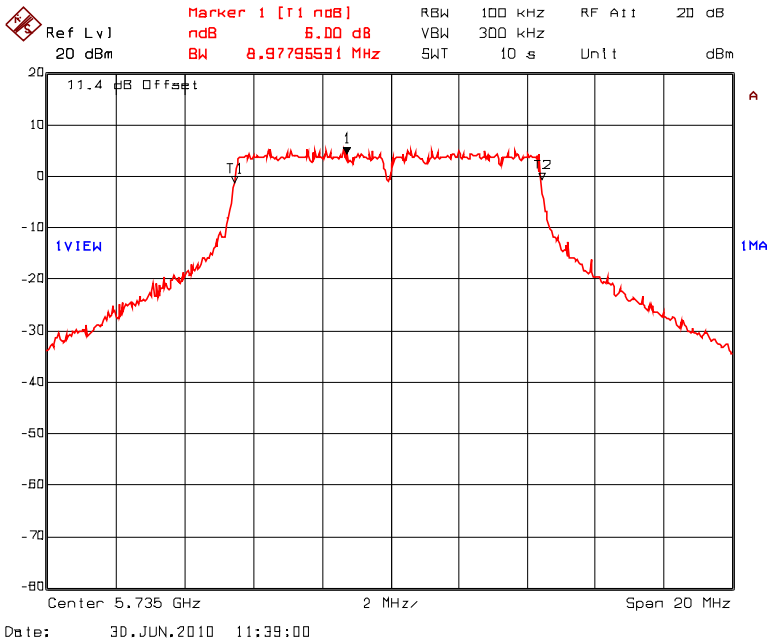
CHAIN 2



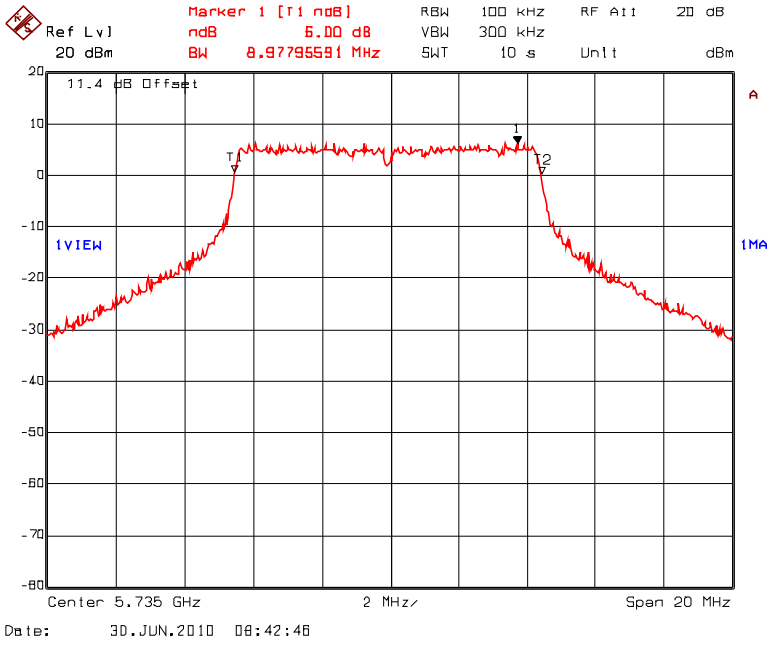
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #15: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: 64QAM 5/6 @ 65 Mb/s

CHAIN 1



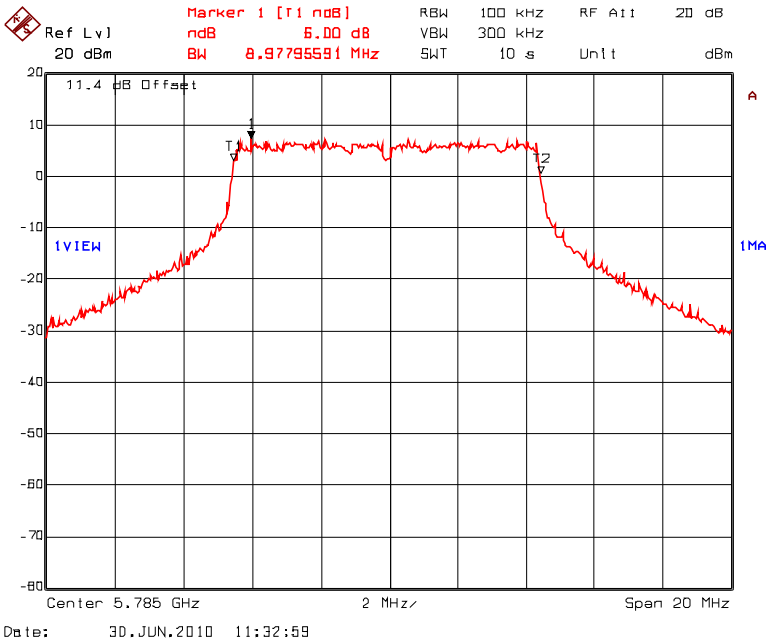
CHAIN 2



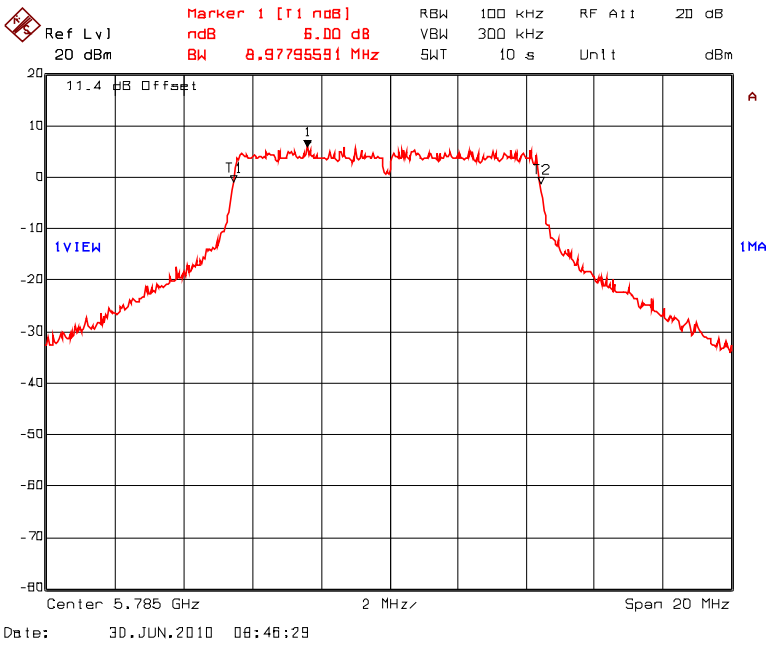
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #16: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 65 Mb/s

CHAIN 1



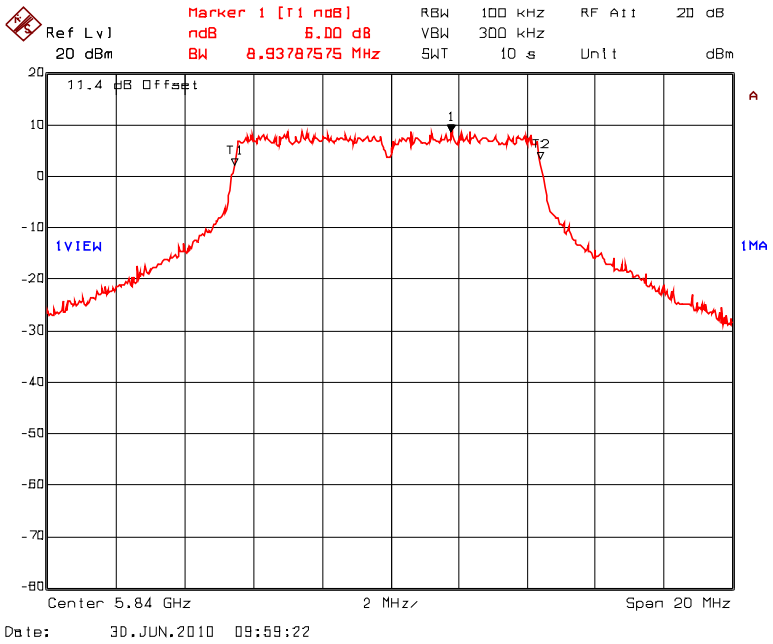
CHAIN 2



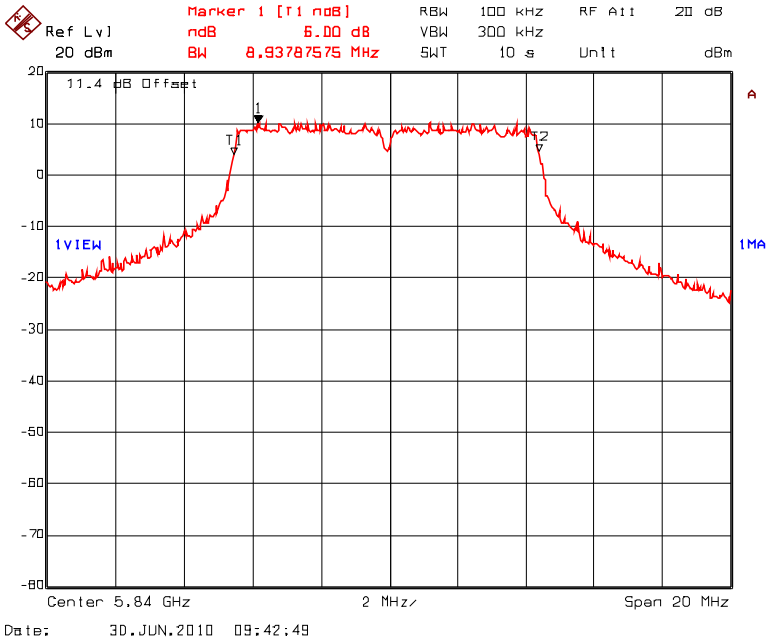
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #17: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: 64QAM 5/6 @ 65 Mb/s

CHAIN 1



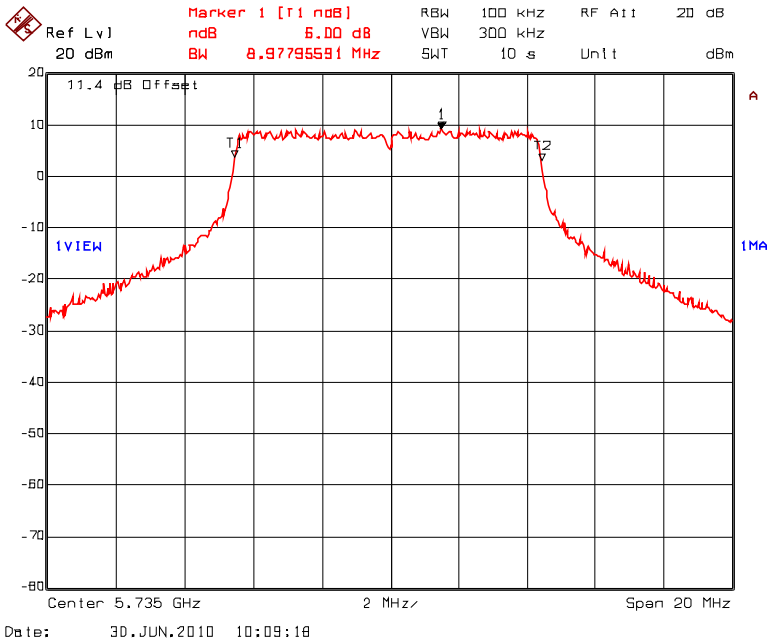
CHAIN 2



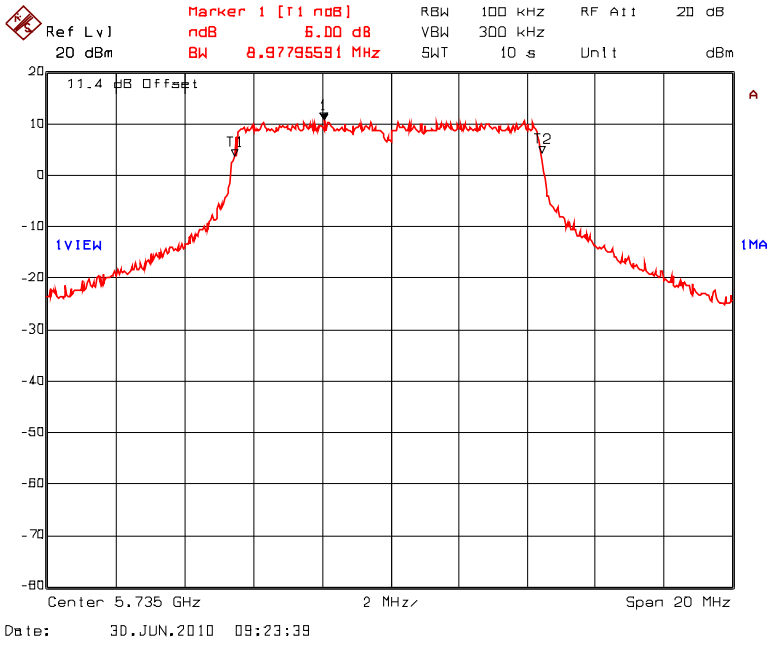
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #18: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

CHAIN 1



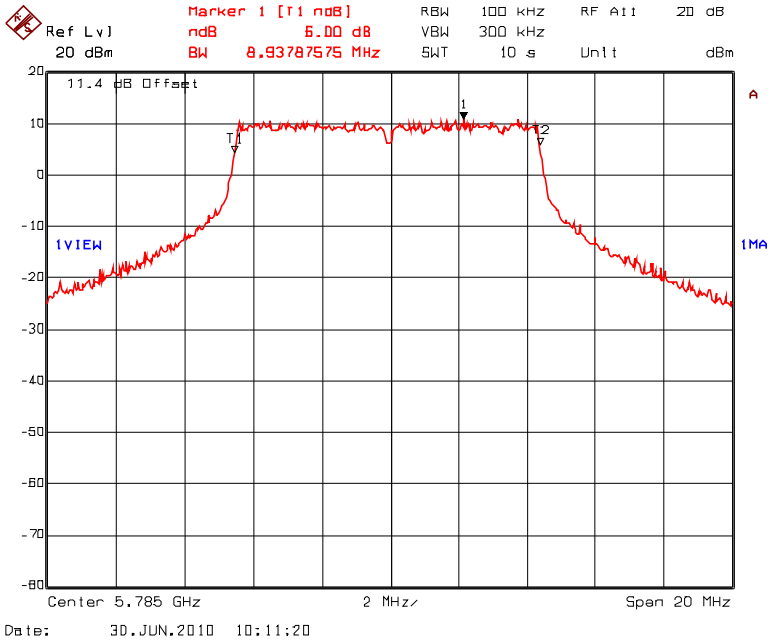
CHAIN 2



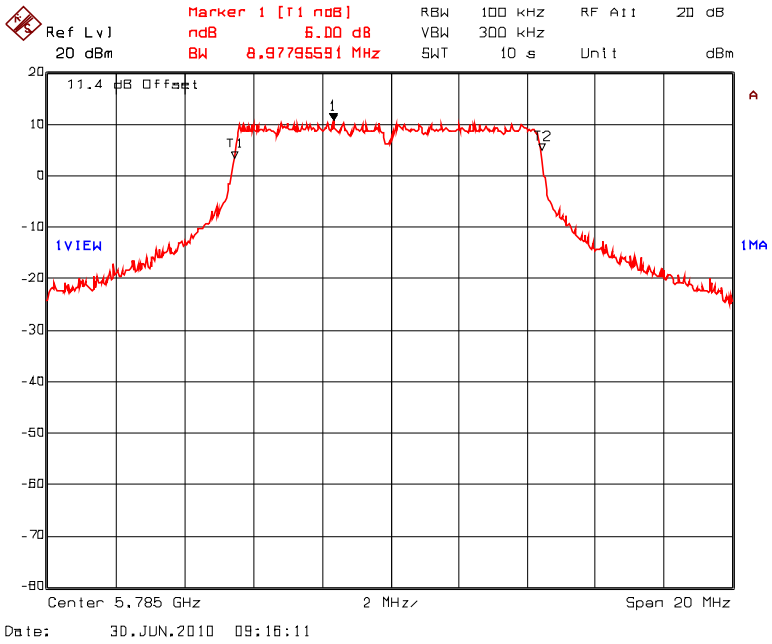
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #19: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

CHAIN 1



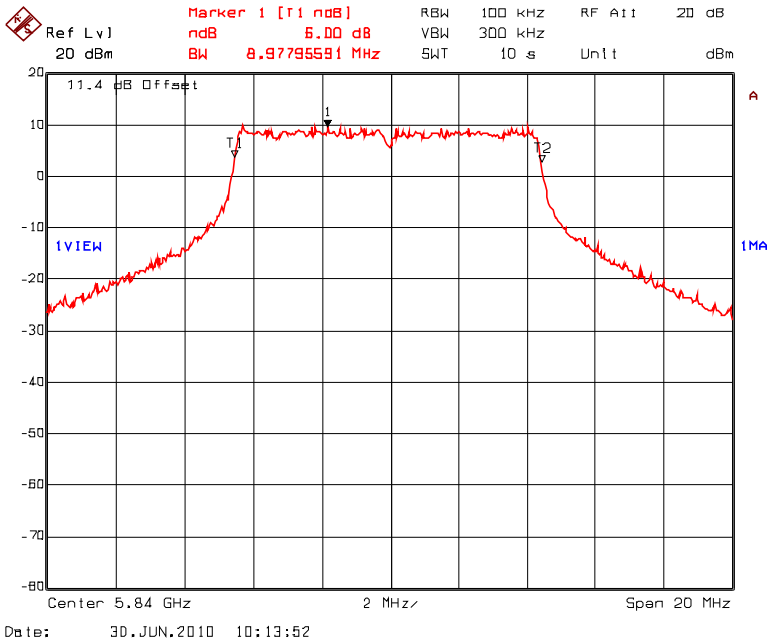
CHAIN 2



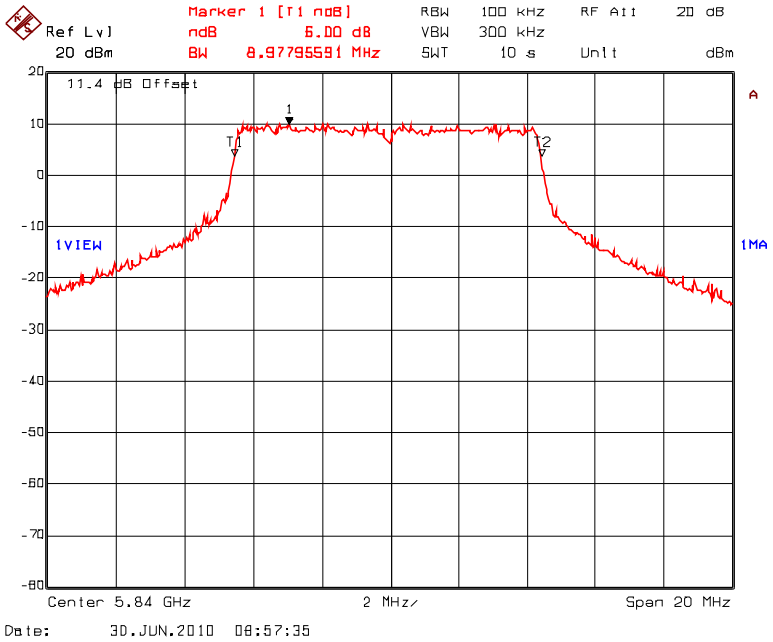
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #20: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

CHAIN 1



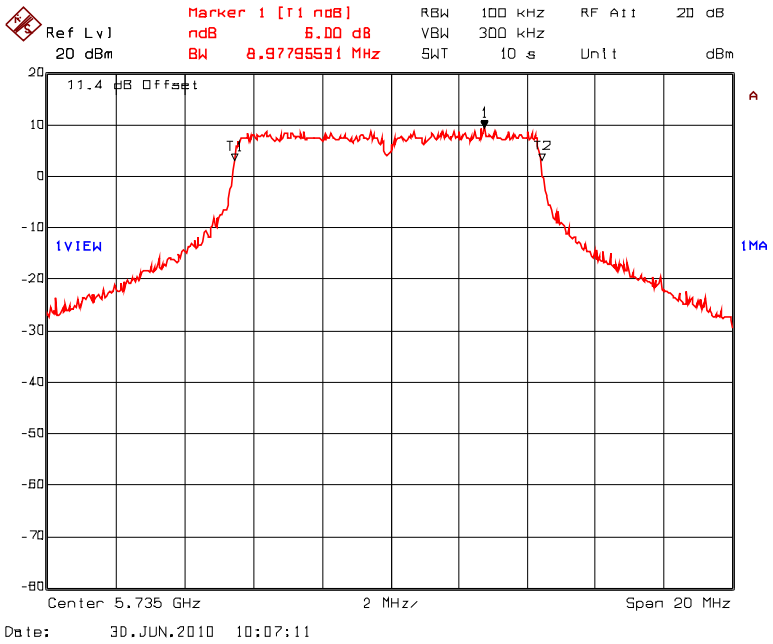
CHAIN 2



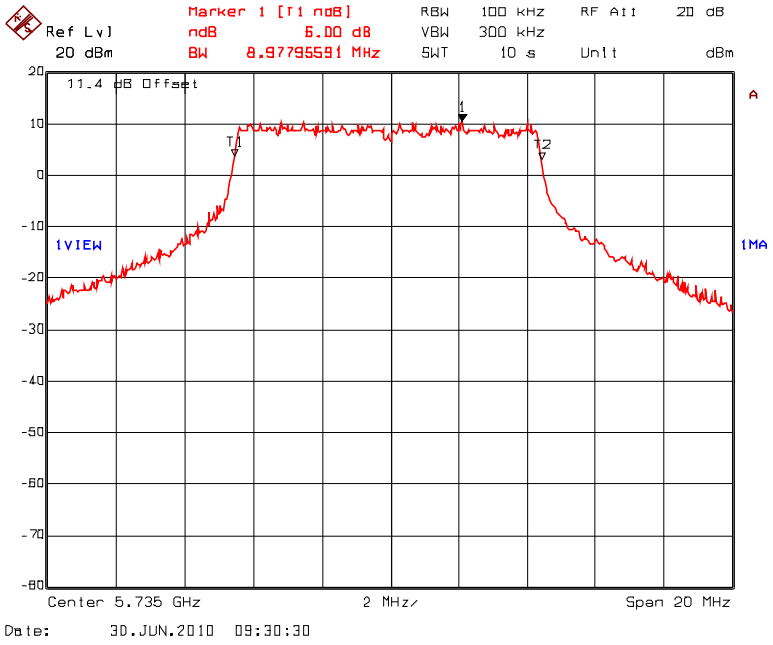
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #21: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

CHAIN 1



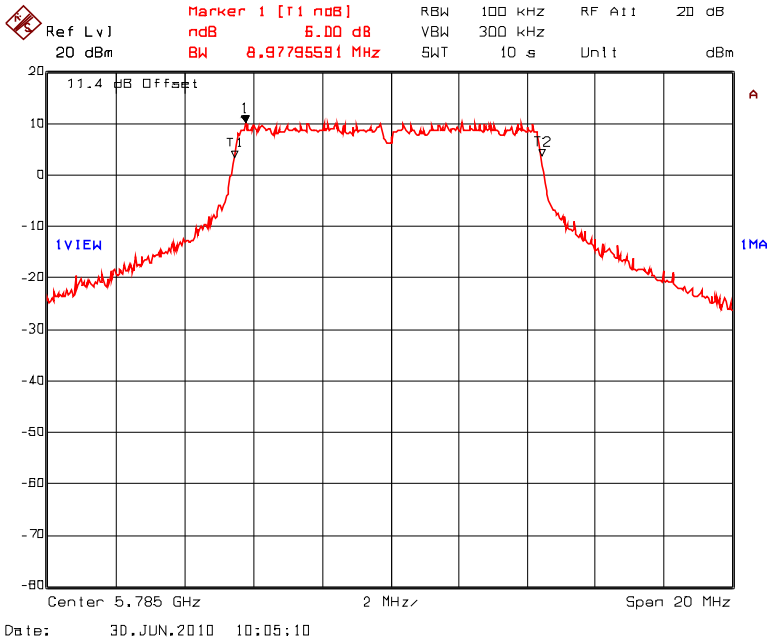
CHAIN 2



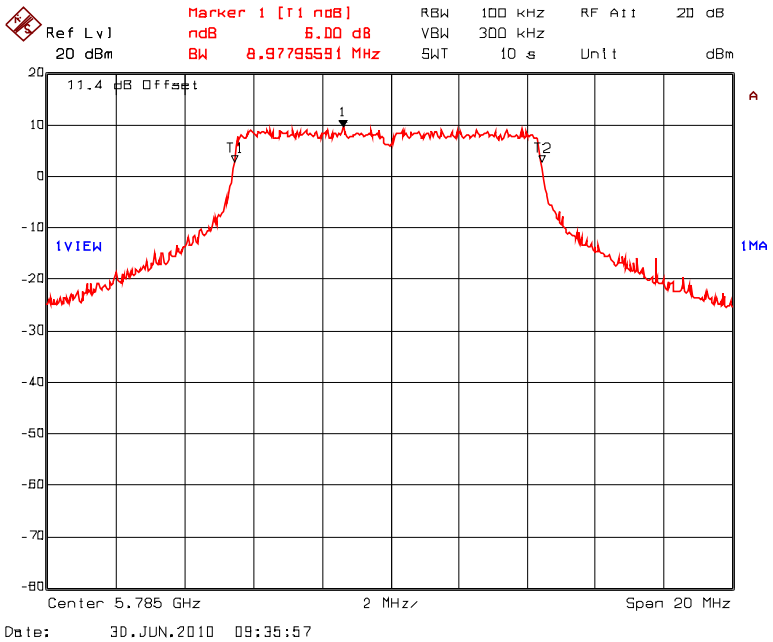
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #22: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

CHAIN 1



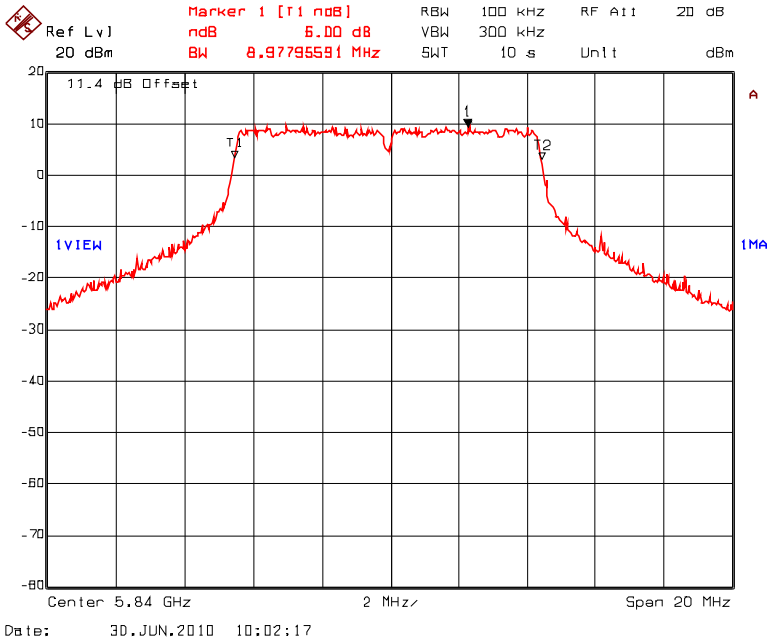
CHAIN 2



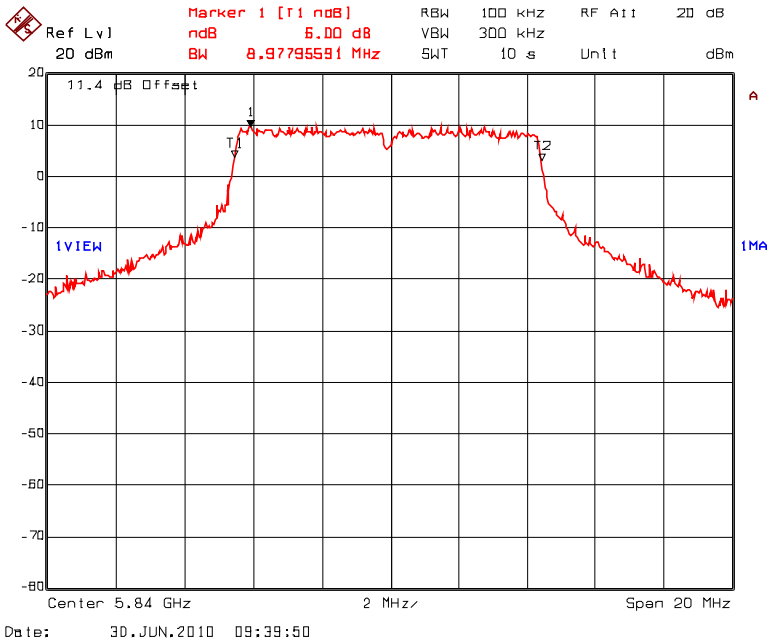
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #23: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

CHAIN 1



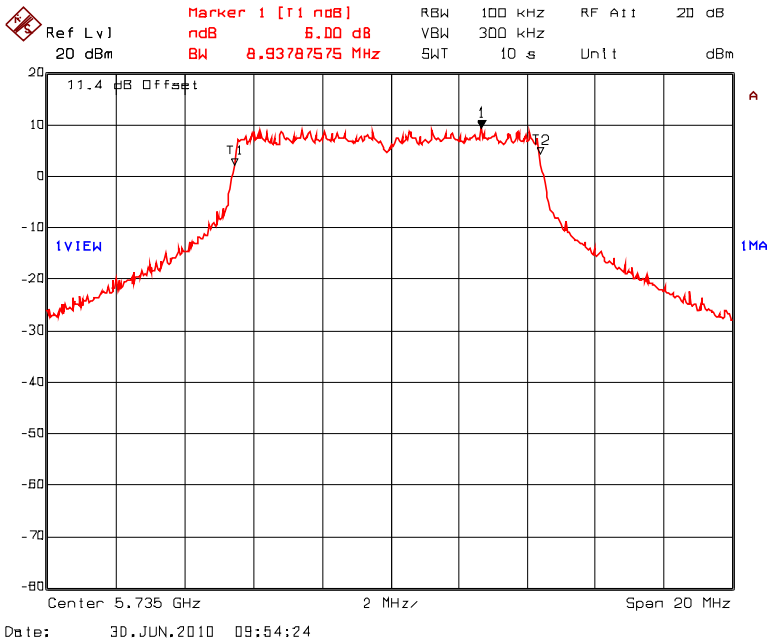
CHAIN 2



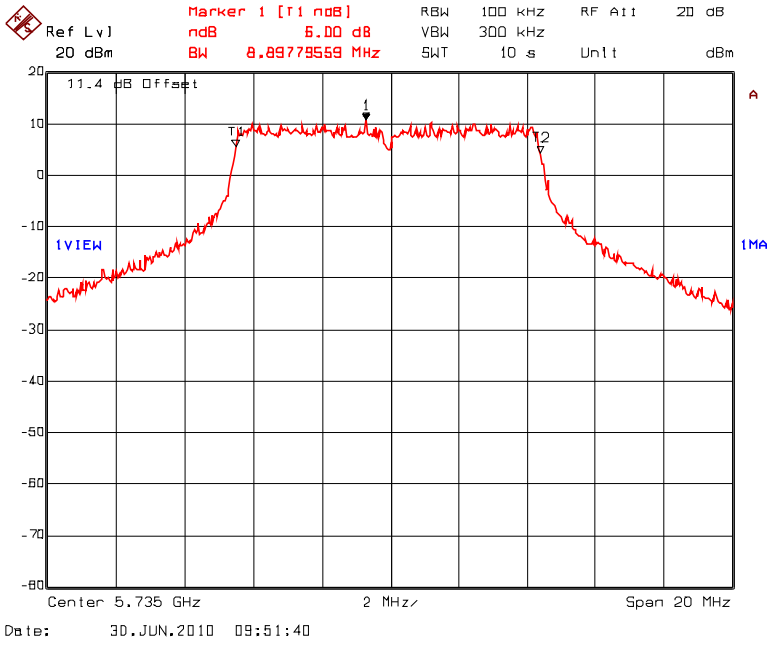
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #24: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1



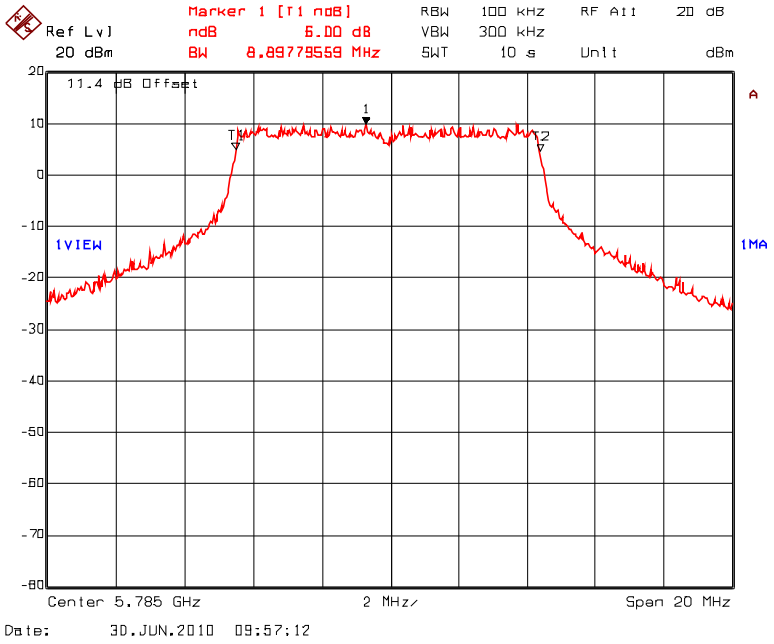
CHAIN 2



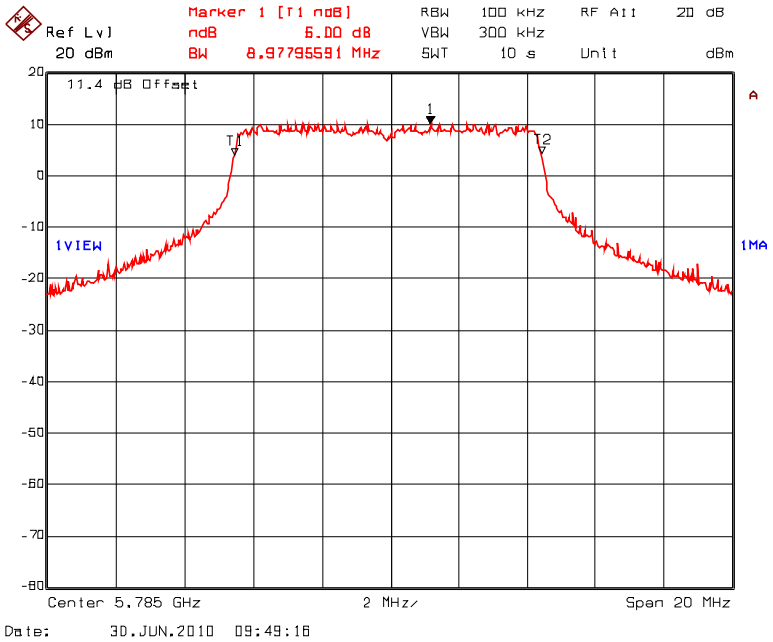
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #25: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1



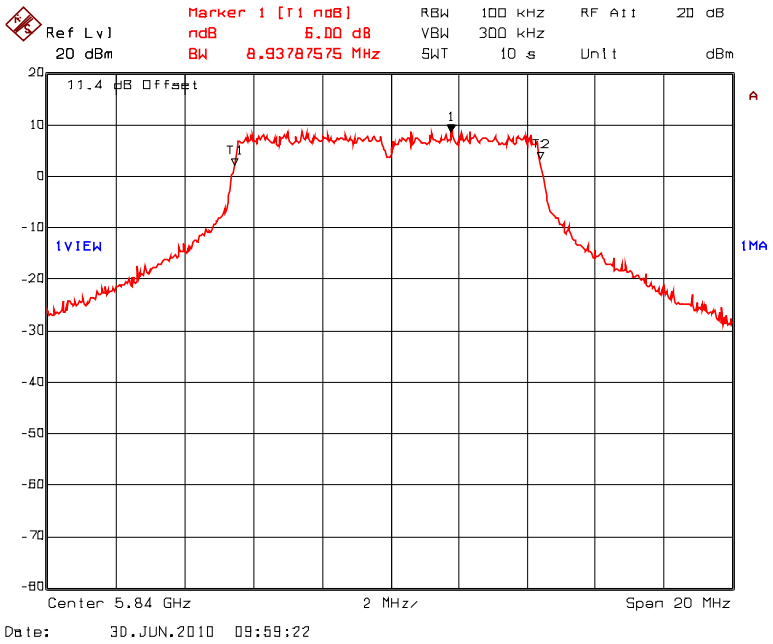
CHAIN 2



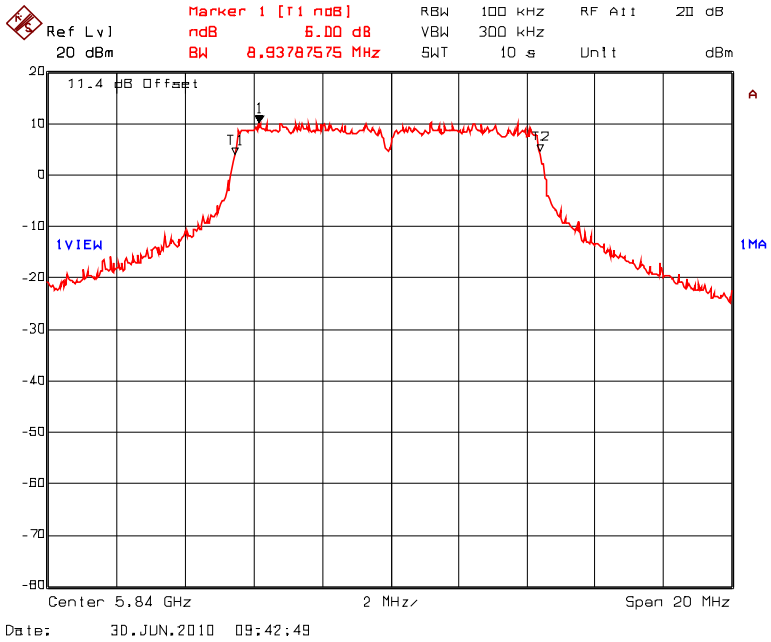
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #26: 6 dB Bandwidth wrt. 10 MHz Channel Spacing Operation Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1



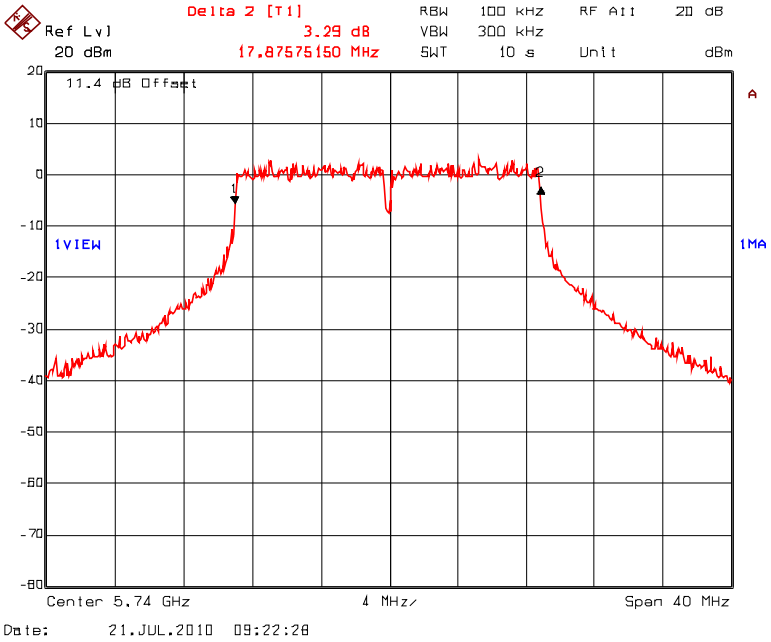
CHAIN 2



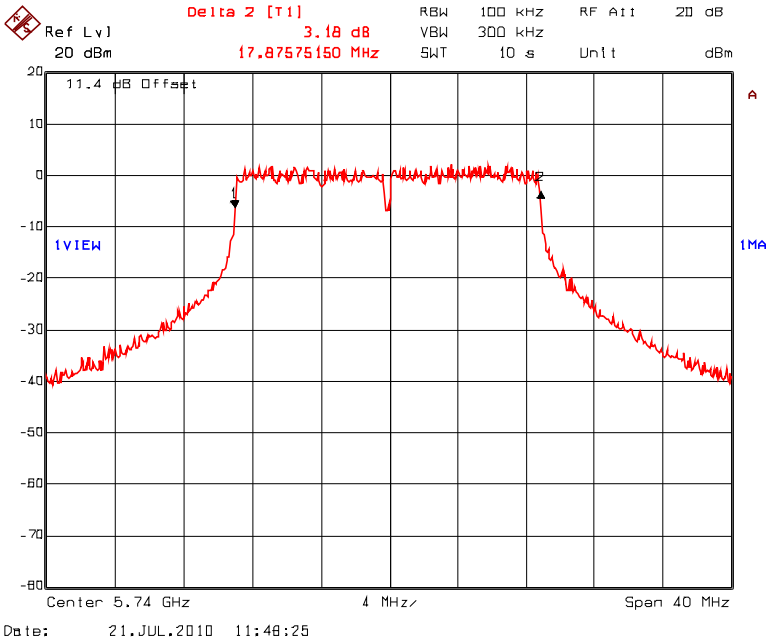
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #27: 6 dB Bandwidth wrt. 20 MHz Channel Spacing Operation Frequency: 5740 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1

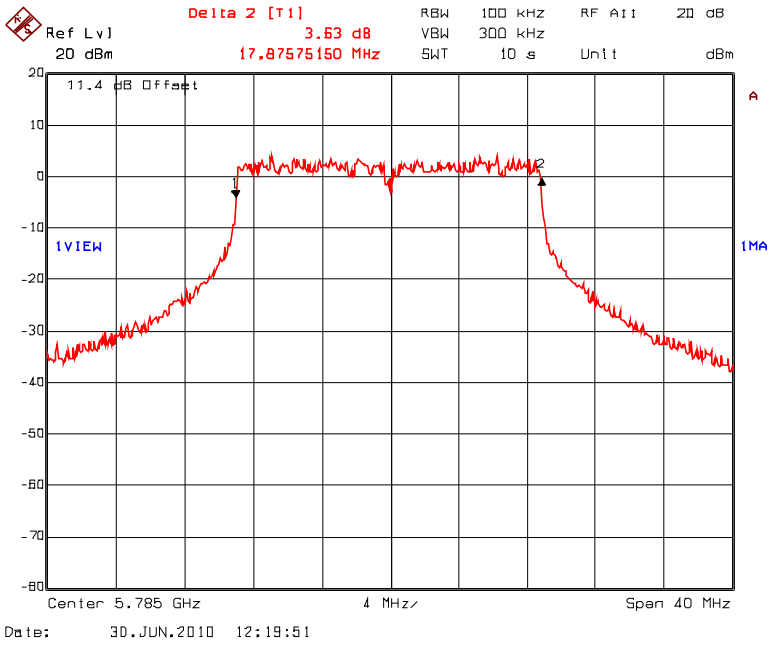


CHAIN 2

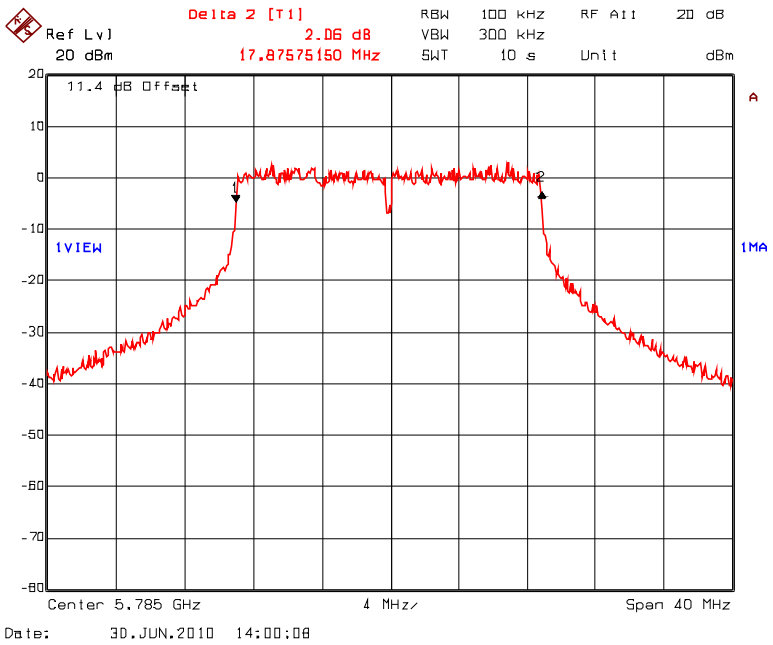


Plot #28: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1

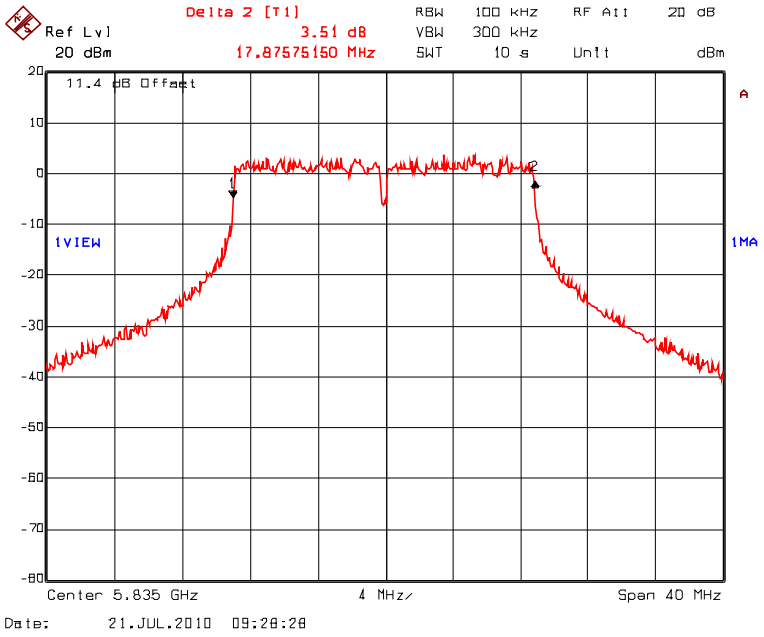


CHAIN 2

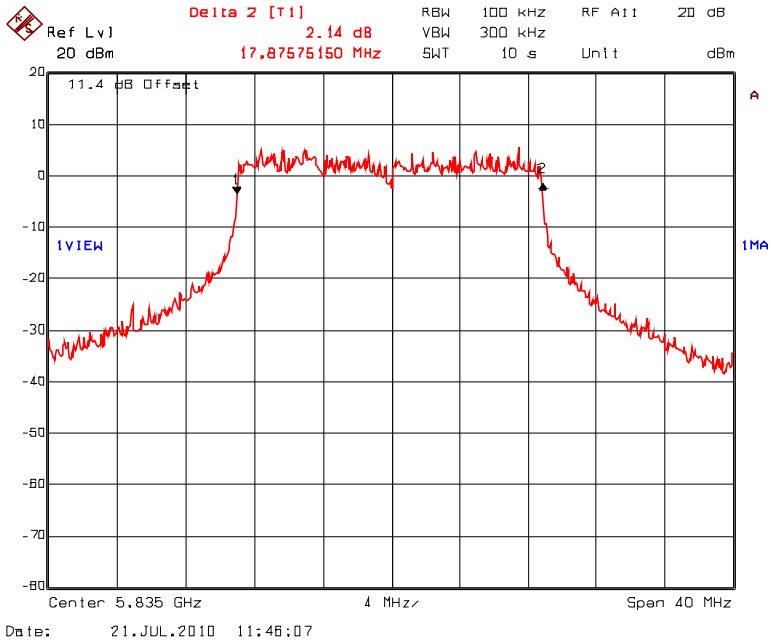


Plot #29: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5835 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1



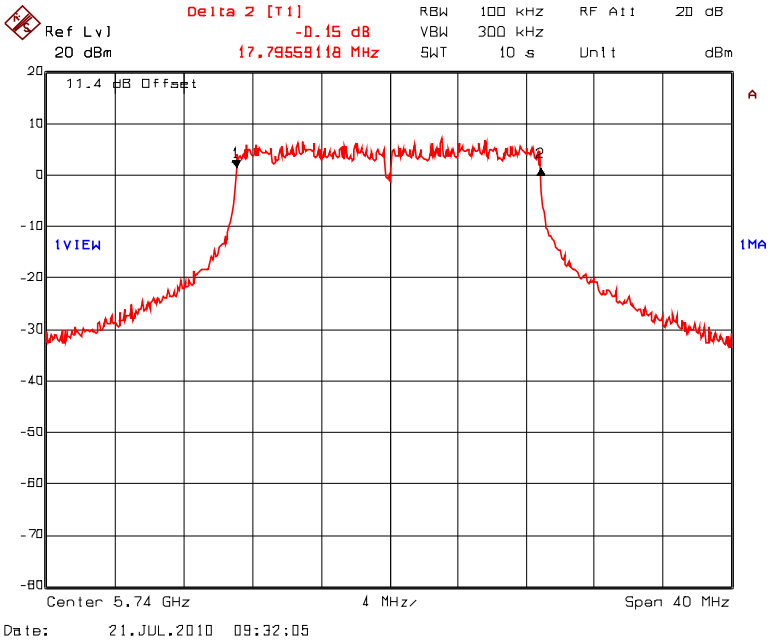
CHAIN 2



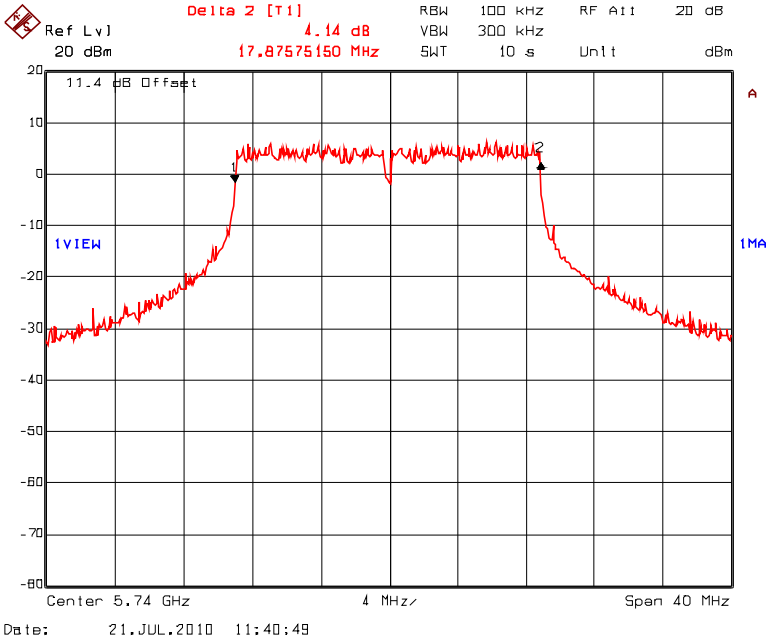
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #30: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5740 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1



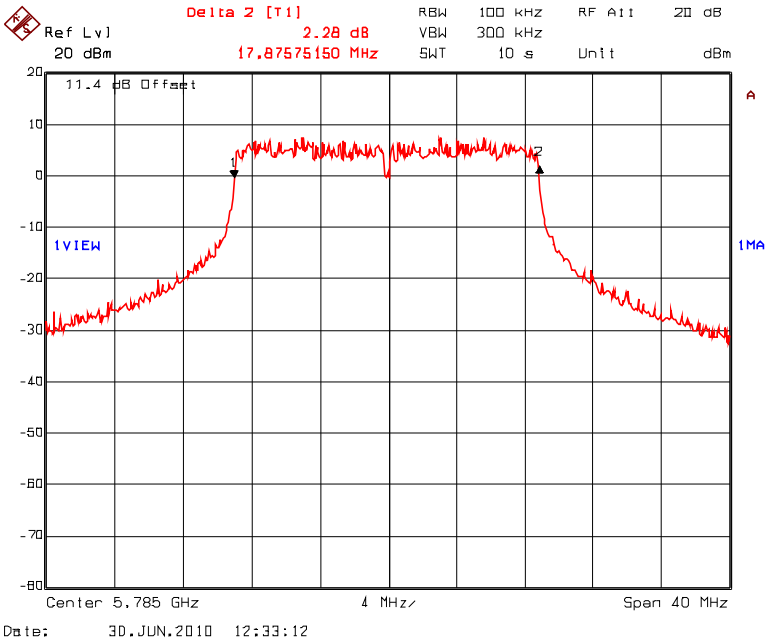
CHAIN 2



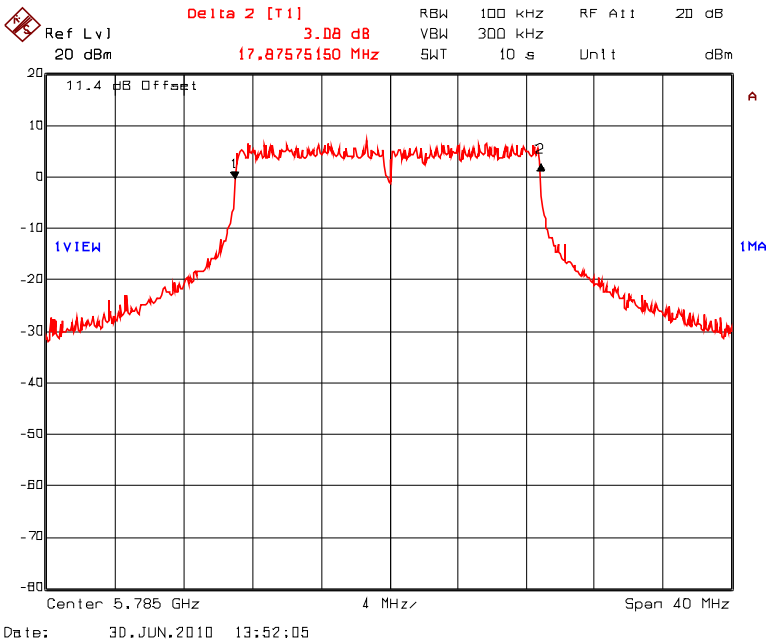
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #31: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1

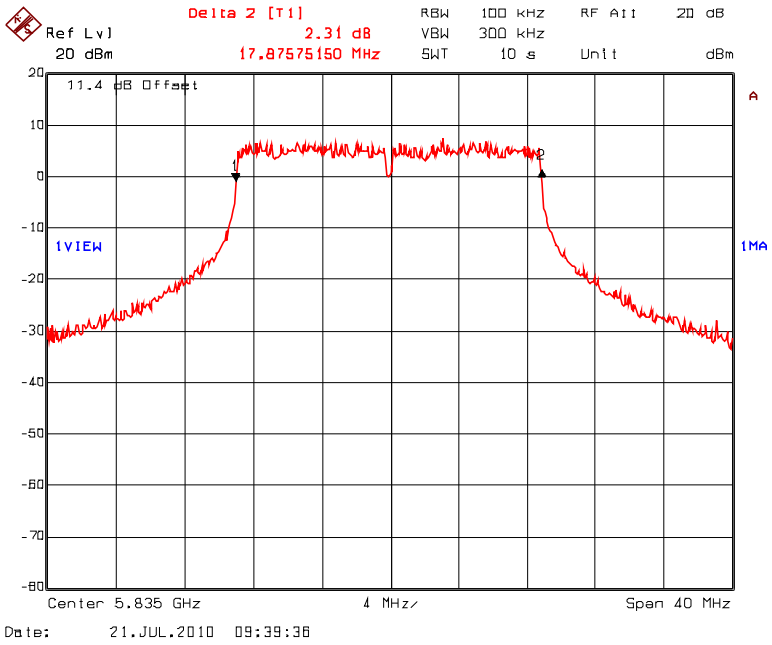


CHAIN 2

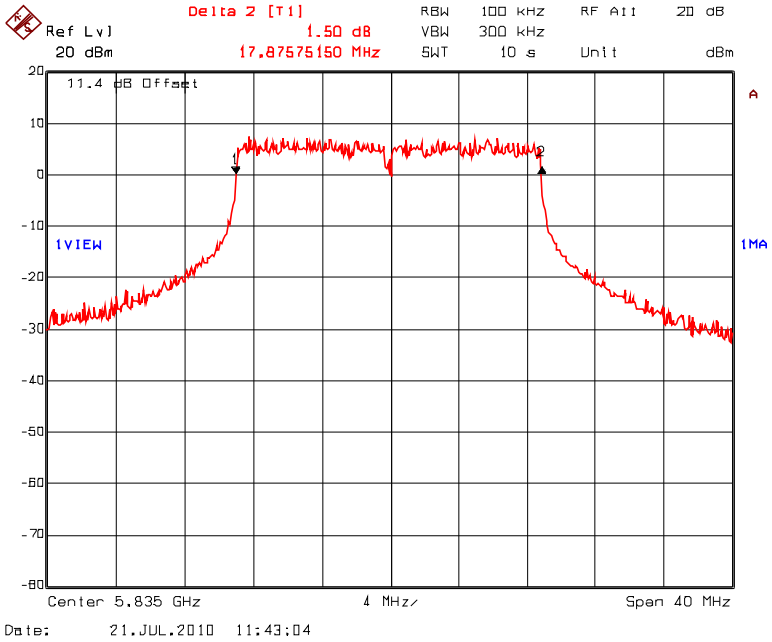


Plot #32: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5835 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1



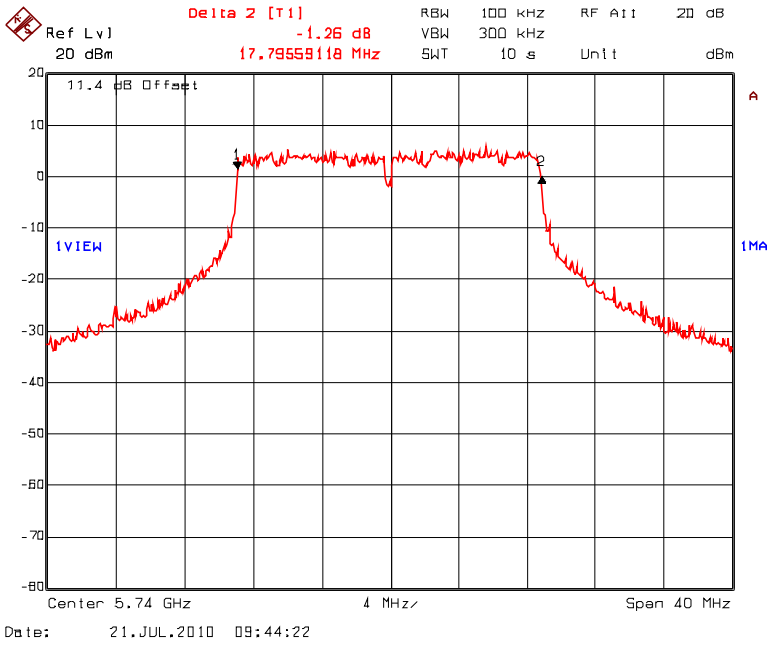
CHAIN 2



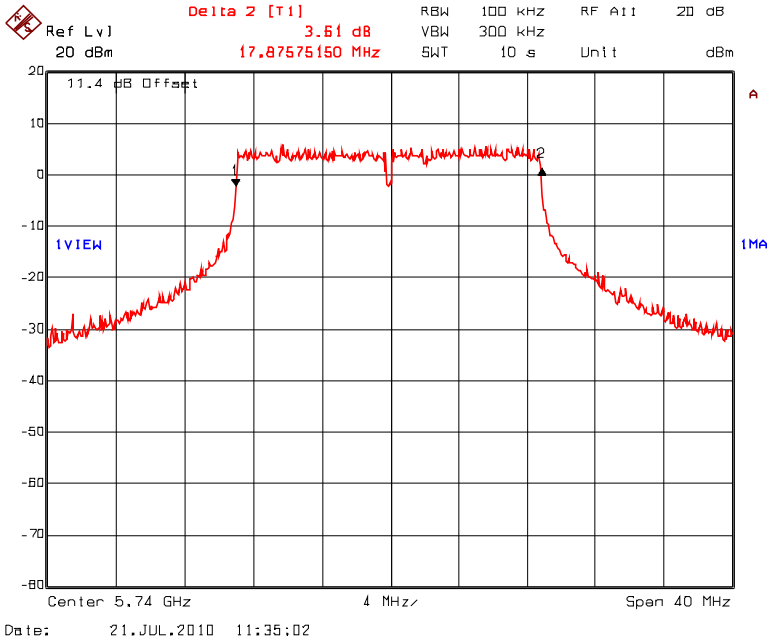
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #33: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5740 MHz, Modulation: QPSK 3/4 @ 39Mb/s

CHAIN 1



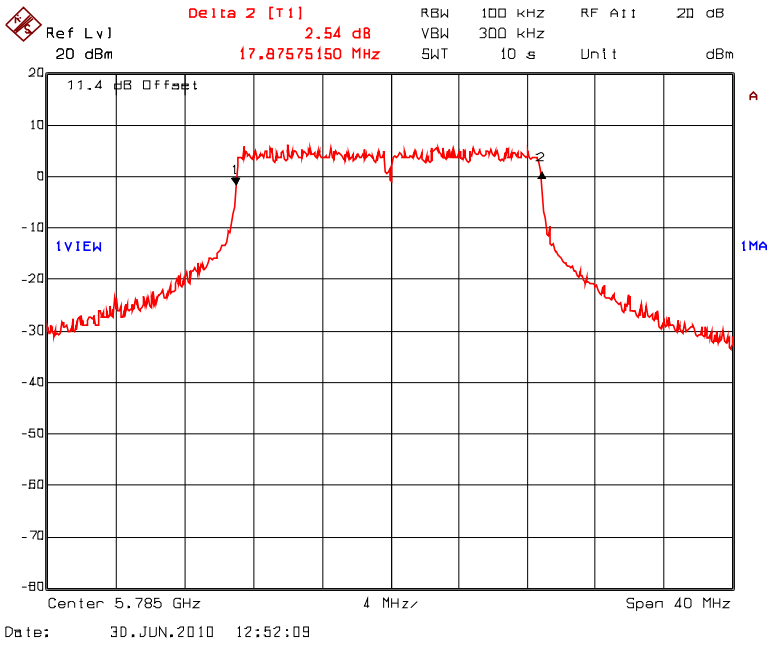
CHAIN 2



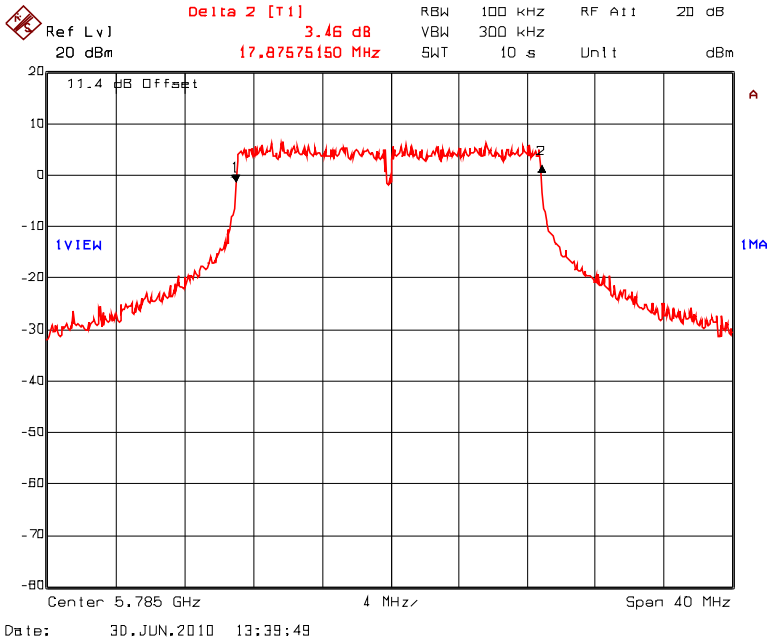
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #34: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 39 Mb/s

CHAIN 1



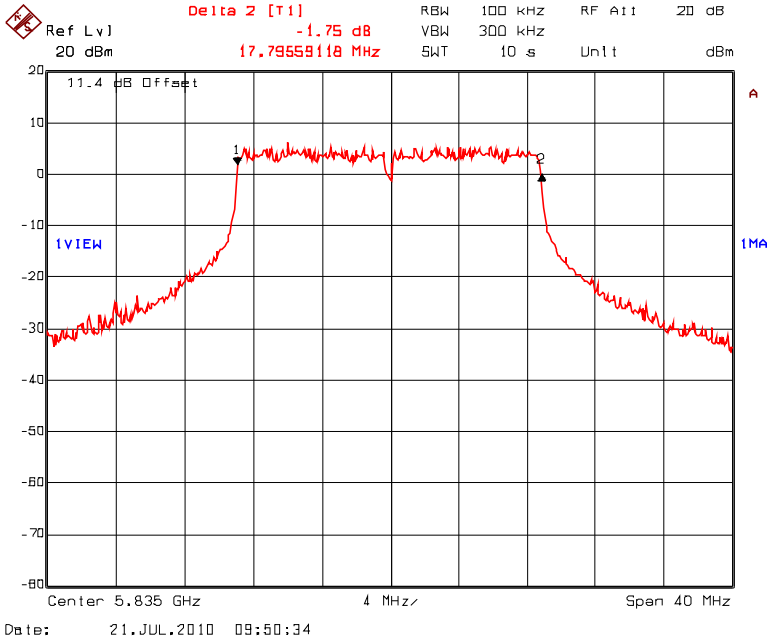
CHAIN 2



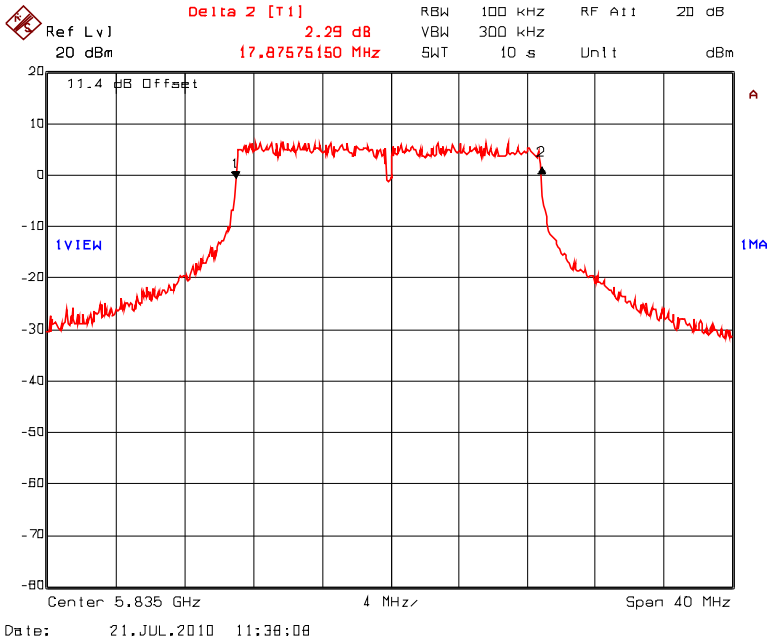
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #35: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5835 MHz, Modulation: QPSK 3/4 @ 39 Mb/s

CHAIN 1



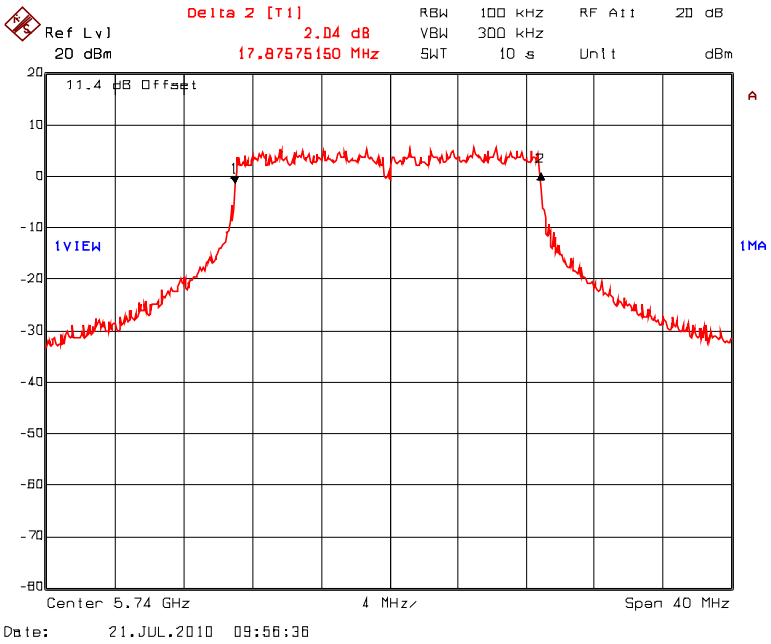
CHAIN 2



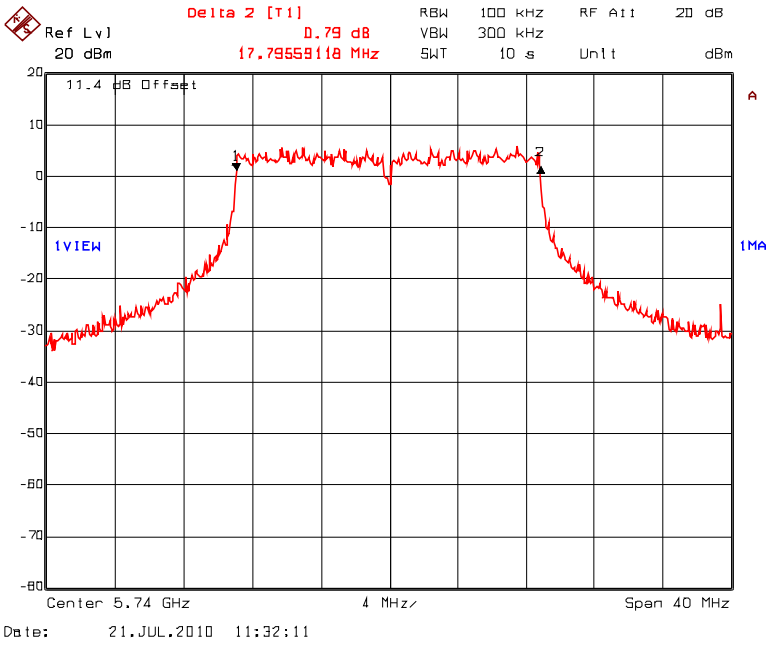
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #36: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13 Mb/s

CHAIN 1



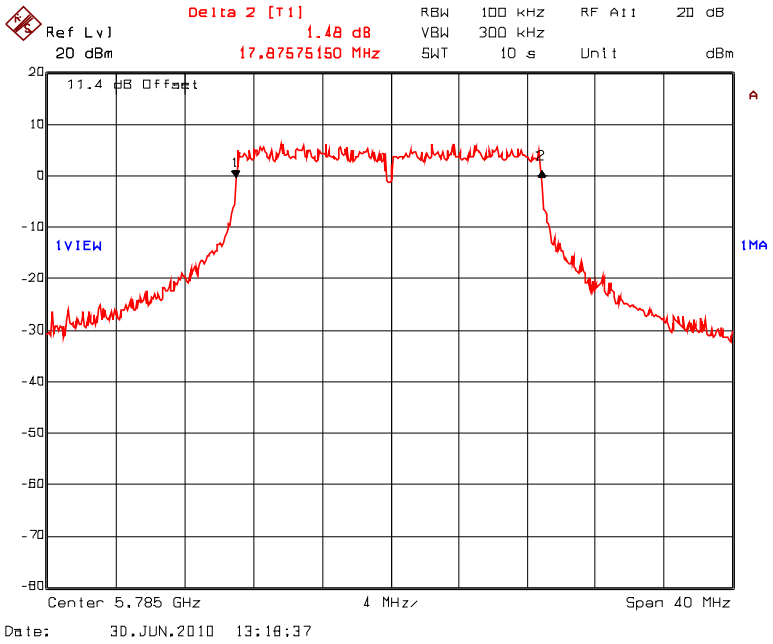
CHAIN 2



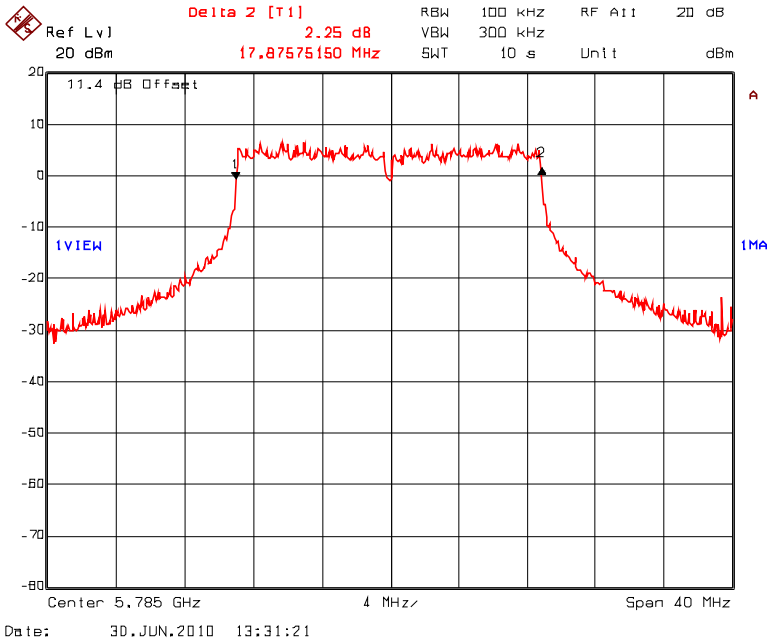
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #37: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13 Mb/s

CHAIN 1



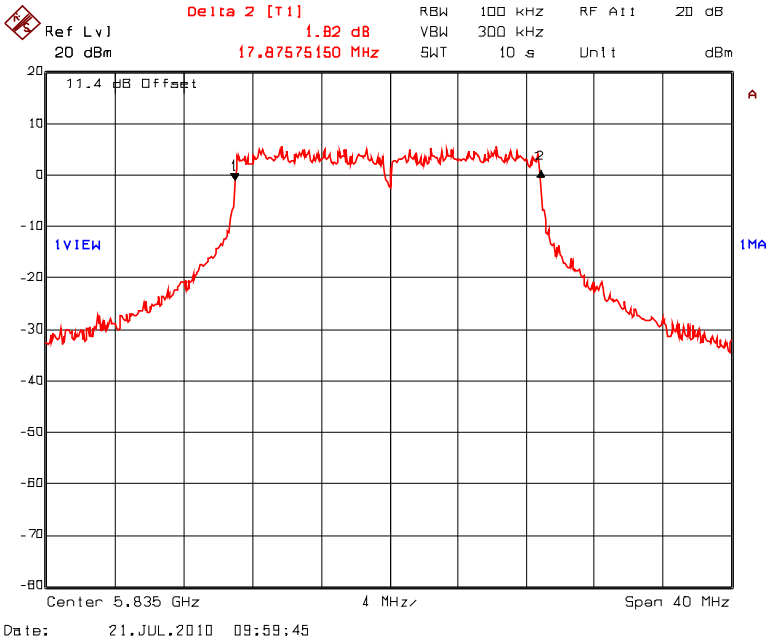
CHAIN 2



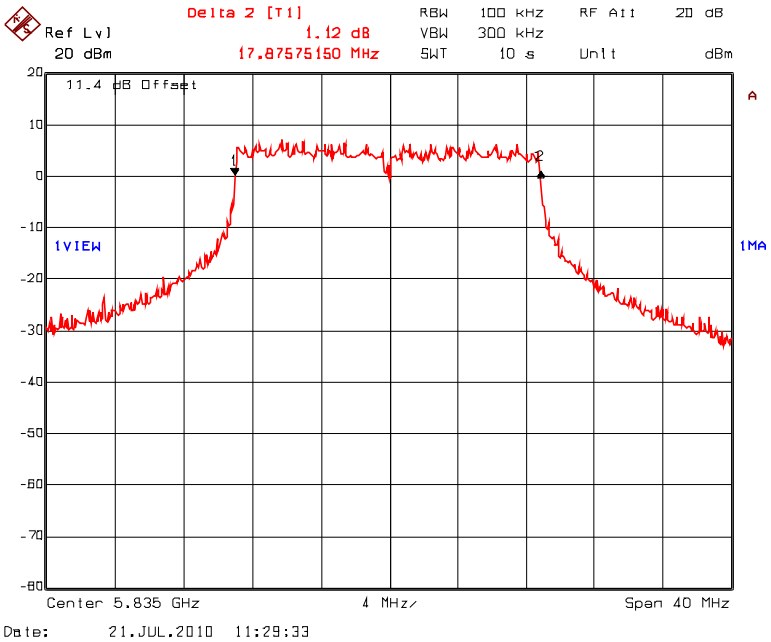
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #38: 6 dB Bandwidth wrt. 20MHz Channel Spacing Operation Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13 Mb/s

CHAIN 1



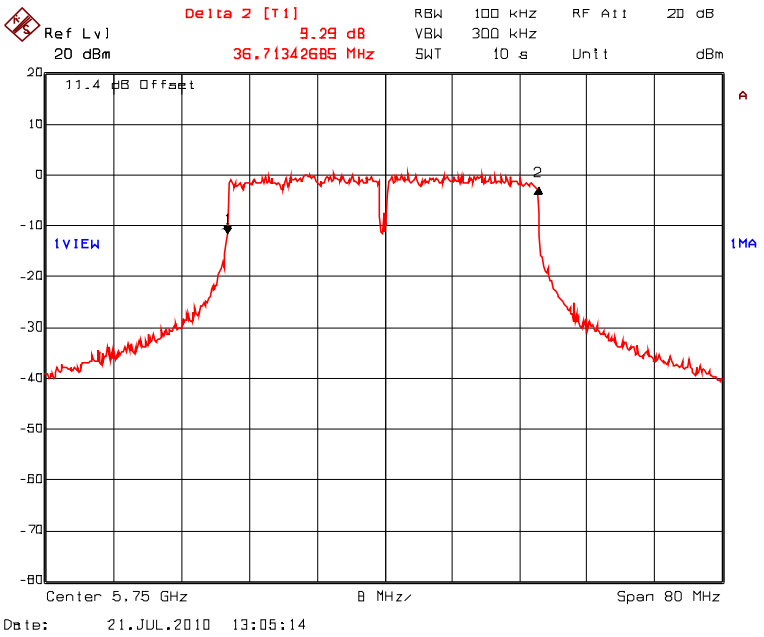
CHAIN 2



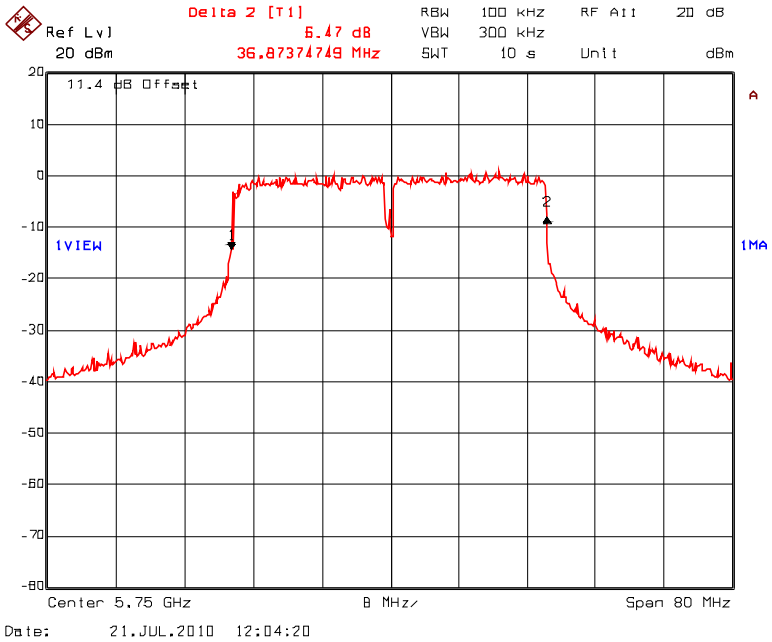
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #39: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5750 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1



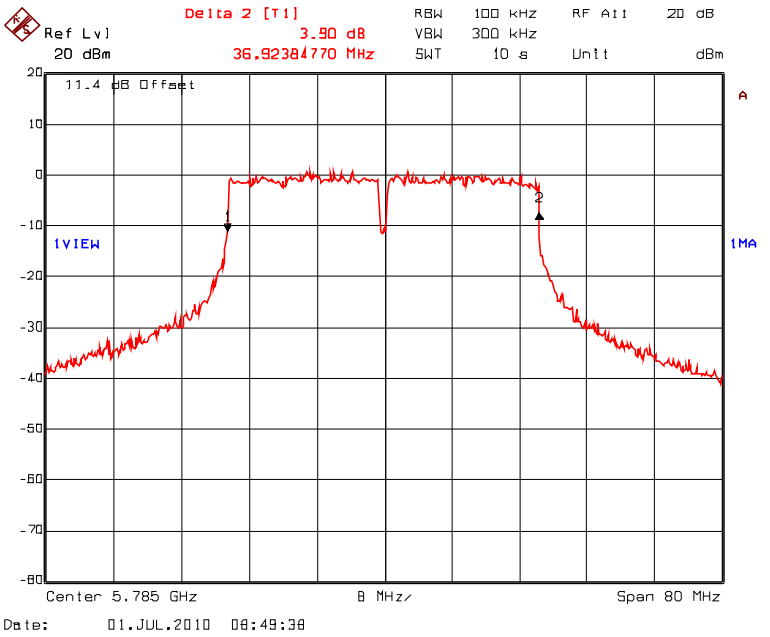
CHAIN 2



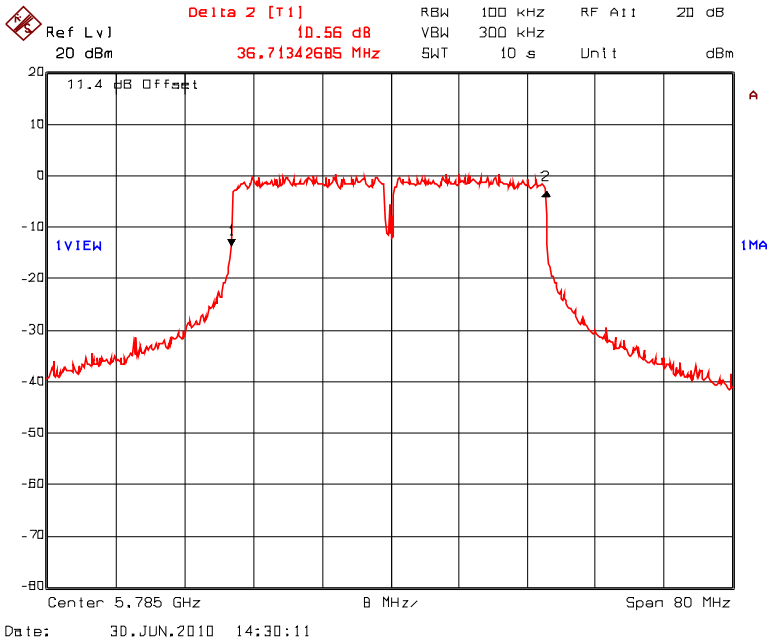
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #40: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1



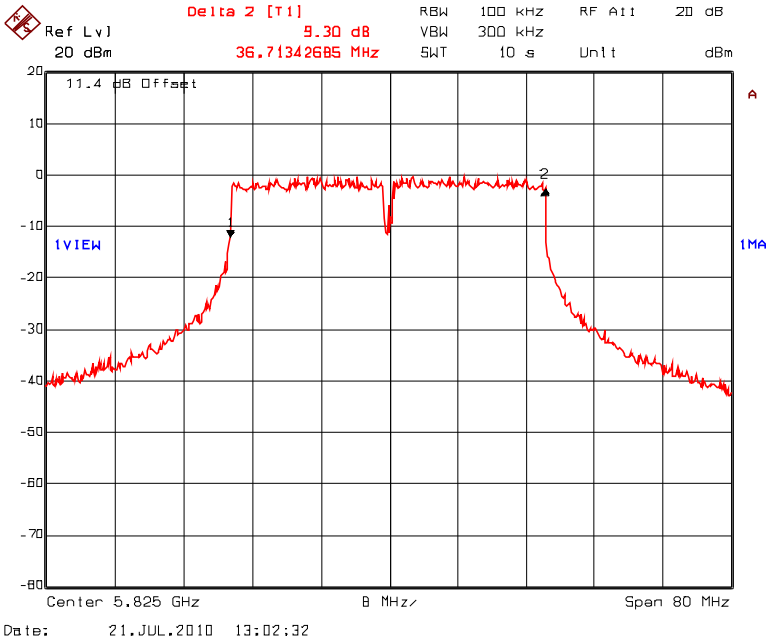
CHAIN 2



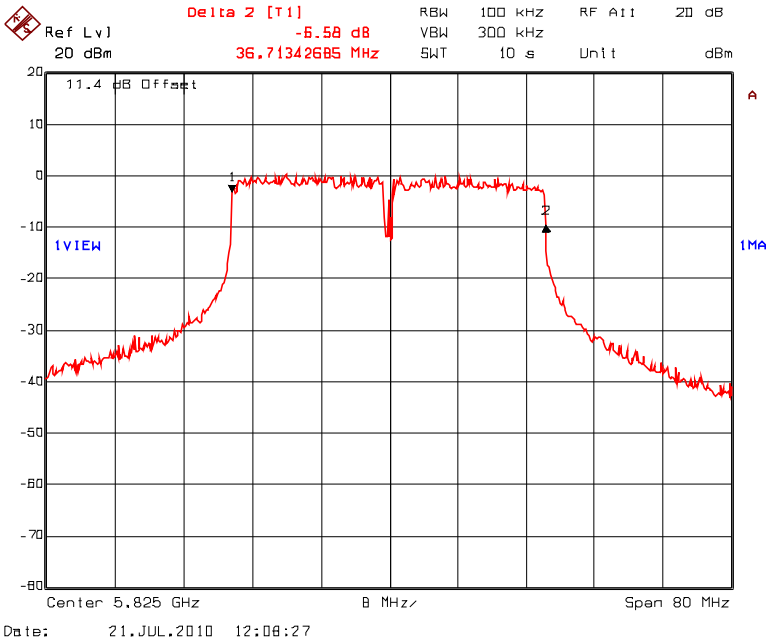
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #41: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5825 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1



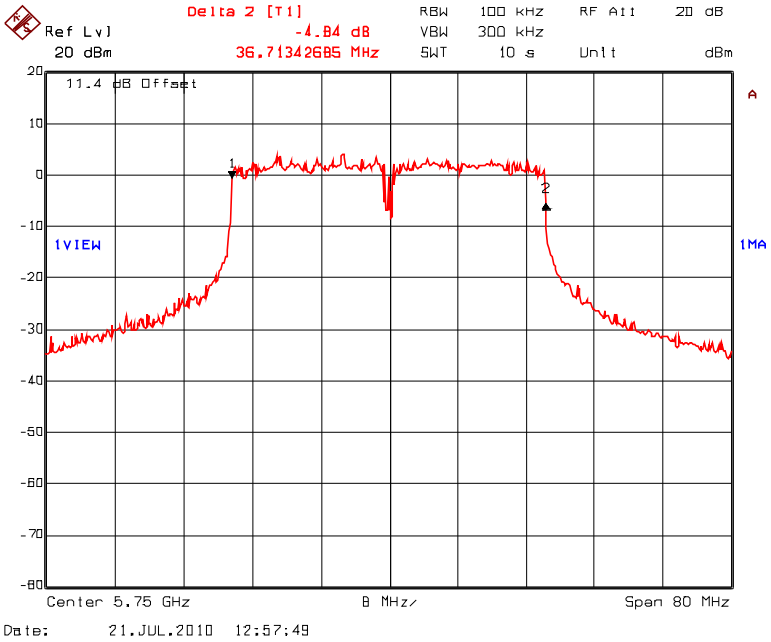
CHAIN 2



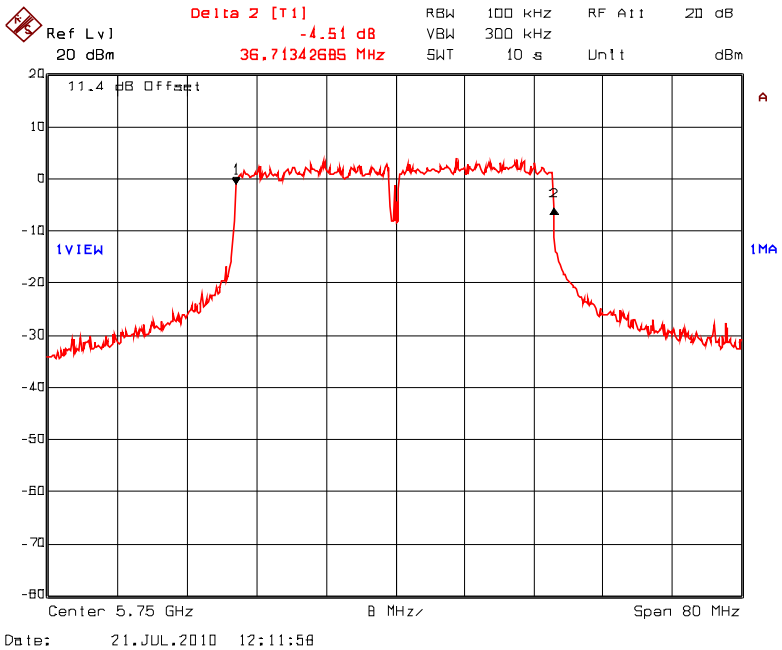
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #42: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5750 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1



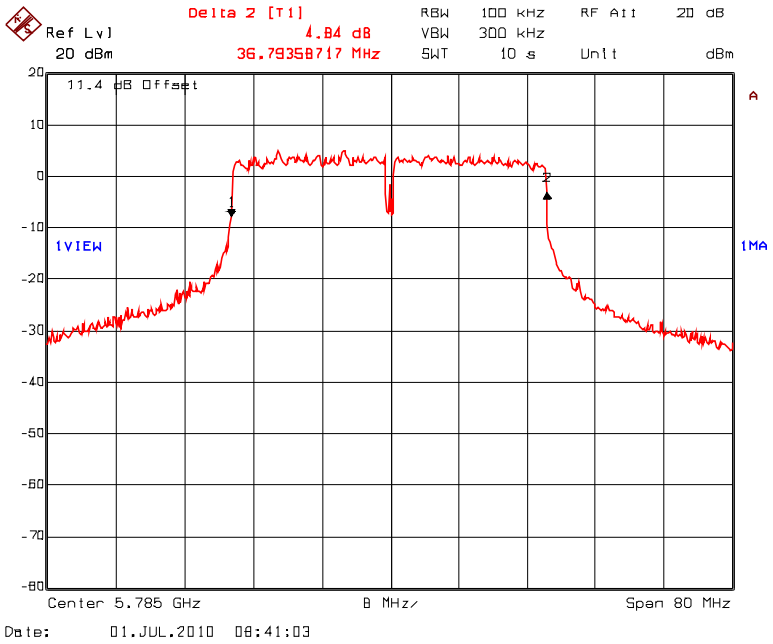
CHAIN 2



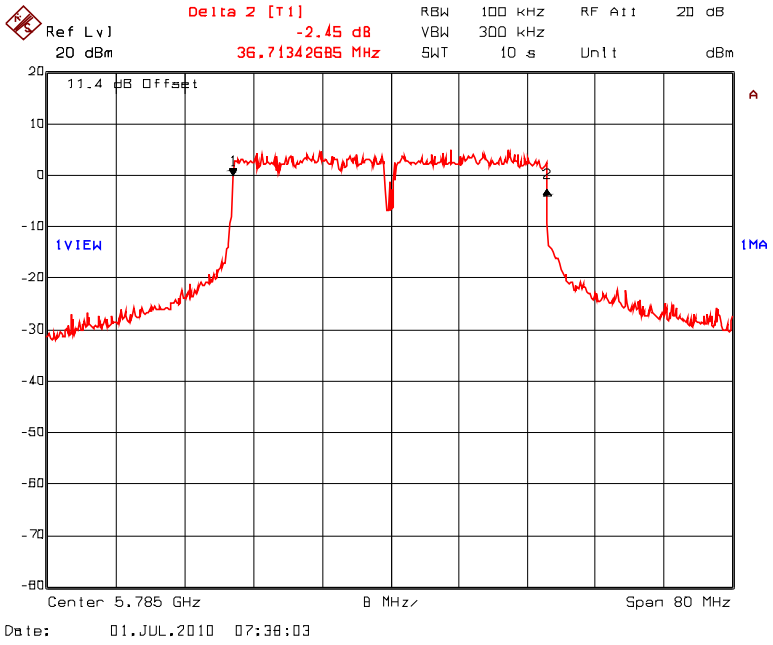
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #43: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1



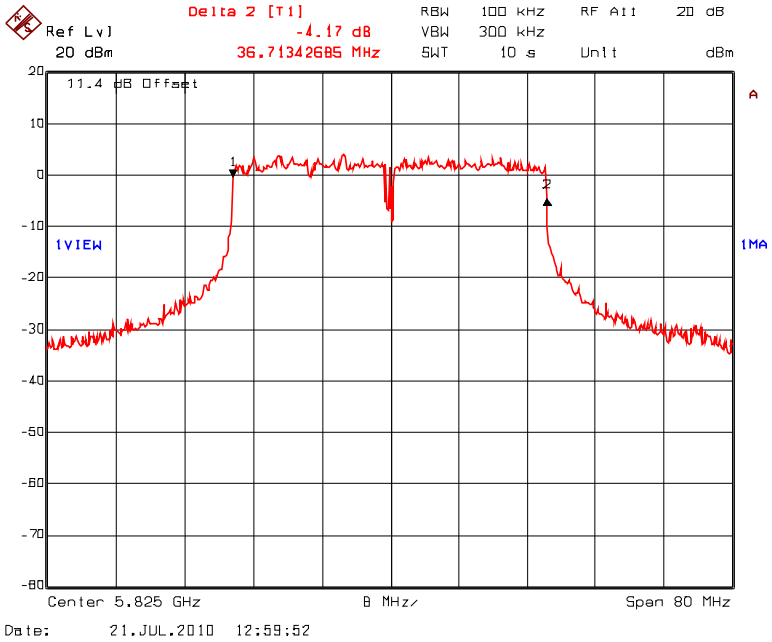
CHAIN 2



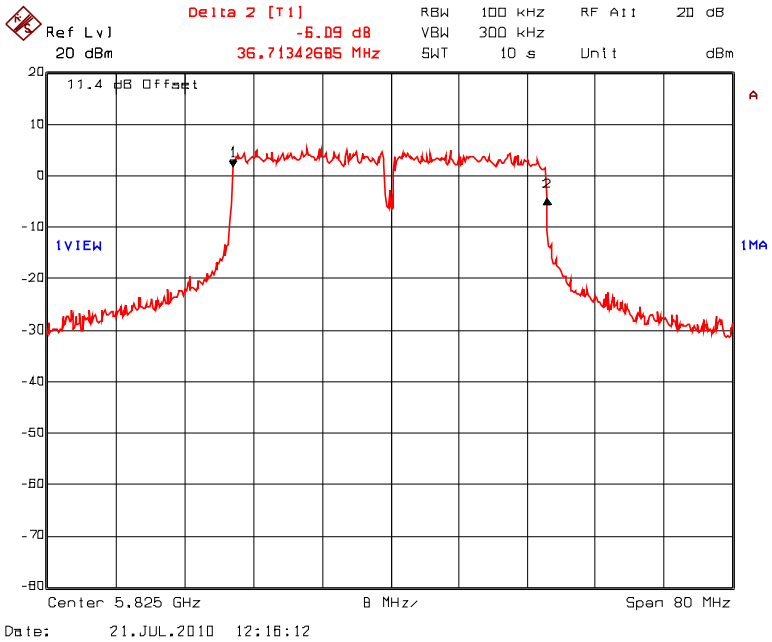
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #44: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5825 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1



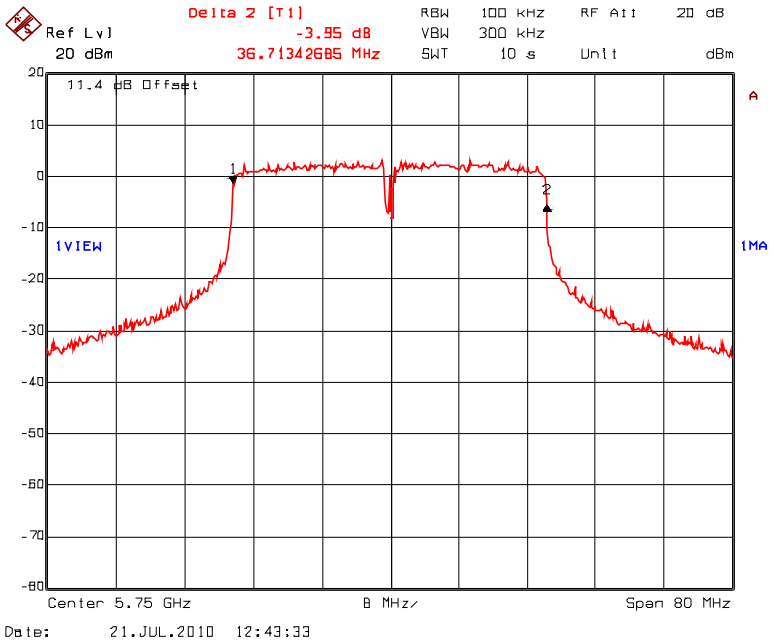
CHAIN 2



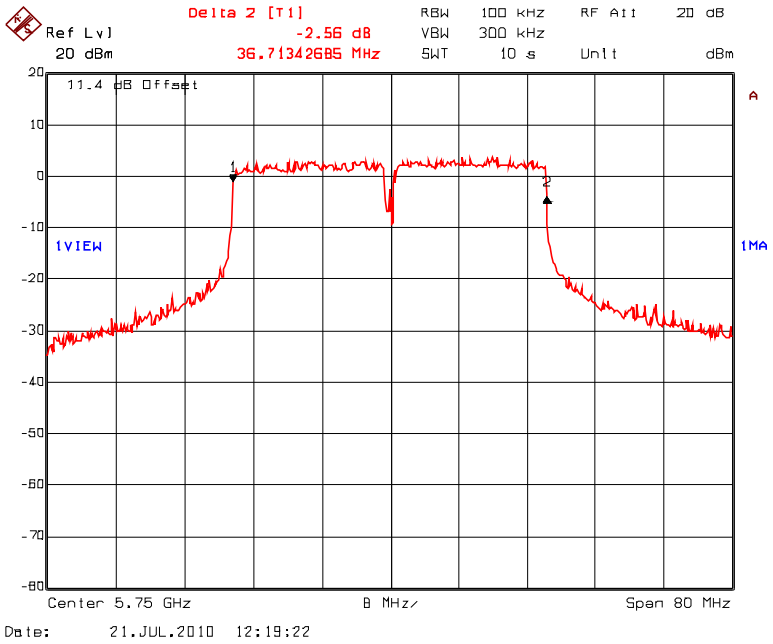
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #45: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5750 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1



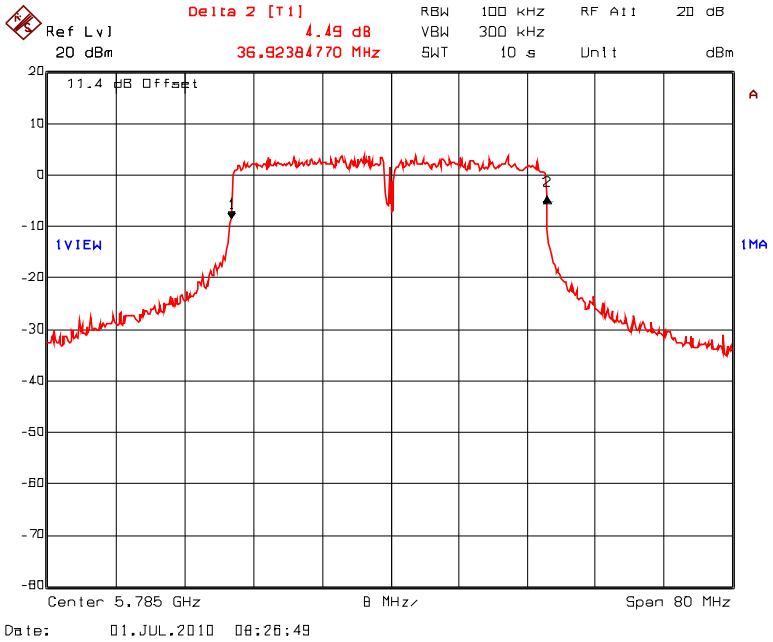
CHAIN 2



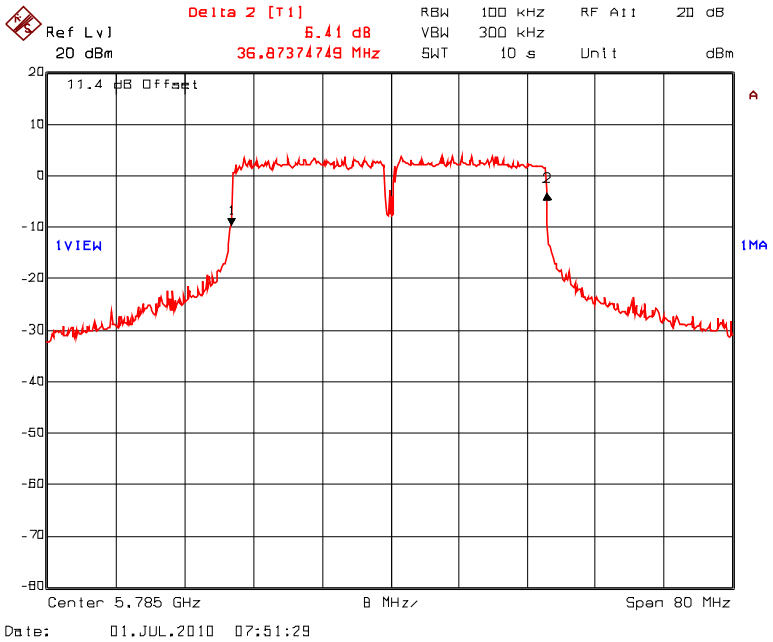
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #46: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1



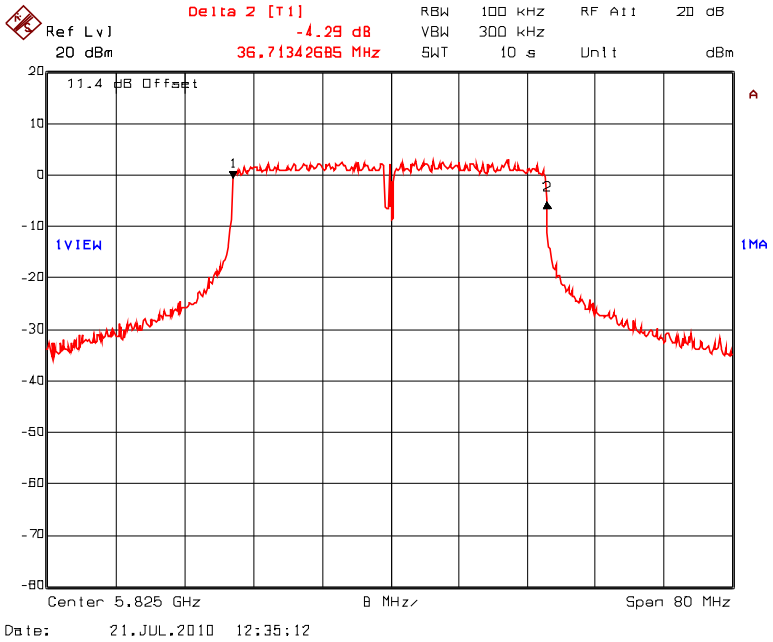
CHAIN 2



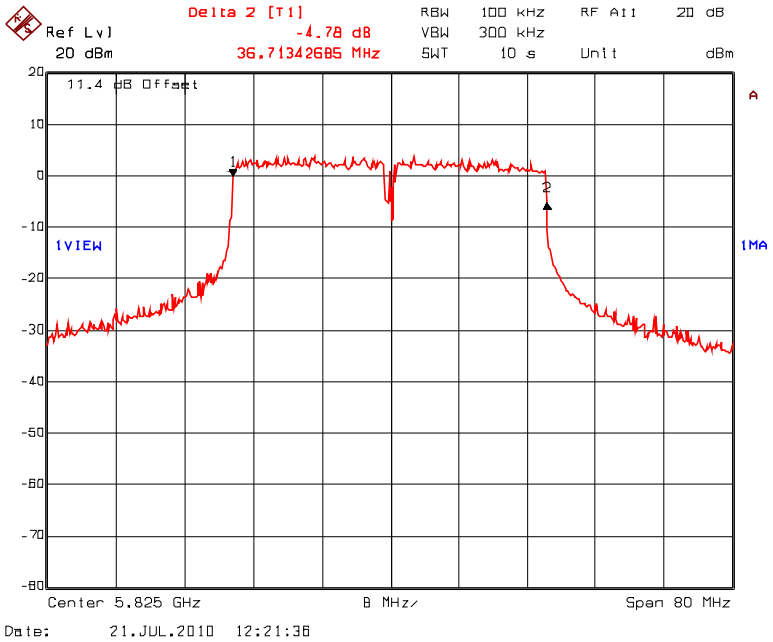
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #47: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5825 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1



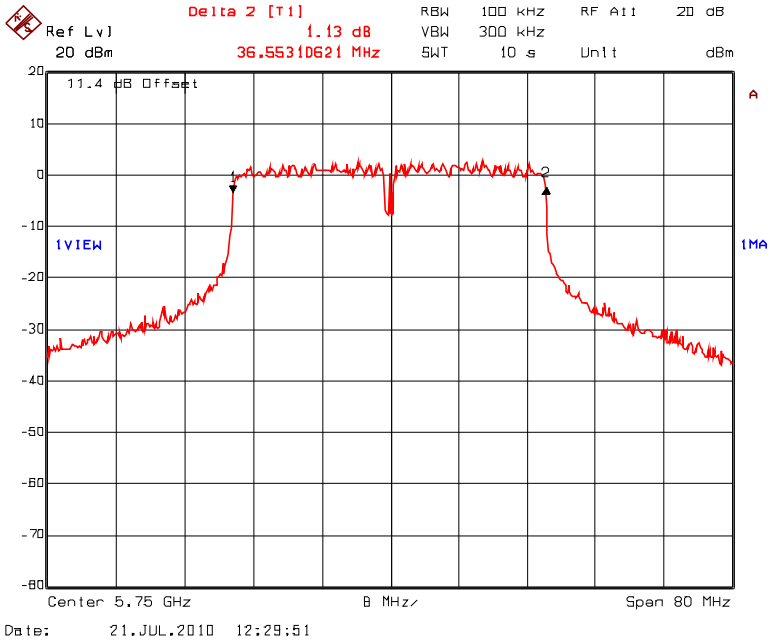
CHAIN 2



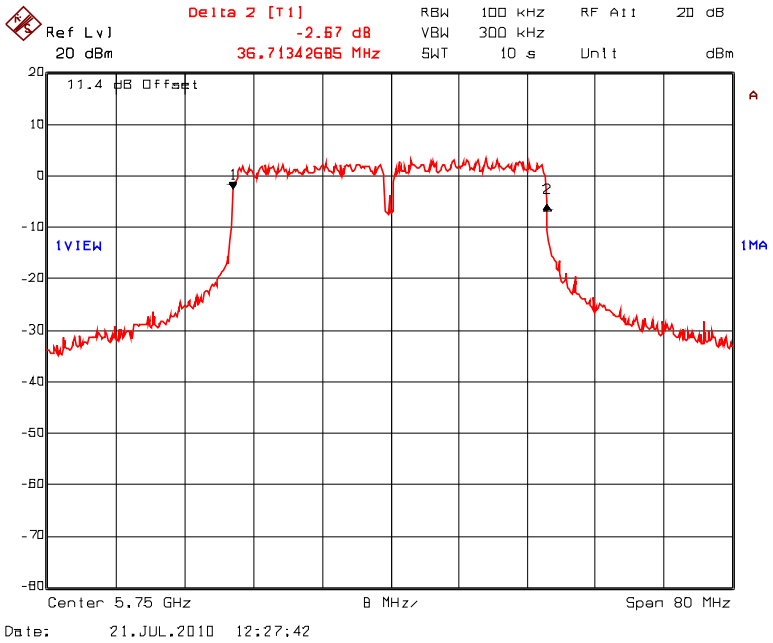
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #48: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1



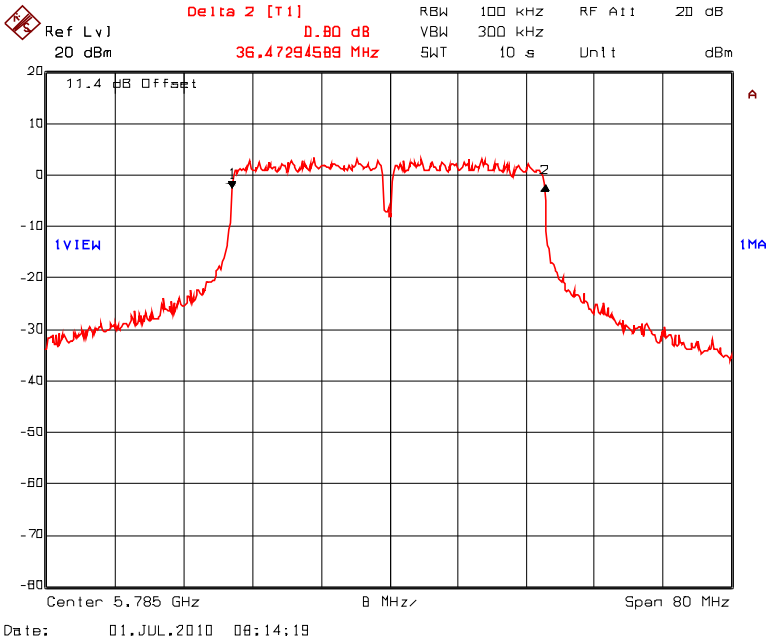
CHAIN 2



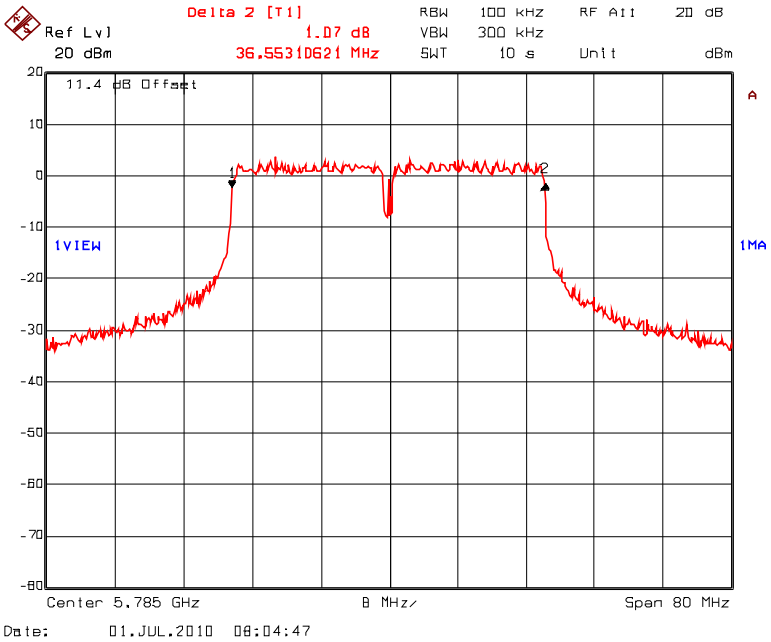
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #49: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1



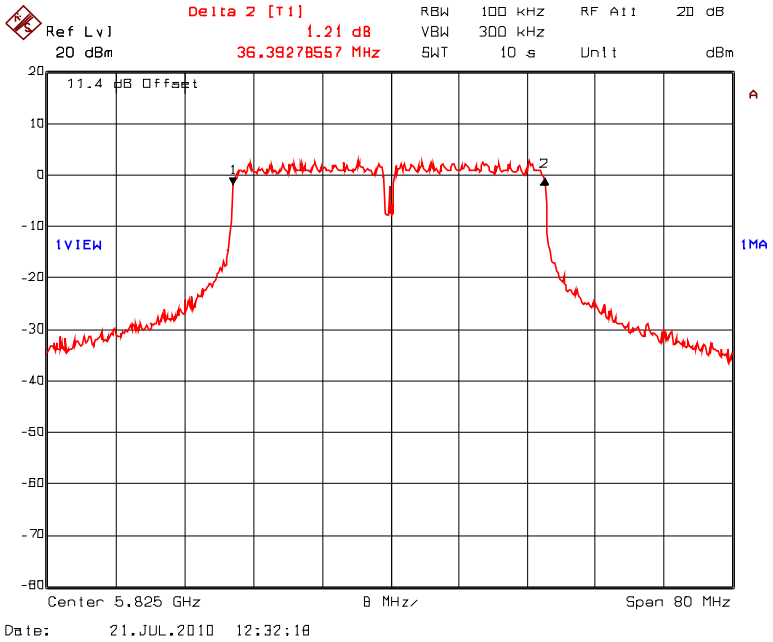
CHAIN 2



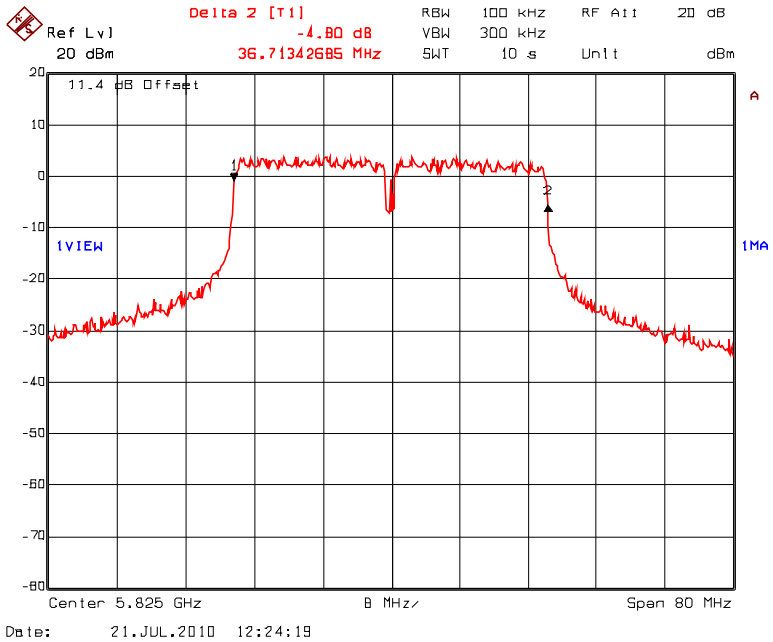
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot #50: 6 dB Bandwidth wrt. 40 MHz Channel Spacing Operation Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1



CHAIN 2



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

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

(1) Fixed point-to-point operation:

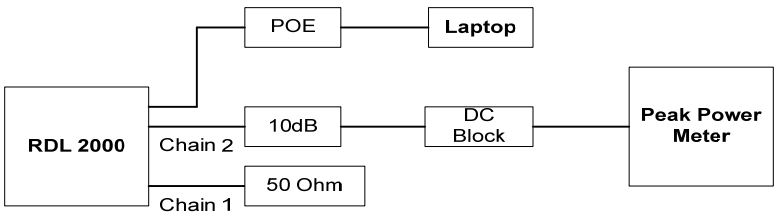
(i) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

(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 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.

As per MIMO test guidelines: RF conducted output power: Measure each transmitter chain by using channel power method. DO NOT USE COMBINER. Combiner measurement is not required for RF conducted power measurement.

Once you obtained each individual transmitter chain power, then sum the output power by using the following formula: Combined peak output power in mW = ((dBm/Chain 1)/10^Log) +((dBm/Chain 2)/10^log)

4.7.2. Test Arrangement



4.7.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Calibration Due-Date
Power Meter	Agilent	N1911A	MY45100734	50 MHz – 18 GHz	Aug 13, 2011
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	N/A
Attenuator	Narda	4768-10	-	DC - 40 GHz	N/A

4.7.4. 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.

Power Output Option 1:

The total peak power was measured using peak power meter

4.7.5. Test Data

4.7.5.1. Test Configuration # 1: 5 MHz Channel Spacing

Peak Conducted Output Power:

Frequency (MHz)	Chain 1 Peak Power (dBm)	Chain 2 Peak Power (dBm)	Combined * Peak O/P Power (dBm)	Limit (dBm)
64QAM 5/6, 32.5 Mbps				
Ch# 01, 5730 MHz	22.8	23.1	25.96	30.0
Ch# 12, 5785 MHz	23.4	23.2	26.31	30.0
Ch# 24, 5845 MHz	22.6	23.5	26.08	30.0
16QAM 3/4, 19.5 Mbps				
Ch# 01, 5730 MHz	26.1	26.4	29.26	30.0
Ch# 12, 5785 MHz	26.8	25.8	29.34	30.0
Ch# 24, 5845 MHz	25.7	26.9	29.35	30.0
QPSK 3/4, 9.7 Mbps				
Ch# 01, 5730 MHz	25.7	26.7	29.24	30.0
Ch# 12, 5785 MHz	26.8	25.9	29.38	30.0
Ch# 24, 5845 MHz	25.3	26.8	29.12	30.0
BPSK 1/2, 3.2 Mbps				
Ch# 01, 5730 MHz	25.3	26.7	29.07	30.0
Ch# 12, 5785 MHz	25.8	25.8	28.81	30.0
Ch# 24, 5845 MHz	25.4	26.9	29.22	30.0

* Combined Peak Output Power (mW) = ((dBm/Chain 1)/10^Log) + ((dBm/Chain 2)/10^Log)

Peak EIRP Power:

Modulation: 64QAM 5/6 @ 32.5 Mb/s

Frequency (MHz)	Combined 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	25.96	32.0	57.96	30.0	Note (1)
5785.0	26.31	32.0	58.31	30.0	Note (1)
5845.0	26.08	32.0	58.08	30.0	Note (1)

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

Modulation: 16QAM 3/4 @ 19.5 Mb/s

Frequency (MHz)	Combined 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	29.26	32.0	61.26	30.0	Note (1)
5785.0	29.34	32.0	61.34	30.0	Note (1)
5845.0	29.35	32.0	61.35	30.0	Note (1)

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

Modulation: QPSK 3/4 @ 9.7 Mb/s

Frequency (MHz)	Combined 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	29.24	32.0	61.24	30.0	Note (1)
5785.0	29.38	32.0	61.38	30.0	Note (1)
5845.0	29.12	32.0	61.12	30.0	Note (1)

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

Modulation: BPSK 1/2 @ 3.2 Mb/s

Frequency (MHz)	Combined 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	29.07	32.0	61.07	30.0	Note (1)
5785.0	28.81	32.0	60.81	30.0	Note (1)
5845.0	29.22	32.0	61.22	30.0	Note (1)

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

4.7.5.2. Test Configuration # 2: 10 MHz Channel Spacing

Peak Conducted Output Power:

Frequency (MHz)	Chain 1 Peak Power (dBm)	Chain 2 Peak Power (dBm)	Combined * Peak O/P Power (dBm)	Limit (dBm)
64QAM 5/6, 65 Mbps				
Ch# 02, 5735 MHz	23.2	23.7	26.47	30.0
Ch# 12, 5785 MHz	23.6	23.2	26.41	30.0
Ch# 23, 5840 MHz	23.2	23.6	26.41	30.0
16QAM 3/4, 39 Mbps				
Ch# 02, 5735 MHz	25.8	26.4	29.12	30.0
Ch# 12, 5785 MHz	25.7	25.8	28.76	30.0
Ch# 23, 5840 MHz	25.9	26.9	29.44	30.0
QPSK 3/4, 19.5 Mbps				
Ch# 02, 5735 MHz	25.8	26.7	29.28	30.0
Ch# 12, 5785 MHz	26.6	25.9	29.27	30.0
Ch# 23, 5840 MHz	25.7	26.9	29.35	30.0
BPSK 1/2, 6.5 Mbps				
Ch# 02, 5735 MHz	25.9	26.6	29.27	30.0
Ch# 12, 5785 MHz	26.2	25.8	29.01	30.0
Ch# 23, 5840 MHz	25.8	27.1	29.51	30.0

* Combined Peak Output Power (mW) = ((dBm/Chain 1)/10^Log) + ((dBm/Chain 2)/10^Log)

Peak EIRP Power:

Modulation: 64QAM 5/6 @ 65 Mb/s

Frequency (MHz)	Combined 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	26.47	32.0	58.47	30.0	Note (1)
5785.0	26.41	32.0	58.41	30.0	Note (1)
5845.0	26.41	32.0	58.41	30.0	Note (1)

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

Modulation: 16QAM 3/4 @ 39 Mb/s

Frequency (MHz)	Combined 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	29.12	32.0	61.12	30.0	Note (1)
5785.0	28.76	32.0	60.76	30.0	Note (1)
5845.0	29.44	32.0	61.44	30.0	Note (1)

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

Modulation: QPSK 3/4 @ 19.5Mb/s

Frequency (MHz)	Combined 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	29.28	32.0	61.28	30.0	Note (1)
5785.0	29.27	32.0	61.27	30.0	Note (1)
5845.0	29.35	32.0	61.35	30.0	Note (1)

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

Modulation: BPSK 1/2 @ 6.5 Mb/s

Frequency (MHz)	Combined 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	29.27	32.0	61.27	30.0	Note (1)
5785.0	29.01	32.0	61.01	30.0	Note (1)
5845.0	29.51	32.0	61.51	30.0	Note (1)

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

4.7.5.3. Test Configuration # 3: 20 MHz Channel Spacing

Peak Conducted Output Power:

Frequency (MHz)	Chain 1 Peak Power (dBm)	Chain 2 Peak Power (dBm)	Combined * Peak O/P Power (dBm)	Limit (dBm)
64QAM 5/6, 130 Mbps				
Ch# 03, 5740 MHz	23.8	22.8	26.32	30.0
Ch# 12, 5785 MHz	23.2	23.4	26.31	30.0
Ch# 22, 5835 MHz	24.6	24.3	27.46	30.0
16QAM 3/4, 78 Mbps				
Ch# 03, 5740 MHz	26.4	25.2	28.83	30.0
Ch# 12, 5785 MHz	26.7	25.8	29.28	30.0
Ch# 22, 5835 MHz	26.5	26.7	29.60	30.0
QPSK 3/4, 39 Mbps				
Ch# 03, 5740 MHz	26.4	25.1	28.81	30.0
Ch# 12, 5785 MHz	26.6	25.9	29.27	30.0
Ch# 22, 5835 MHz	26.5	26.7	29.57	30.0
BPSK 1/2, 13 Mbps				
Ch# 03, 5740 MHz	26.1	25.3	28.72	30.0
Ch# 12, 5785 MHz	25.8	25.7	28.76	30.0
Ch# 22, 5835 MHz	26.6	26.7	29.64	30.0

* Combined Peak Output Power (mW) = ((dBm/Chain 1)/10^Log) + ((dBm/Chain 2)/10^Log)

Peak EIRP Power:

Modulation: 64QAM 5/6 @ 130Mb/s

Frequency (MHz)	Combined 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	26.32	32.0	58.32	30.0	Note (1)
5785.0	26.31	32.0	58.31	30.0	Note (1)
5845.0	27.46	32.0	59.46	30.0	Note (1)

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

Modulation: 16QAM 3/4 @ 78 Mb/s

Frequency (MHz)	Combined 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	28.83	32.0	60.83	30.0	Note (1)
5785.0	29.28	32.0	61.28	30.0	Note (1)
5845.0	29.60	32.0	61.60	30.0	Note (1)

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

Modulation: QPSK 3/4 @ 39Mb/s

Frequency (MHz)	Combined 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	28.81	32.0	60.81	30.0	Note (1)
5785.0	29.27	32.0	61.27	30.0	Note (1)
5845.0	29.57	32.0	61.57	30.0	Note (1)

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

Modulation: BPSK 1/2 @ 13 Mb/s

Frequency (MHz)	Combined 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	28.72	32.0	60.72	30.0	Note (1)
5785.0	28.76	32.0	60.76	30.0	Note (1)
5845.0	29.64	32.0	61.64	30.0	Note (1)

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

4.7.5.4. Test Configuration # 4: 40 MHz Channel Spacing

Peak Conducted Output Power:

Frequency (MHz)	Chain 1 Peak Power (dBm)	Chain 2 Peak Power (dBm)	Combined * Peak O/P Power (dBm)	Limit (dBm)
64QAM 5/6, 300 Mbps				
Ch# 05, 5750 MHz	25.3	24.9	28.12	30.0
Ch# 12, 5785 MHz	25.2	25.8	28.51	30.0
Ch# 20, 5825 MHz	25.9	25.6	28.74	30.0
16QAM 3/4, 180 Mbps				
Ch# 05, 5750 MHz	26.5	26.4	29.46	30.0
Ch# 12, 5785 MHz	26.9	26.5	29.71	30.0
Ch# 20, 5825 MHz	26.8	27.0	29.91	30.0
QPSK 3/4, 90 Mbps				
Ch# 05, 5750 MHz	27.1	26.3	29.76	30.0
Ch# 12, 5785 MHz	27.5	26.3	29.95	30.0
Ch# 20, 5825 MHz	27.0	26.9	29.96	30.0
BPSK 1/2, 30 Mbps				
Ch# 05, 5750 MHz	27.2	26.4	29.82	30.0
Ch# 12, 5785 MHz	27.5	26.2	29.91	30.0
Ch# 20, 5825 MHz	26.8	27.1	29.96	30.0

* Combined Peak Output Power (mW) = ((dBm/Chain 1)/10^Log) + ((dBm/Chain 2)/10^Log)

Peak EIRP Power:

Modulation: 64QAM 5/6 @ 300Mb/s

Frequency (MHz)	Combined 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	28.12	32.0	60.12	30.0	Note (1)
5785.0	28.51	32.0	60.51	30.0	Note (1)
5845.0	28.74	32.0	60.74	30.0	Note (1)

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

Modulation: 16QAM 3/4 @ 180Mb/s

Frequency (MHz)	Combined 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	29.46	32.0	61.46	30.0	Note (1)
5785.0	29.71	32.0	61.71	30.0	Note (1)
5845.0	29.91	32.0	61.91	30.0	Note (1)

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

Modulation: QPSK 3/4 @ 19.5Mb/s

Frequency (MHz)	Combined 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	29.76	32.0	61.76	30.0	Note (1)
5785.0	29.95	32.0	61.95	30.0	Note (1)
5845.0	29.96	32.0	61.96	30.0	Note (1)

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

Modulation: BPSK 1/2 @ 6.5 Mb/s

Frequency (MHz)	Combined 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	29.82	32.0	61.82	30.0	Note (1)
5785.0	29.91	32.0	61.91	30.0	Note (1)
5845.0	29.96	32.0	61.96	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	29.96	32.0	61.96	354

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: 3.54 meters	Manufacturer' instruction for separation distance between antenna and persons required: 3.54 meters
Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement. **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.**	- Antenna is required to be professionally installed. - Applicant must specify the said installation instruction for the operator and installer in the manual.

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

4.9.1. Limits

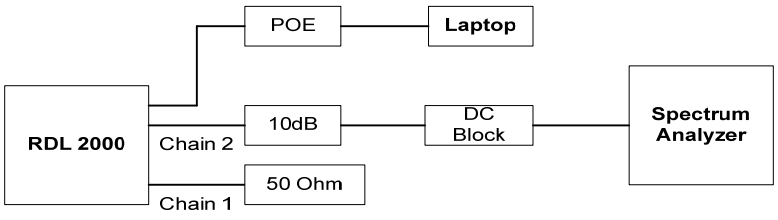
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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)).

As per MIMO measurement guidelines each Transmitter Chain must be measured and also measured with combiner. Both measurements must comply with limits.

4.9.2. Method of Measurements

Refer to "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005". Measurements performed with the spectrum analyzer's resolution bandwidth RBW = 1 MHz & VBW = 3 MHz, SW = 10s (worst case).

4.9.3. Test Arrangement



4.9.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Calibration Due-Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz with external mixer	August 10, 2010
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	N/A
Attenuator	Narda	4768-10	-	DC - 40 GHz	N/A
Combiner	Mini-Circuit	15542	0235	DC - 40 GHz	N/A

4.9.5. Test Data

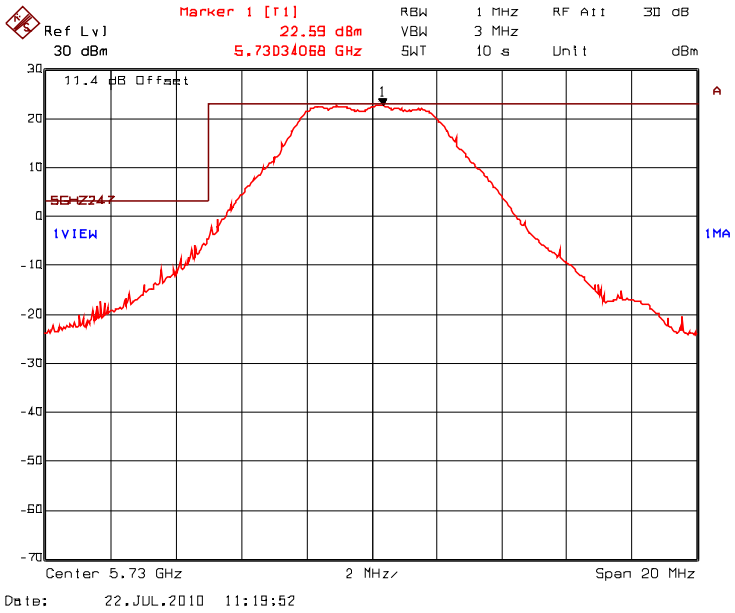
Note: Measurement results for all types of modulation were scanned and found similar. Since BPSK 1/2 modulation measurement gave the highest peak power, all band-edge measurements were performed with BPSK modulation as worst case.

4.9.5.1. Transmitter Band-edge Conducted Spurious Emissions wrt. 5 MHz Channel Spacing

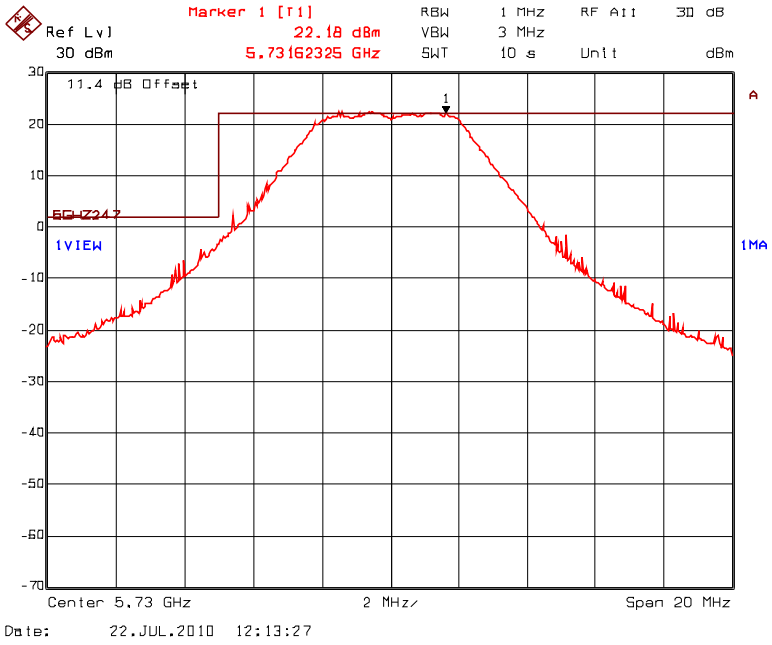
Conforms. Refer to Plots # 51 to 54 for details of Measurements.

Plot # 51: Transmitter Band-Edge Spurious Conducted Emissions Lowest Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1

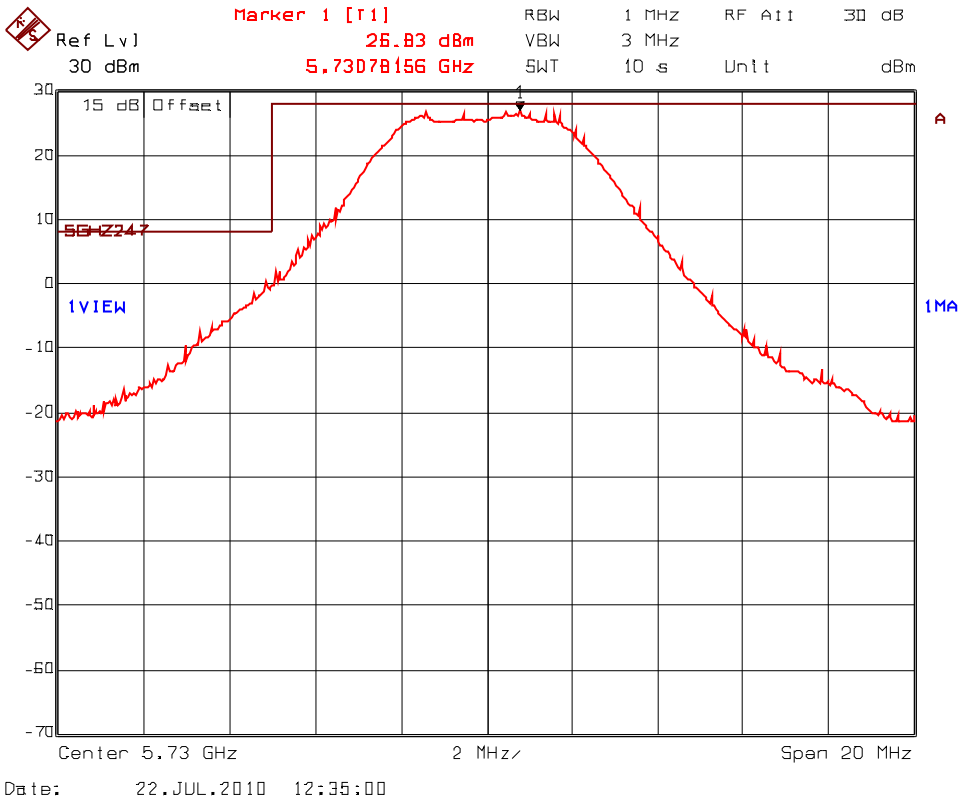


CHAIN 2



Plot # 52: Combined Tx Band-Edge Spurious Conducted Emissions Lowest Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

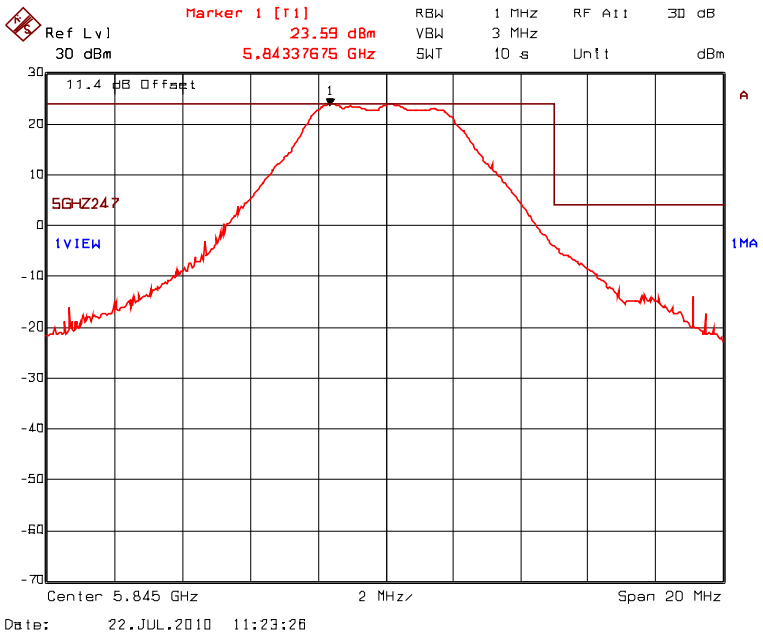
COMBINER (CHAIN 1 + CHAIN 2)



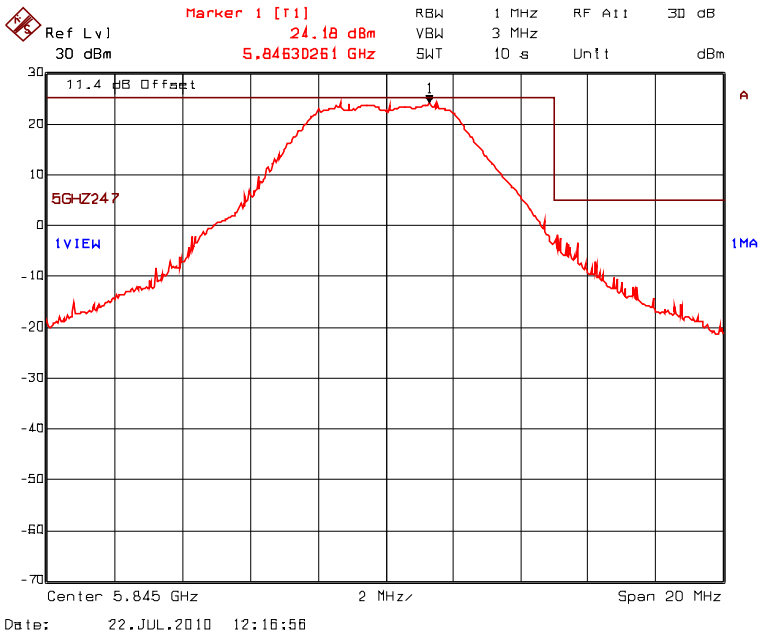
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 53: Transmitter Band-Edge Spurious Conducted Emissions Highest Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



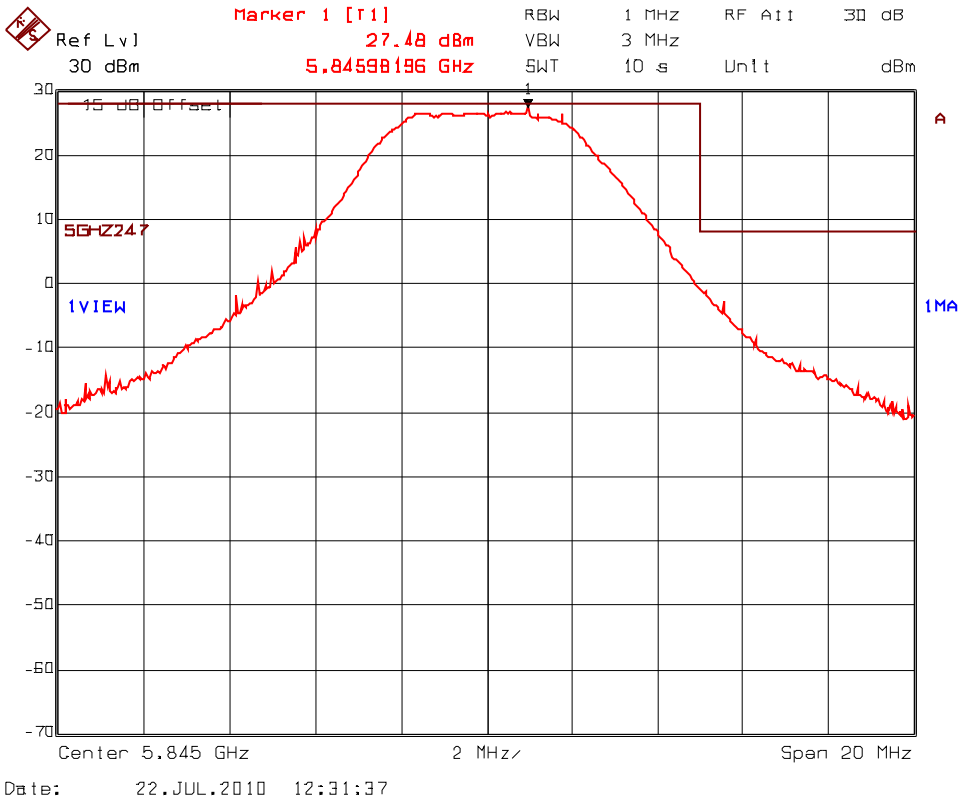
CHAIN 2



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

Plot # 54: Combined Tx Band-Edge Spurious Conducted Emissions Highest Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



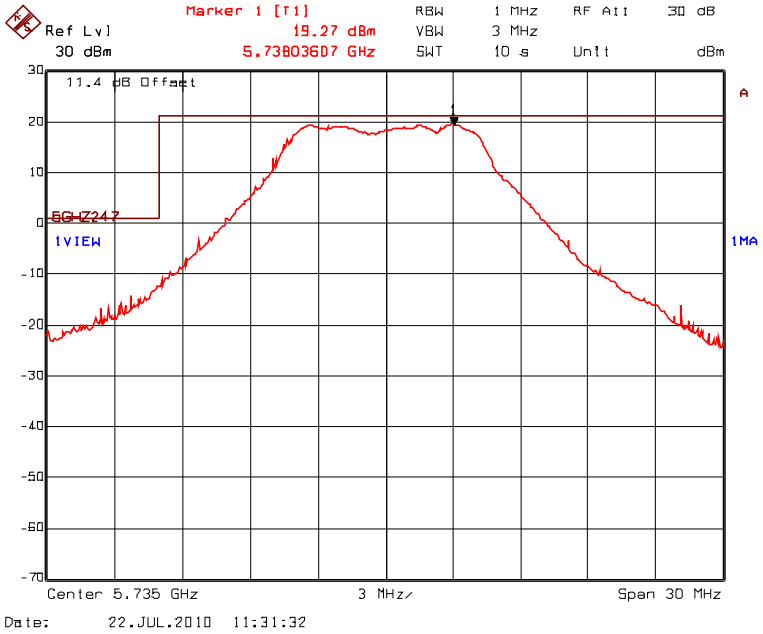
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

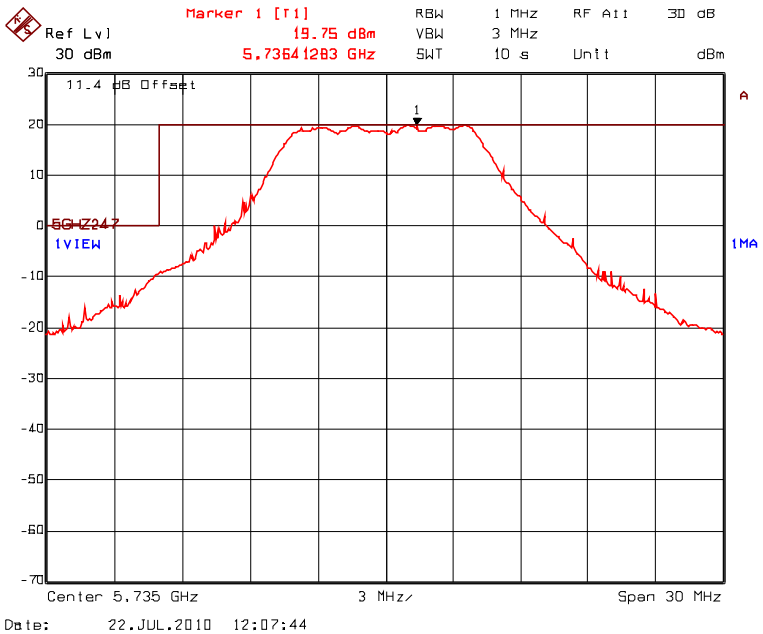
Conforms. Refer to Plots # 55 to 58 for details of Measurements.

Plot # 55: Transmitter Band-Edge Spurious Conducted Emissions
Lowest Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1

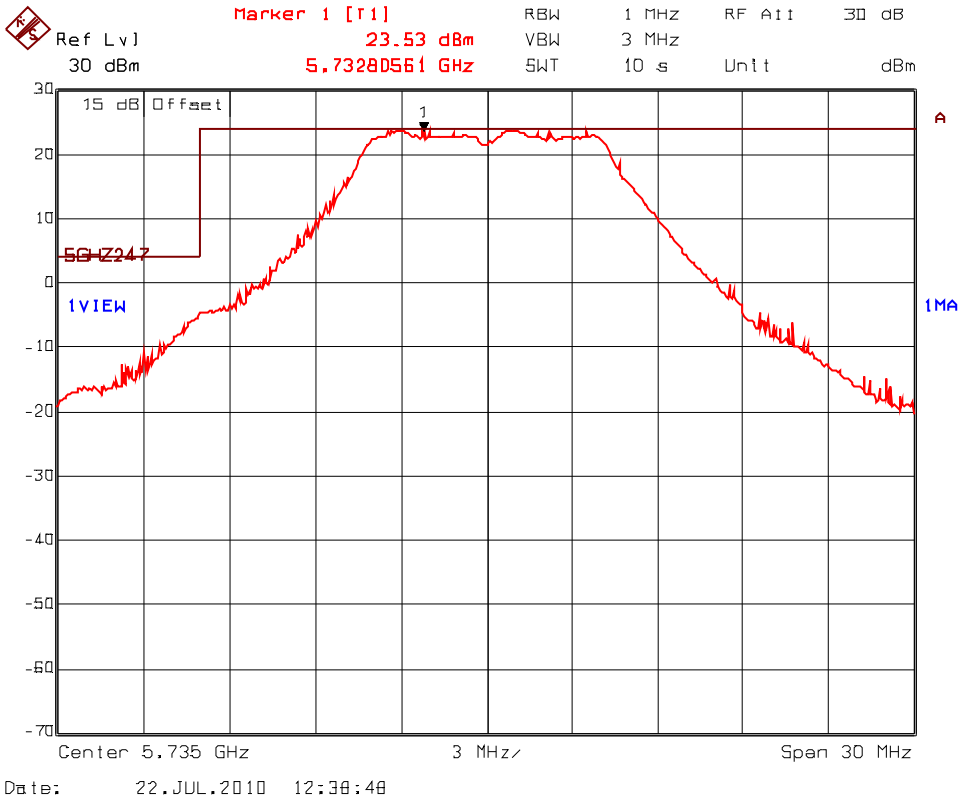


CHAIN 2



Plot # 56: Combined Tx Band-Edge Spurious Conducted Emissions Lowest Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

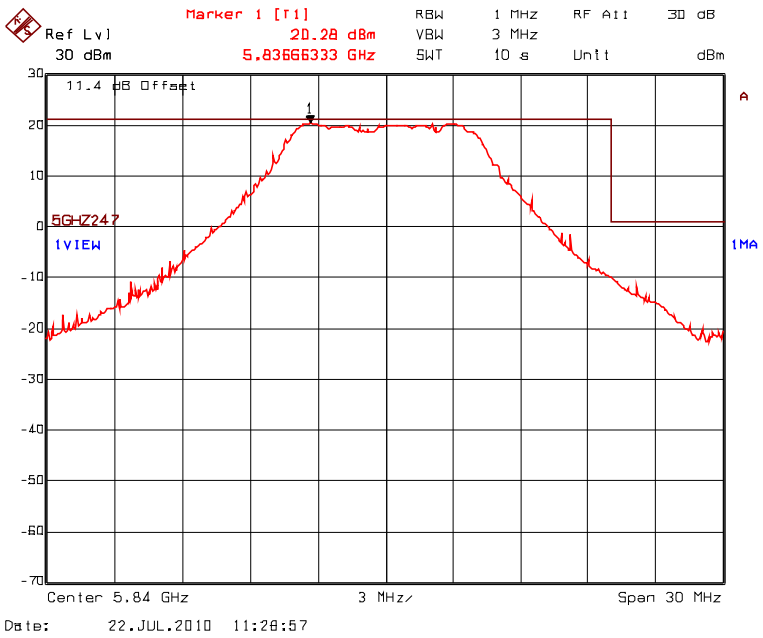
COMBINER (CHAIN 1 + CHAIN 2)



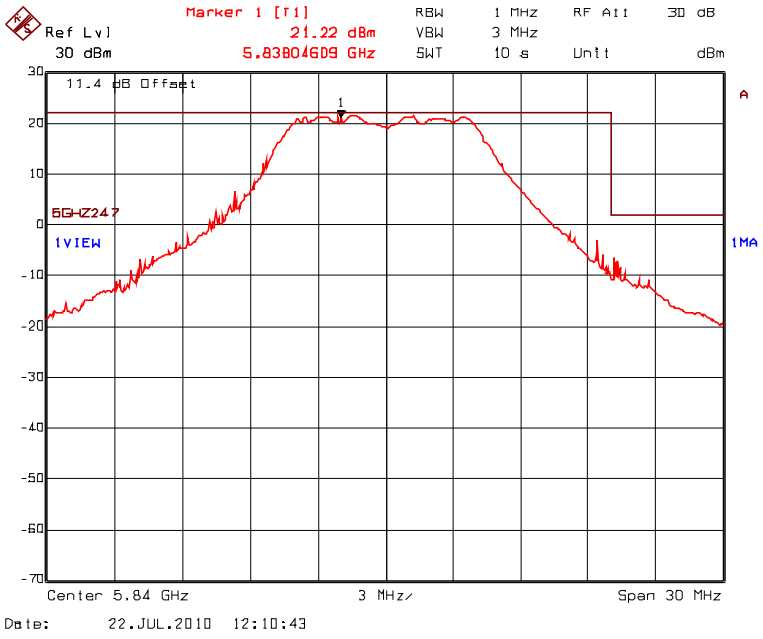
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 57: Transmitter Band-Edge Spurious Conducted Emissions Highest Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



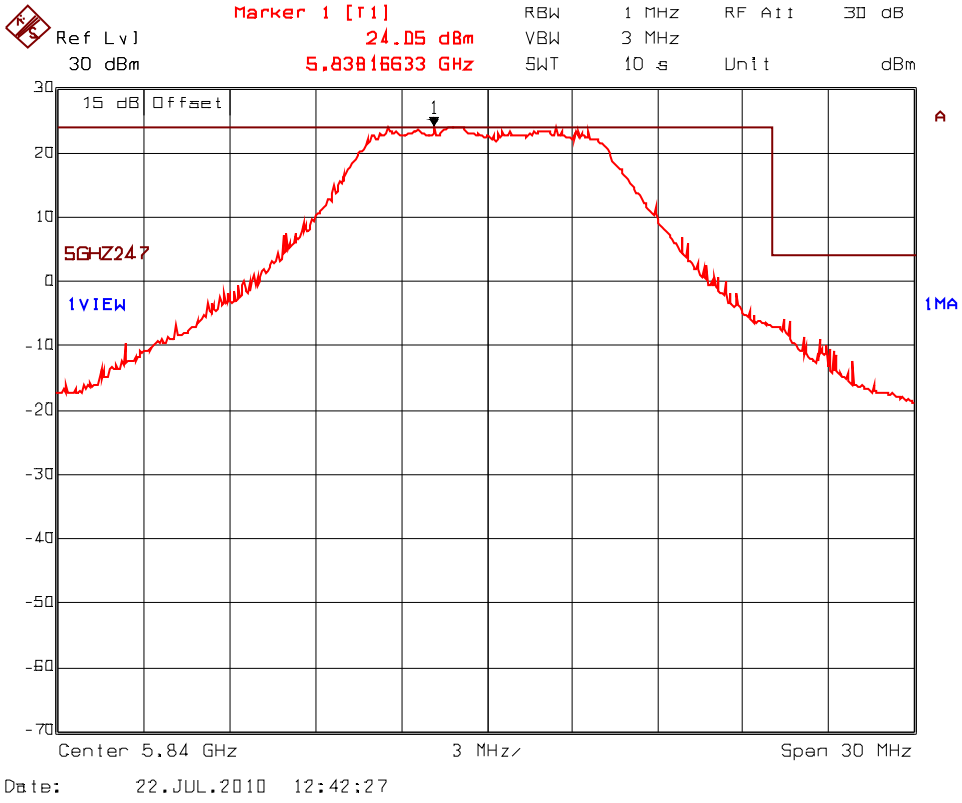
CHAIN 2



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

Plot # 58: Combined Tx Band-Edge Spurious Conducted Emissions Highest Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



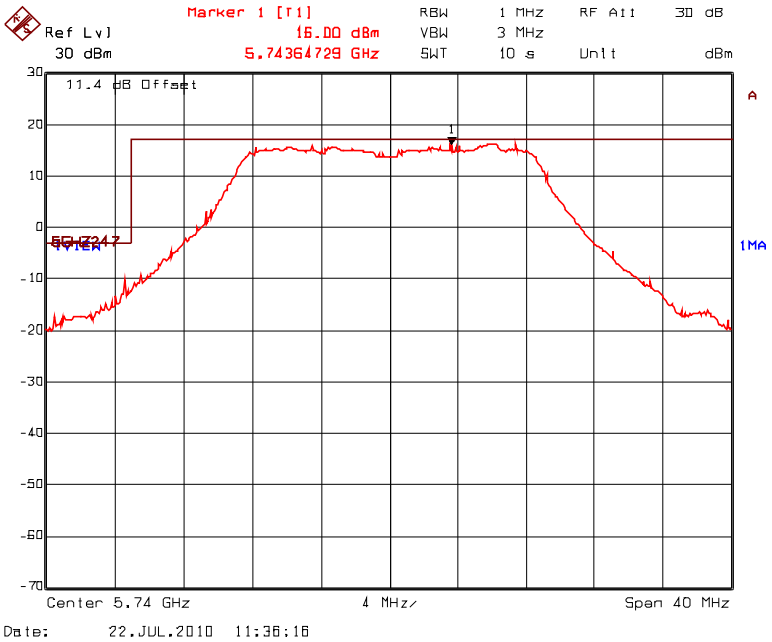
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

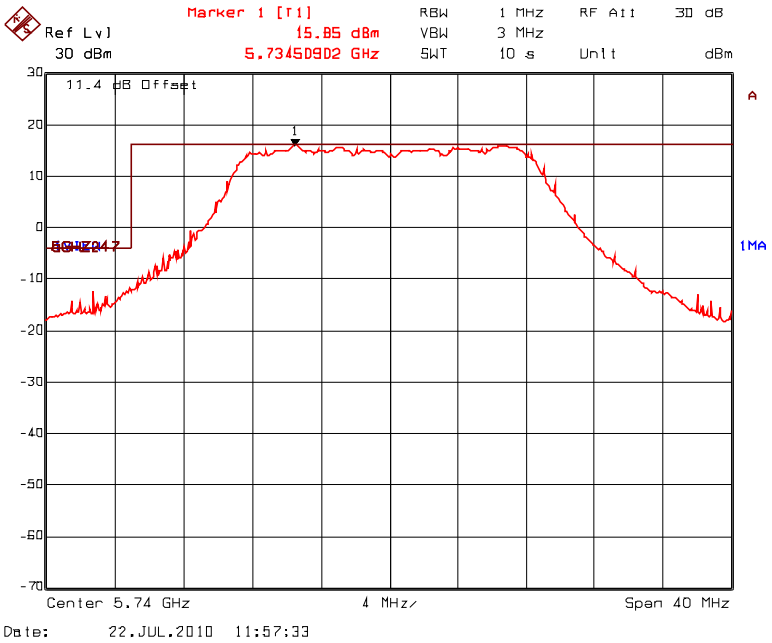
Conforms. Refer to Plots # 59 to 62 for details of Measurements

Plot # 59: Transmitter Band-Edge Spurious Conducted Emissions Lowest Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1

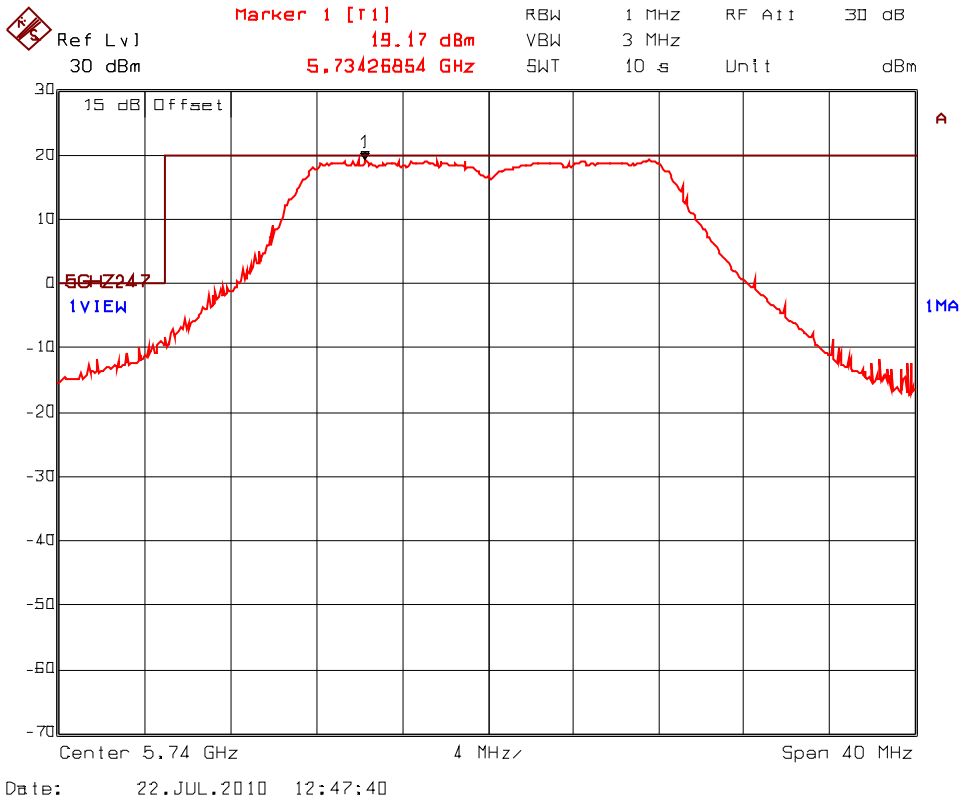


CHAIN 2



Plot # 60: Combined Tx Band-Edge Spurious Conducted Emissions Lowest Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

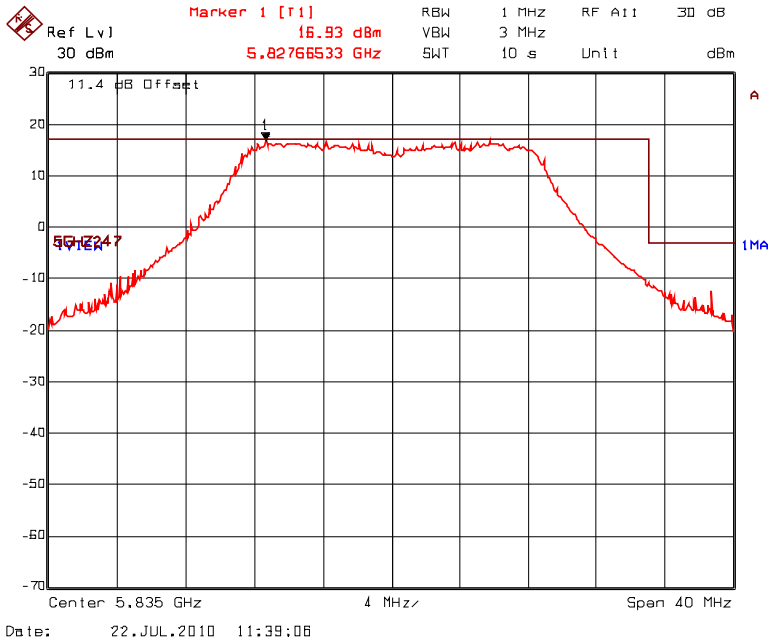
COMBINER (CHAIN 1 + CHAIN 2)



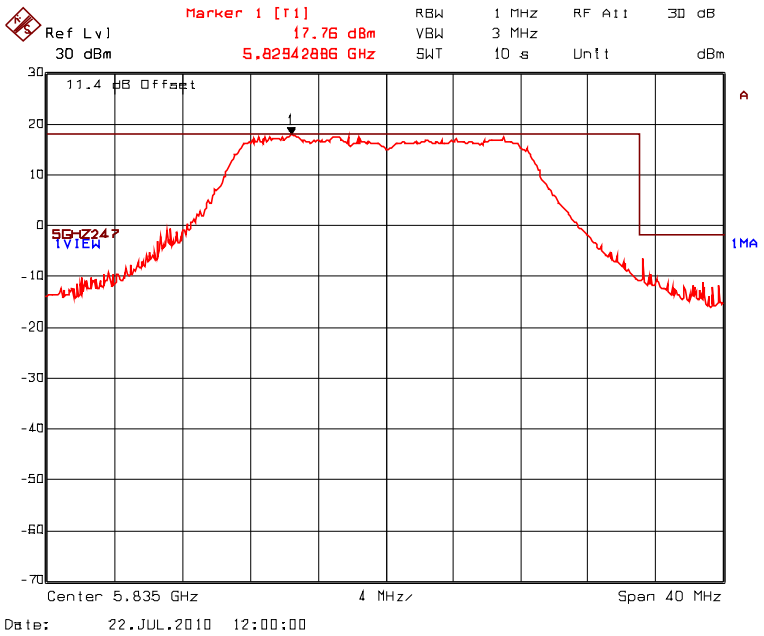
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 61: Transmitter Band-Edge Spurious Conducted Emissions Highest Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



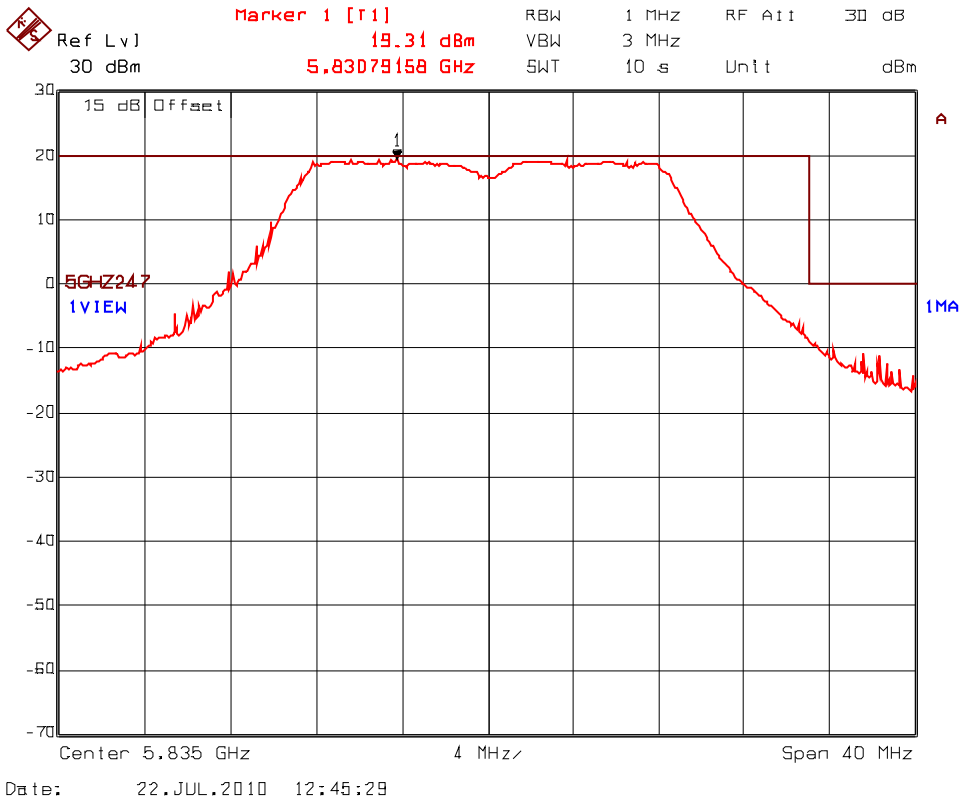
CHAIN 2



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

Plot # 62: Combined Tx Band-Edge Spurious Conducted Emissions Highest Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



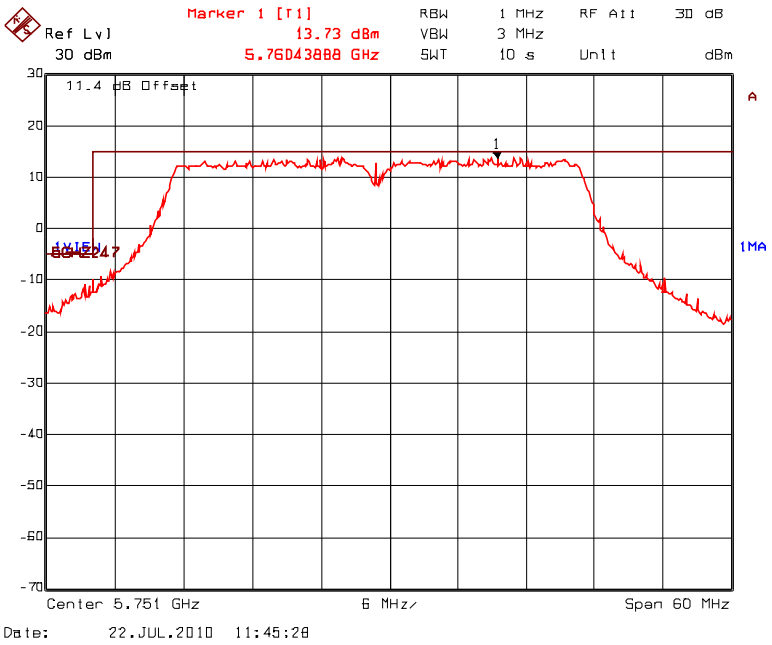
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

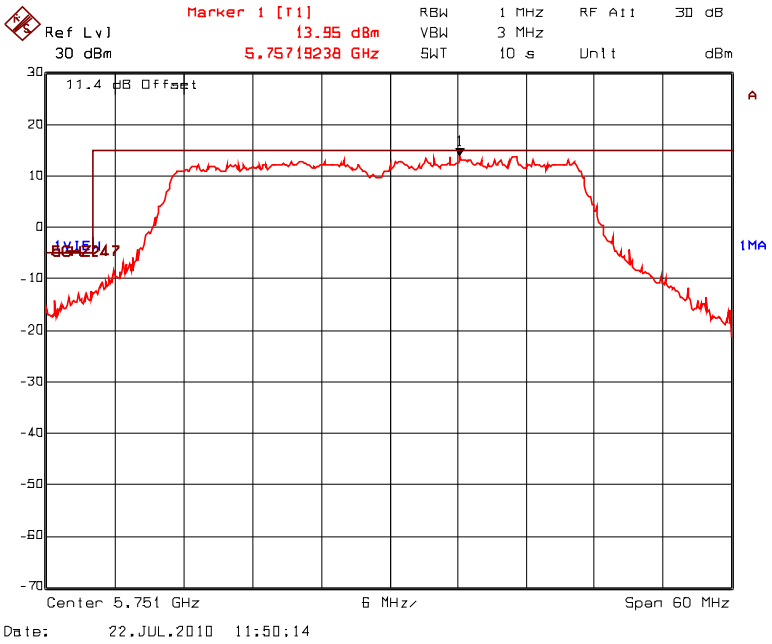
Conforms. Refer to Plots # 63 to 66 for details of Measurements

Plot # 63: Transmitter Band-Edge Spurious Conducted Emissions Lowest Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1

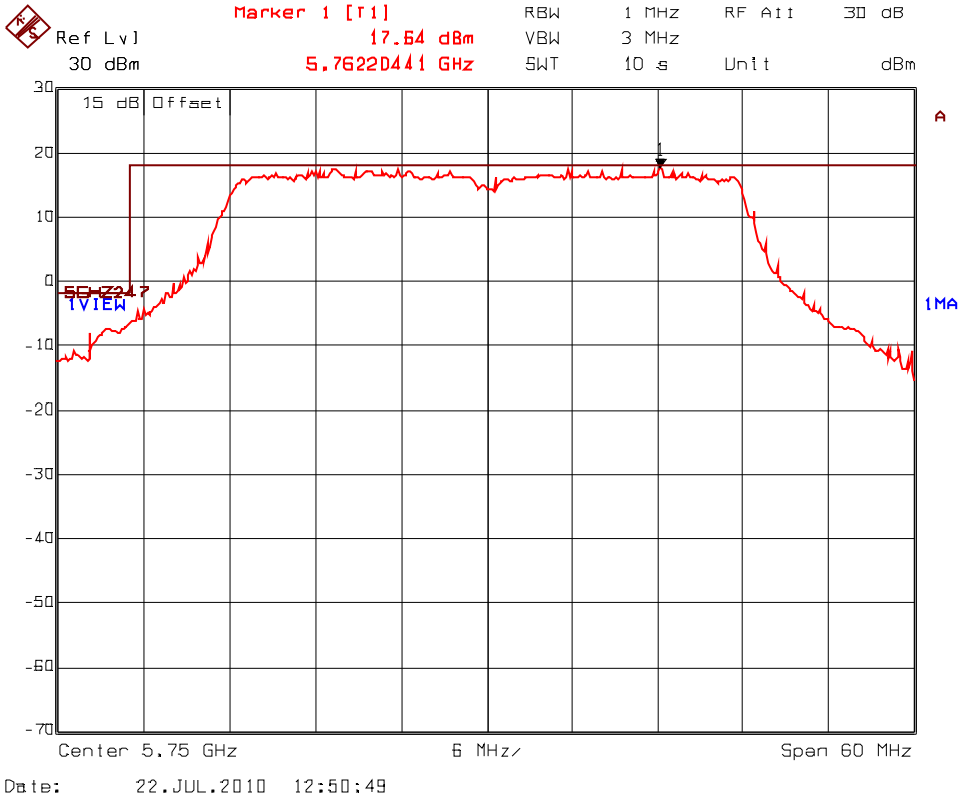


CHAIN 2



Plot # 64: Combined Tx Band-Edge Spurious Conducted Emissions Lowest Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

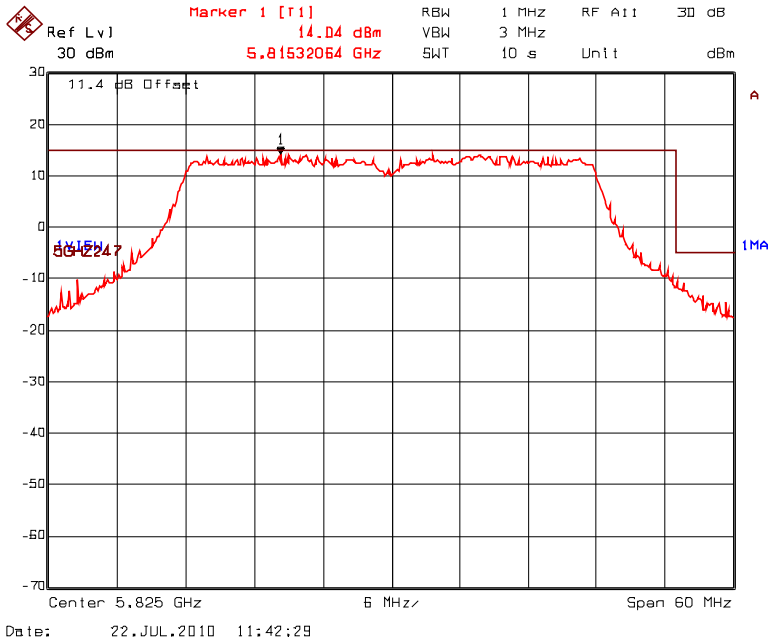
COMBINER (CHAIN 1 + CHAIN 2)



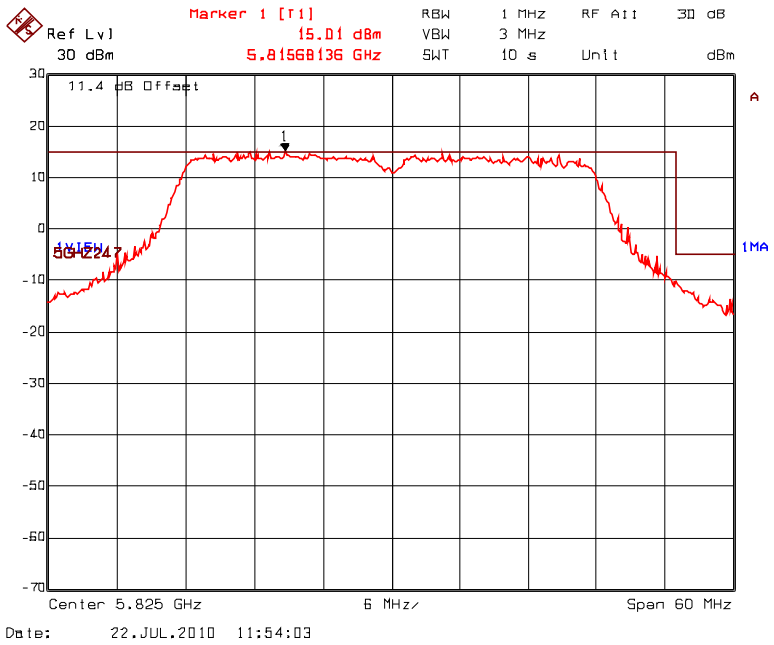
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 65: Transmitter Band-Edge Spurious Conducted Emissions Highest Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

CHAIN 1



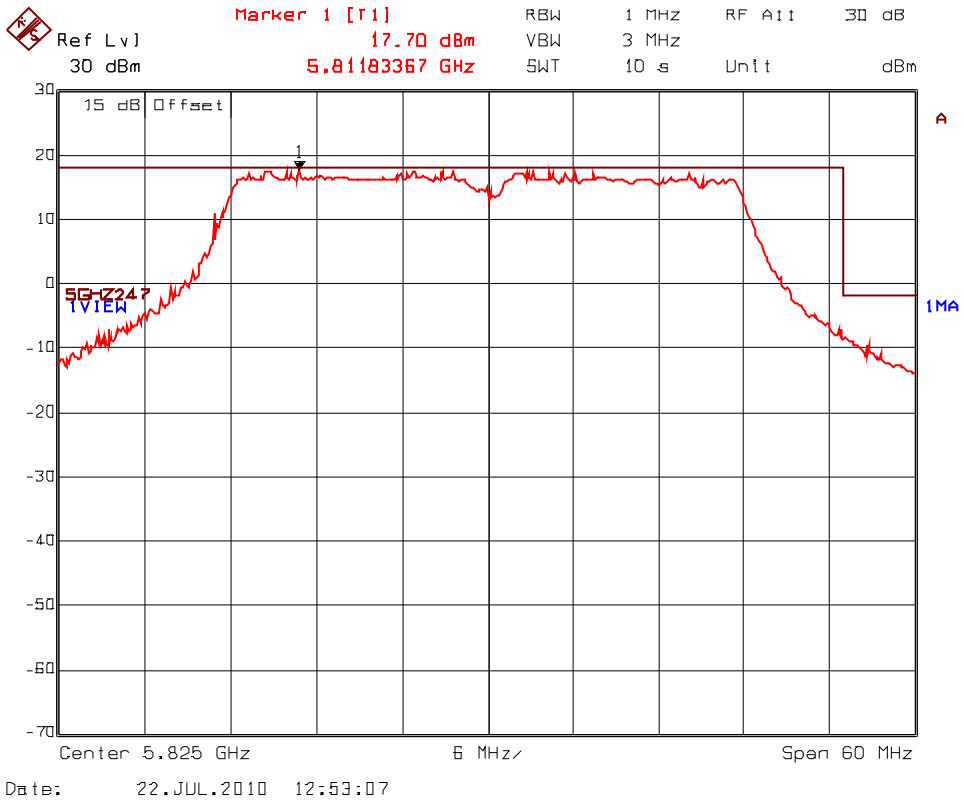
CHAIN 2



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

Plot # 66: Combined Tx Band-Edge Spurious Conducted Emissions Highest Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 3.2 Mb/s

COMBINER (CHAIN 1 + CHAIN 2)

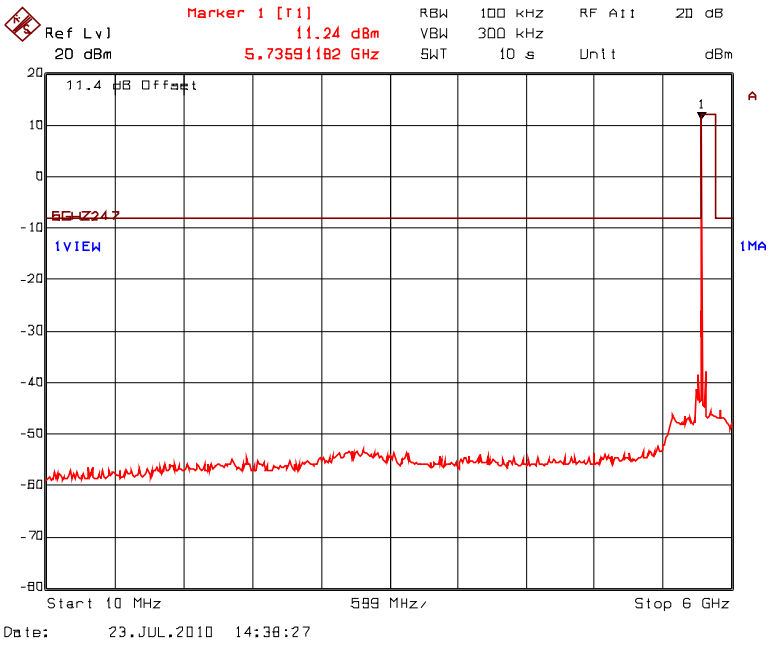


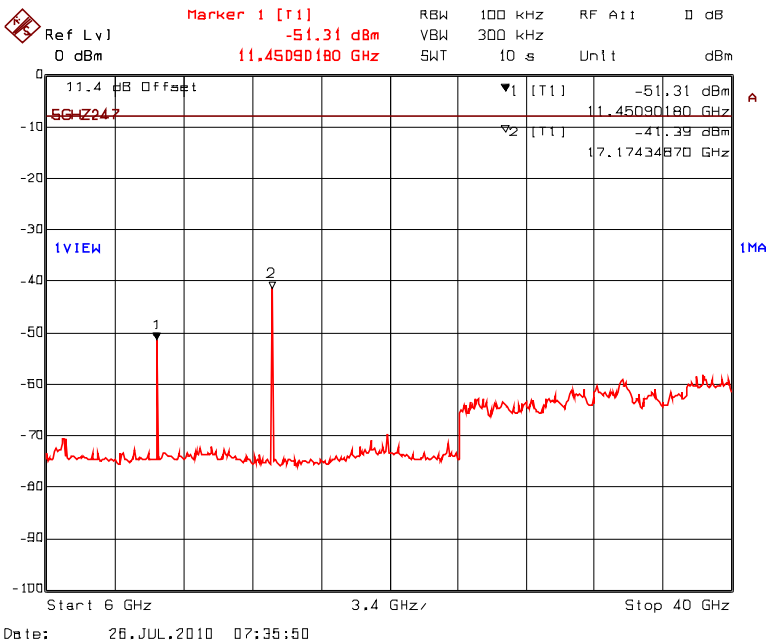
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

4.9.5.5. Transmitter Conducted Spurious Emissions wrt. 5 MHz Channel Spacing

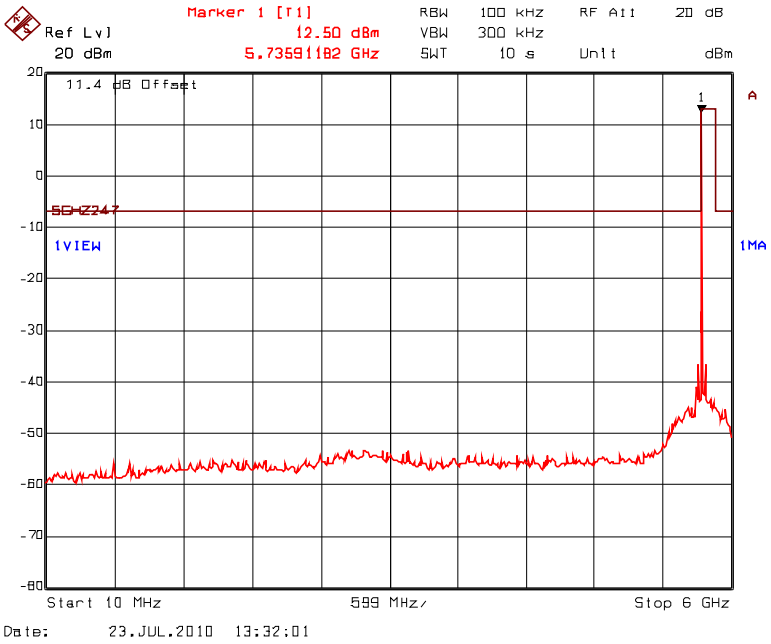
Note: Since the conducted output power with BPSK 1/2, 3.2Mbps modulation was highest compared with all other modulation & data rates, the Transmitter Conducted Spurious Emissions with the modulation of BPSK 1/2 @ 30 Mb/s was chosen as worst case to represent for all other modulations.

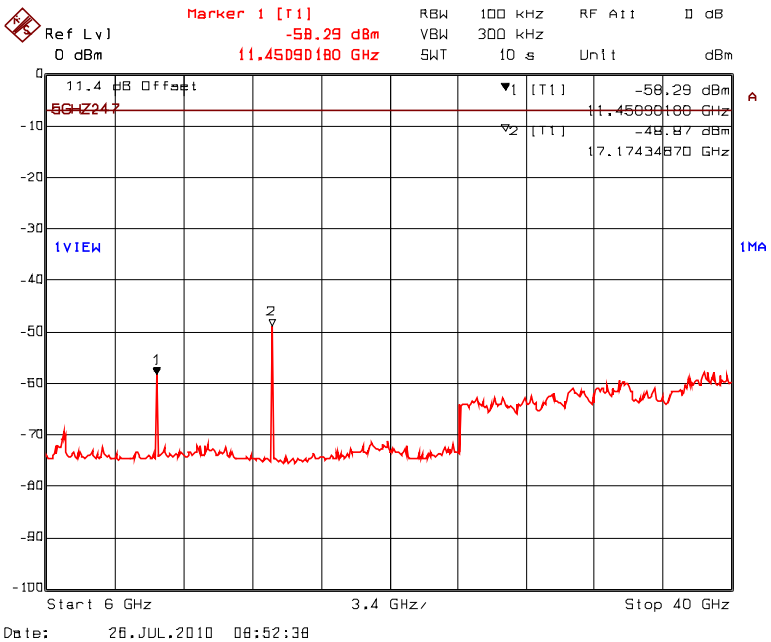
Plot # 67(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s





Plot # 67(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

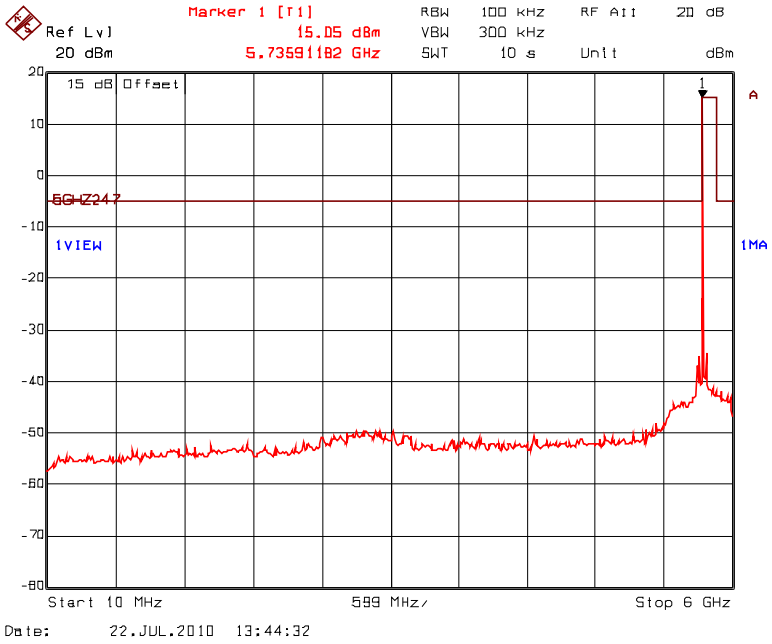


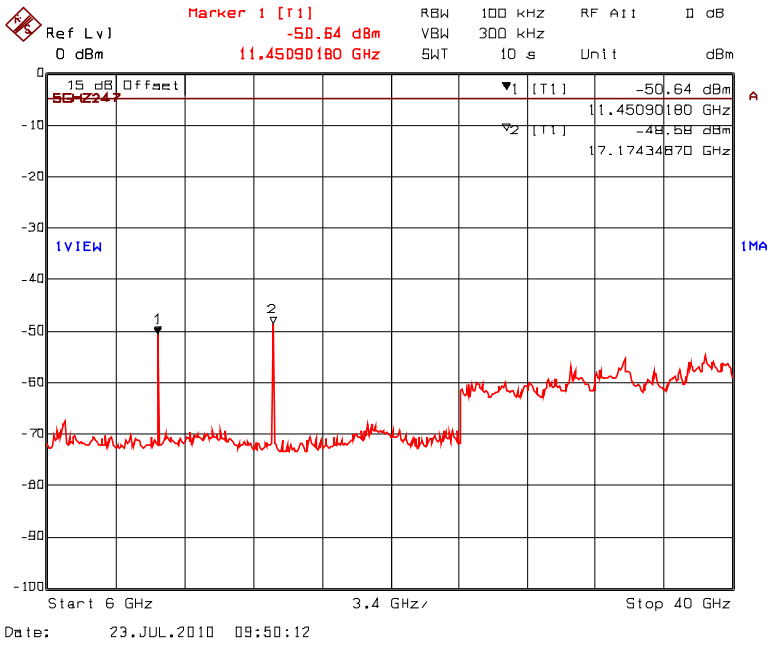


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 67(c): Combined Tx Spurious Conducted Emissions
Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

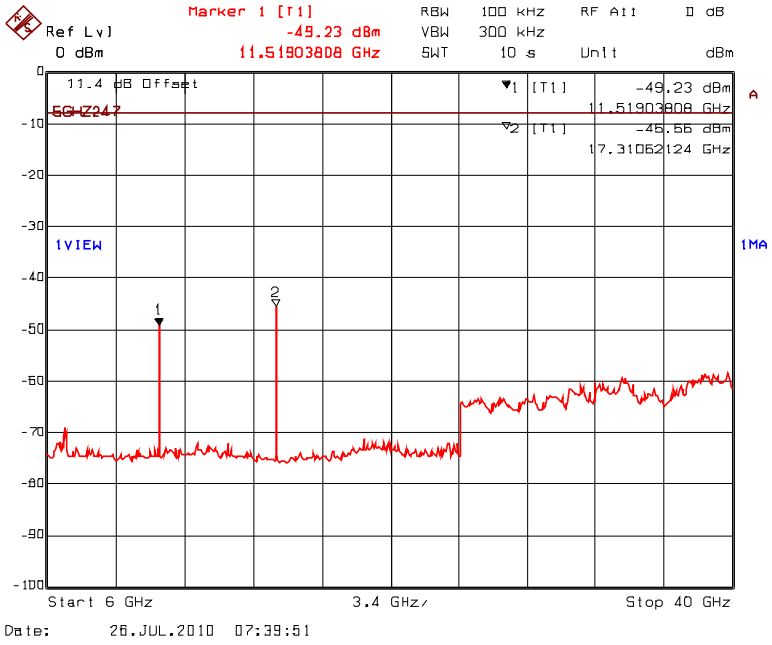
COMBINER (CHAIN 1 + CHAIN 2)





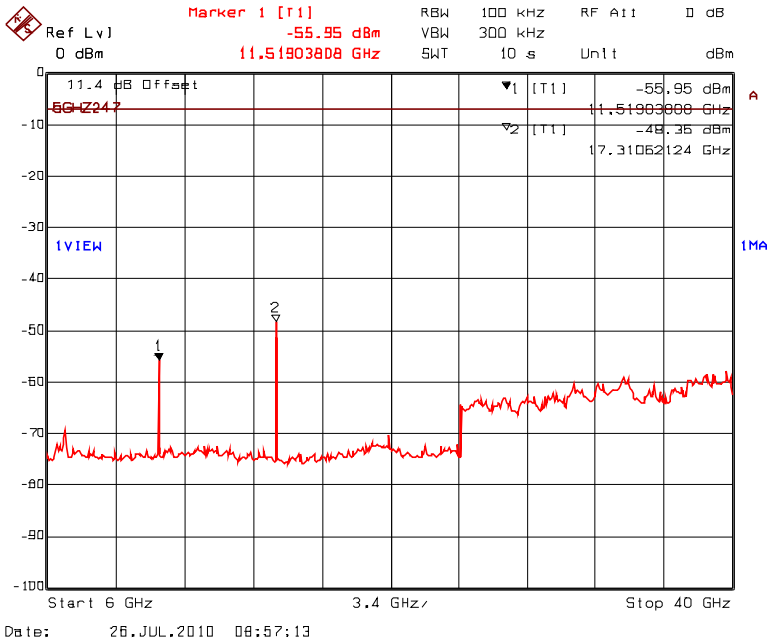
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 68(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s



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

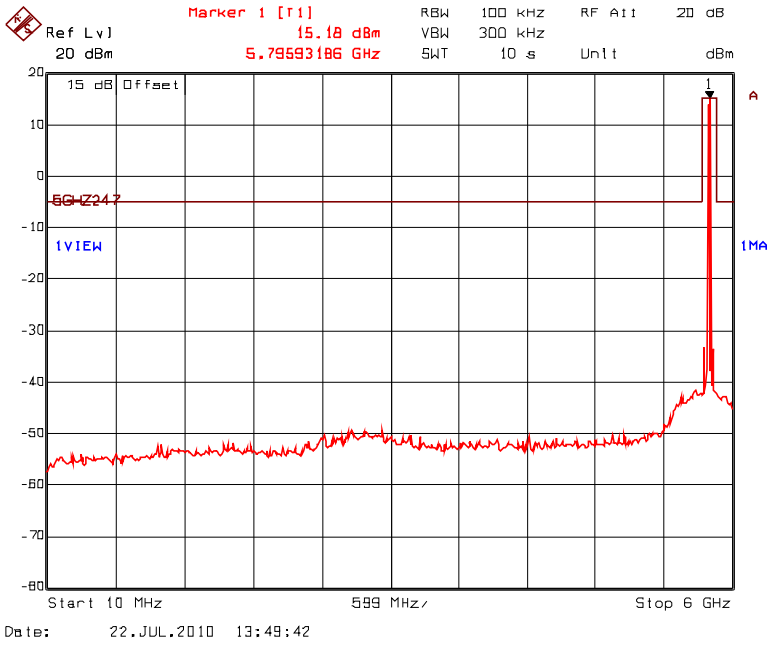
Plot # 68(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

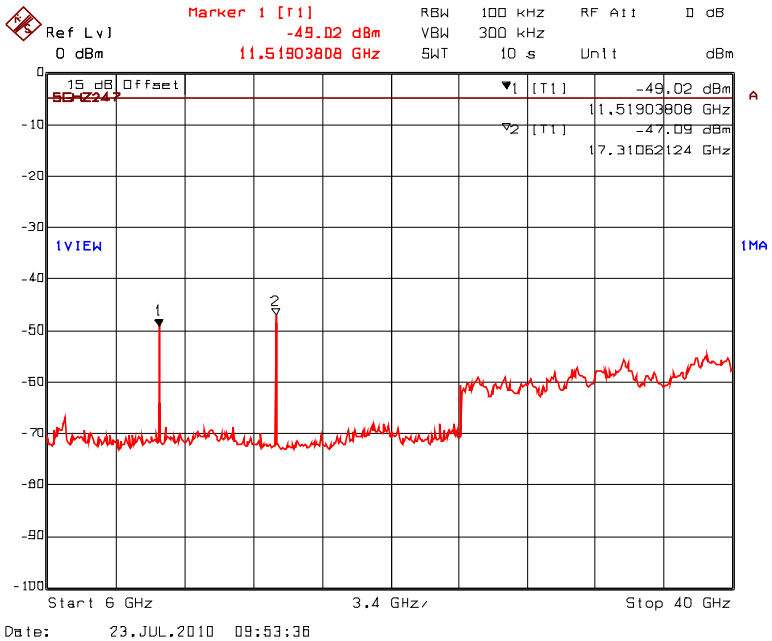


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 68(c): Combined Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

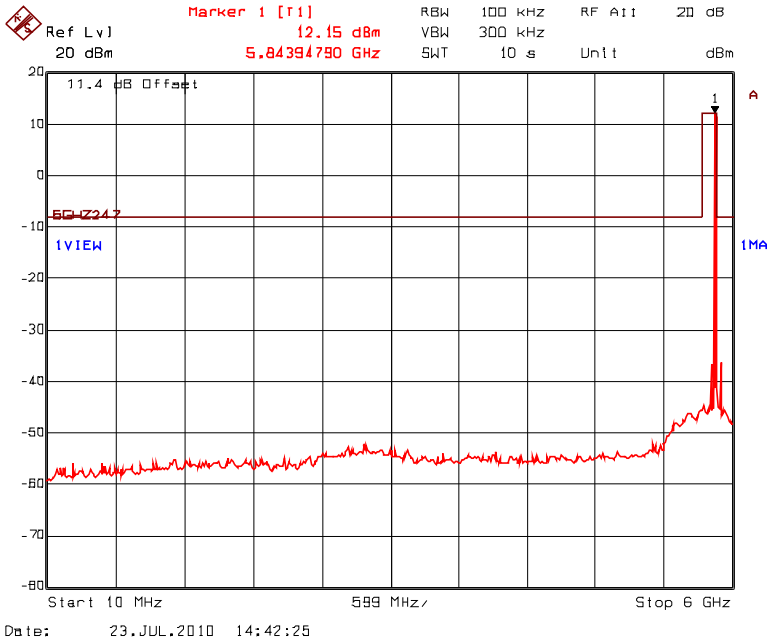
COMBINER (CHAIN 1 + CHAIN 2)

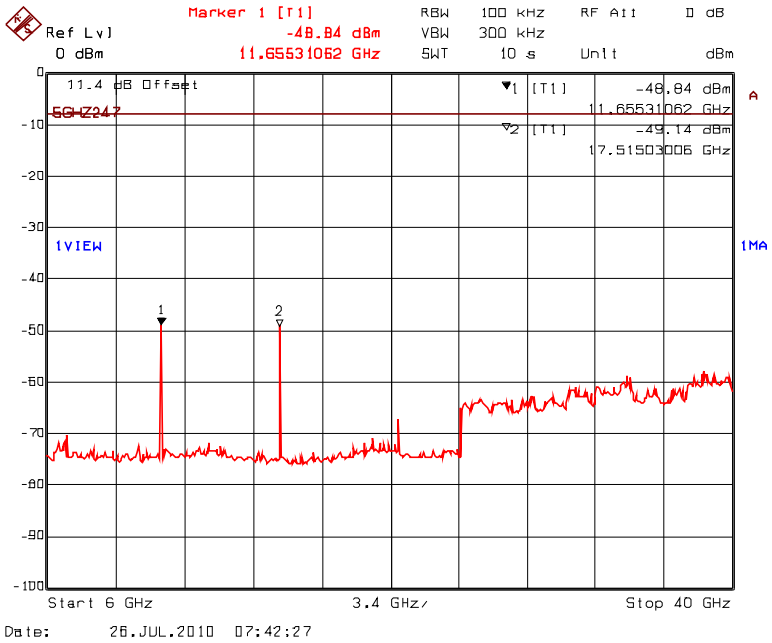




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

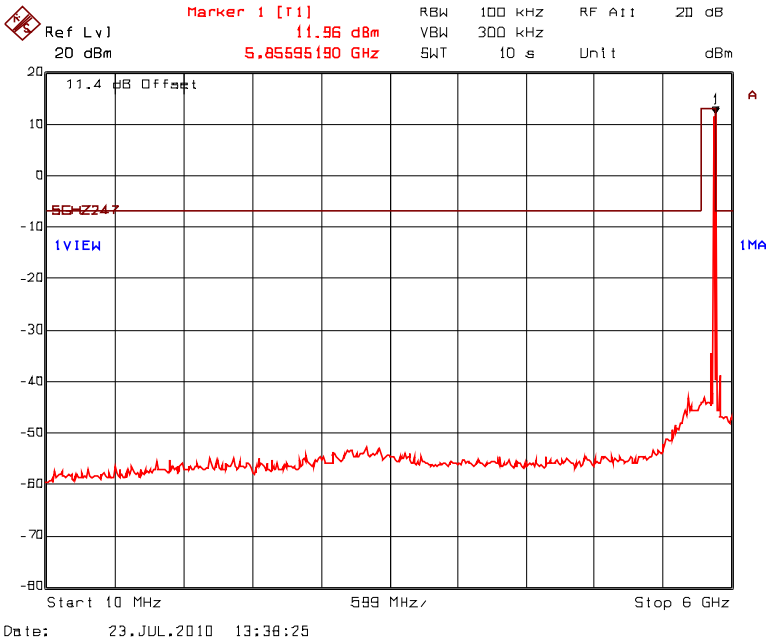
Plot # 69(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

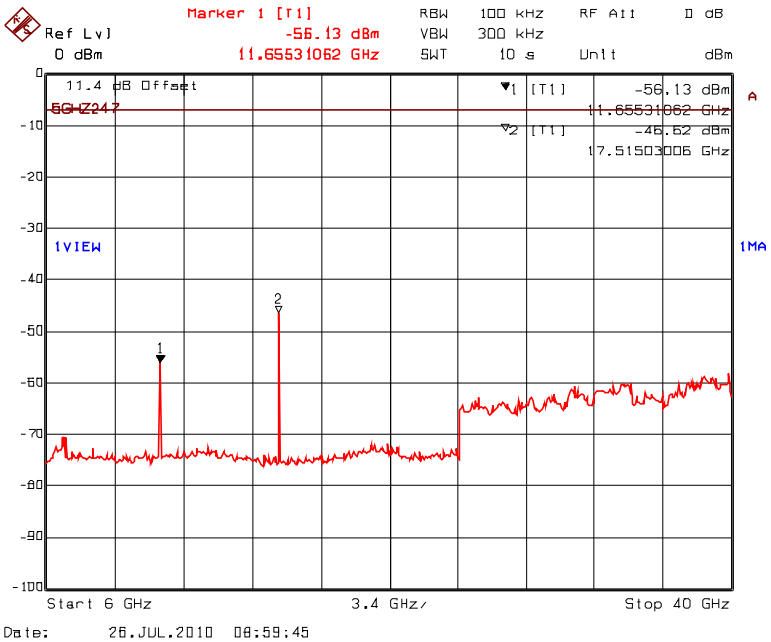




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 69(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

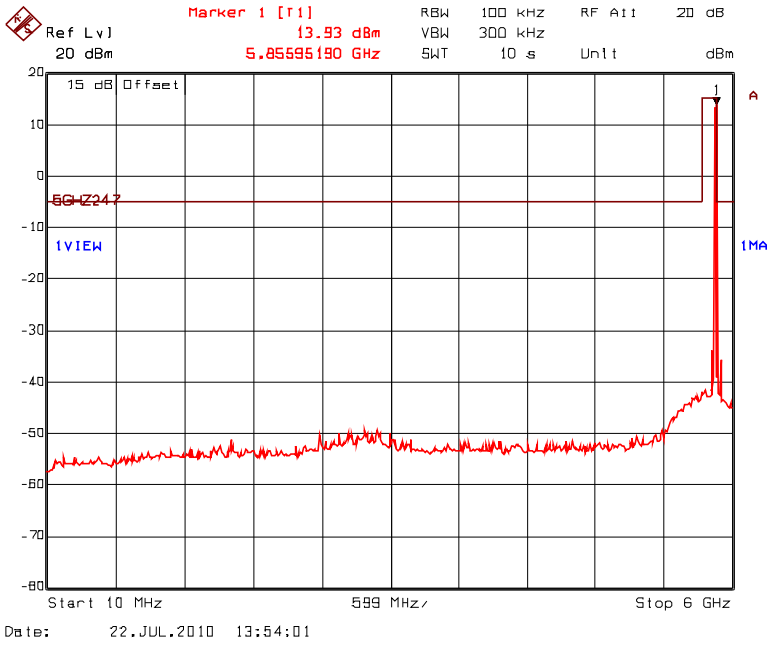


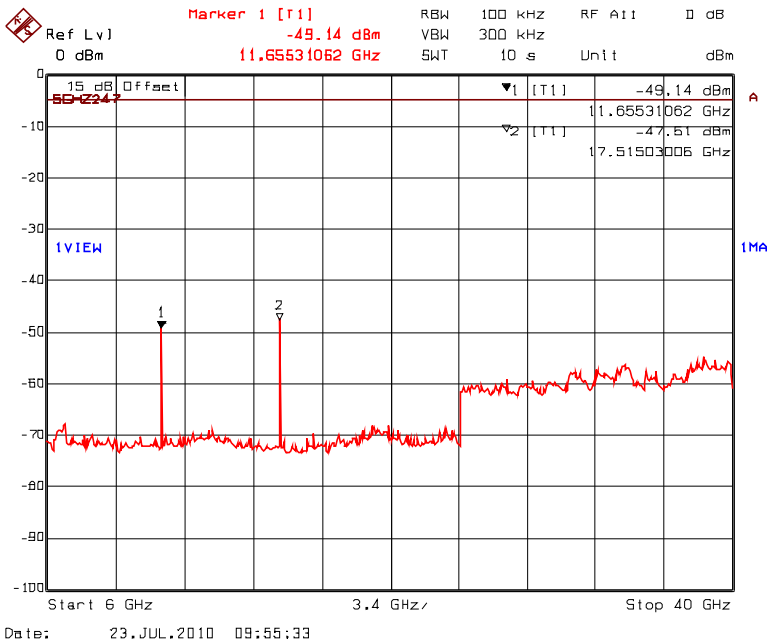


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 69(c): Combined Tx Spurious Conducted Emissions
Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



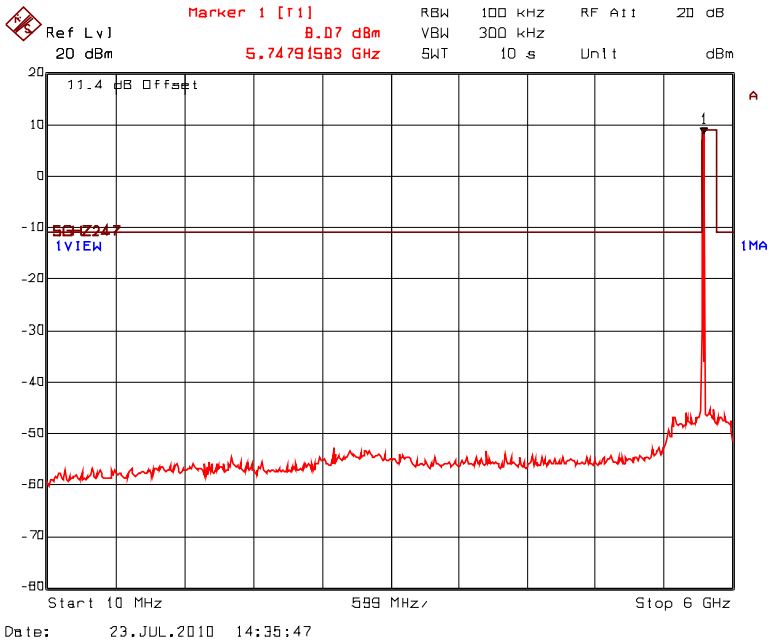


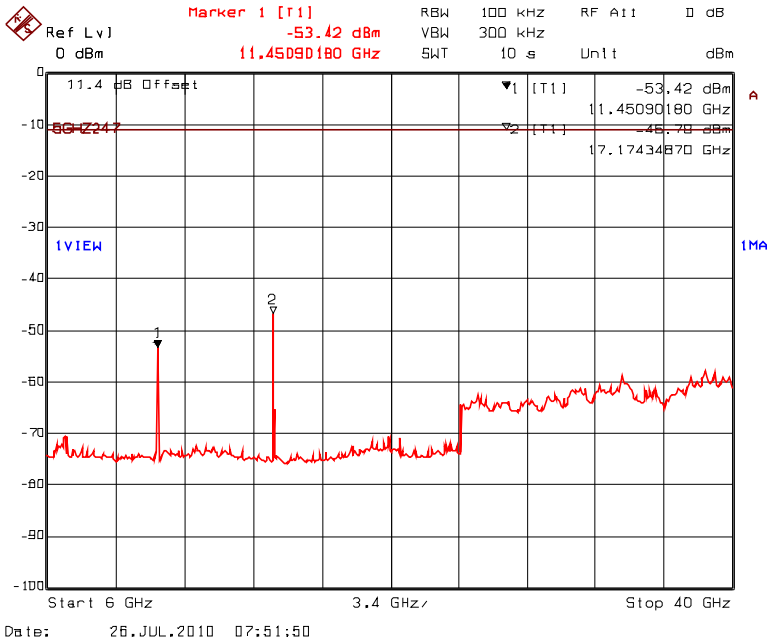
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

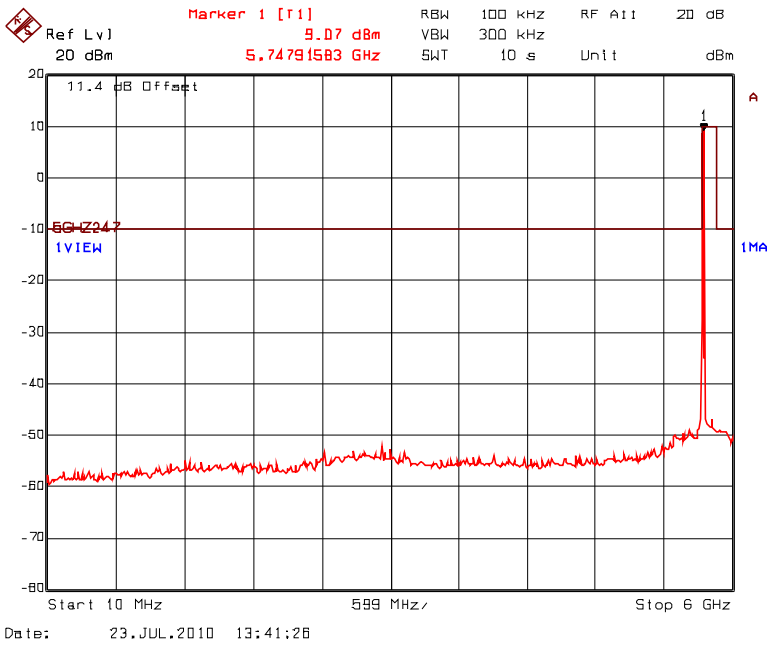
Note: Since the conducted output power with BPSK 1/2, 3.2Mbps modulation was highest compared with all other modulation & data rates, the Transmitter Conducted Spurious Emissions with the modulation of BPSK 1/2 @ 30 Mb/s was chosen as worst case to represent for all other modulations.

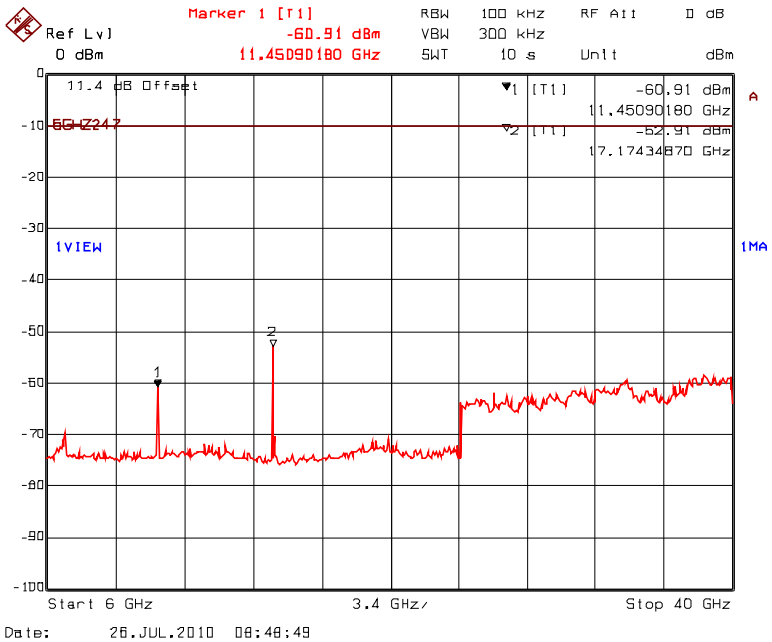
Plot # 70(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s





Plot # 70(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

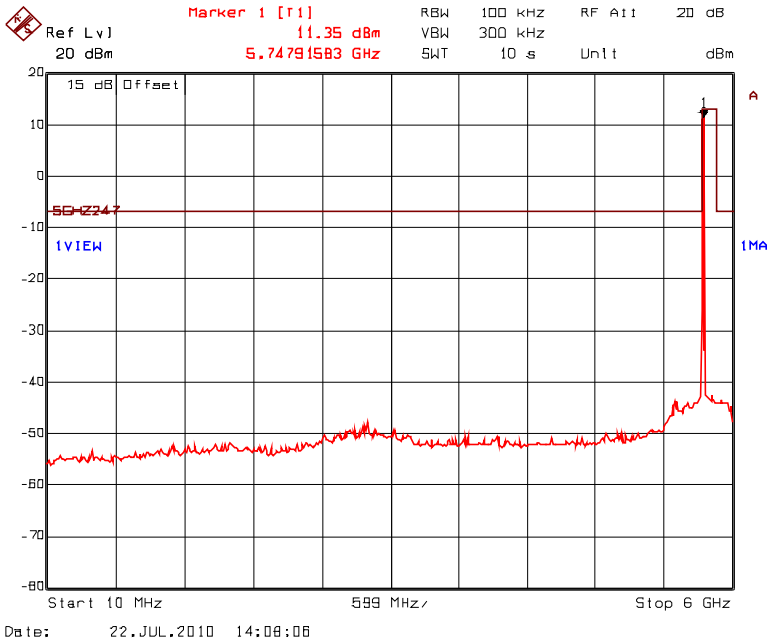


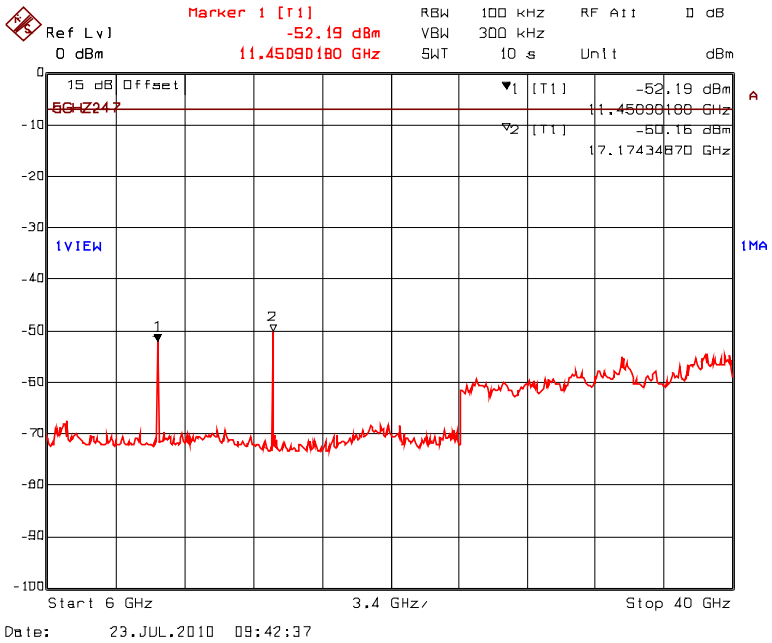


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 70(c): Combined Tx Spurious Conducted Emissions
Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

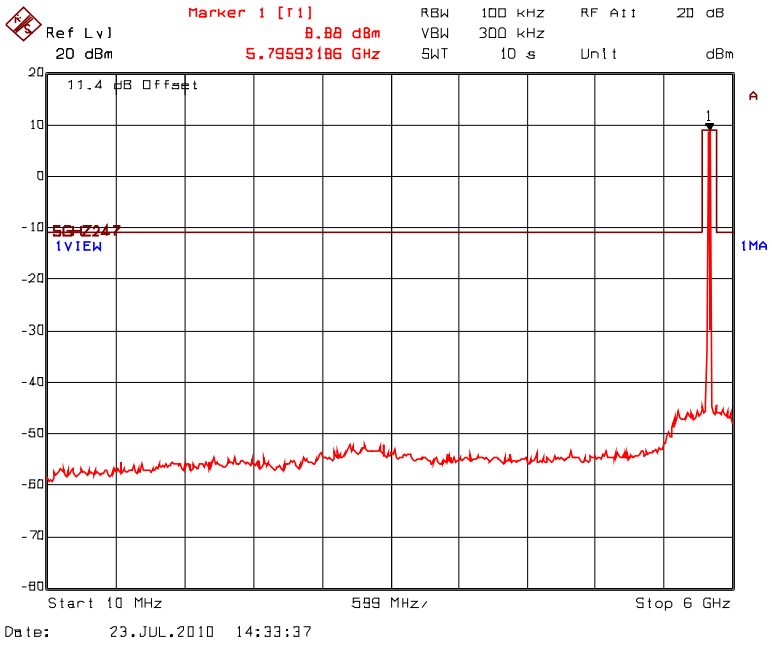
COMBINER (CHAIN 1 + CHAIN 2)

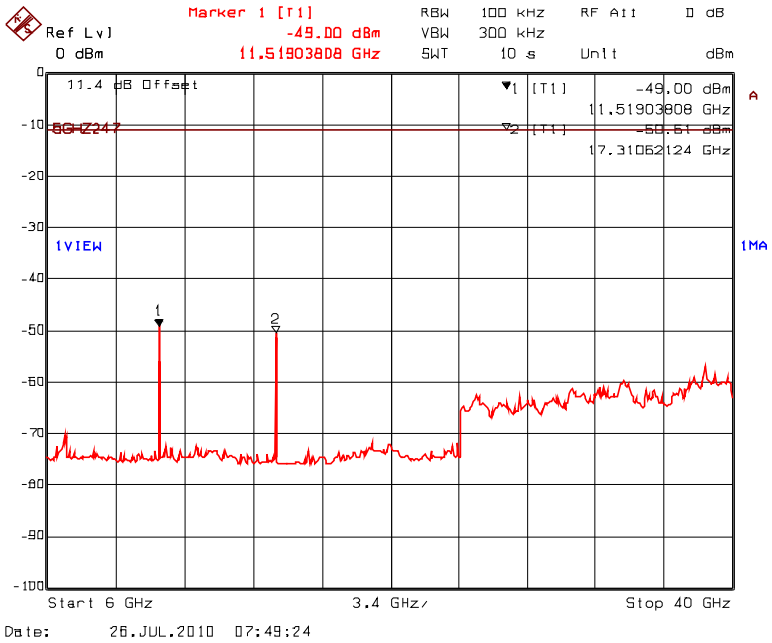




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

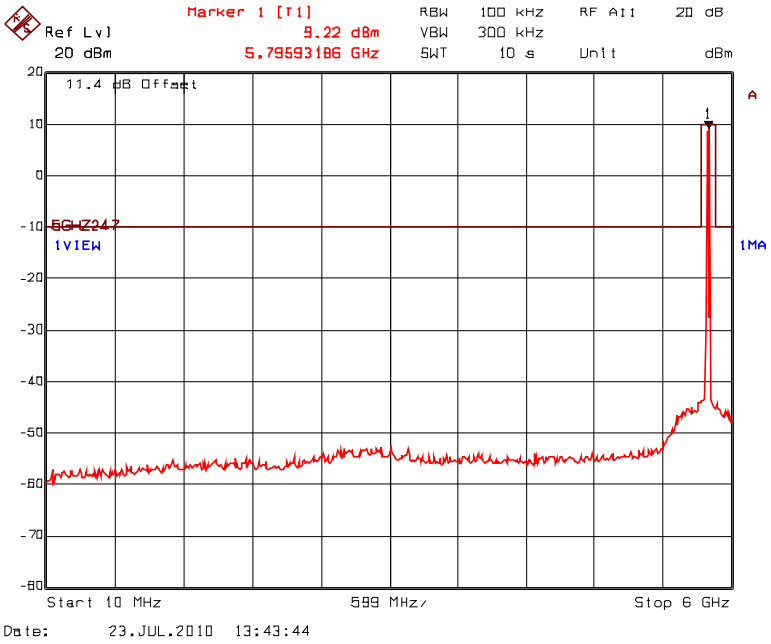
Plot # 71(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

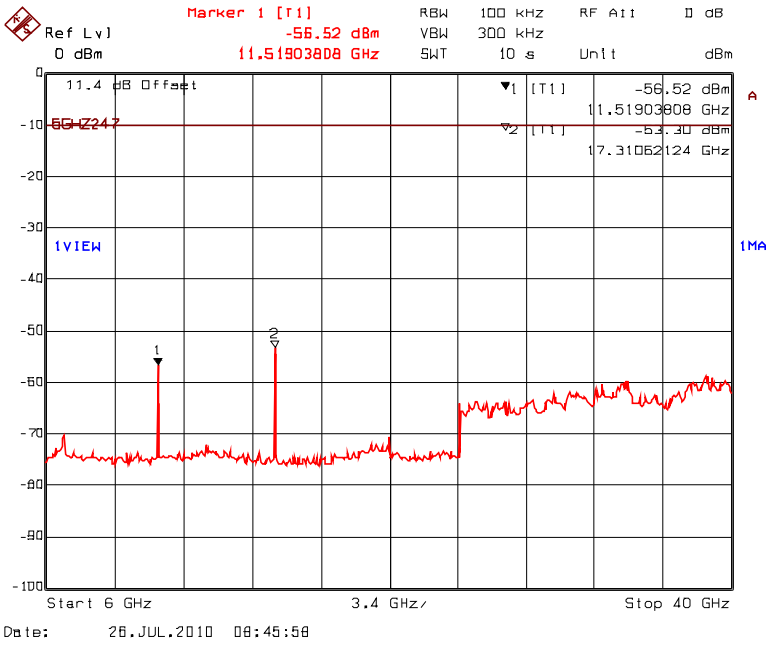




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 71(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

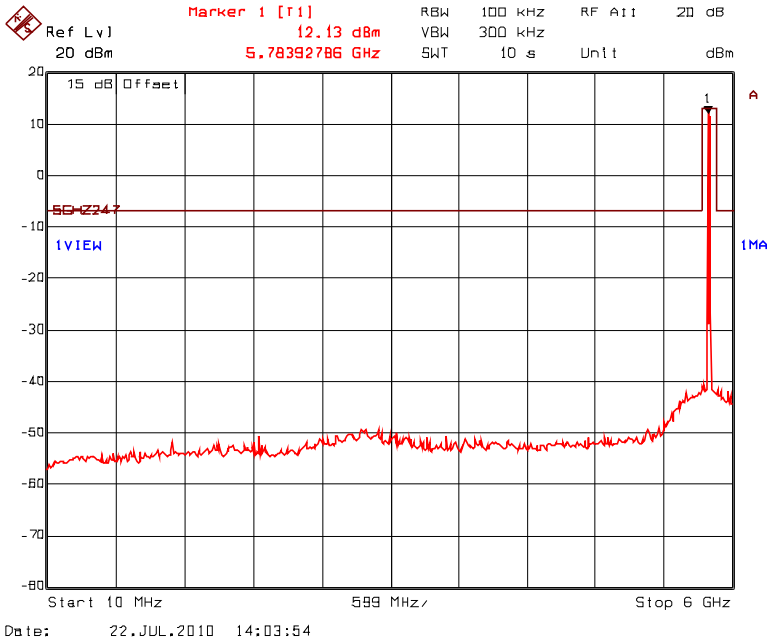


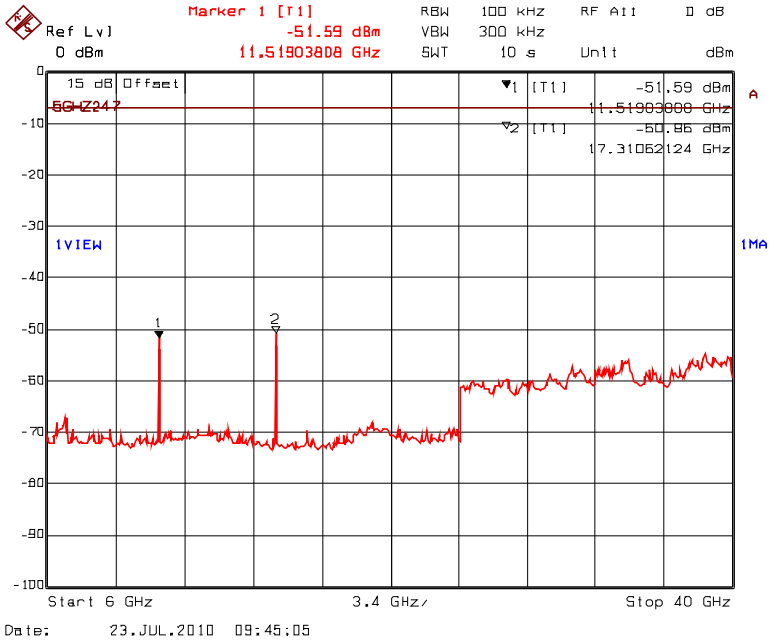


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 71(c): Combined Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

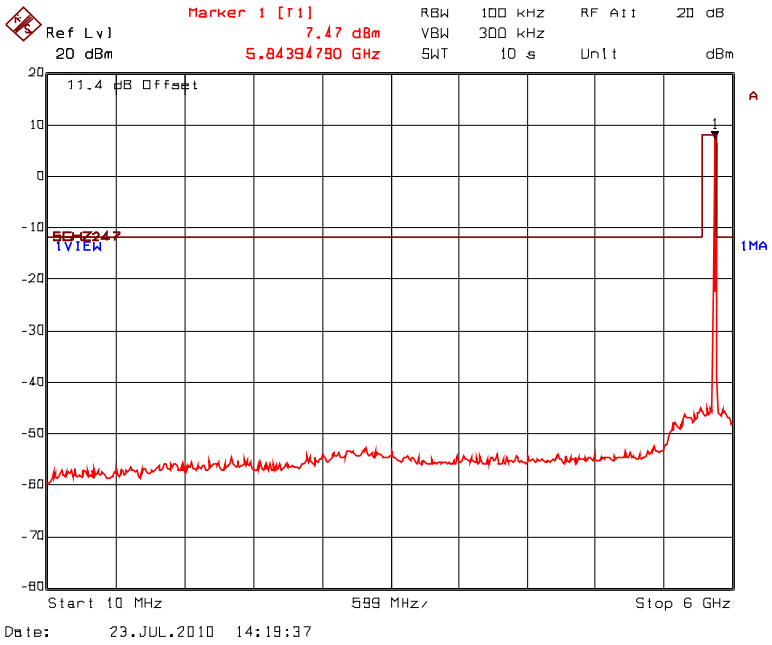
COMBINER (CHAIN 1 + CHAIN 2)

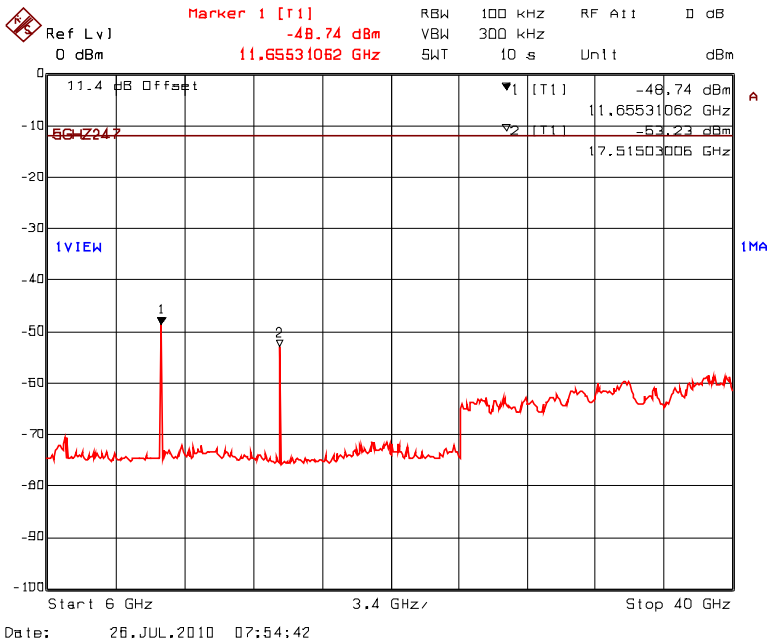




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

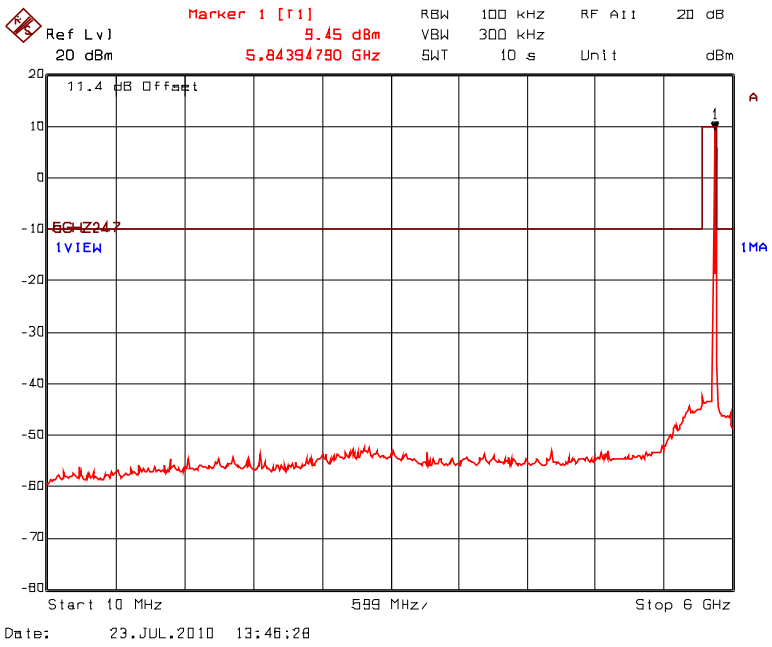
Plot # 72(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

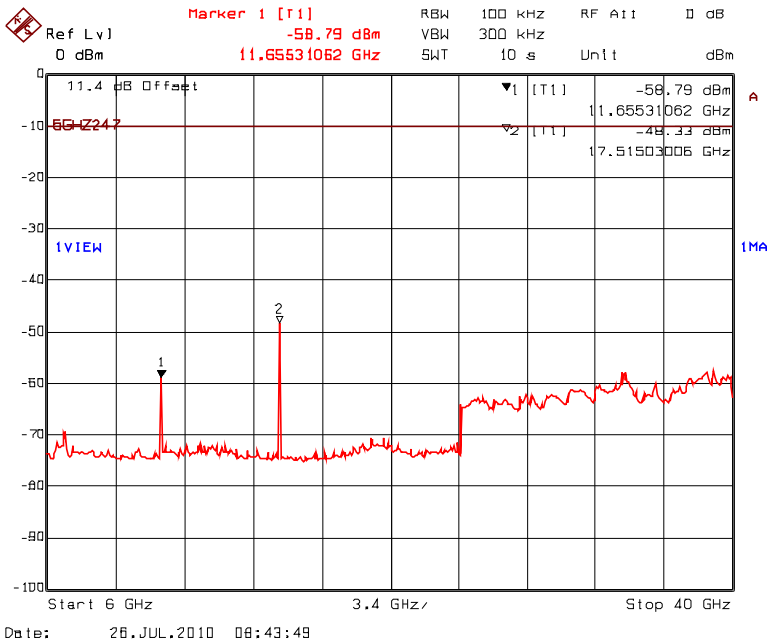




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 72(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

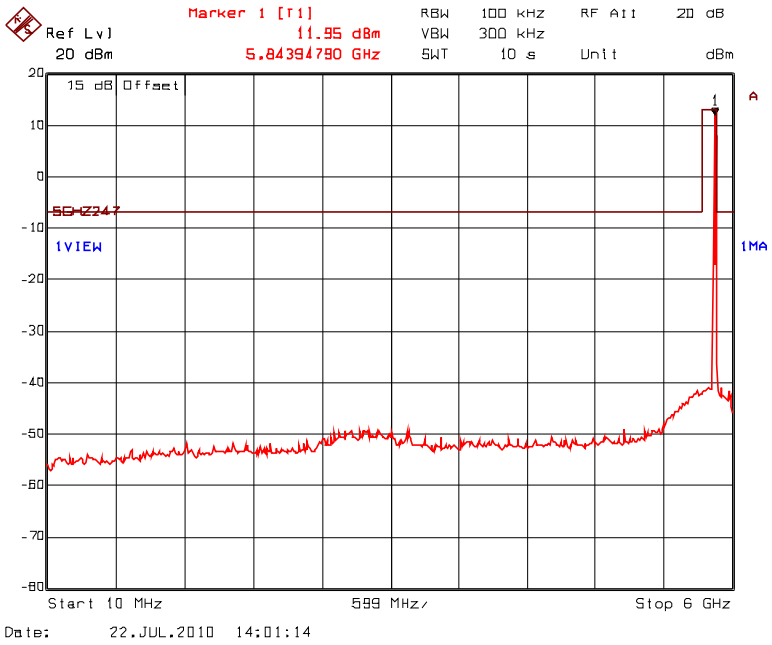


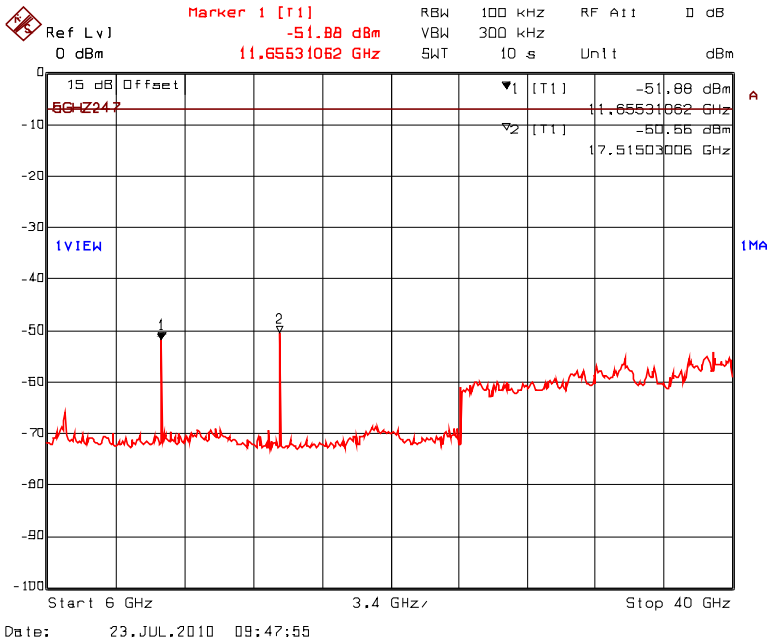


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 72(c): Combined Tx Spurious Conducted Emissions
Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



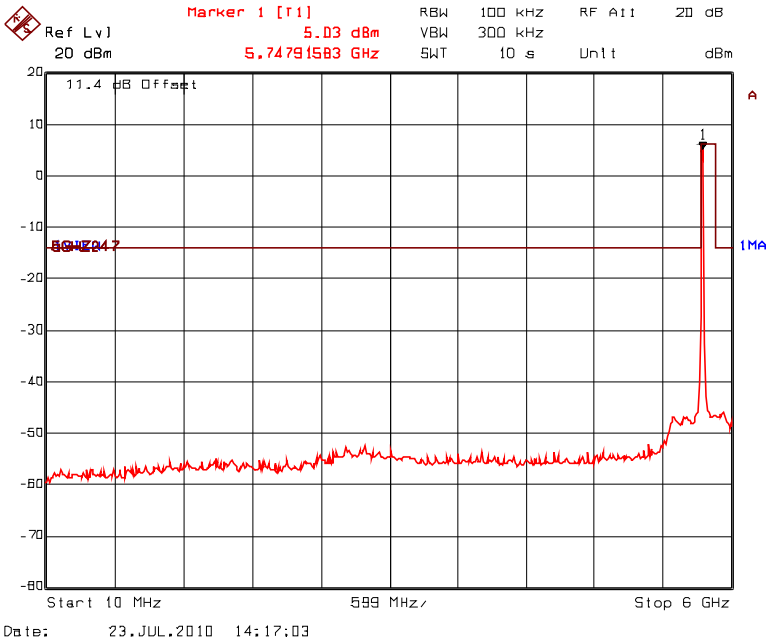


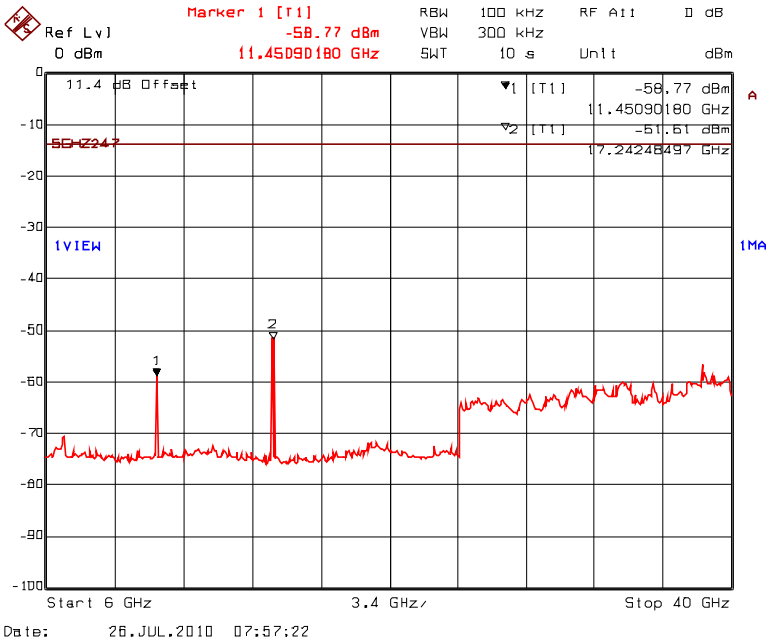
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

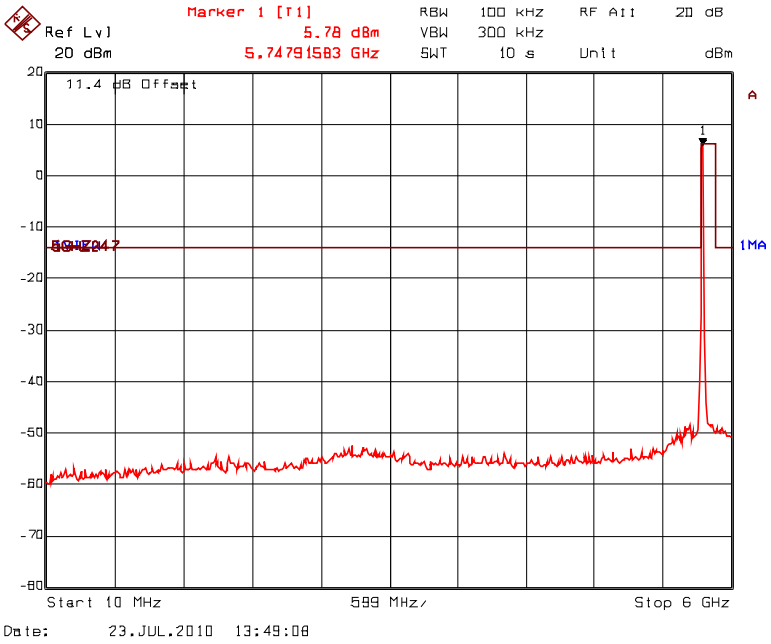
Note: Since the conducted output power with BPSK 1/2, 3.2Mbps modulation was highest compared with all other modulation & data rates, the Transmitter Conducted Spurious Emissions with the modulation of BPSK 1/2 @ 30 Mb/s was chosen as worst case to represent for all other modulations.

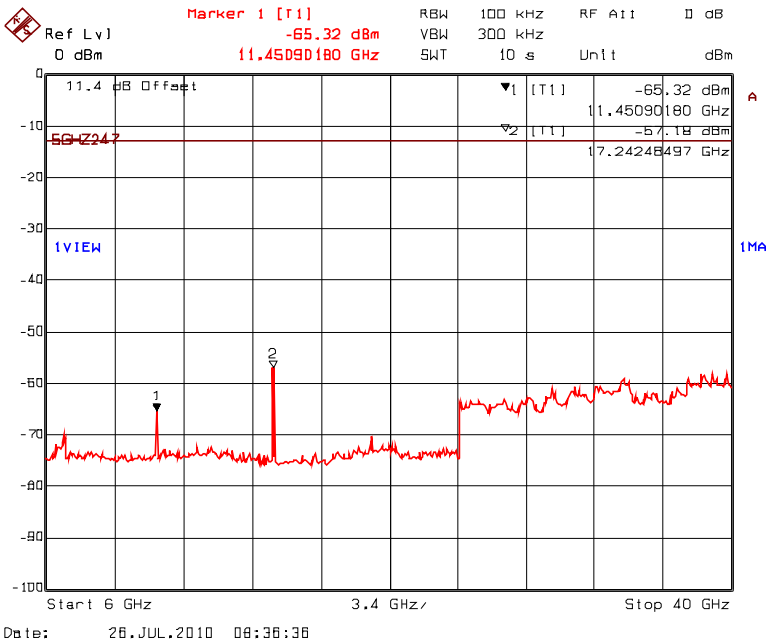
Plot # 73(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13Mb/s





Plot # 73(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13Mb/s

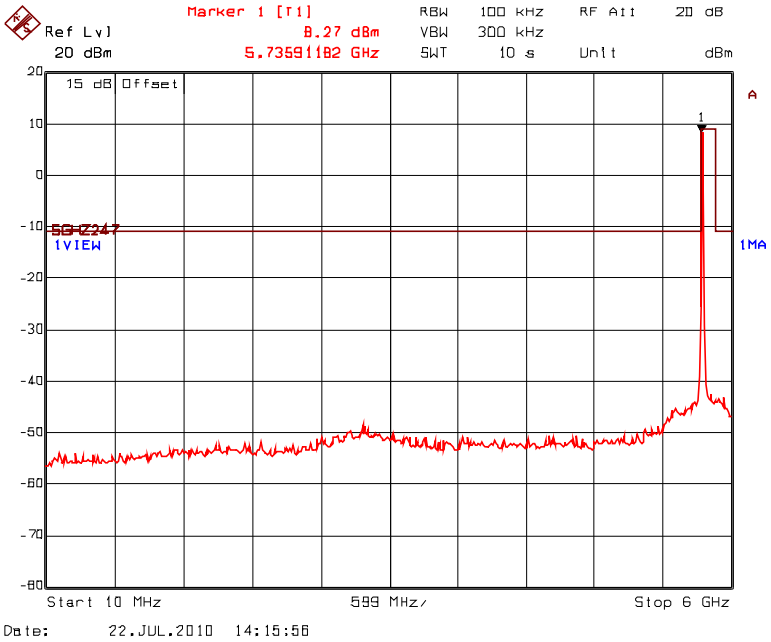


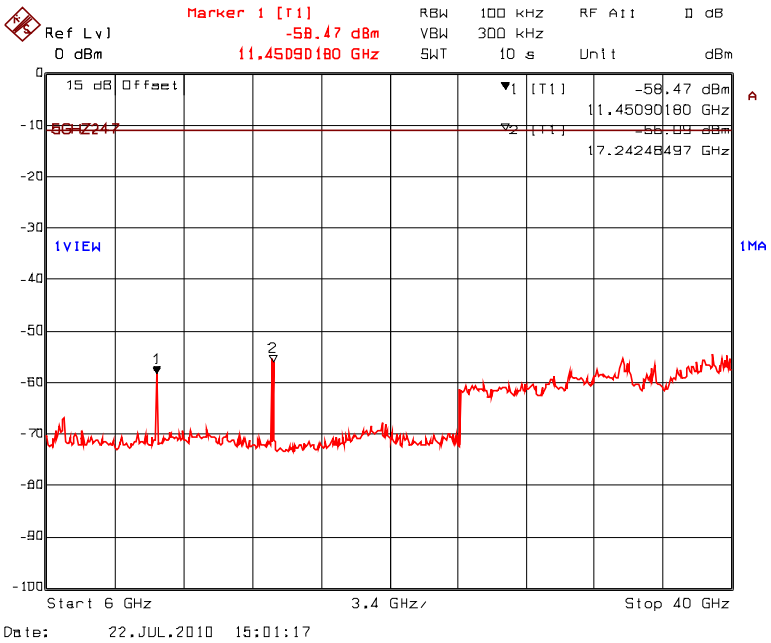


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 73(c): Combined Tx Spurious Conducted Emissions
Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13Mb/s

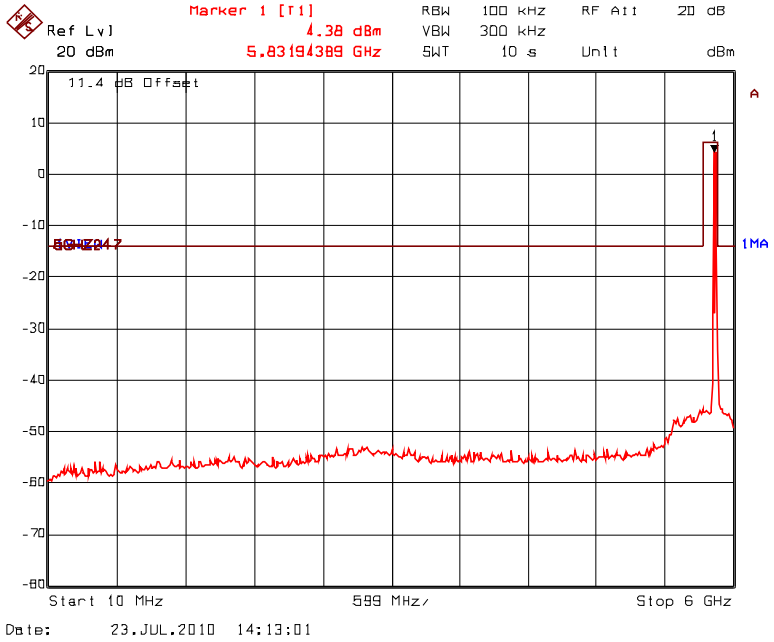
COMBINER (CHAIN 1 + CHAIN 2)

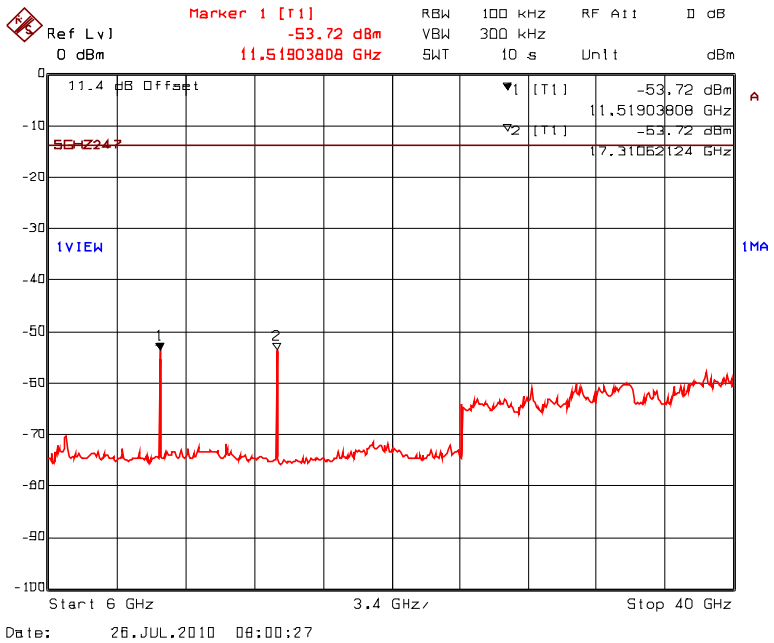




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

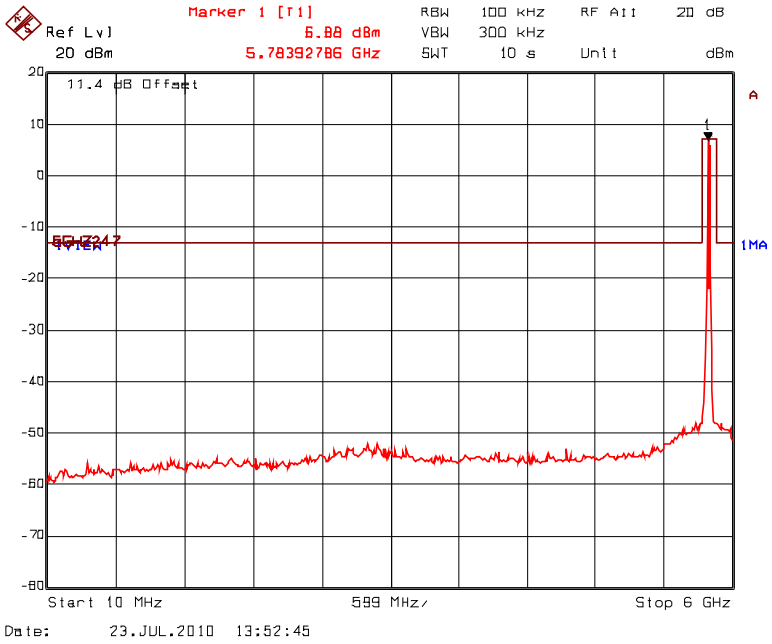
Plot # 74(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13Mb/s

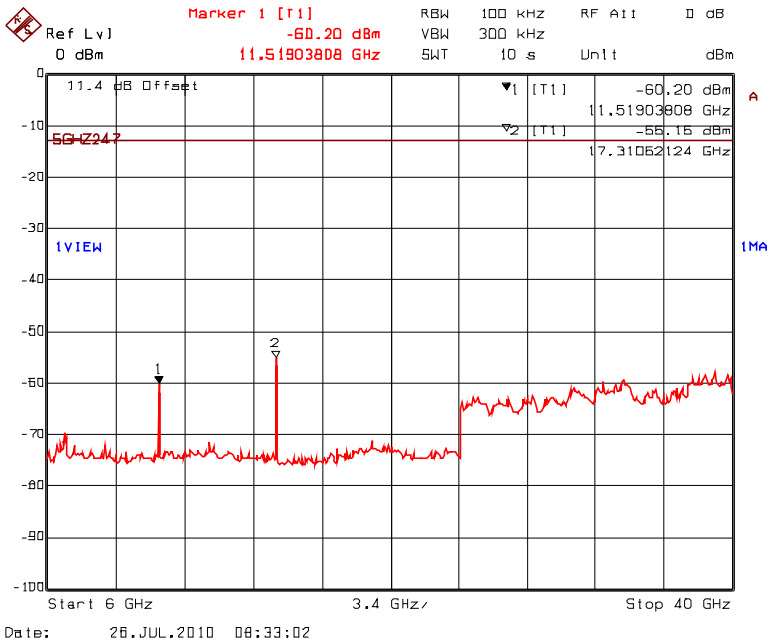




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 74(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13Mb/s

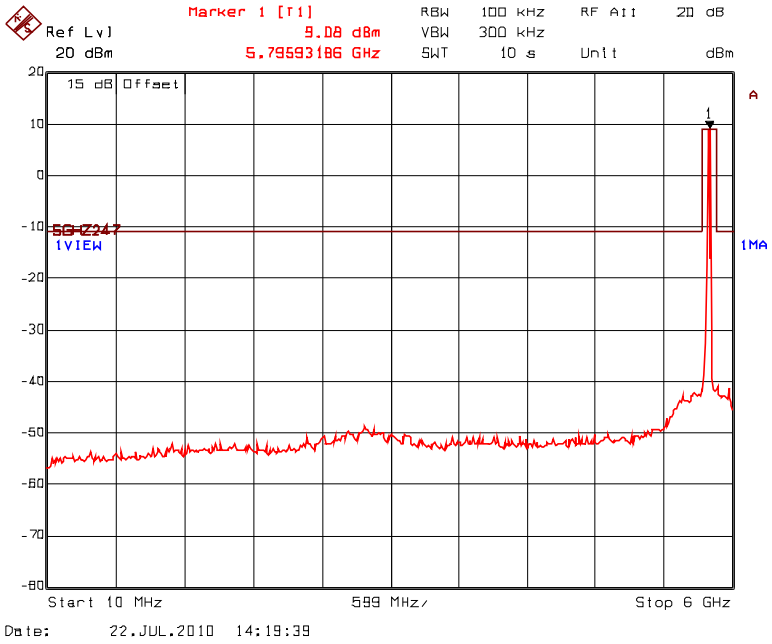


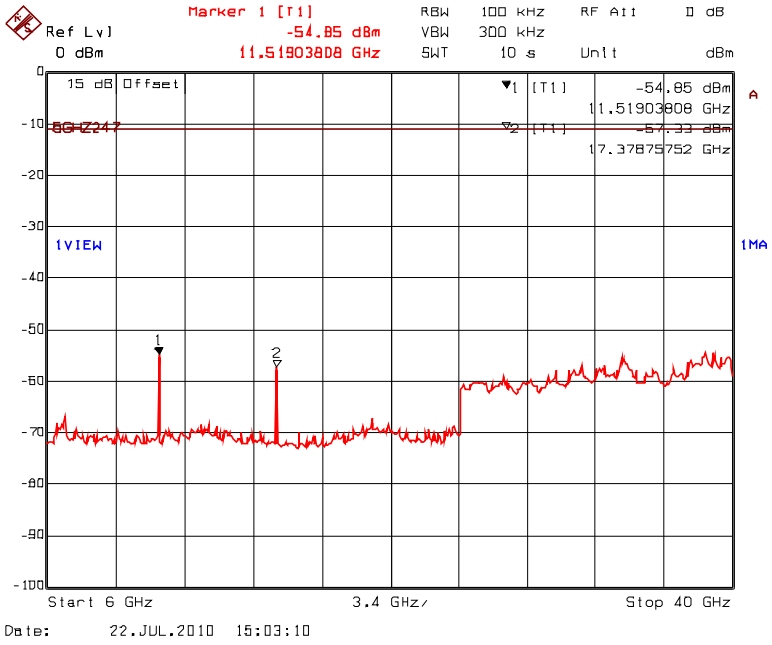


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 74(c): Combined Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13Mb/s

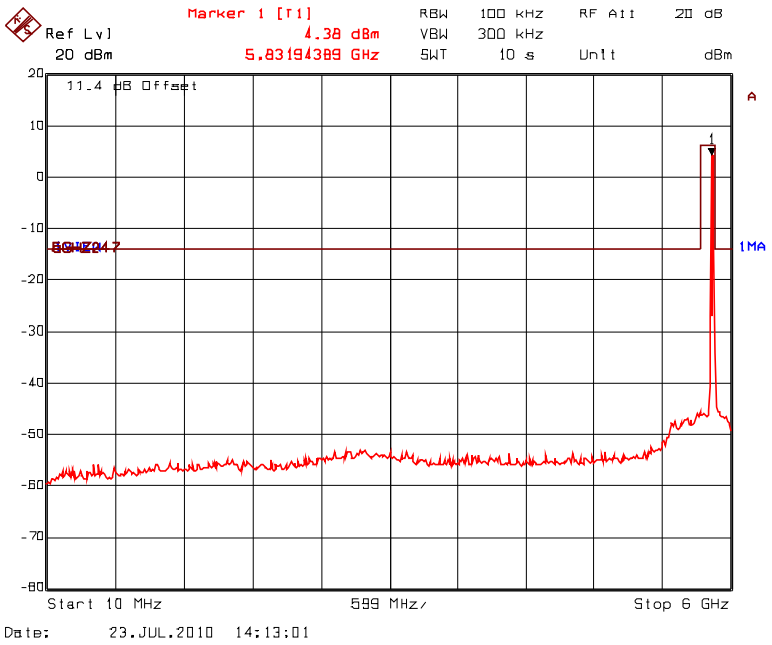
COMBINER (CHAIN 1 + CHAIN 2)

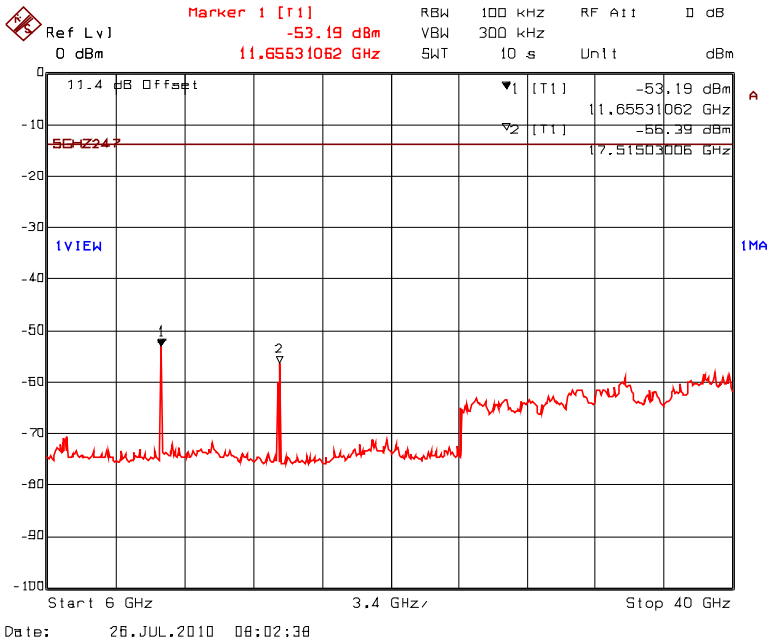




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

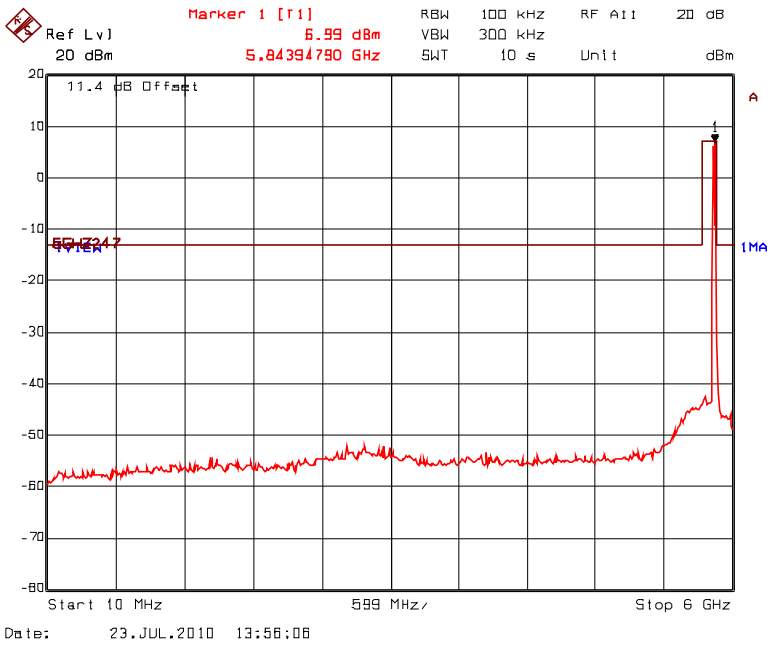
Plot # 75(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13Mb/s

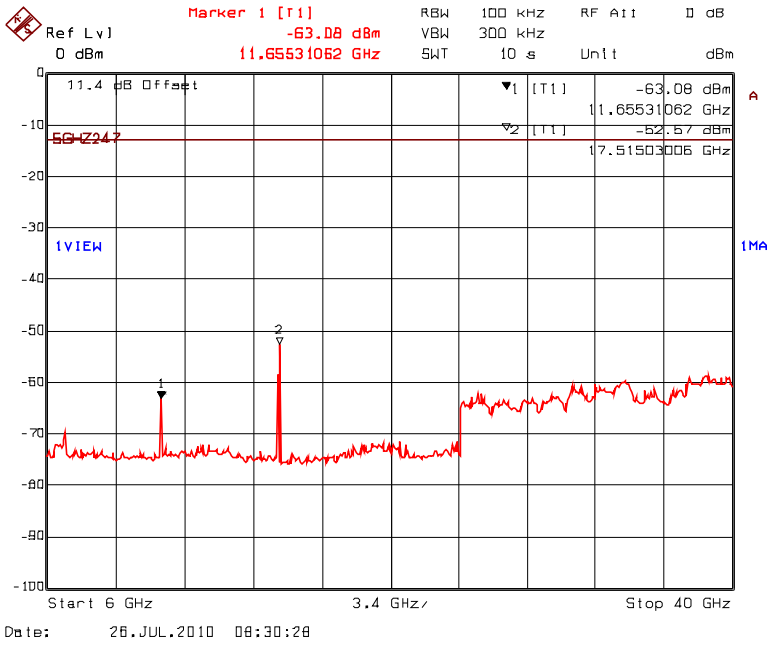




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 75(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13Mb/s

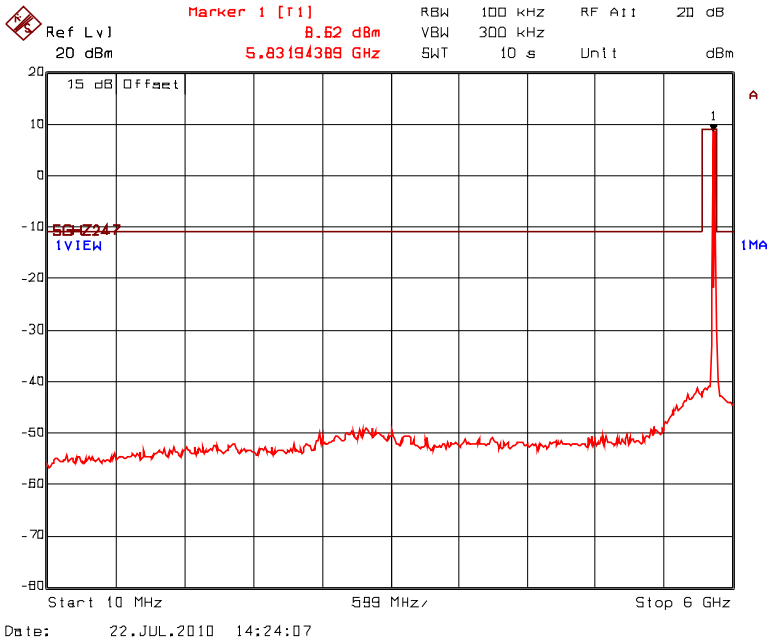


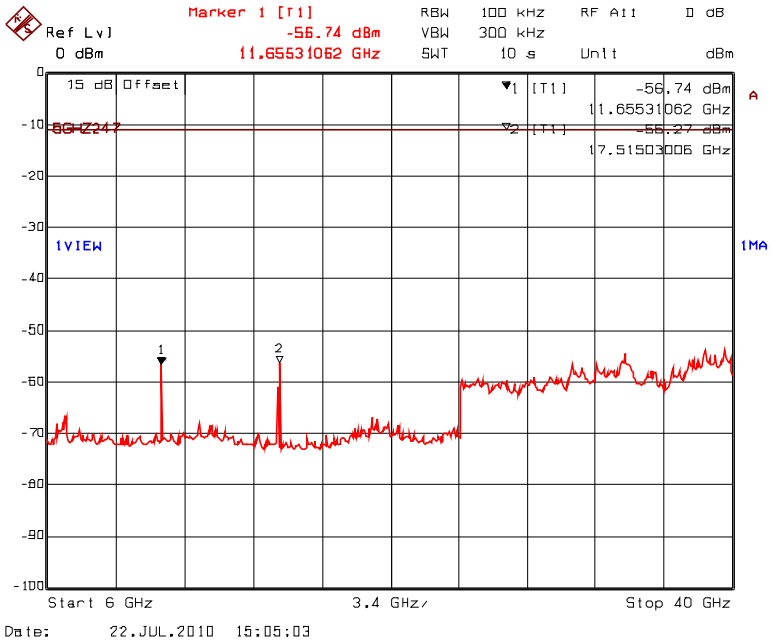


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 75(c): Combined Tx Spurious Conducted Emissions
Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



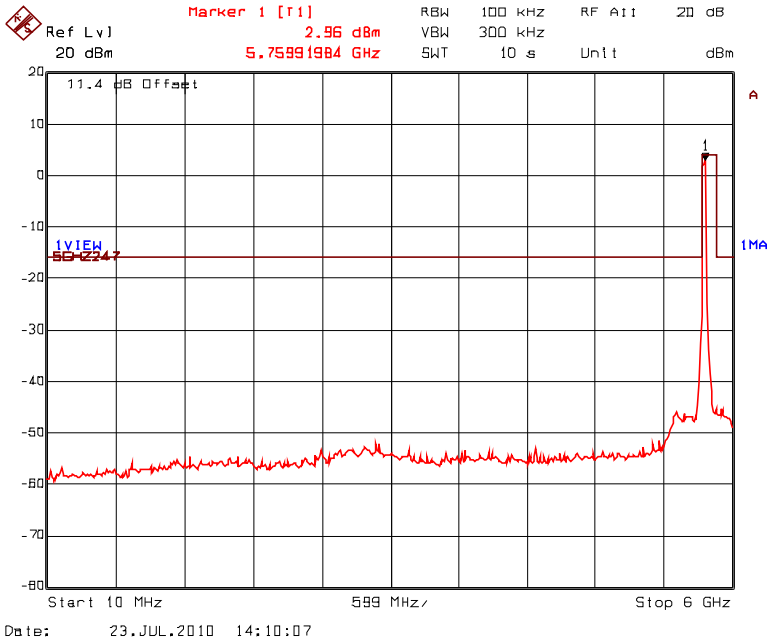


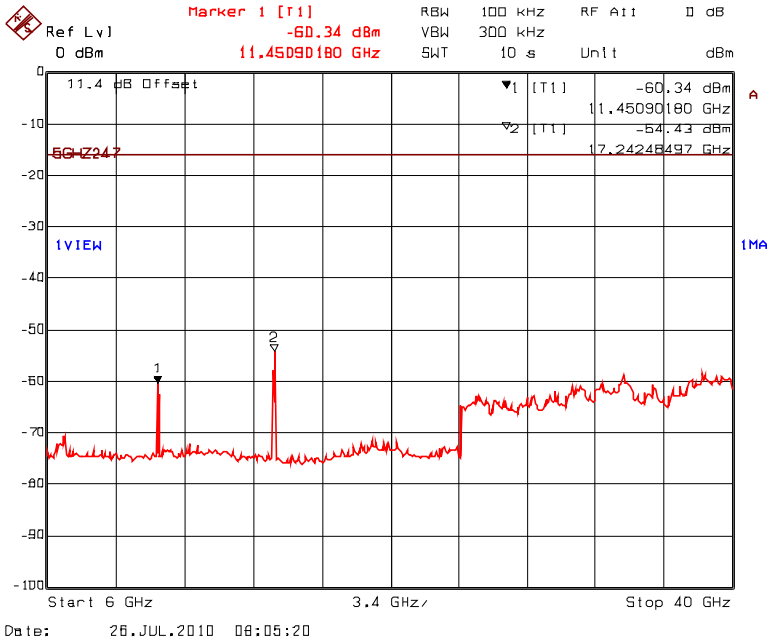
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

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

Note: Since the conducted output power with BPSK 1/2, 3.2Mbps modulation was highest compared with all other modulation & data rates, the Transmitter Conducted Spurious Emissions with the modulation of BPSK 1/2 @ 30 Mb/s was chosen as worst case to represent for all other modulations.

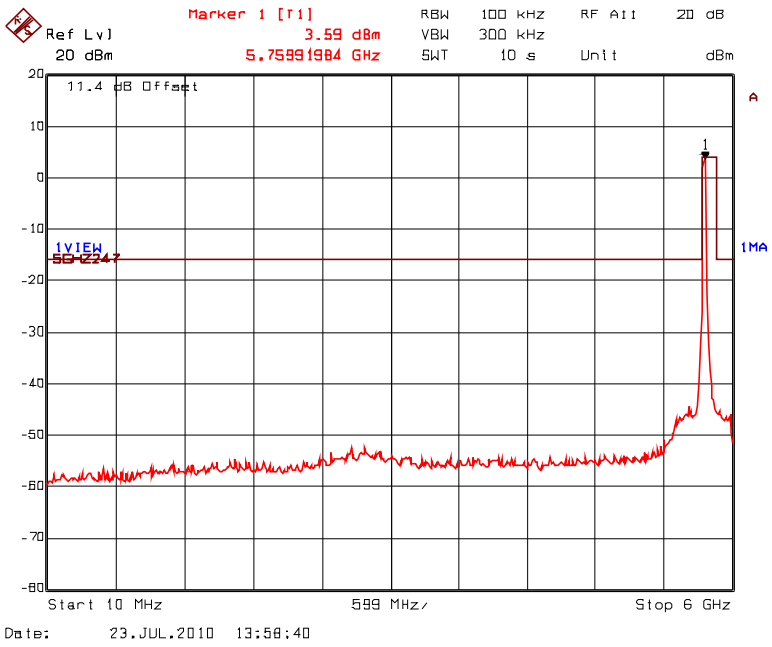
Plot # 76(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

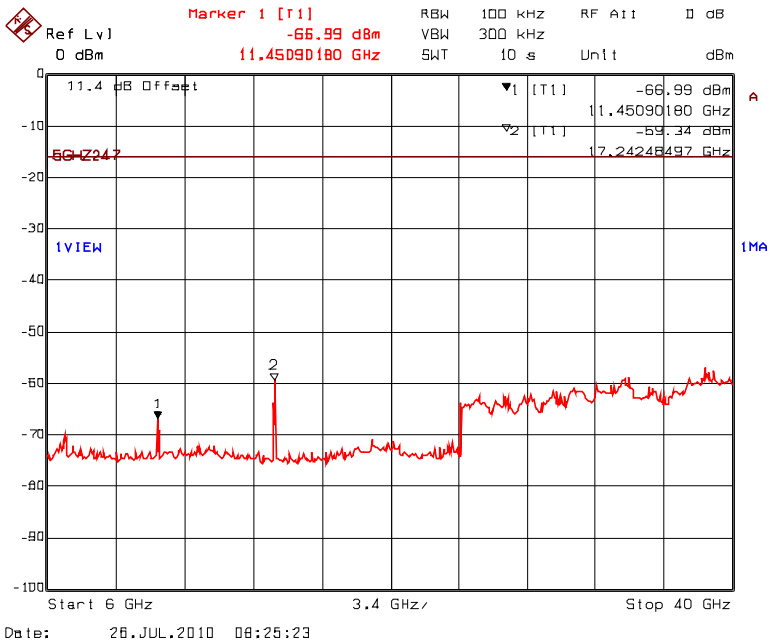




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 76(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

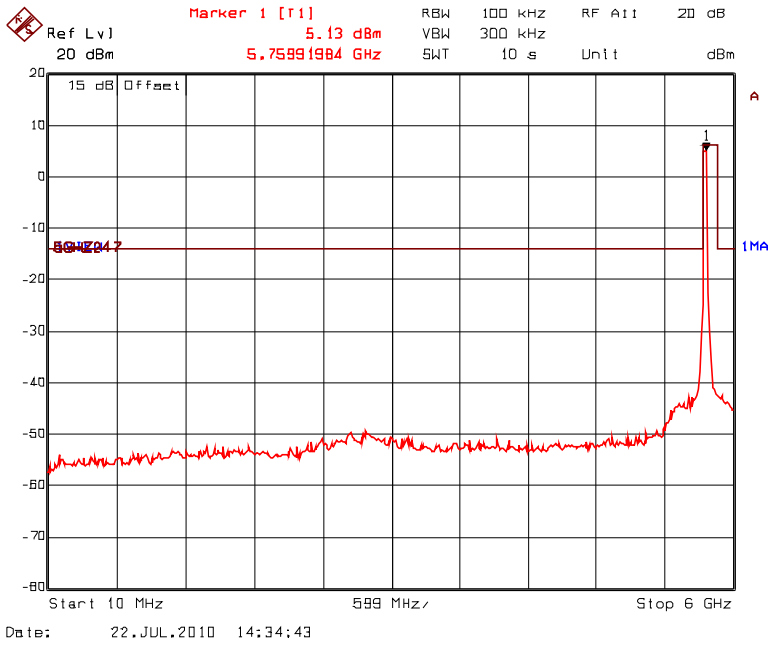


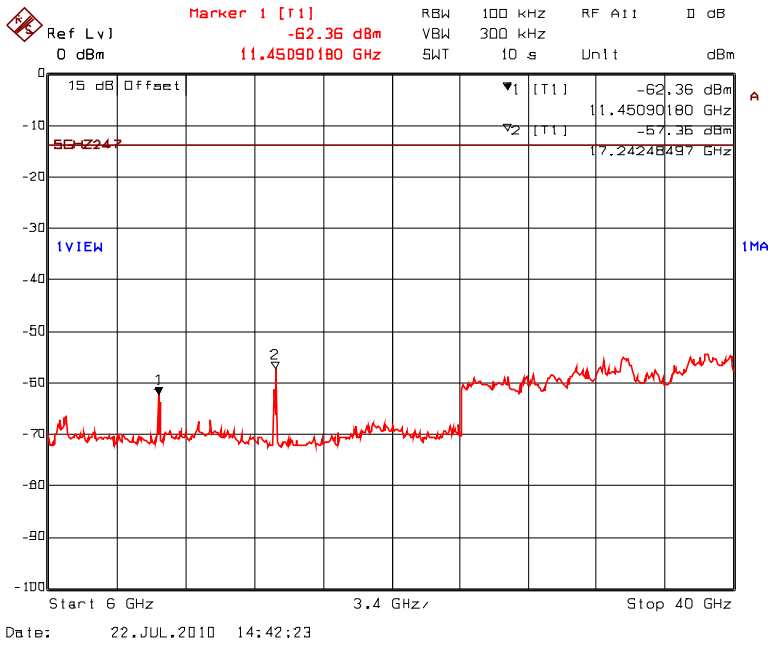


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 76(c): Combined Tx Spurious Conducted Emissions Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

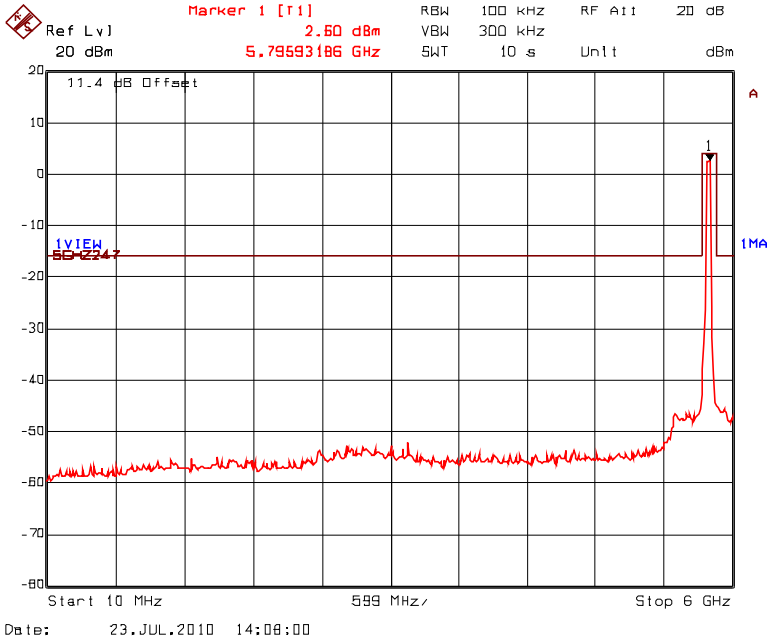
COMBINER (CHAIN 1 + CHAIN 2)

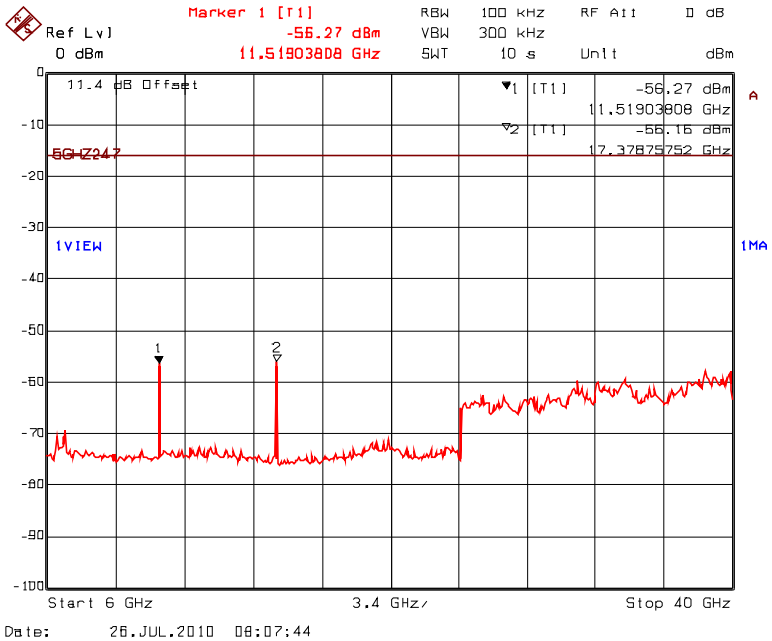




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

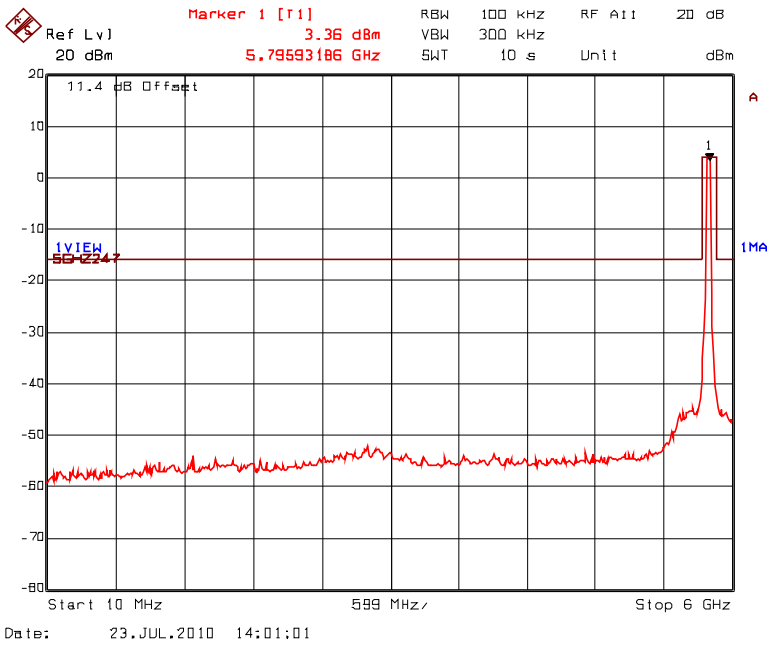
Plot # 77(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

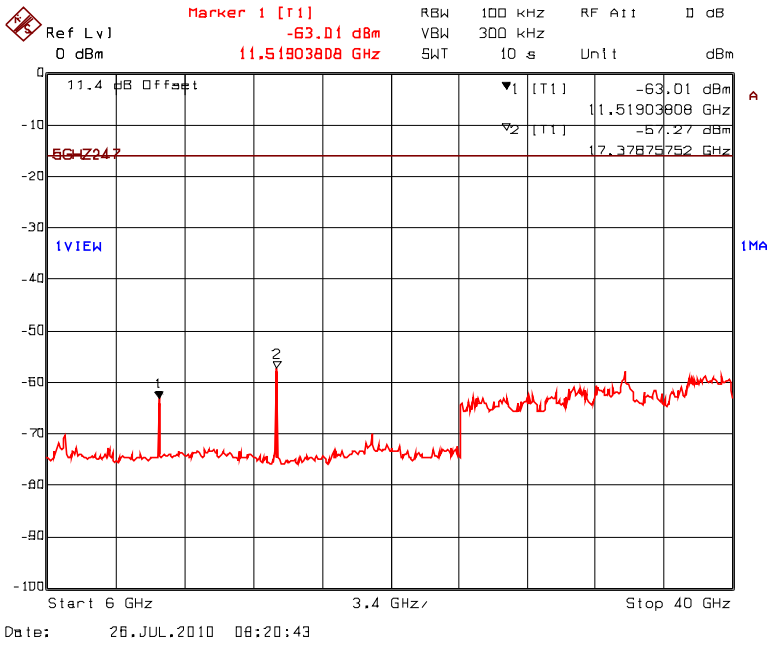




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 77(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

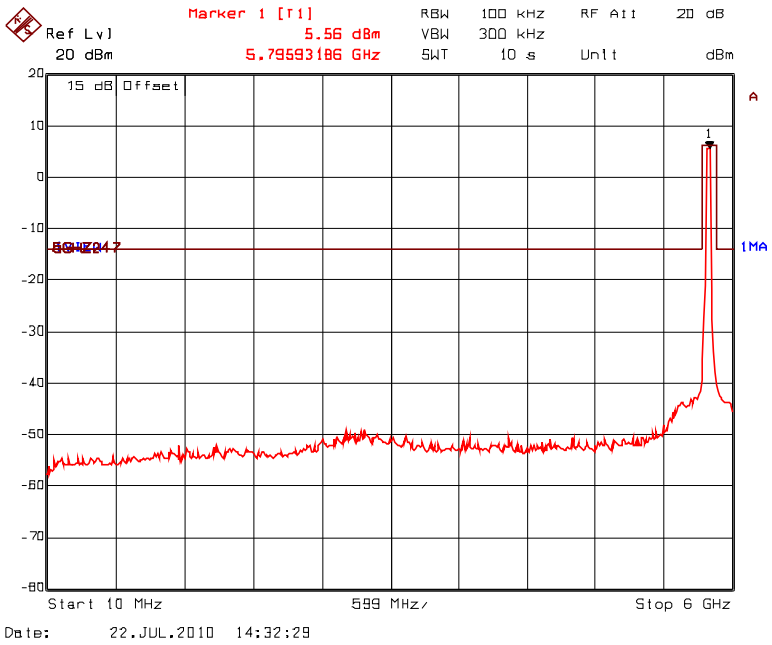


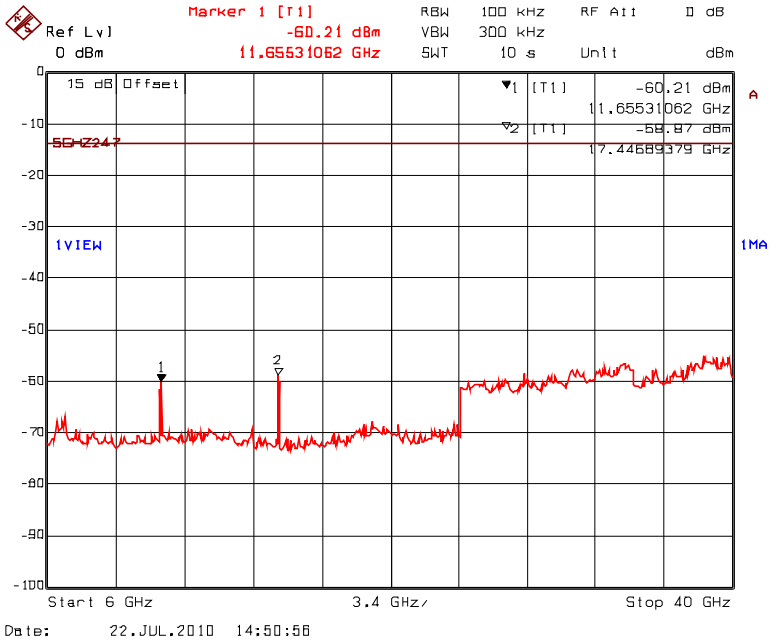


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 77(c): Combined Tx Spurious Conducted Emissions
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

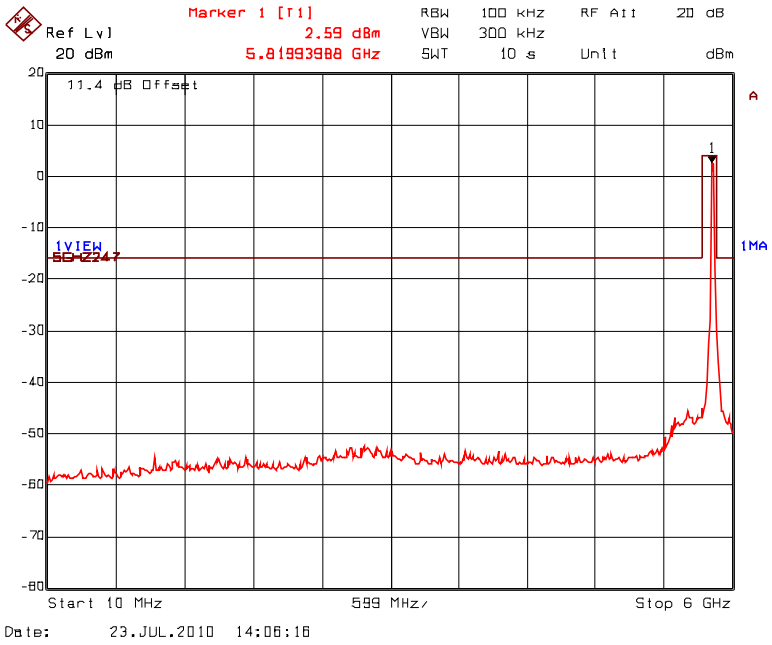
COMBINER (CHAIN 1 + CHAIN 2)

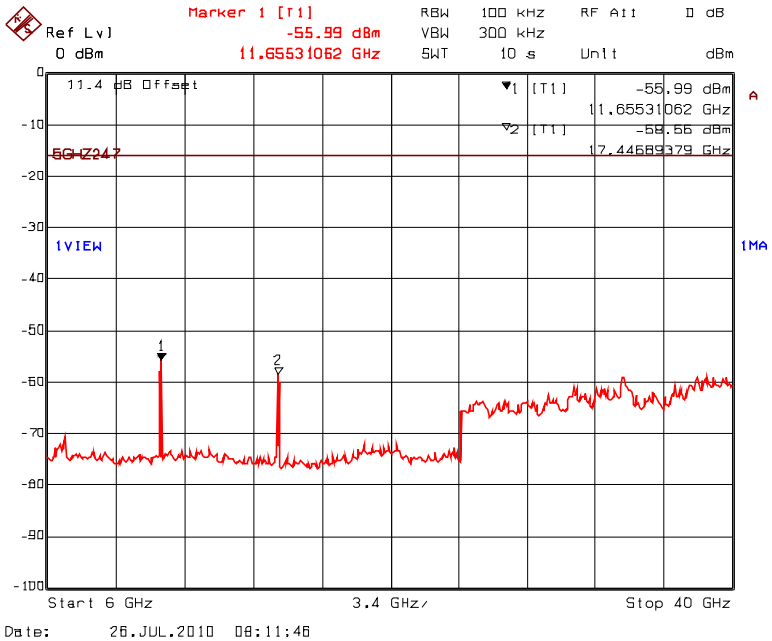




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

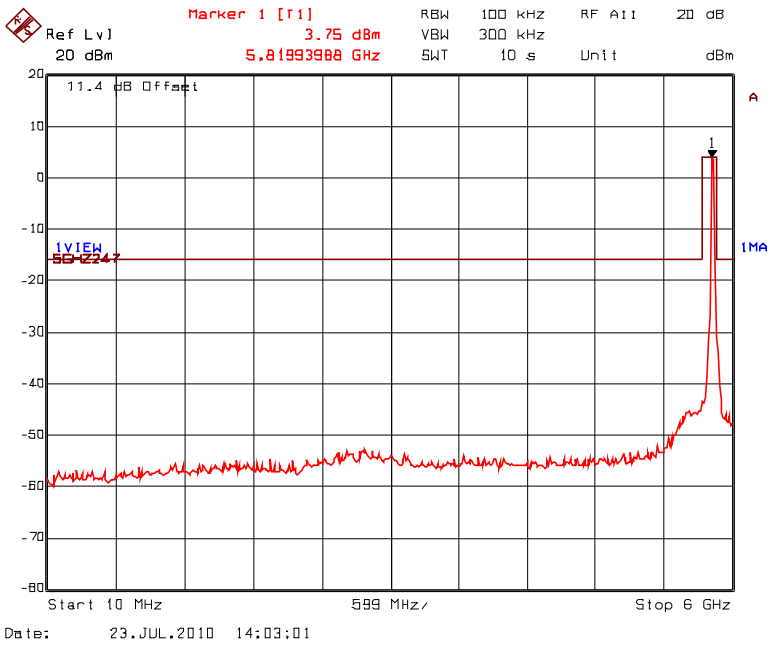
Plot # 78(a): Chain 1, Tx Spurious Conducted Emissions
Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

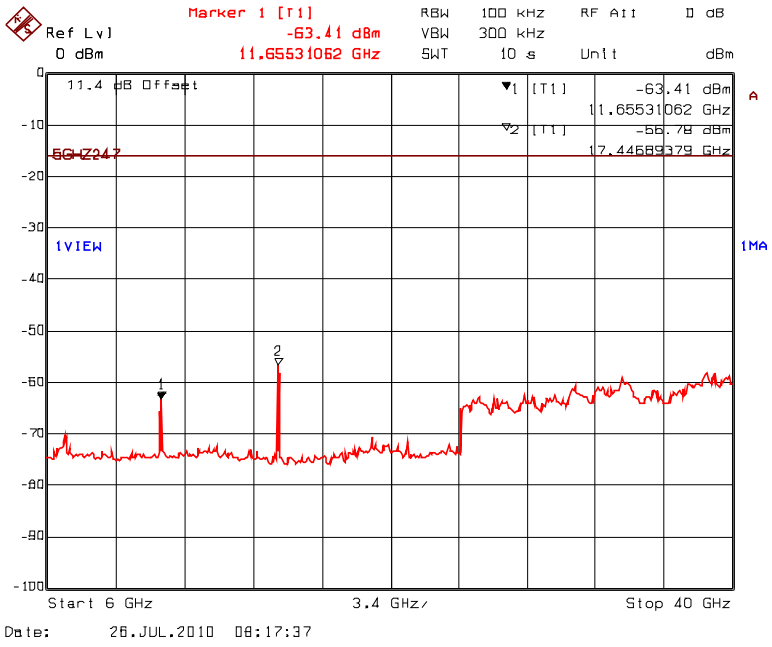




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 78(b): Chain 2, Tx Spurious Conducted Emissions
Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

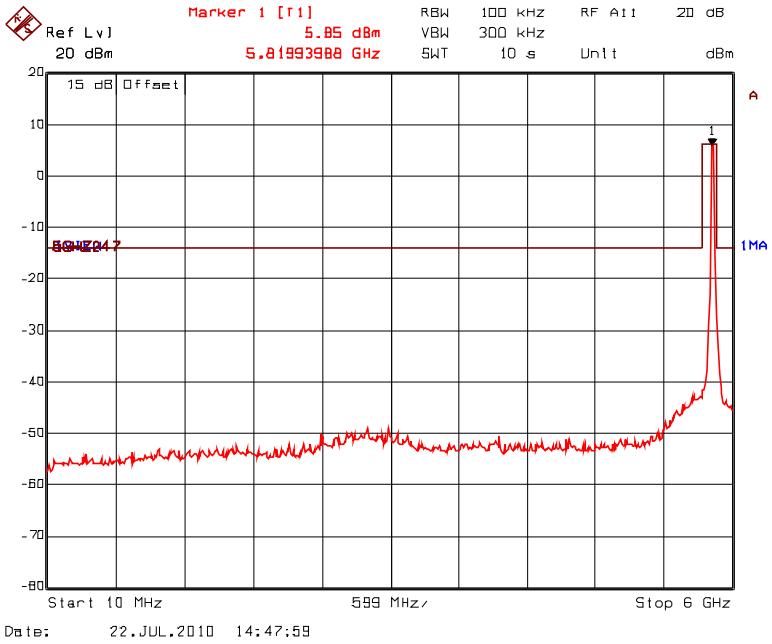


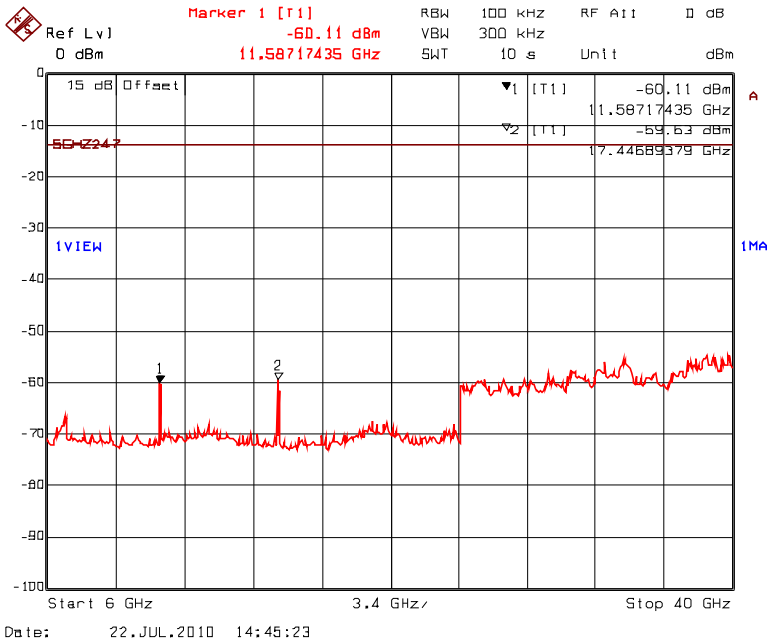


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 78(c): Combined Tx Spurious Conducted Emissions
Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

COMBINER (CHAIN 1 + CHAIN 2)





- *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.

As per MIMO measurement guidelines Power Spectral Density for each Transmitter Chain must be measured and also measured with combiner. Both measurements must comply with limits.

4.10.2. Method of Measurements

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

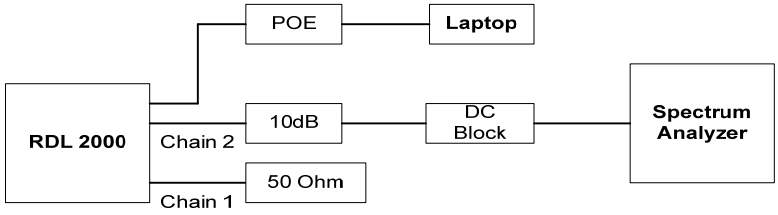
The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should 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	Calibration Due-Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz with external mixer	August 10, 2010
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	N/A
Attenuator	Narda	4768-10	-	DC - 40 GHz	N/A
Combiner	Mini-Circuit	15542	0235	DC - 40 GHz	N/A

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: 5 MHz Channel Spacing

Channel (5MHz)	Frequency (MHz)	Modulation Type	Data Rate (Mbps)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	Combine (dBm)	Limit (dBm)
1	5730	64QAM 5/6	32.5	-4.22	-5.87	-0.92	8
12	5785	64QAM 5/6	32.5	-2.54	-3.83	-0.80	8
24	5845	64QAM 5/6	32.5	-4.42	-3.66	-0.87	8
1	5730	16QAM 3/4	19.5	-1.17	-0.06	2.21	8
12	5785	16QAM 3/4	19.5	0.04	-0.66	3.03	8
24	5845	16QAM 3/4	19.5	-0.58	0.01	1.98	8
1	5730	QPSK 3/4	9.7	-1.76	1.75	2.28	8
12	5785	QPSK 3/4	9.7	1.20	-0.39	3.87	8
24	5845	QPSK 3/4	9.7	1.04	0.51	3.59	8
1	5730	BPSK 1/2	3.2	-0.96	0.65	3.15	8
12	5785	BPSK 1/2	3.2	0.17	0.05	3.33	8
24	5845	BPSK 1/2	3.2	-0.60	0.26	3.05	8

4.10.5.2. Test Configuration # 2: 10 MHz Channel Spacing

Channel (10MHz)	Frequency (MHz)	Modulation Type	Data Rate (Mbps)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	Combine (dBm)	Limit (dBm)
2	5735	64QAM 5/6	65	-7.22	-7.01	-3.18	8
12	5785	64QAM 5/6	65	-5.87	-7.29	-3.69	8
23	5840	64QAM 5/6	65	-5.62	-7.23	-2.30	8
2	5735	16QAM 3/4	39	-4.47	-2.74	-0.22	8
12	5785	16QAM 3/4	39	-4.01	-3.71	0.50	8
23	5840	16QAM 3/4	39	-4.60	-2.84	3.35	8
2	5735	QPSK 3/4	19.5	-4.23	0.36	1.19	8
12	5785	QPSK 3/4	19.5	-3.46	-3.87	0.93	8
23	5840	QPSK 3/4	19.5	-0.42	-3.12	4.43	8
2	5735	BPSK 1/2	6.5	-4.60	-1.19	-2.55	8
12	5785	BPSK 1/2	6.5	-2.39	-1.35	-0.45	8
23	5840	BPSK 1/2	6.5	-4.02	-2.18	-1.42	8

4.10.5.3. Test Configuration # 3: 20 MHz Channel Spacing

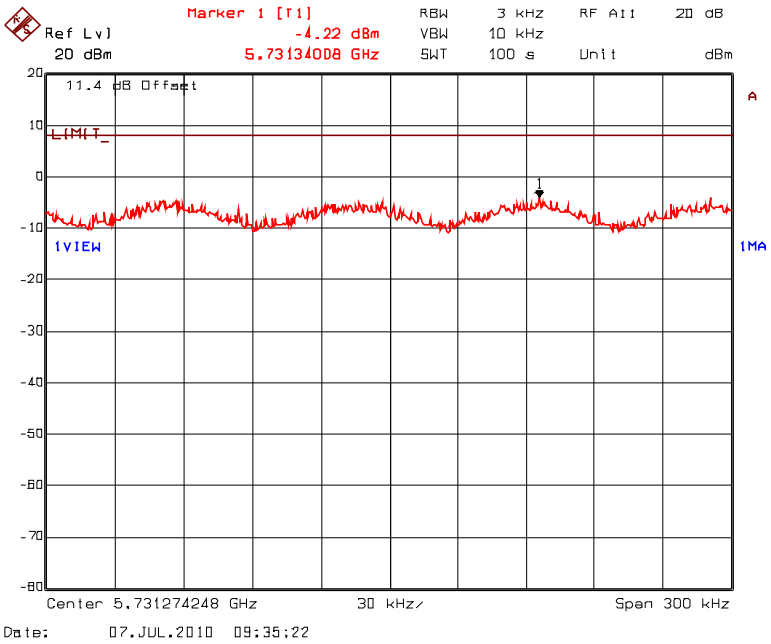
Channel (20MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	Combine (dBm)	Limit (dBm)
3	5740	64QAM 5/6	130	-11.53	-9.43	-8.27	8
12	5785	64QAM 5/6	130	-13.29	-10.08	-3.47	8
22	5835	64QAM 5/6	130	-11.29	-11.60	-2.05	8
3	5740	16QAM 3/4	78	-4.97	-5.59	-2.60	8
12	5785	16QAM 3/4	78	-2.07	-5.97	-0.01	8
22	5835	16QAM 3/4	78	-5.01	-1.98	2.61	8
3	5740	QPSK 3/4	39	-2.31	-9.29	-8.77	8
12	5785	QPSK 3/4	39	-3.38	-5.55	-0.85	8
22	5835	QPSK 3/4	39	-3.67	-3.93	1.55	8
3	5740	BPSK 1/2	13	-9.29	-9.59	-4.68	8
12	5785	BPSK 1/2	13	-3.36	-8.00	-3.40	8
22	5835	BPSK 1/2	13	-5.78	-11.36	0.77	8

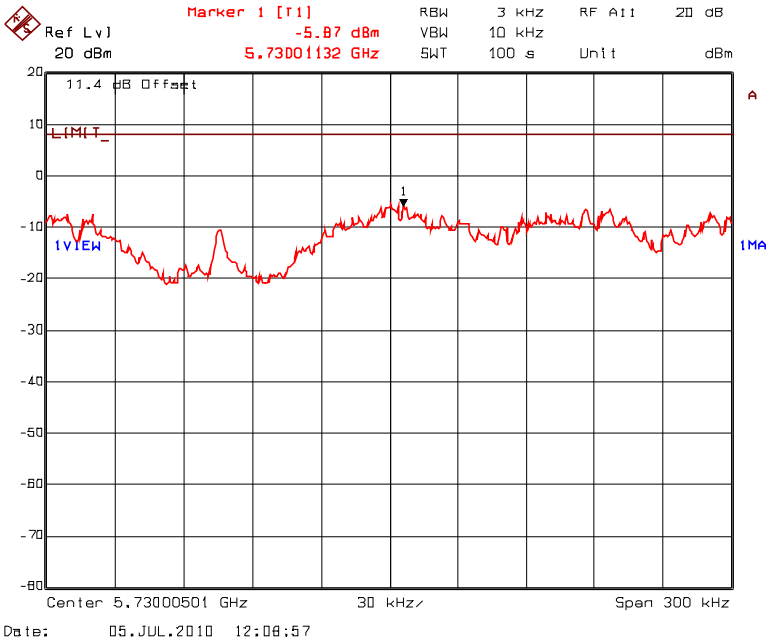
4.10.5.4. Test Configuration # 4: 40 MHz Channel Spacing

Channel (40MHz)	Frequency (MHz)	Modulation	Data Rate (Mbps)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	Combine (dBm)	Limit (dBm)
5	5750	64QAM 5/6	300	-14.07	-19.71	-9.01	8
12	5785	64QAM 5/6	300	-10.70	-6.65	-2.31	8
20	5825	64QAM 5/6	300	-12.67	-5.77	-10.66	8
5	5750	16QAM 3/4	180	-5.78	-5.57	-2.70	8
12	5785	16QAM 3/4	180	-11.51	-5.34	-5.55	8
20	5825	16QAM 3/4	180	-1.49	-5.06	-1.84	8
5	5750	QPSK 3/4	90	-6.15	-6.29	-6.71	8
12	5785	QPSK 3/4	90	-1.89	-2.01	2.12	8
20	5825	QPSK 3/4	90	-5.75	-7.39	2.51	8
5	5750	BPSK 1/2	30	-2.78	-3.14	-2.34	8
12	5785	BPSK 1/2	30	-3.59	-3.79	-6.80	8
20	5825	BPSK 1/2	30	-3.14	-3.43	-4.50	8

Plot # 79(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

CHAIN 1 & CHAIN 2

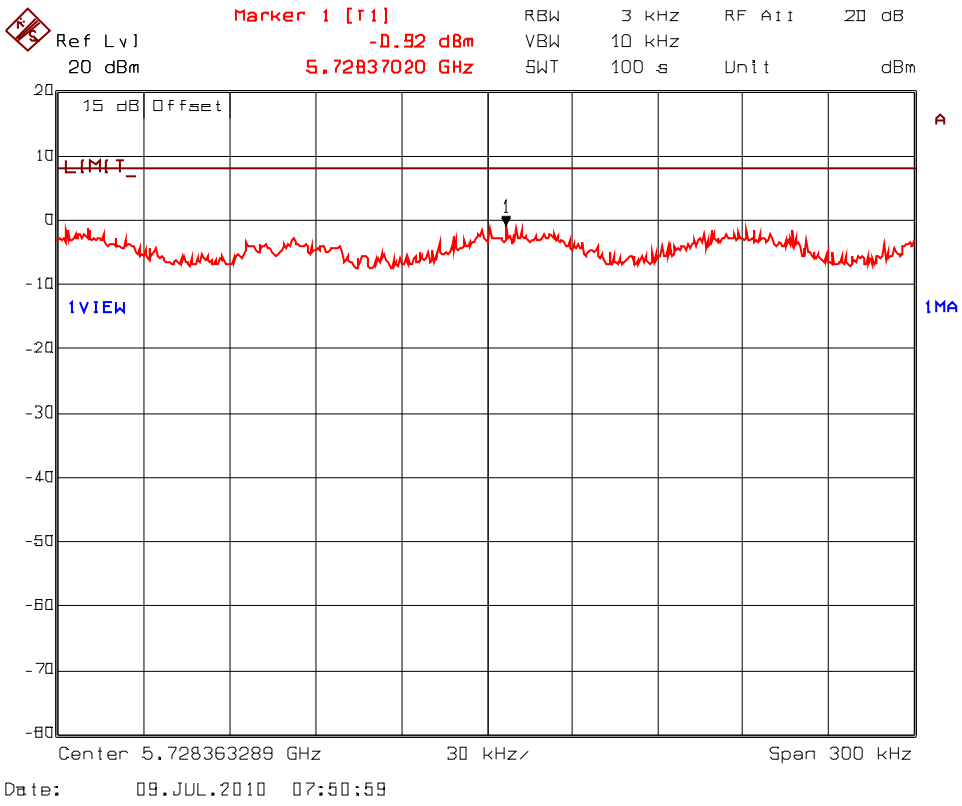




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

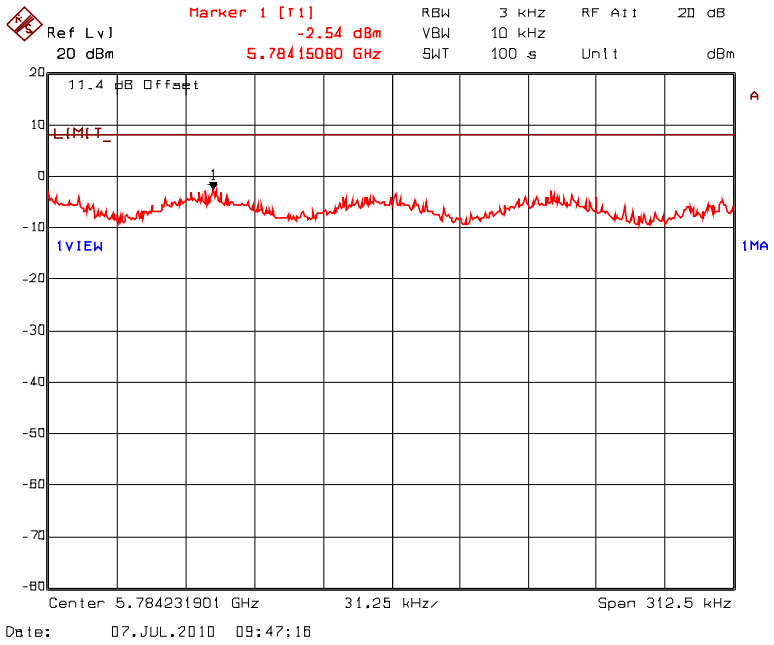
Plot # 79(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

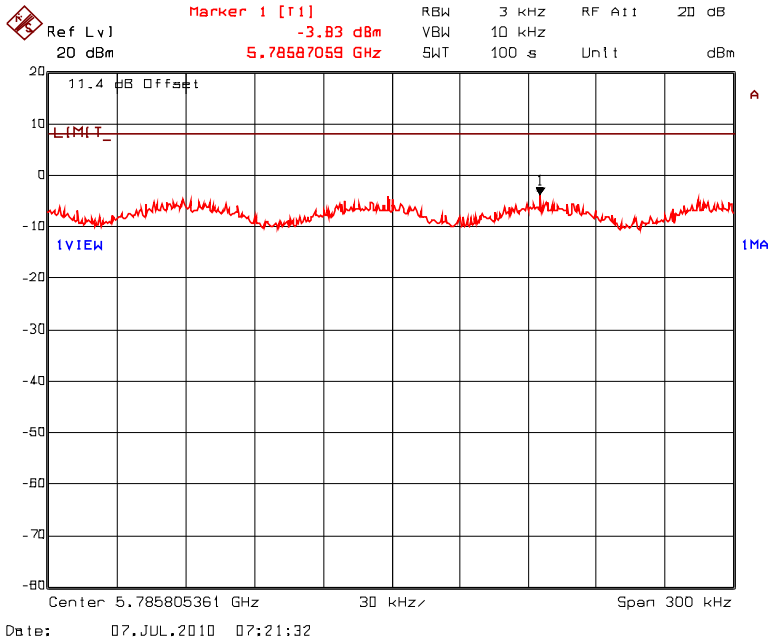
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 80(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

CHAIN 1 & CHAIN 2

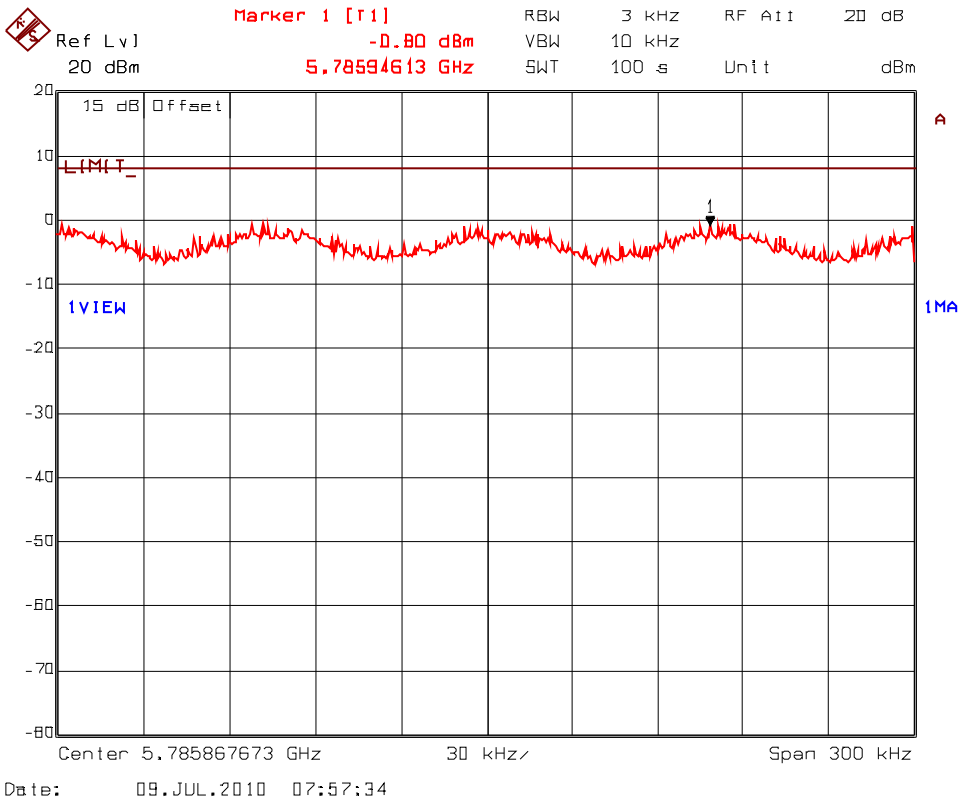




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 80(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

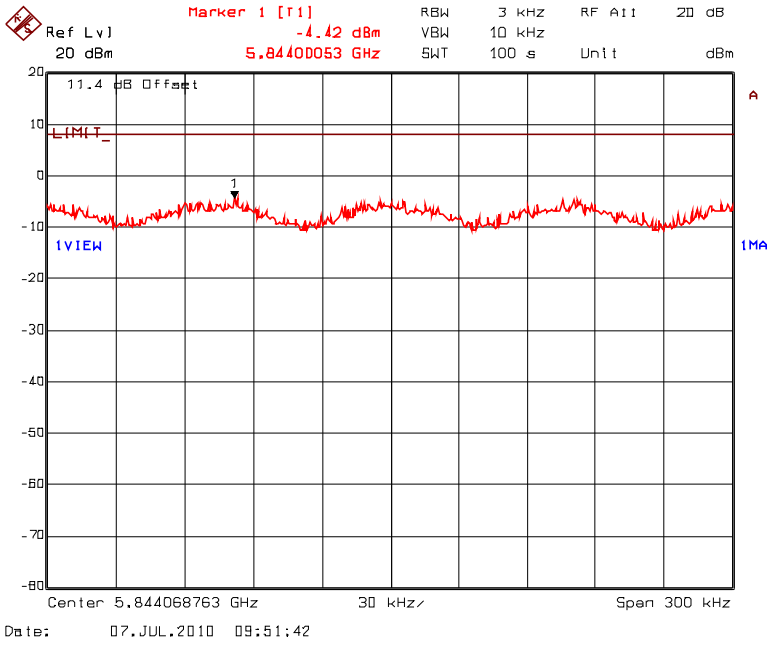
COMBINER (CHAIN 1 + CHAIN 2)

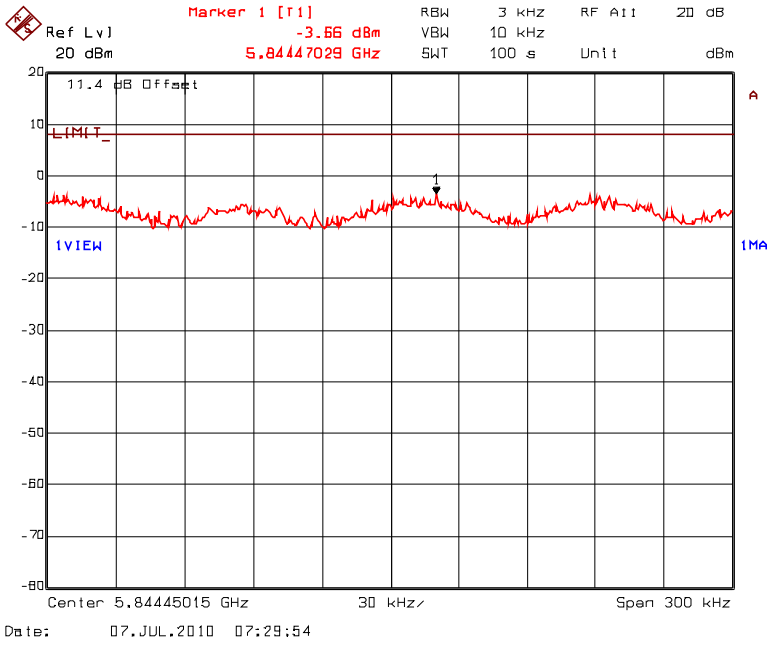


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 81(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

CHAIN 1 & CHAIN 2

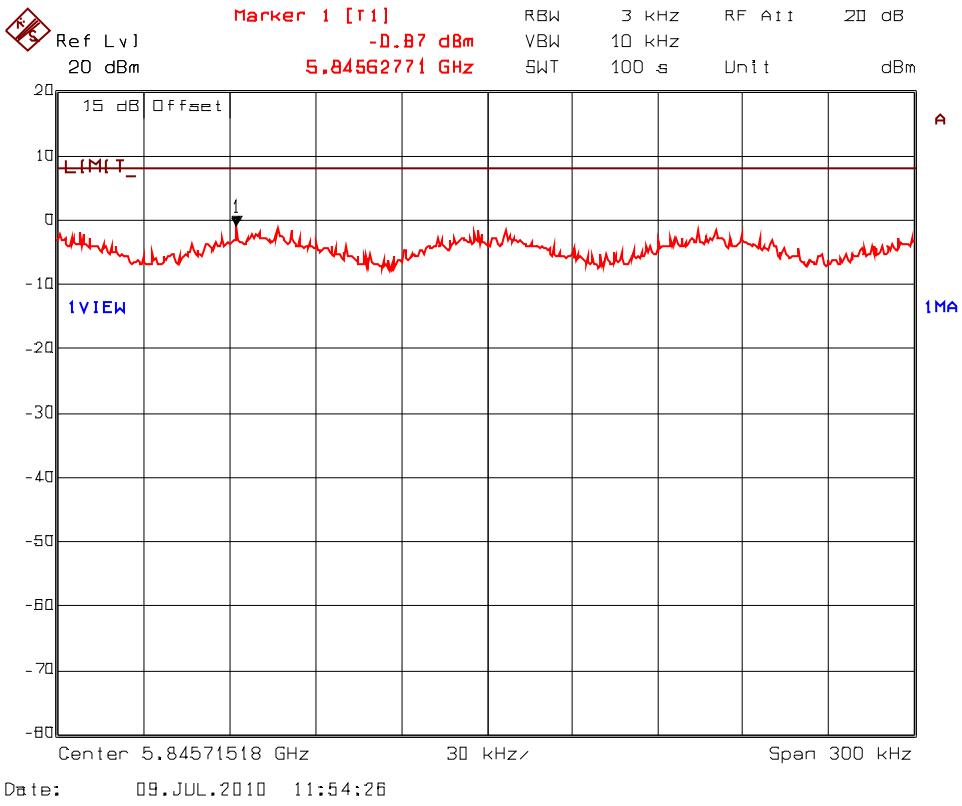




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

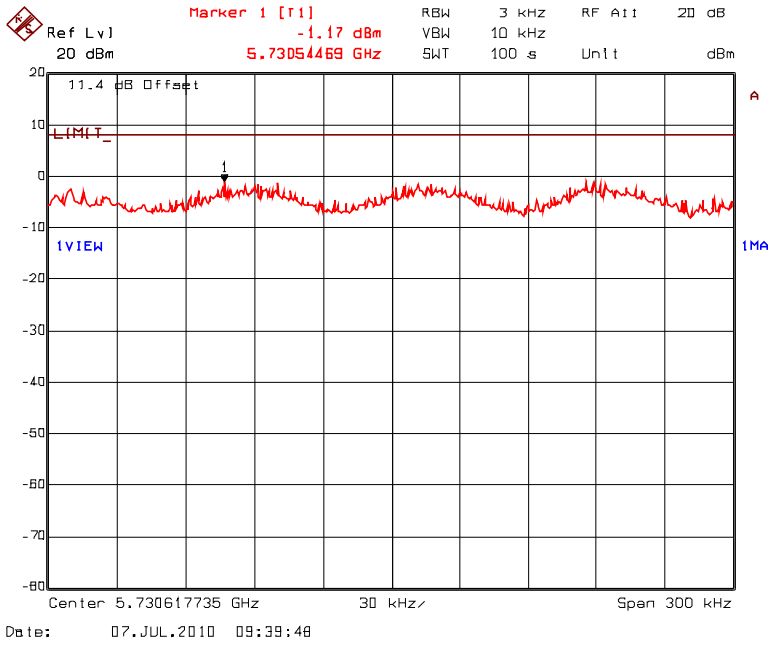
Plot # 81(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: 64QAM 5/6 @ 32.5Mb/s

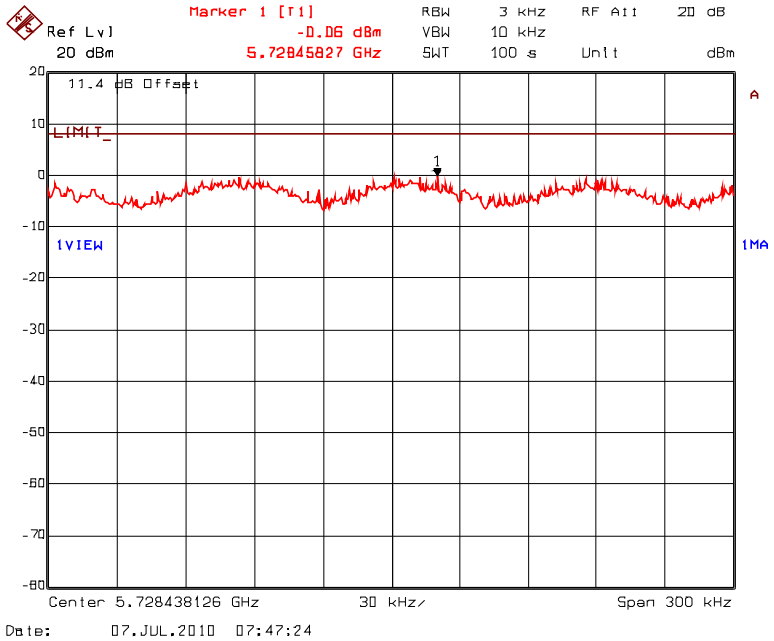
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 82(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

CHAIN 1 & CHAIN 2

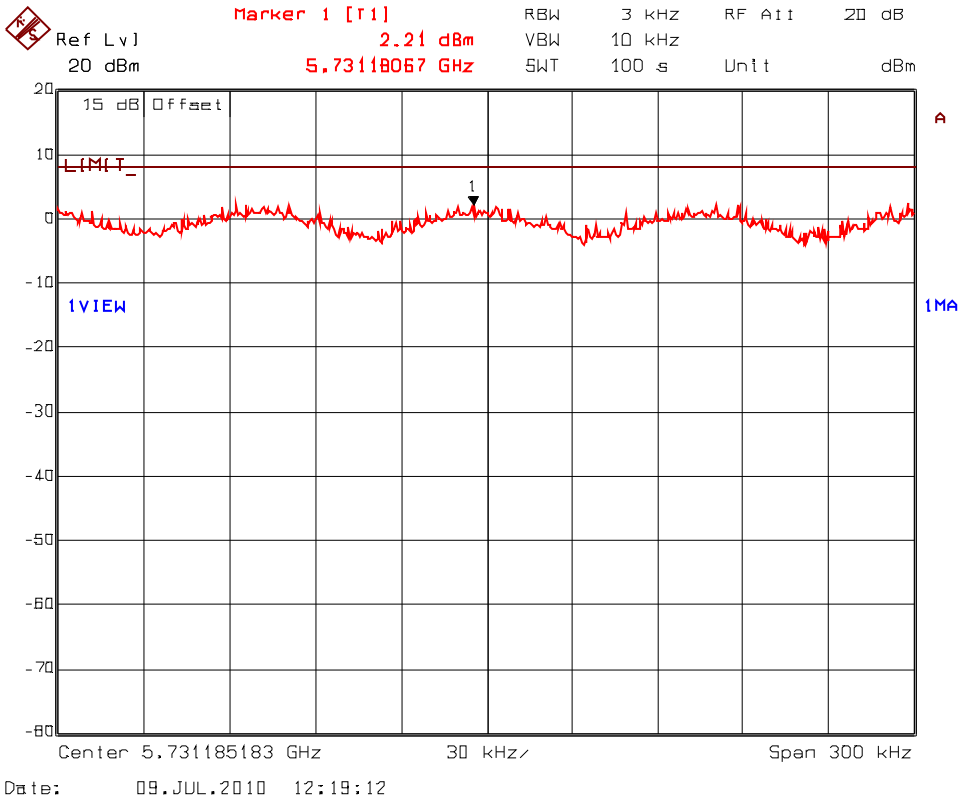




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 82(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

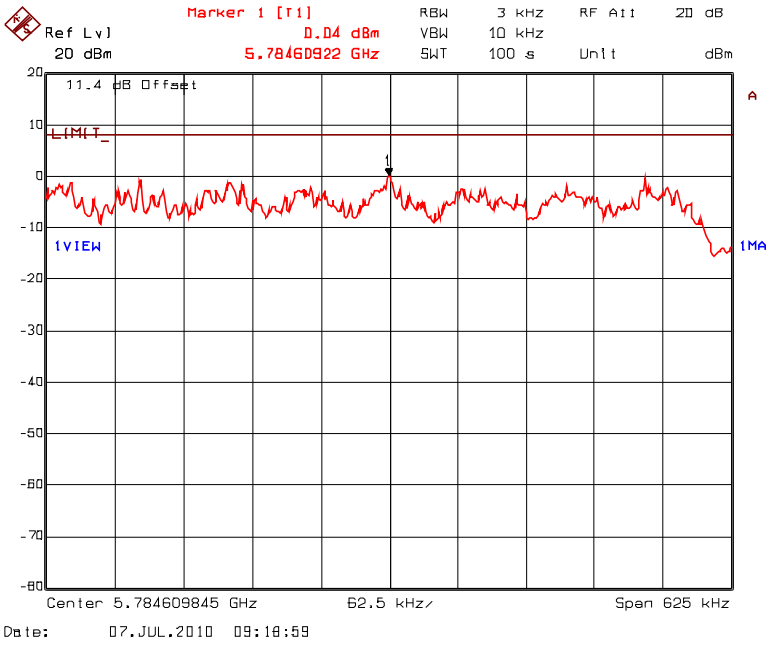
COMBINER (CHAIN 1 + CHAIN 2)

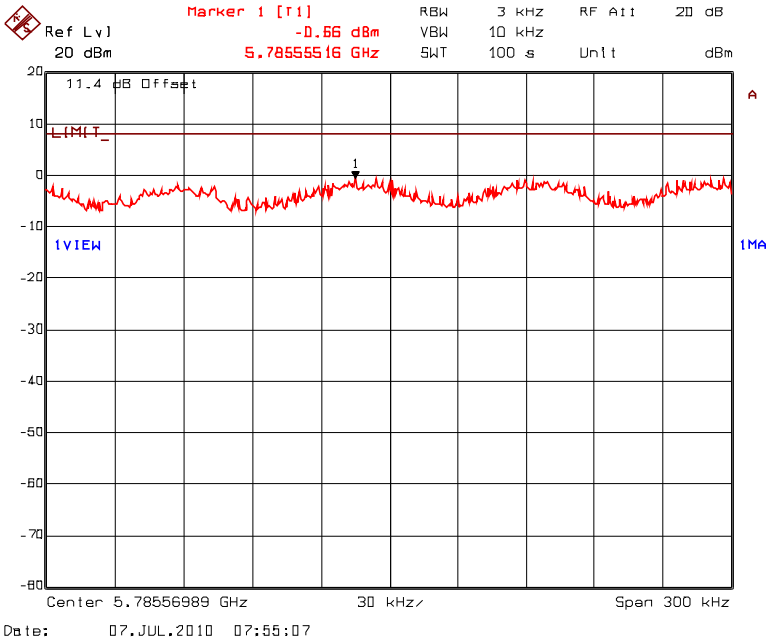


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 83(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

CHAIN 1 & CHAIN 2

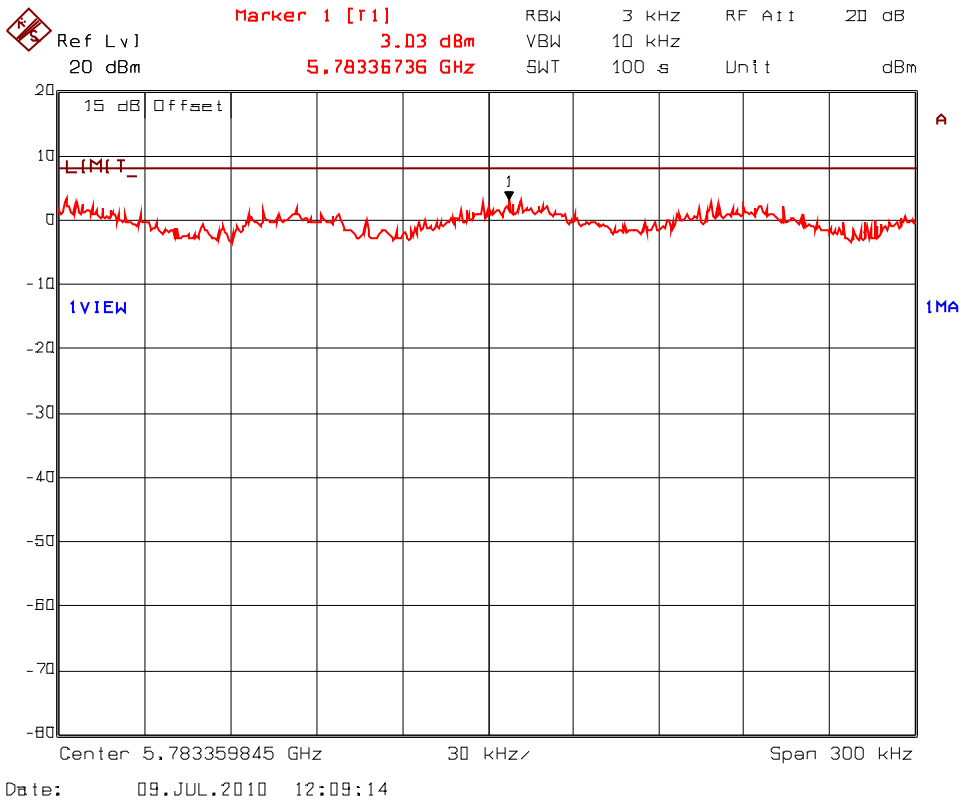




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 83(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

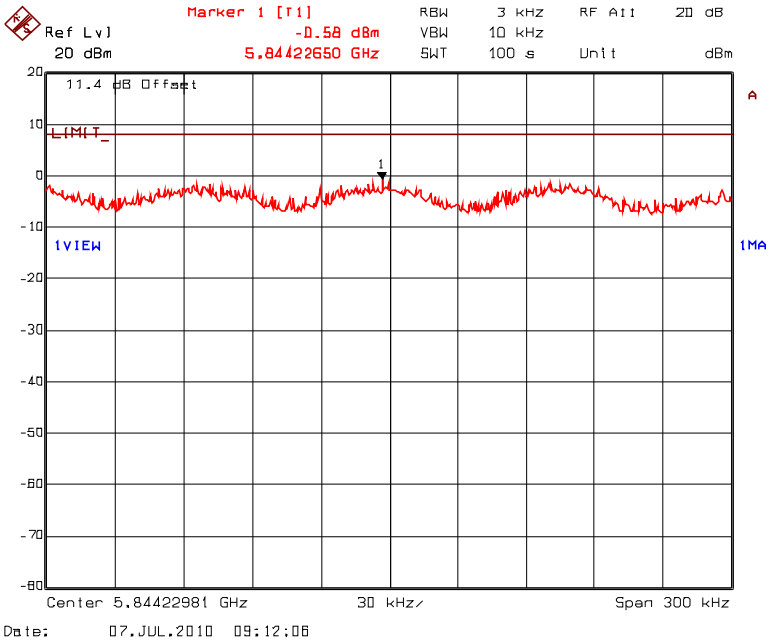
COMBINER (CHAIN 1 + CHAIN 2)

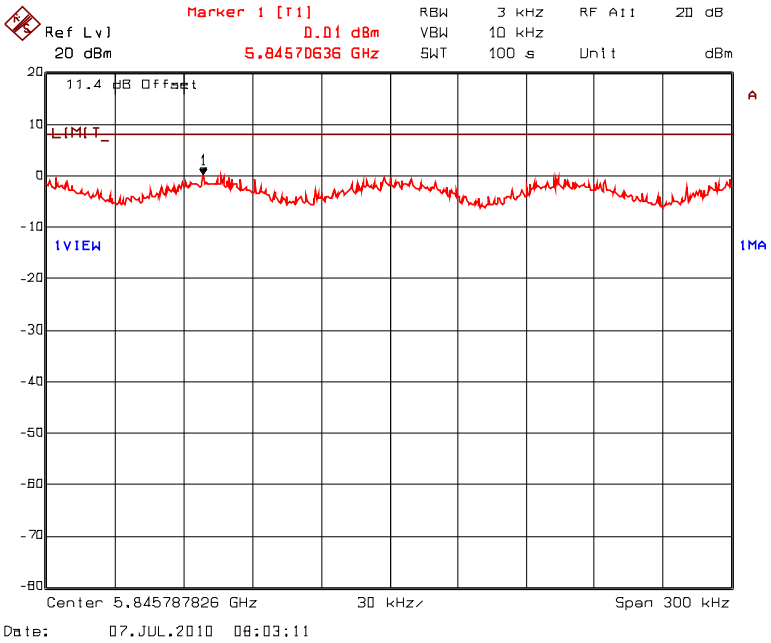


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 84(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

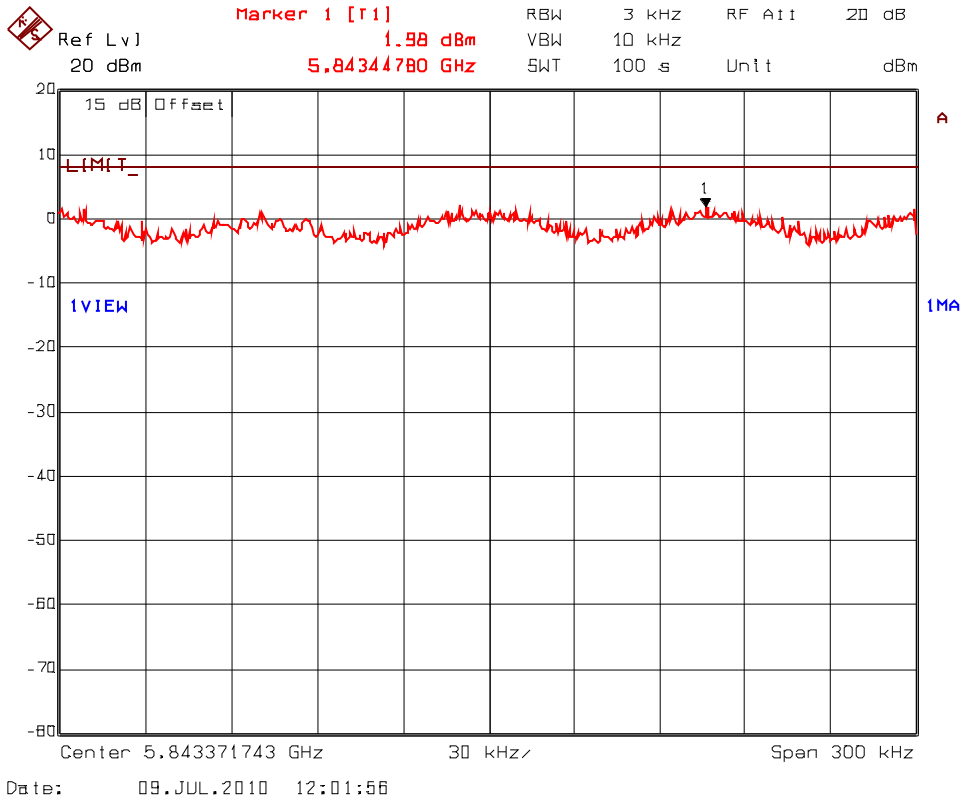
CHAIN 1 & CHAIN 2





Plot # 84(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: 16QAM 3/4 @ 19.5Mb/s

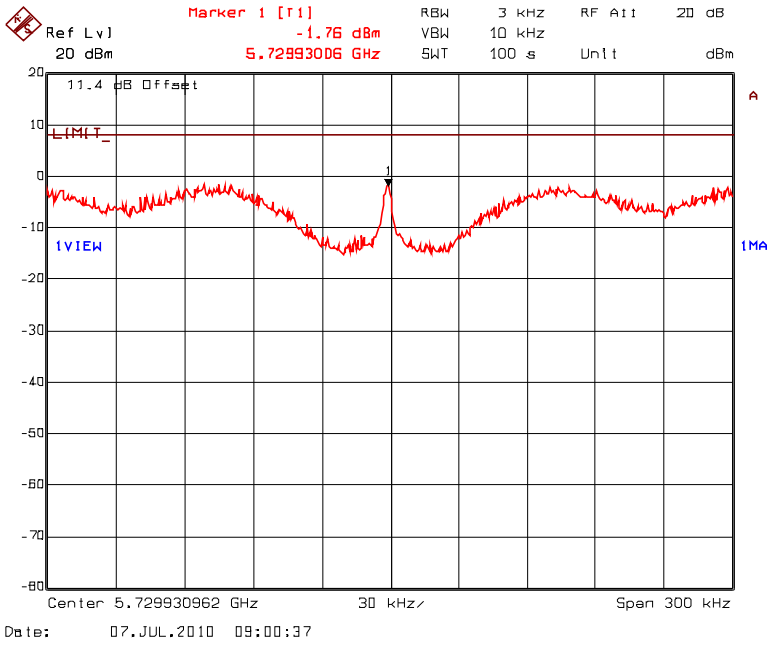
COMBINER (CHAIN 1 + CHAIN 2)

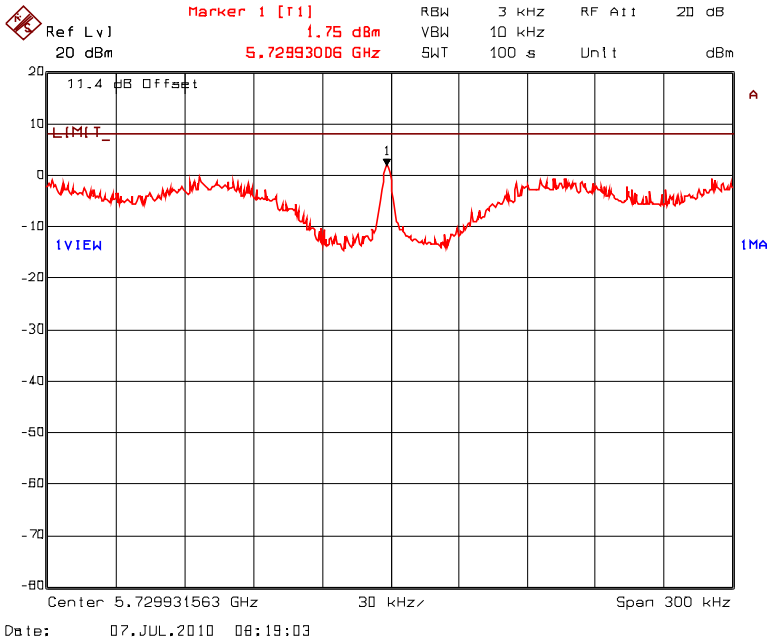


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 85(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

CHAIN 1 & CHAIN 2

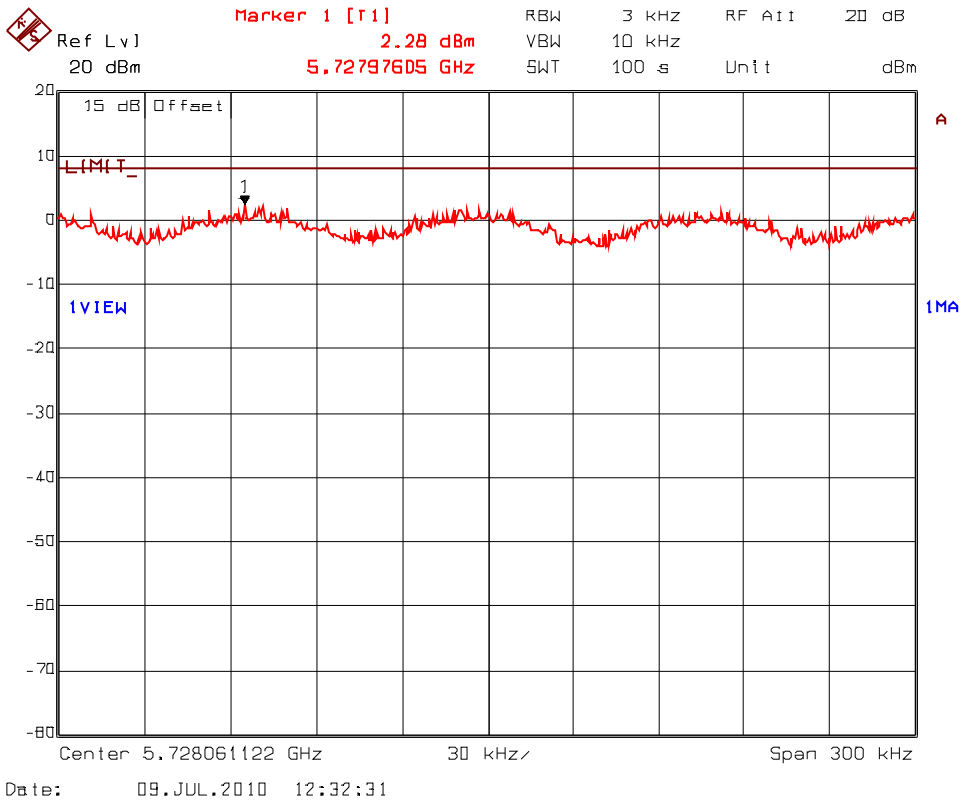




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 85(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

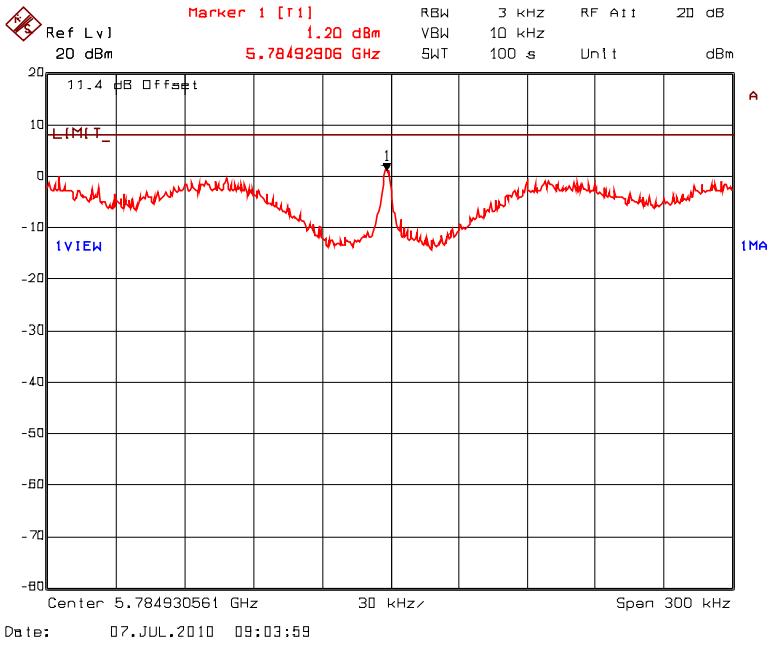
COMBINER (CHAIN 1 + CHAIN 2)

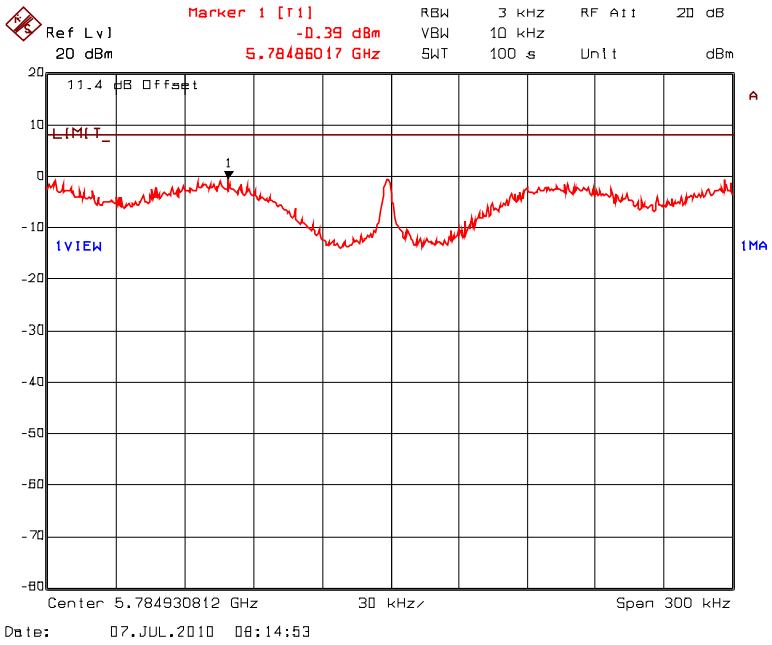


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 86(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

CHAIN 1 & CHAIN 2

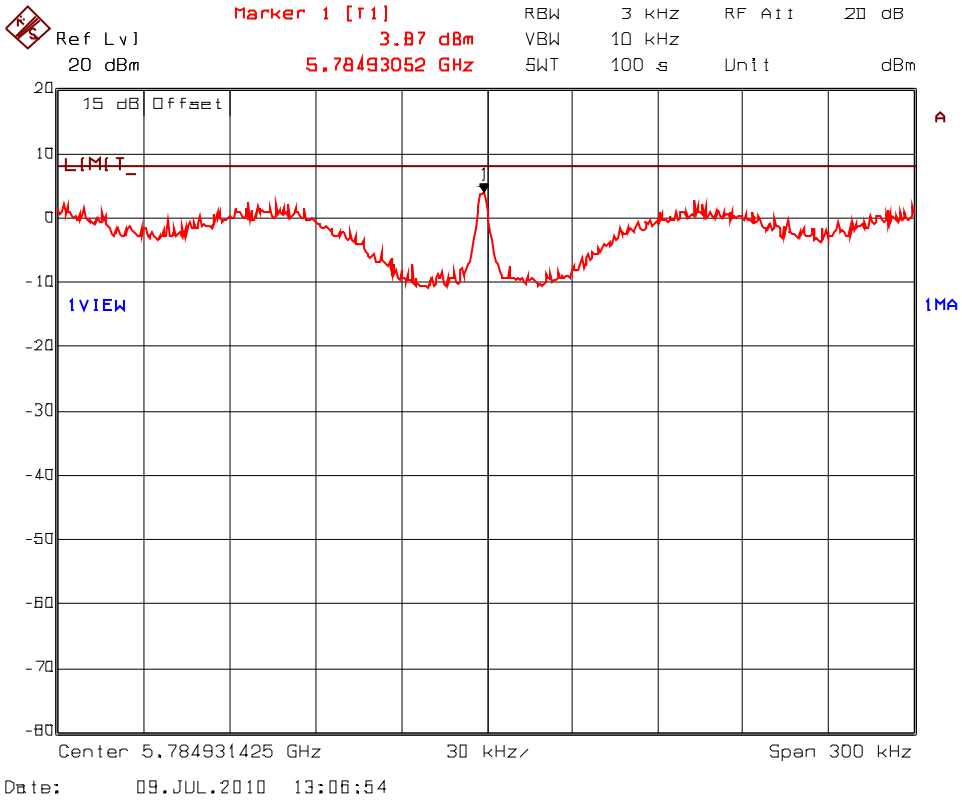




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 86(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

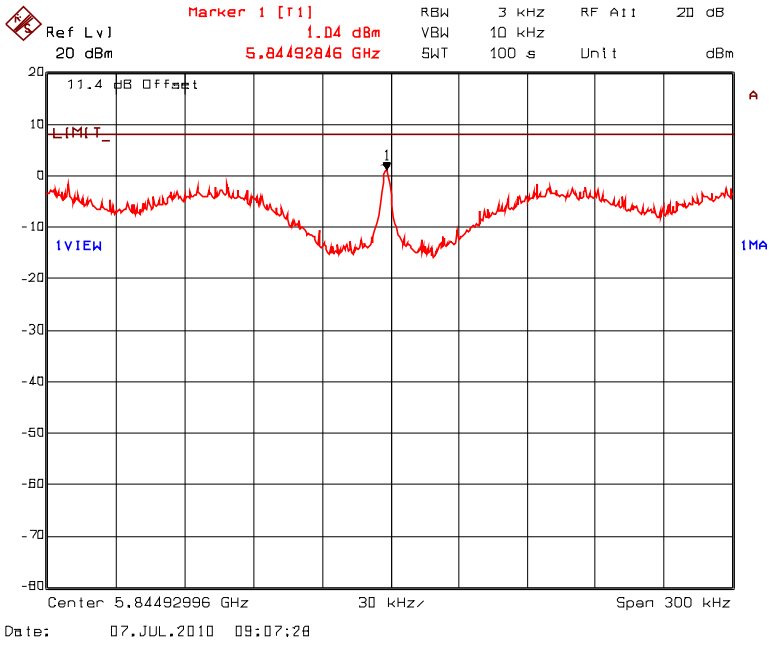
COMBINER (CHAIN 1 + CHAIN 2)

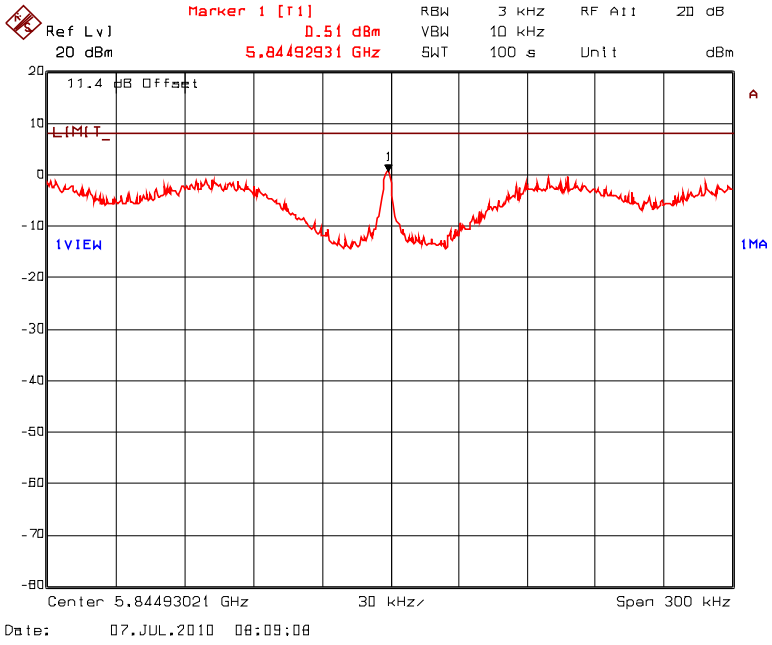


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 87(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

CHAIN 1 & CHAIN 2

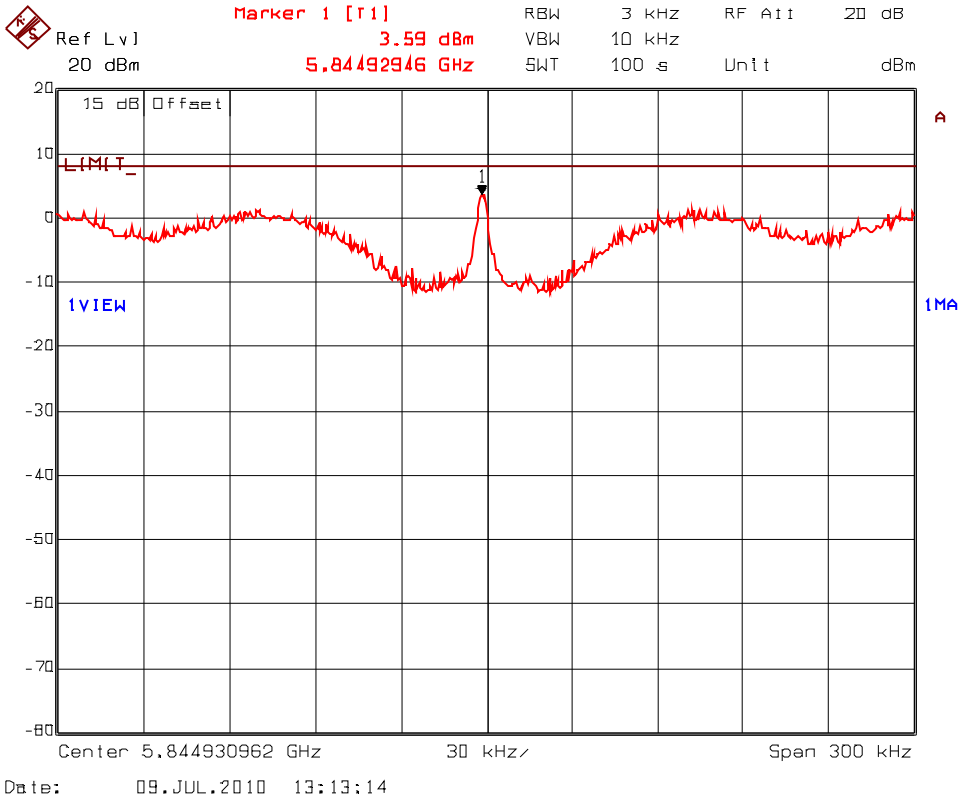




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 87(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: QPSK 3/4 @ 9.7Mb/s

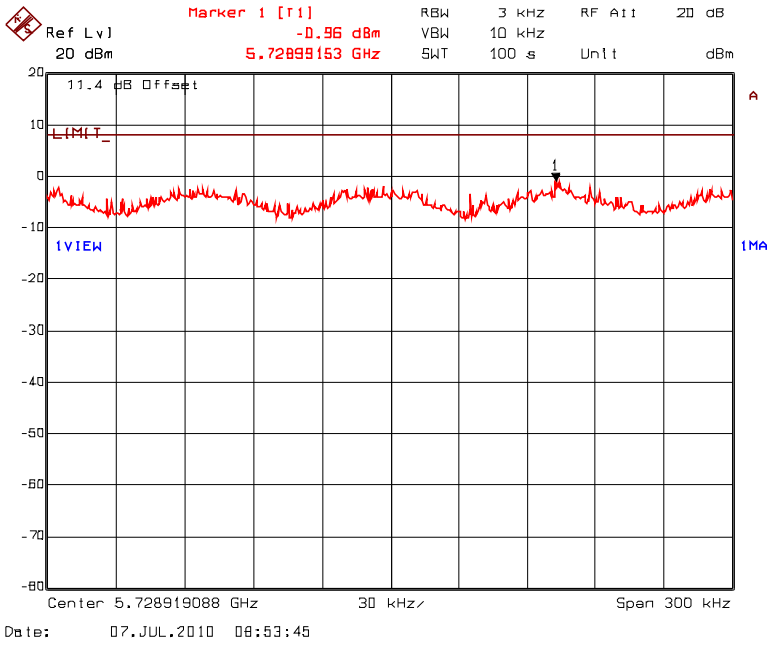
COMBINER (CHAIN 1 + CHAIN 2)

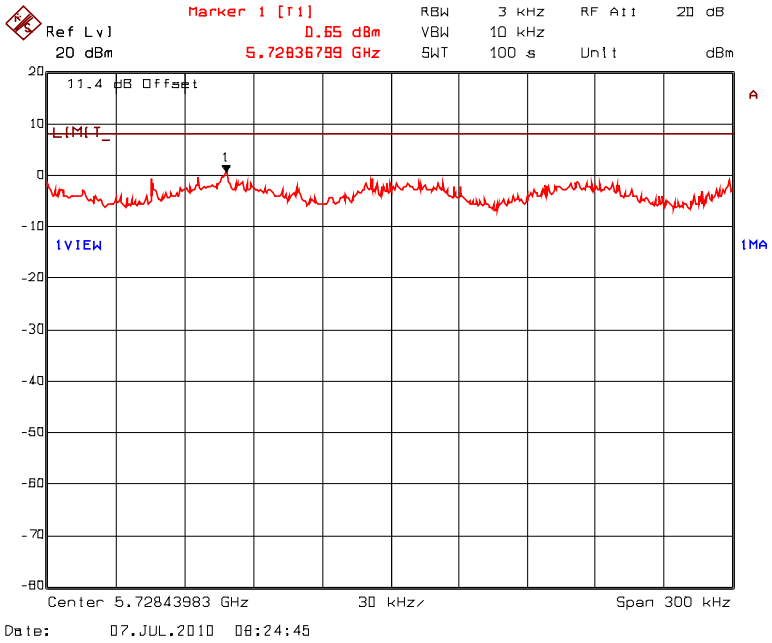


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 88(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

CHAIN 1 & CHAIN 2

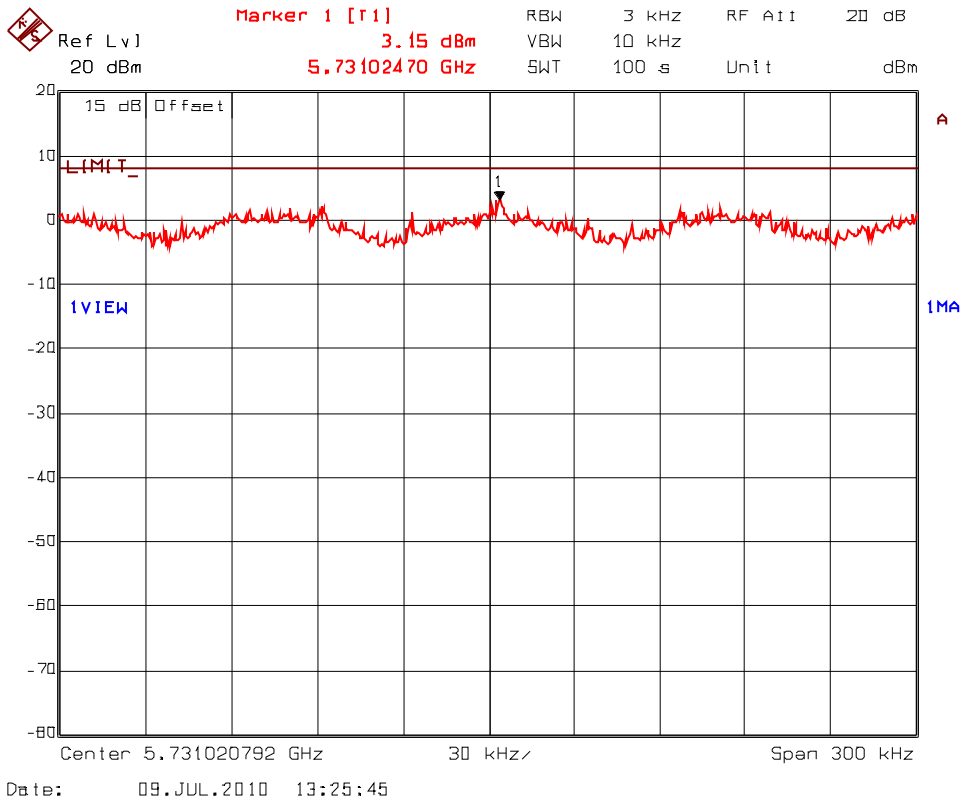




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 88(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5730 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

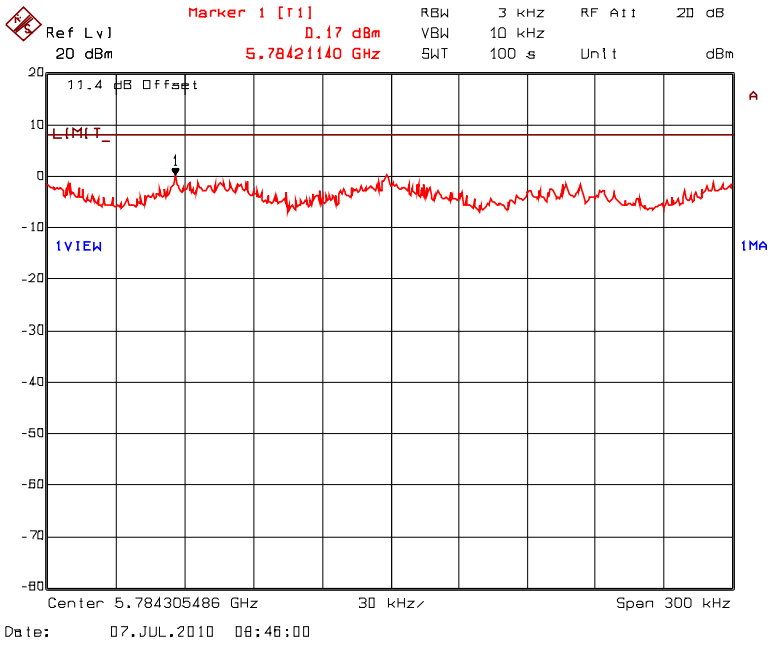
COMBINER (CHAIN 1 + CHAIN 2)

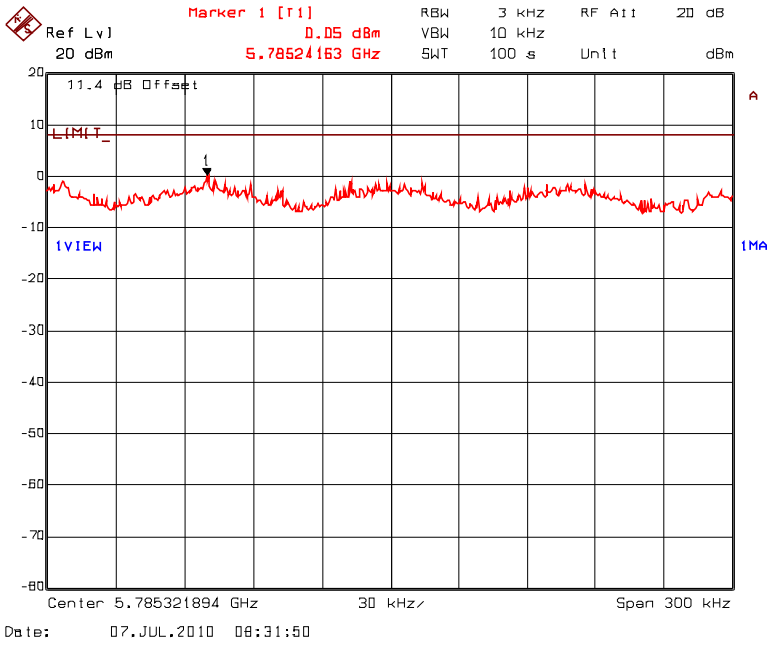


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 89(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

CHAIN 1 & CHAIN 2

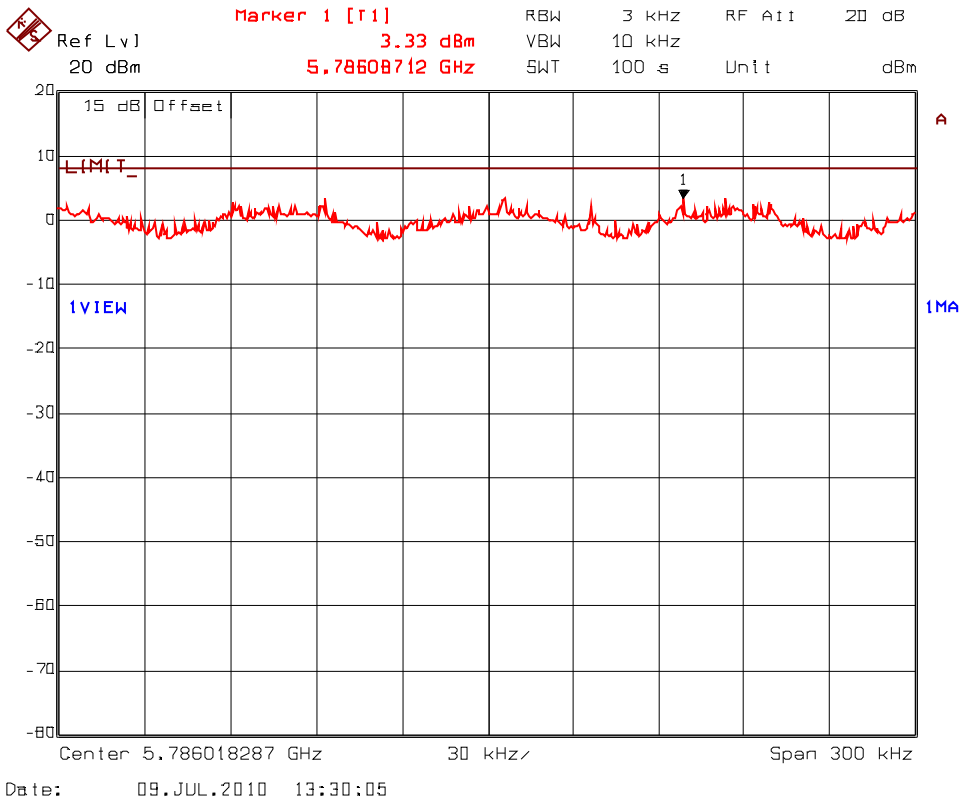




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 89(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

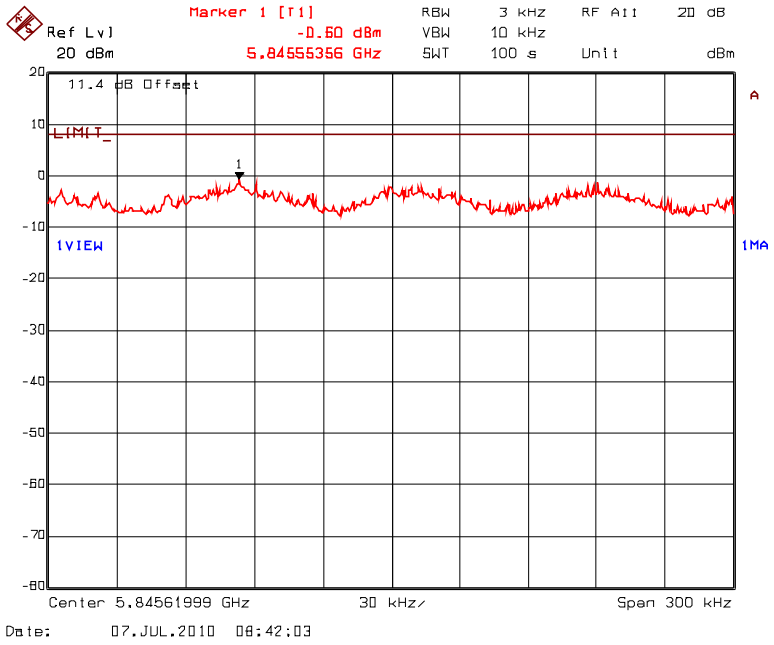
COMBINER (CHAIN 1 + CHAIN 2)

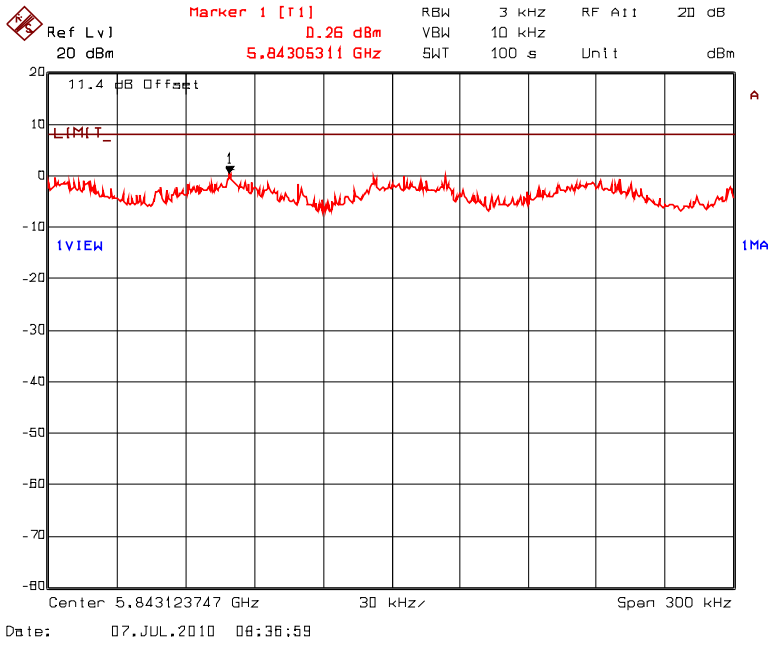


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 90(a): Transmitted Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

CHAIN 1 & CHAIN 2

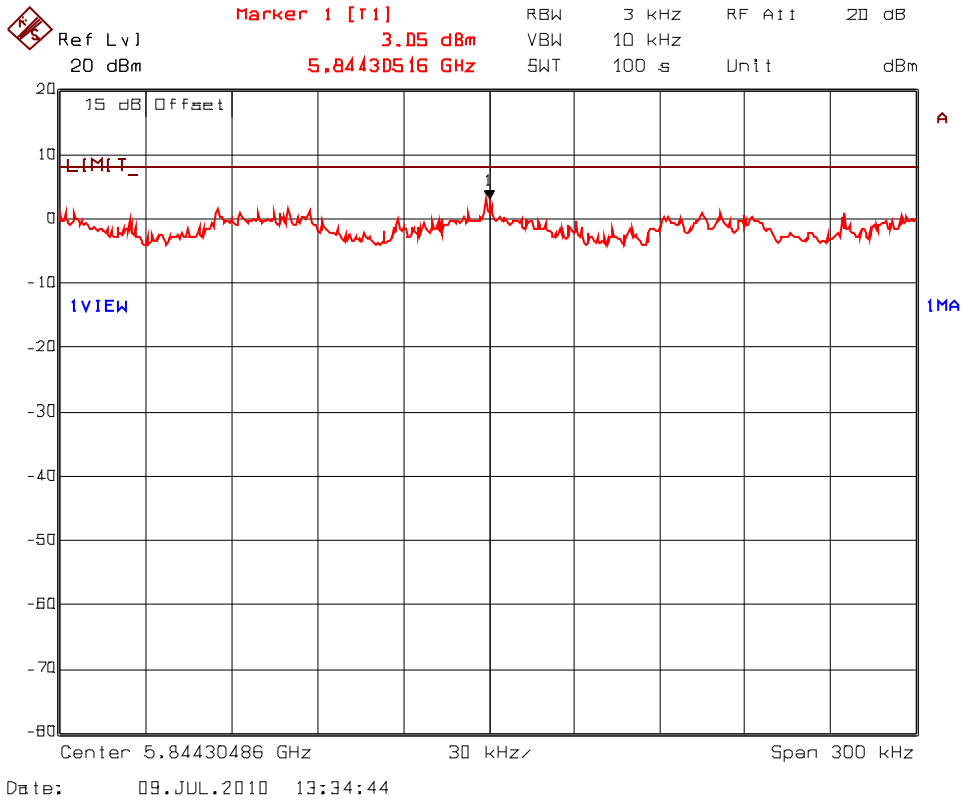




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 90(b): Combined Tx Power Density in 3 kHz BW wrt. 5 MHz Channel Spacing Frequency: 5845 MHz, Modulation: BPSK 1/2 @ 3.2Mb/s

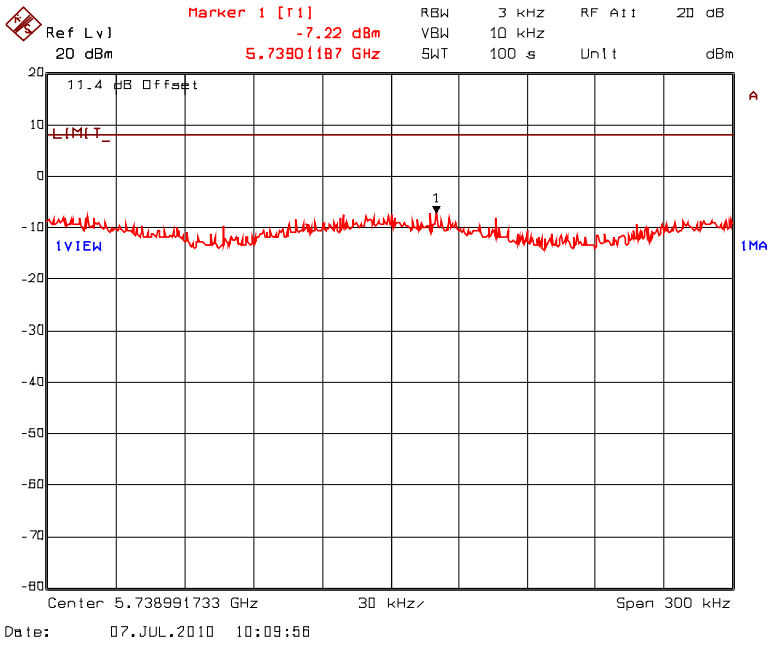
COMBINER (CHAIN 1 + CHAIN 2)

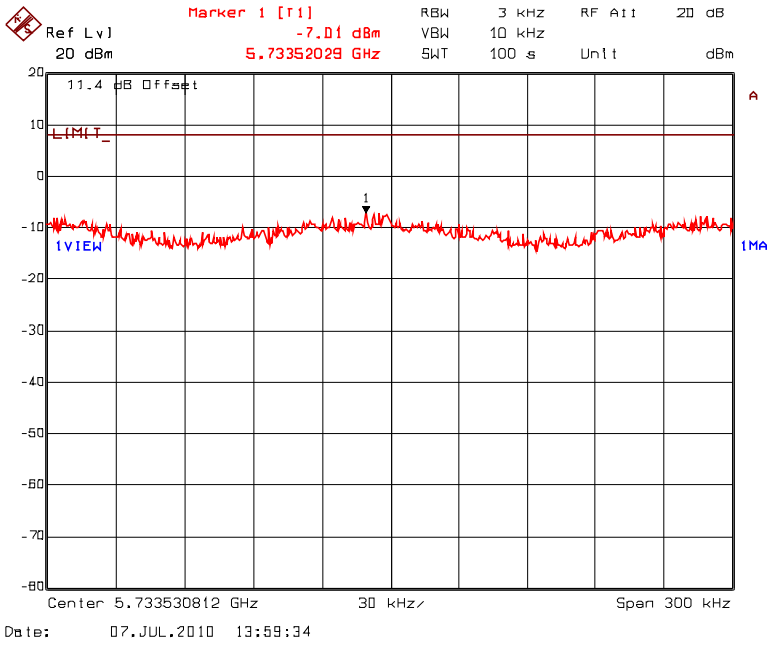


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 91(a): Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5735 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

CHAIN 1 & CHAIN 2

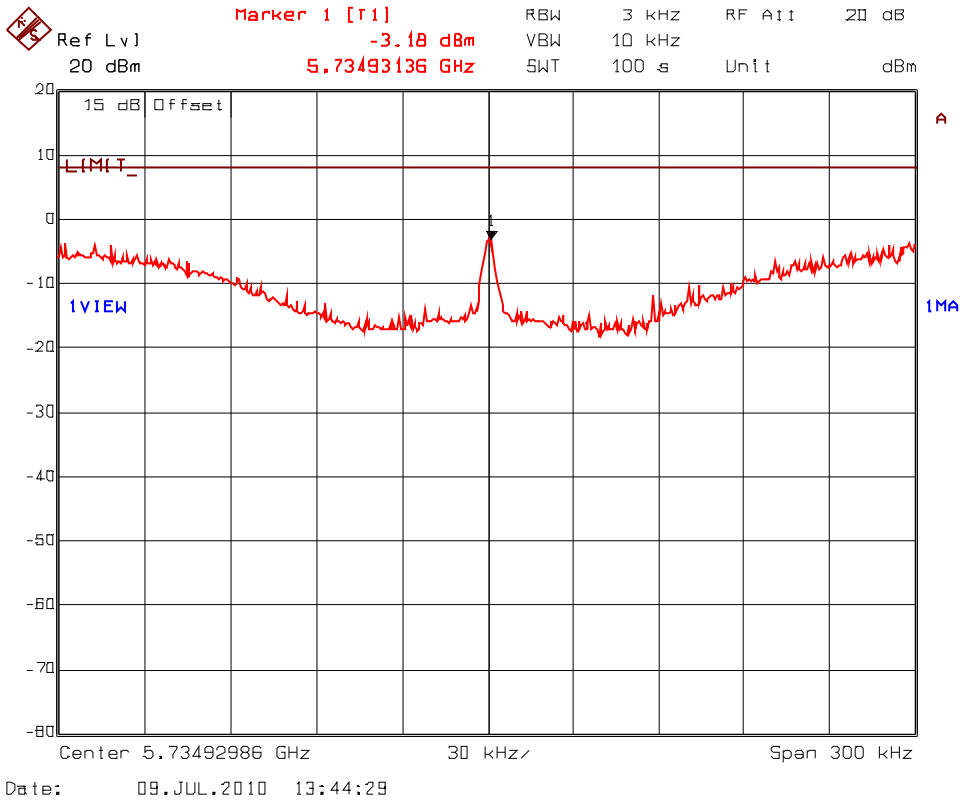




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

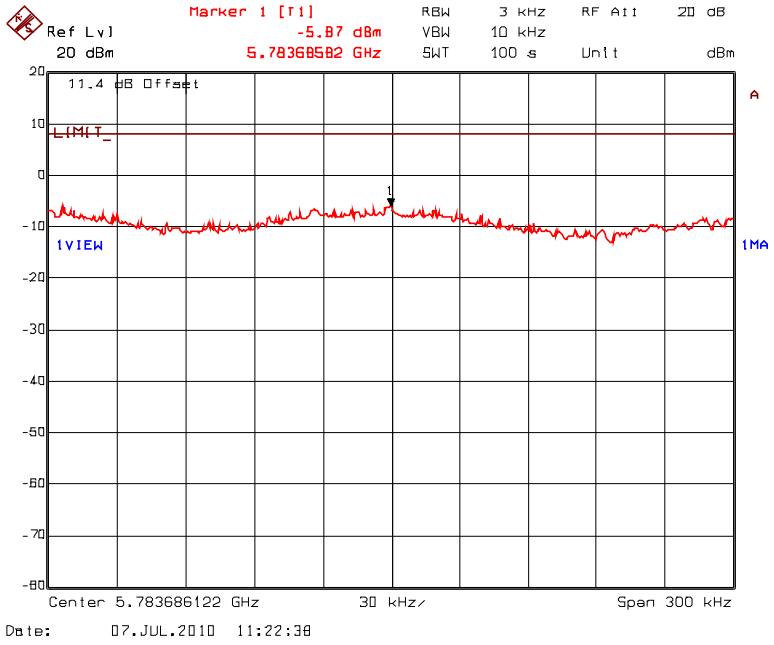
Plot # 91(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5735 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

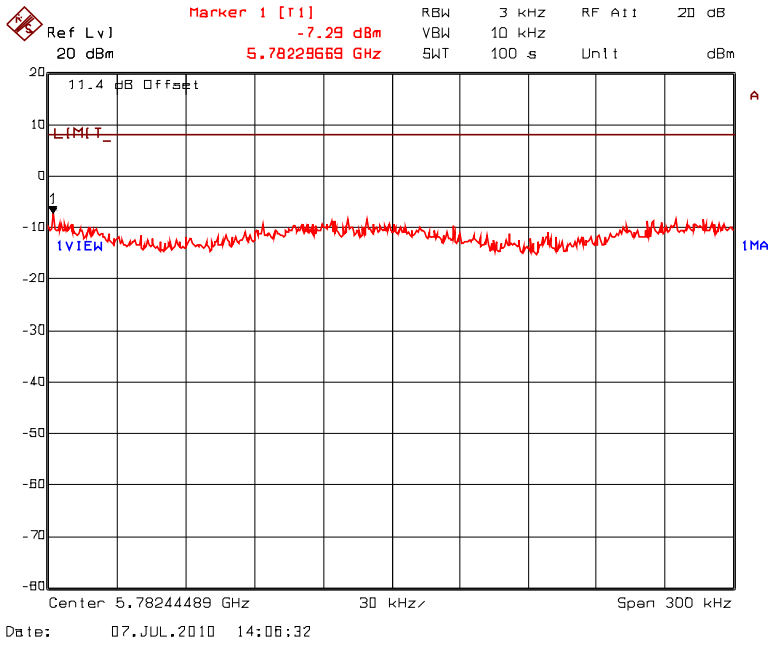
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 92(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

CHAIN 1 & CHAIN 2

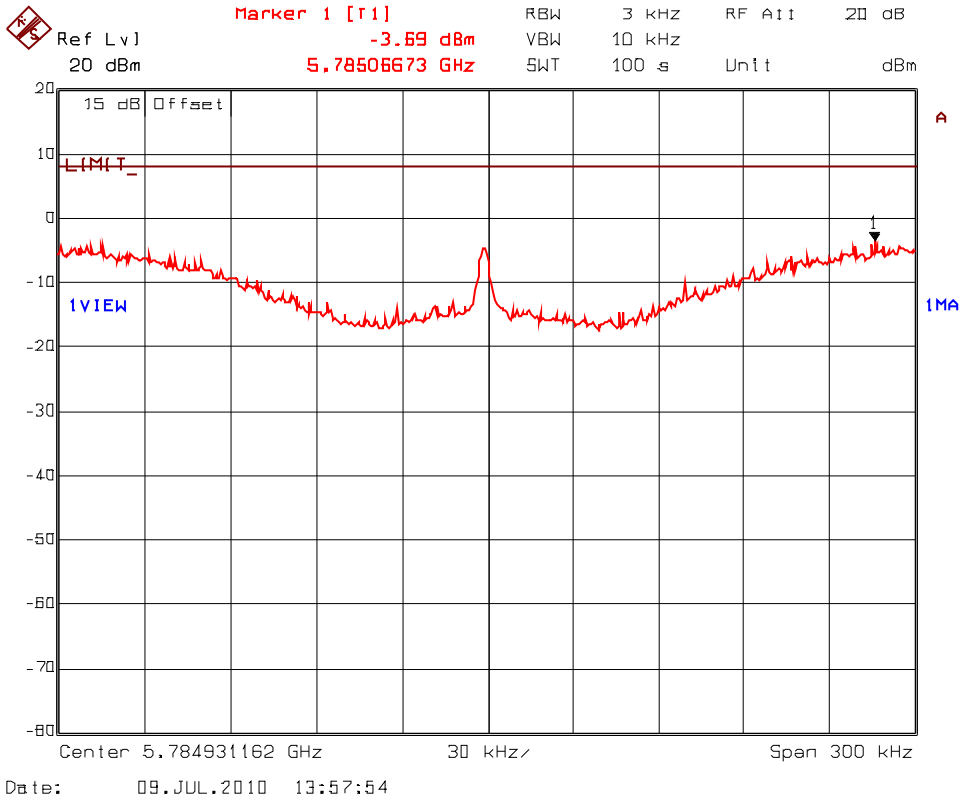




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 92(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

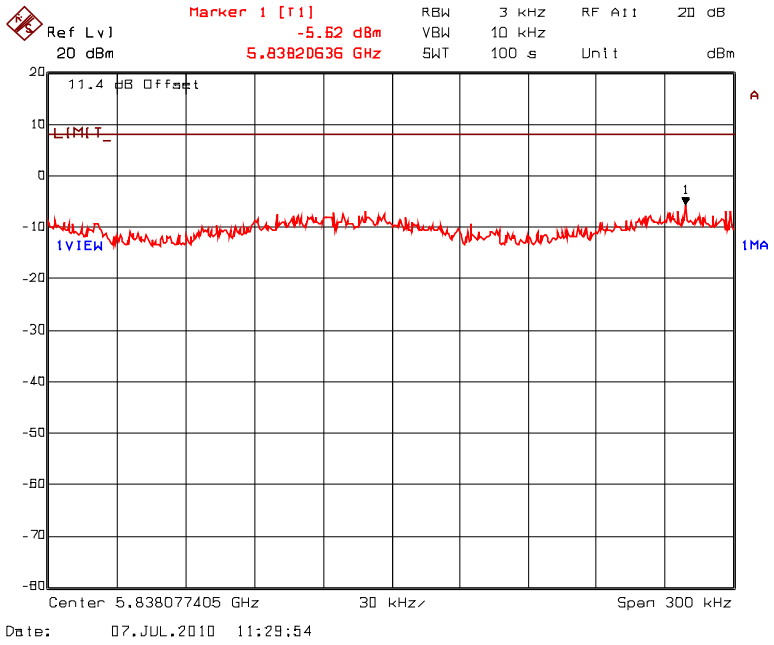
COMBINER (CHAIN 1 + CHAIN 2)

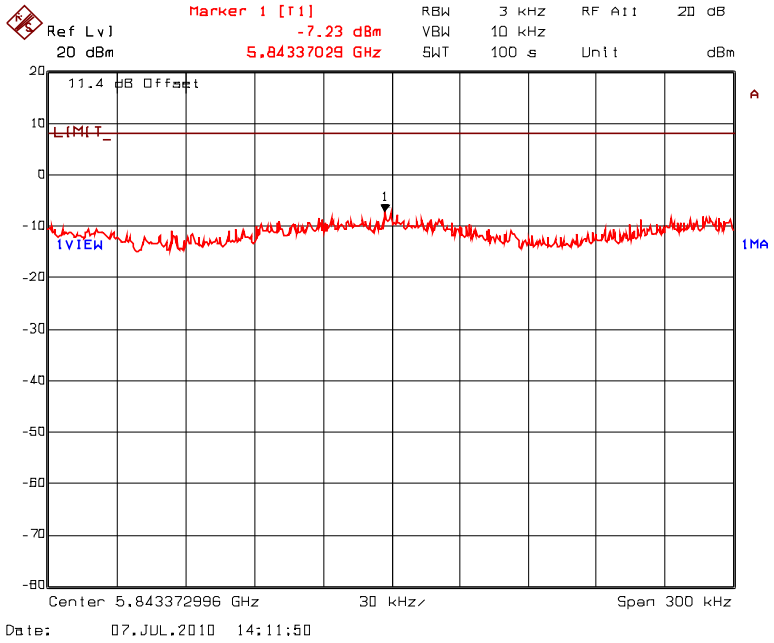


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 93(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

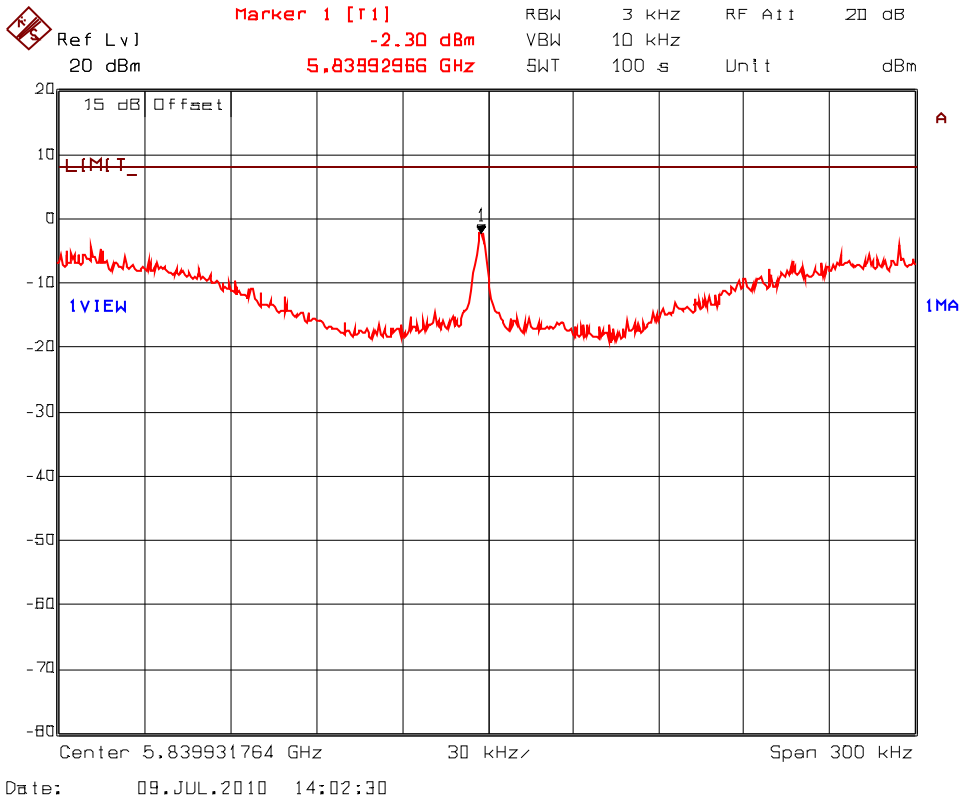
CHAIN 1 & CHAIN 2





Plot # 93(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: 64QAM 5/6 @ 65Mb/s

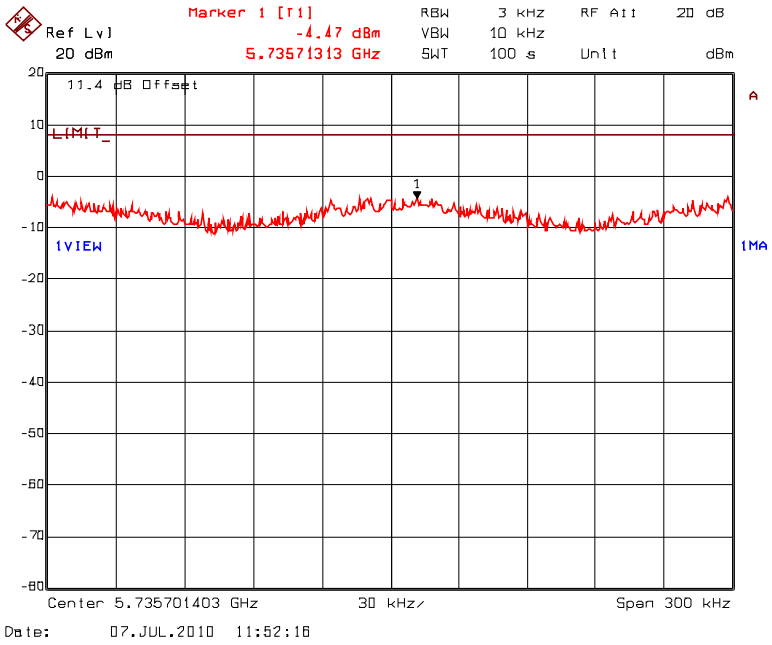
COMBINER (CHAIN 1 + CHAIN 2)

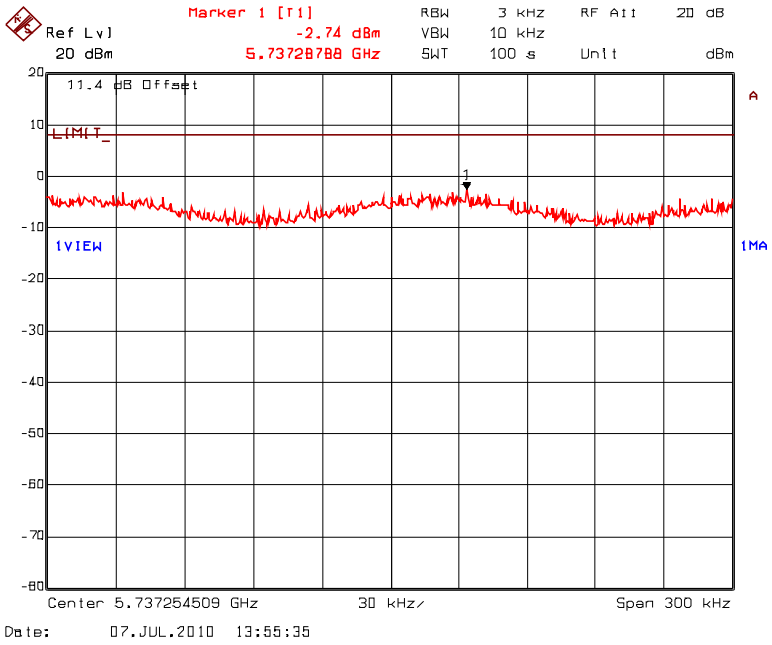


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 94(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5735 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

CHAIN 1 & CHAIN 2

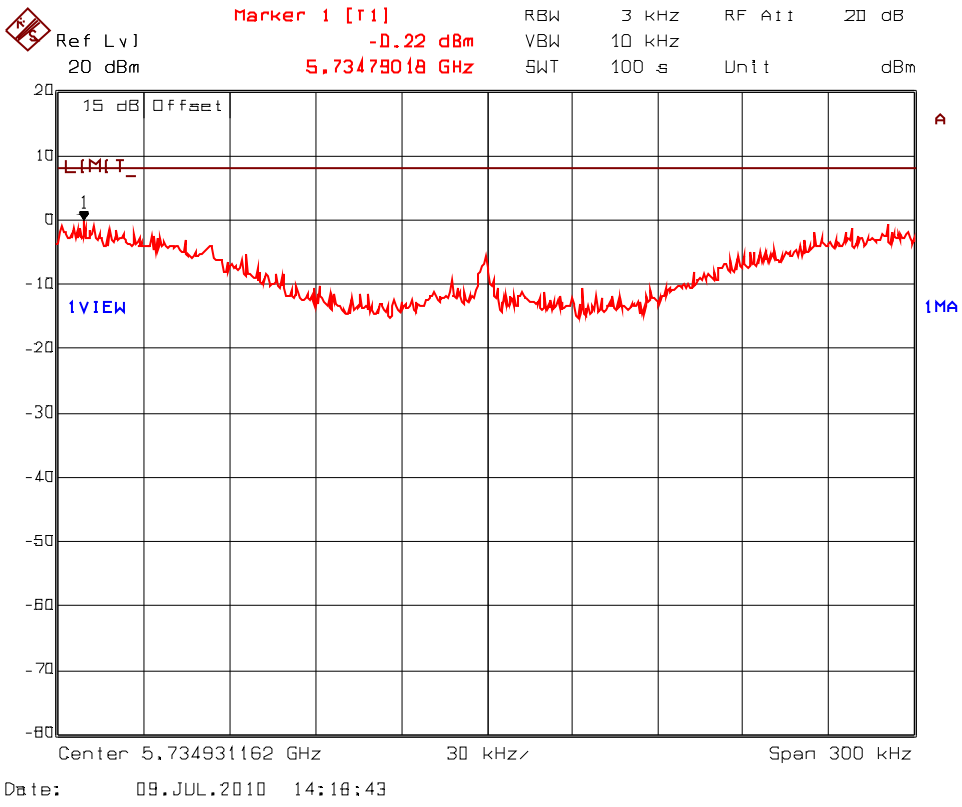




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 94(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5735 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

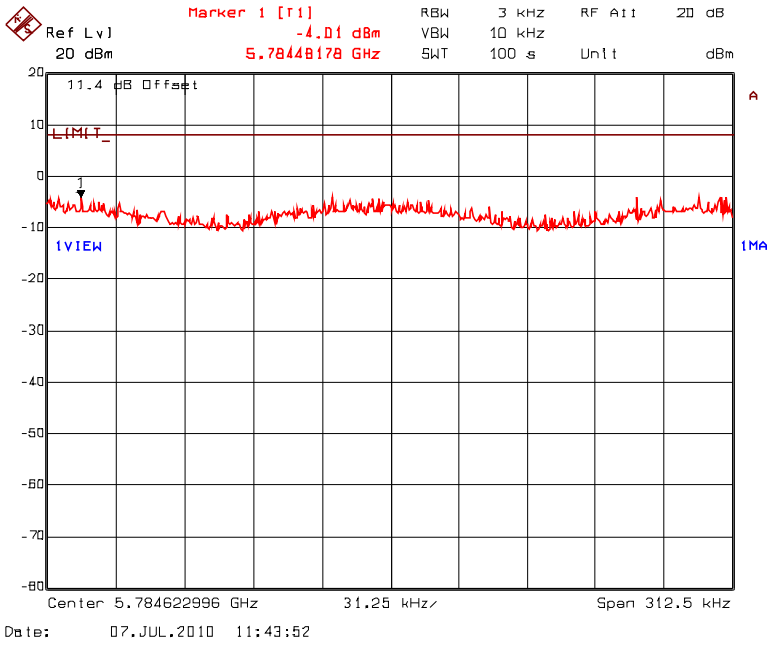
COMBINER (CHAIN 1 + CHAIN 2)

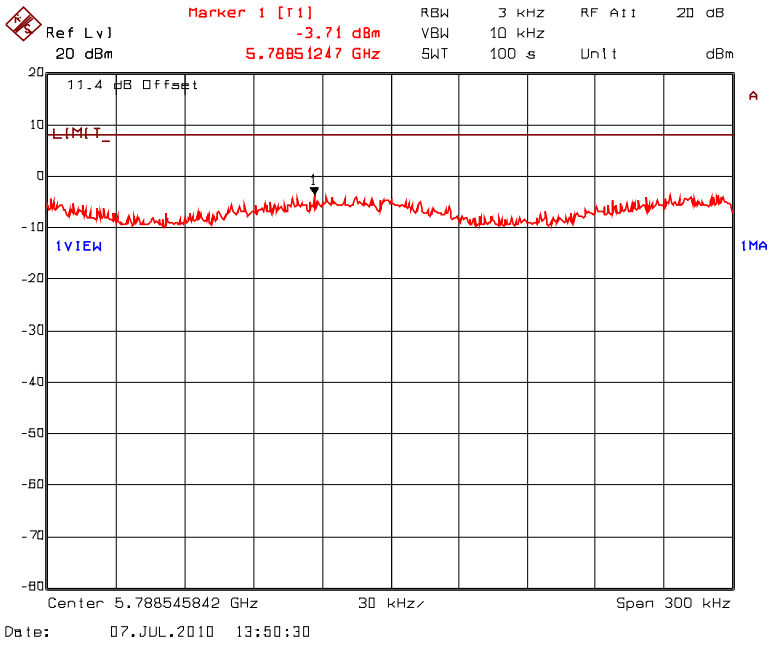


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 95(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

CHAIN 1 & CHAIN 2

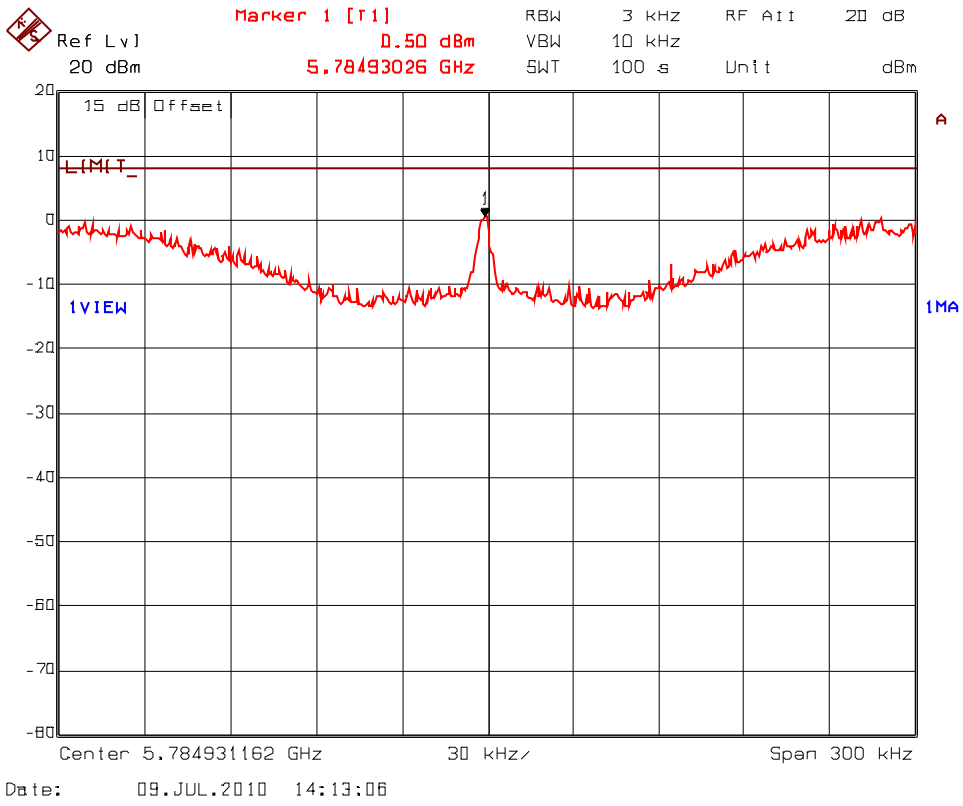




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 95(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

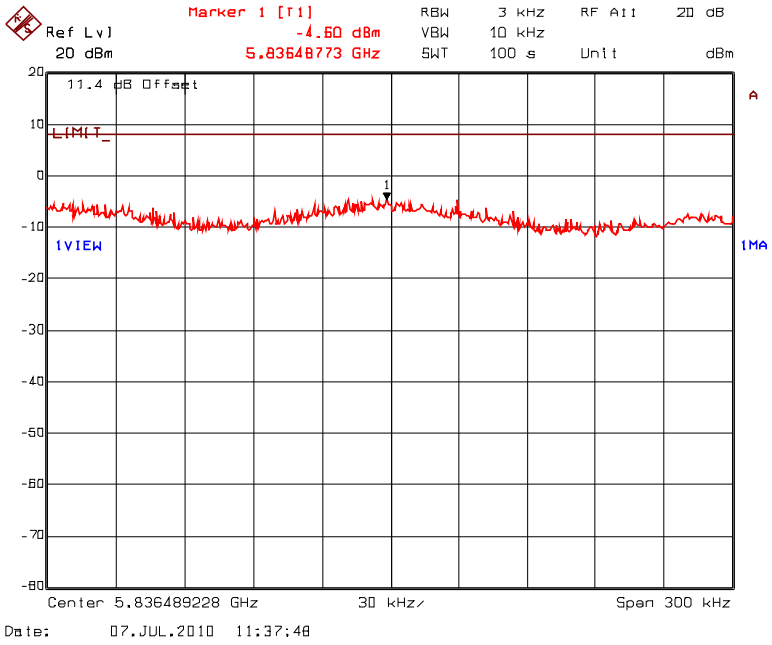
COMBINER (CHAIN 1 + CHAIN 2)

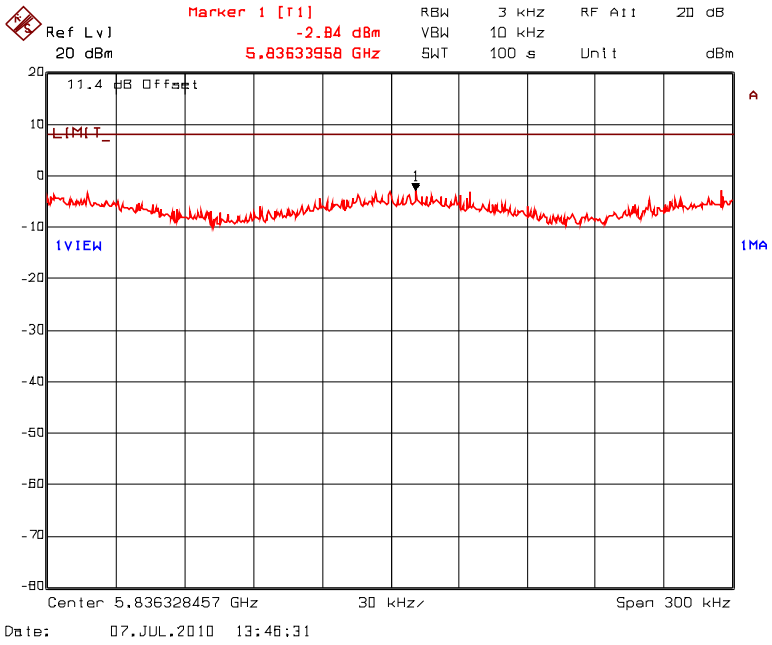


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 96(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

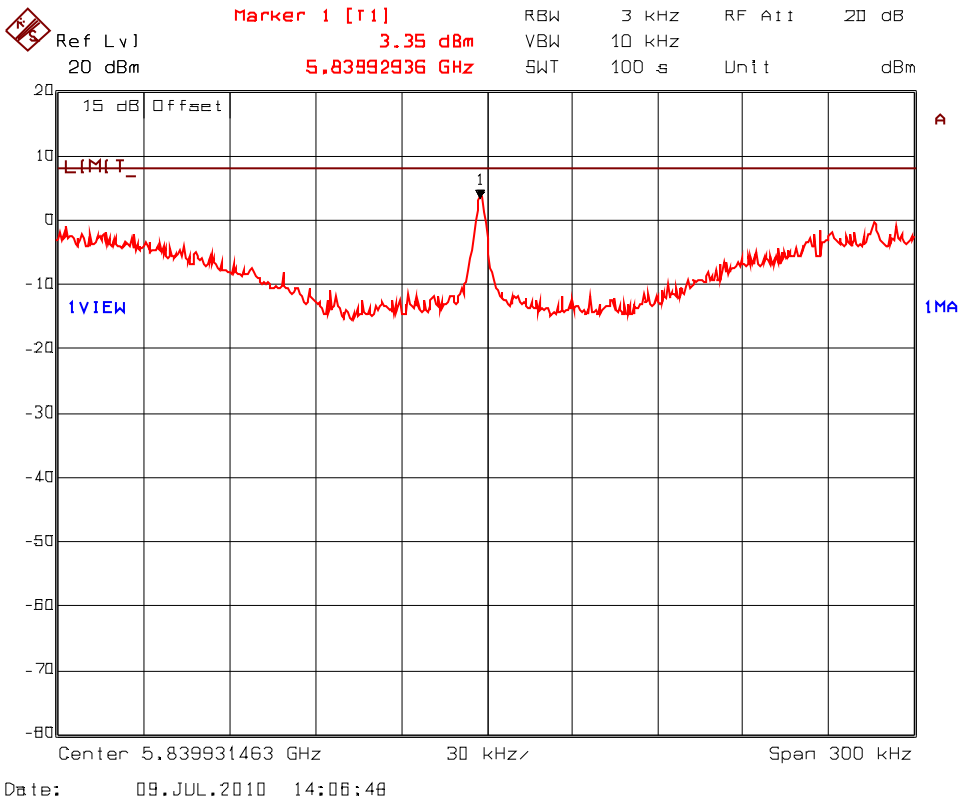
CHAIN 1 & CHAIN 2





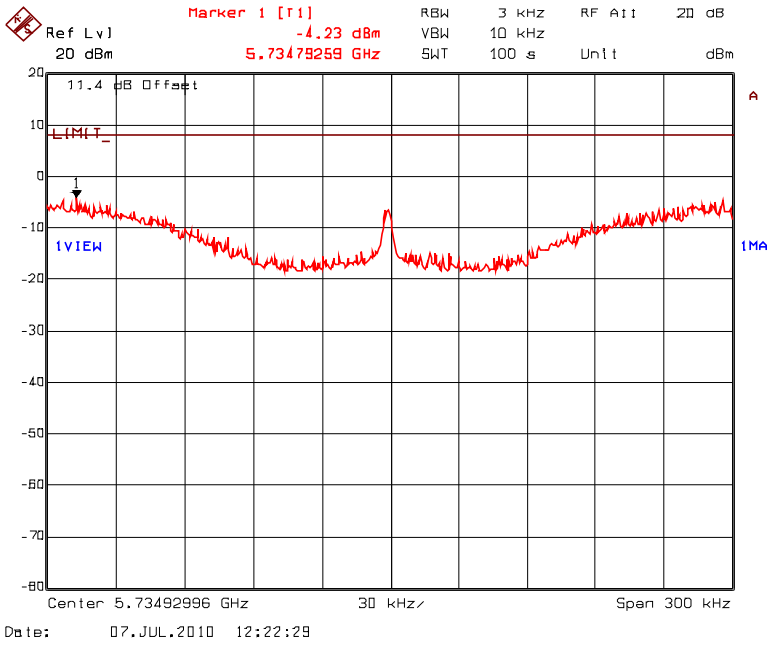
Plot # 96(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: 16QAM 3/4 @ 39Mb/s

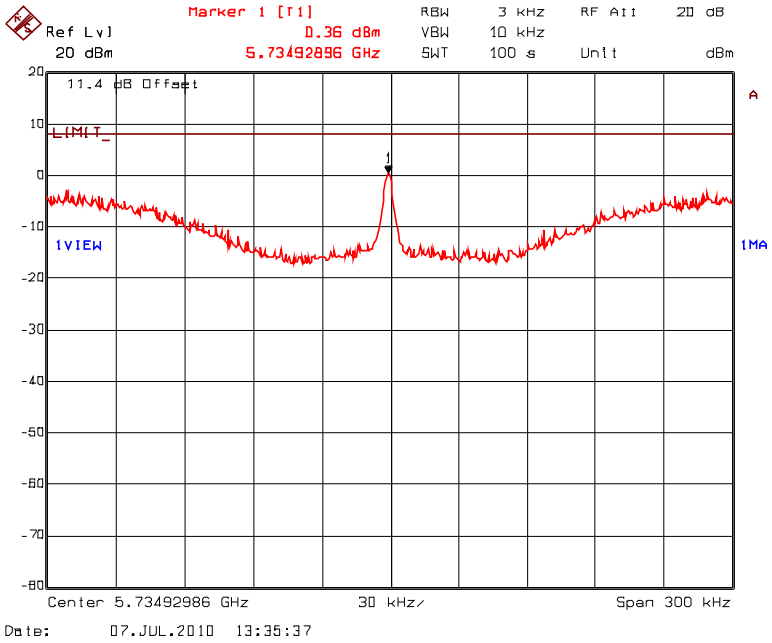
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 97(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5735 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

CHAIN 1 & CHAIN 2

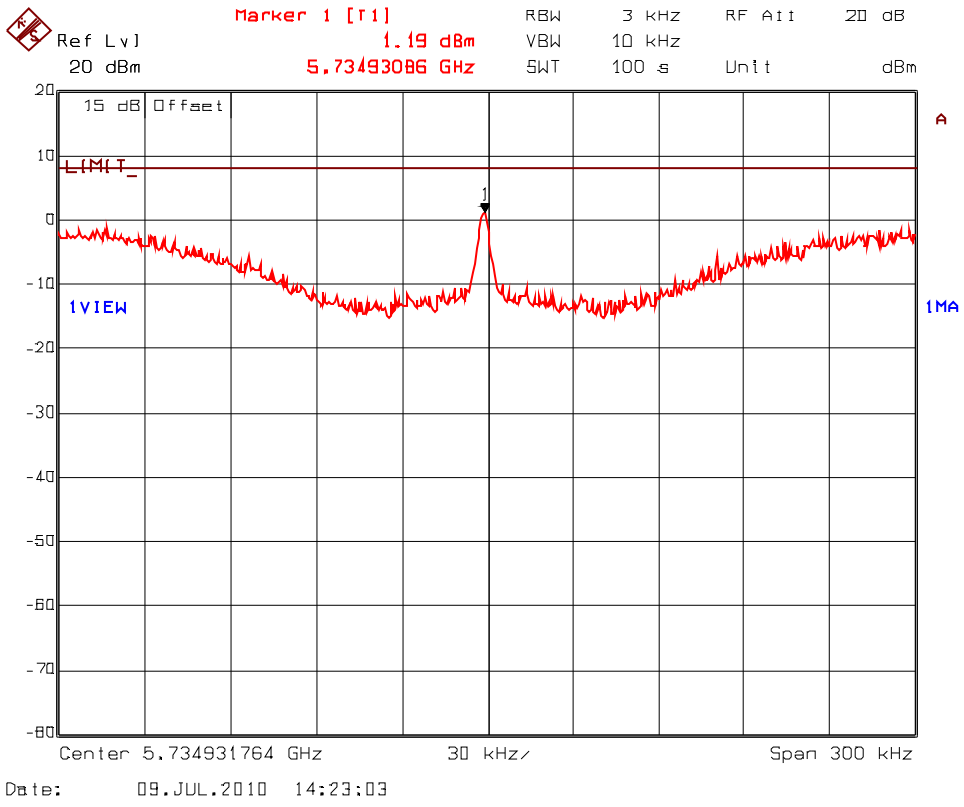




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

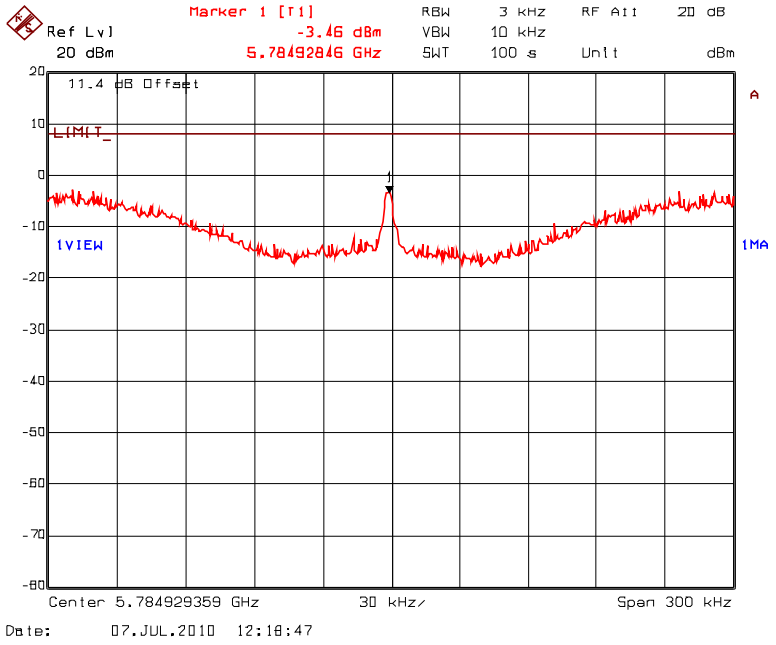
Plot # 97(b): Combined Tx Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5735 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

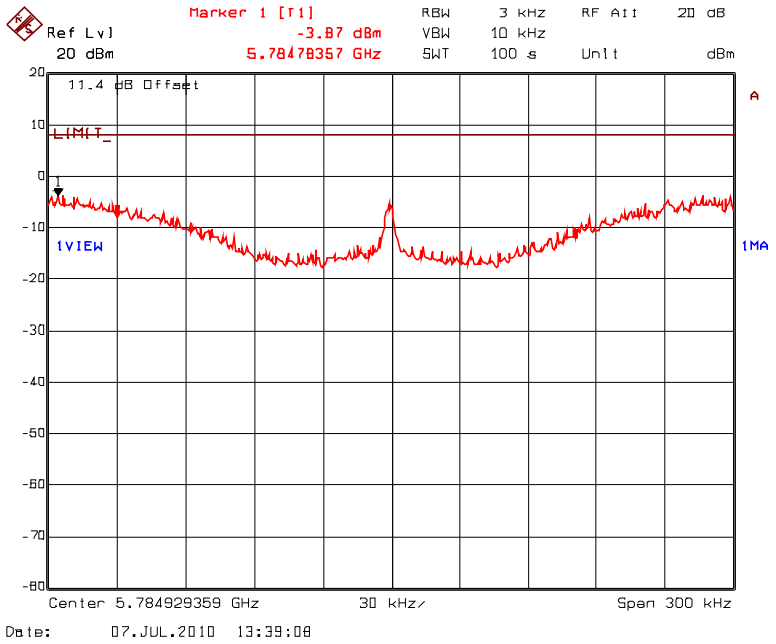
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 98(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

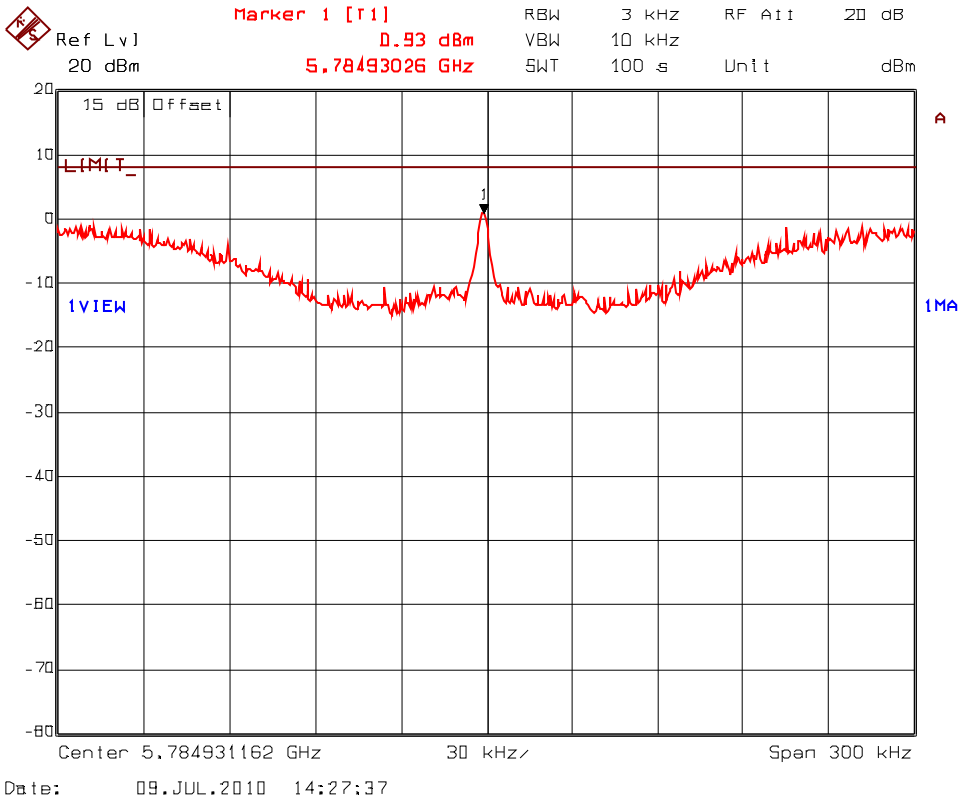
CHAIN 1 & CHAIN 2





Plot # 98(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

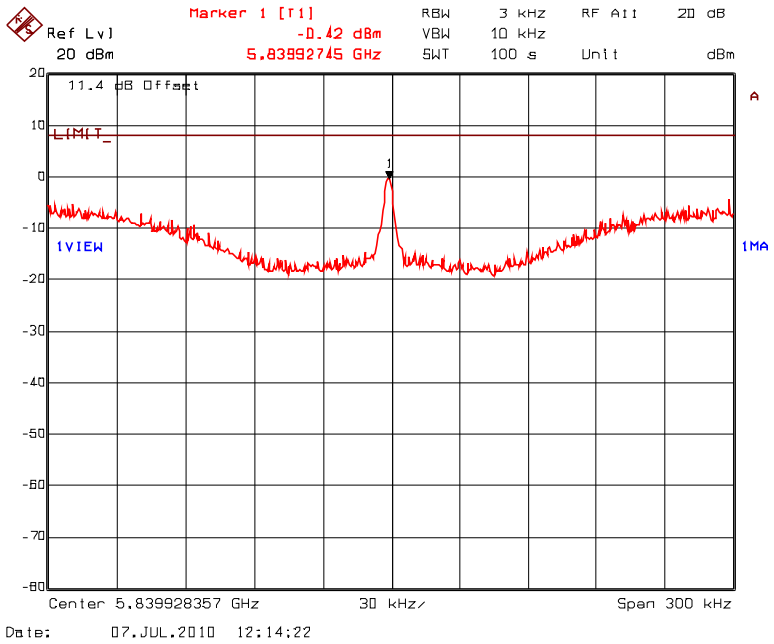
COMBINER (CHAIN 1 + CHAIN 2)

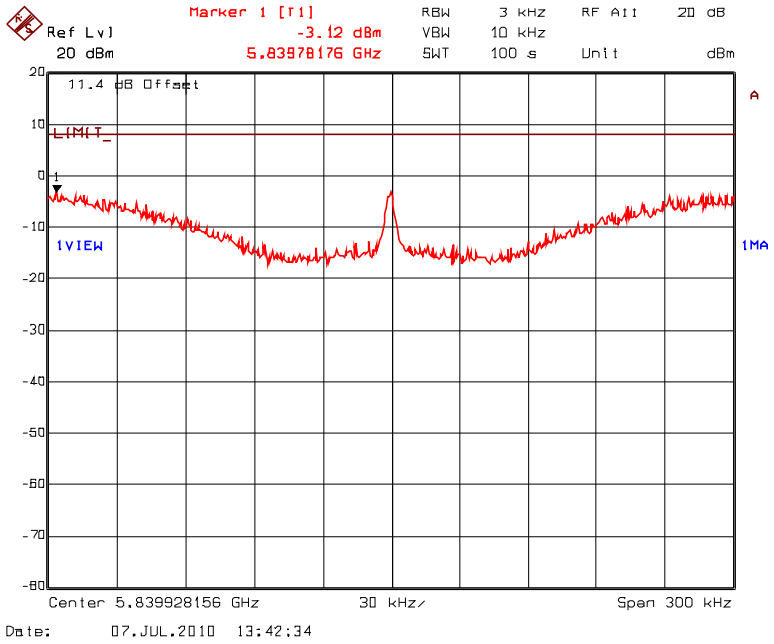


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 99(a): Transmitted Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

CHAIN 1 & CHAIN 2

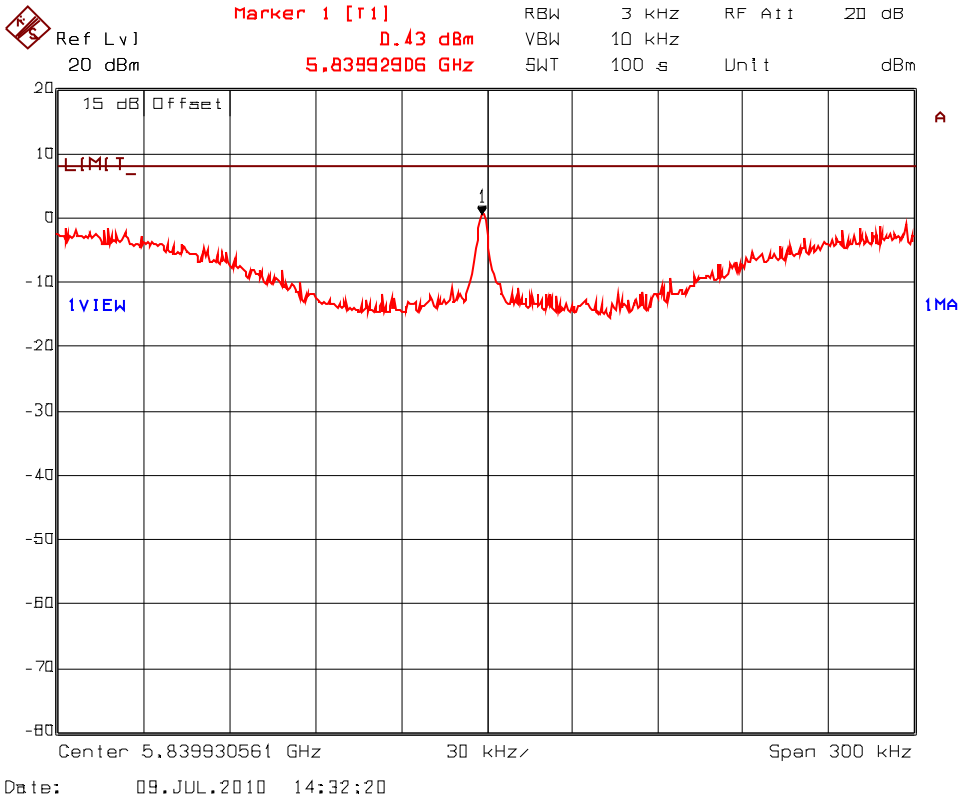




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

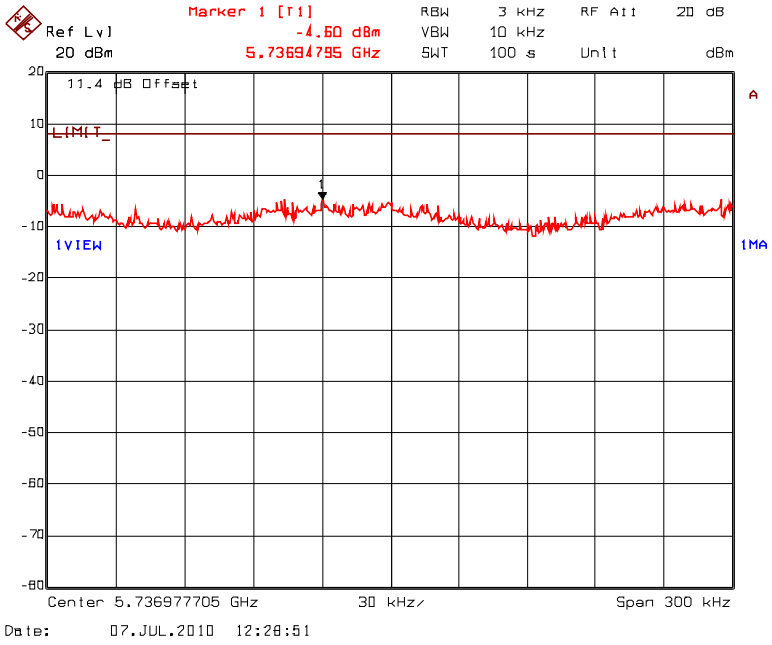
Plot # 99(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5840 MHz, Modulation: QPSK 3/4 @ 19.5Mb/s

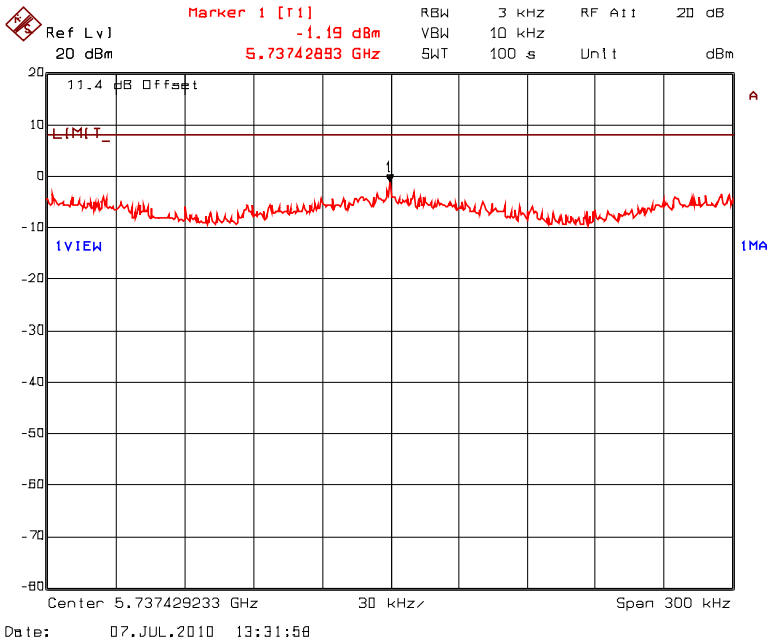
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 100(a): Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1 & CHAIN 2

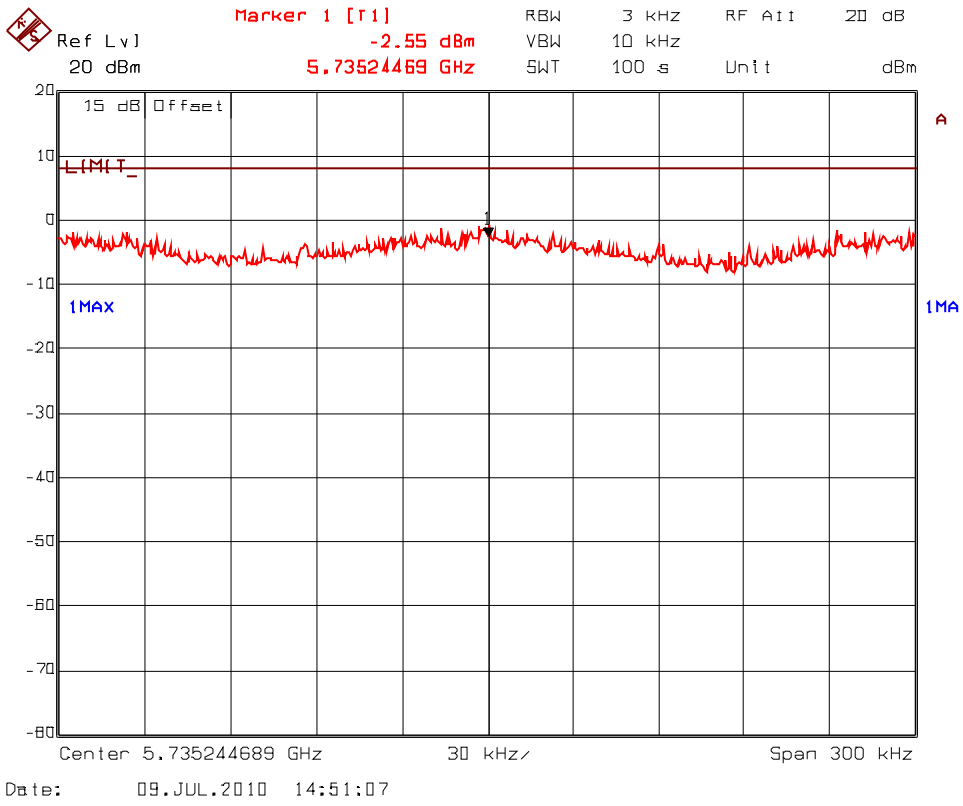




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 100(b): Combined Tx Power Density in 3 kHz BW wrt. 10MHz Channel Spacing Frequency: 5735 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

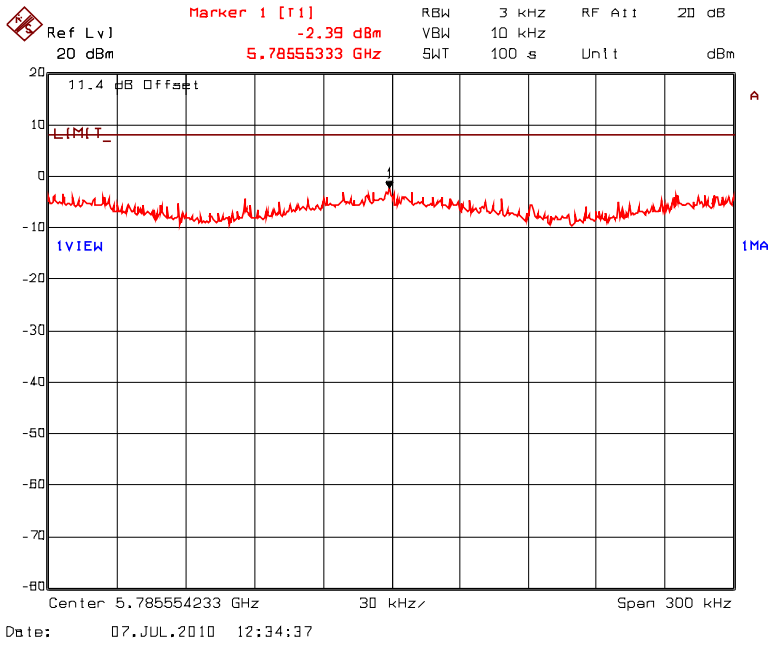
COMBINER (CHAIN 1 + CHAIN 2)

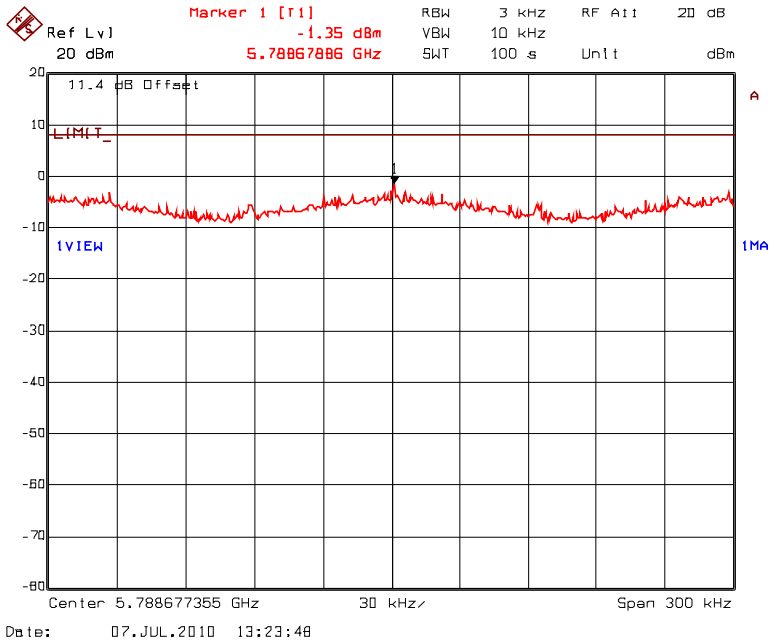


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 101(a): Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1 & CHAIN 2

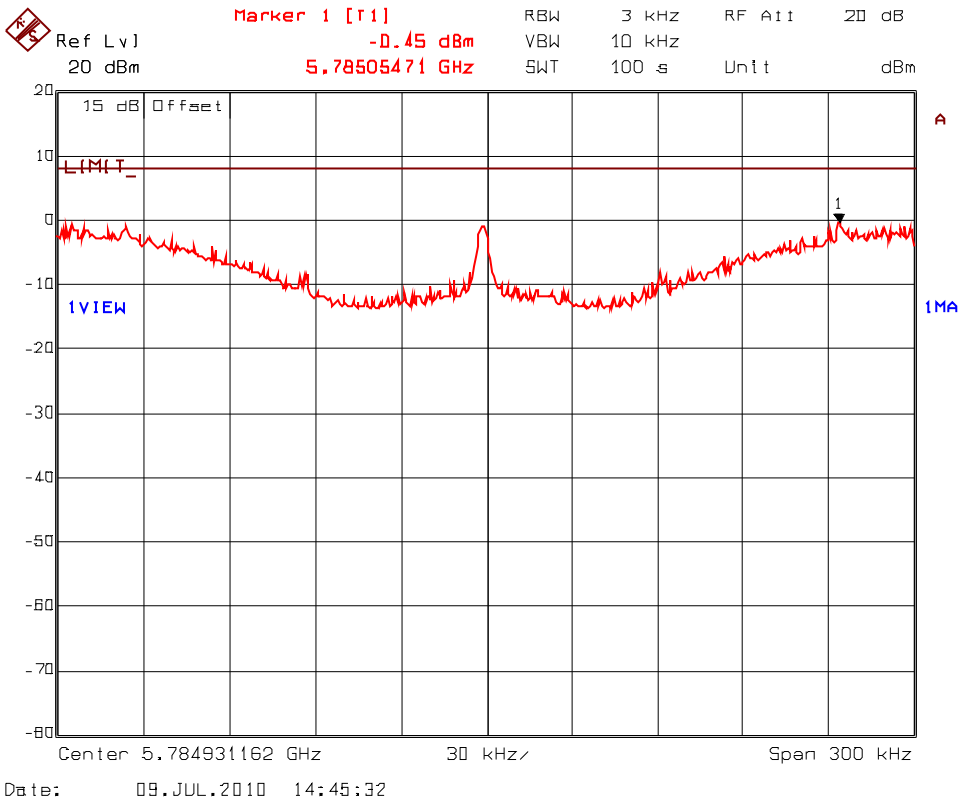




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 101(b): Combined Tx Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

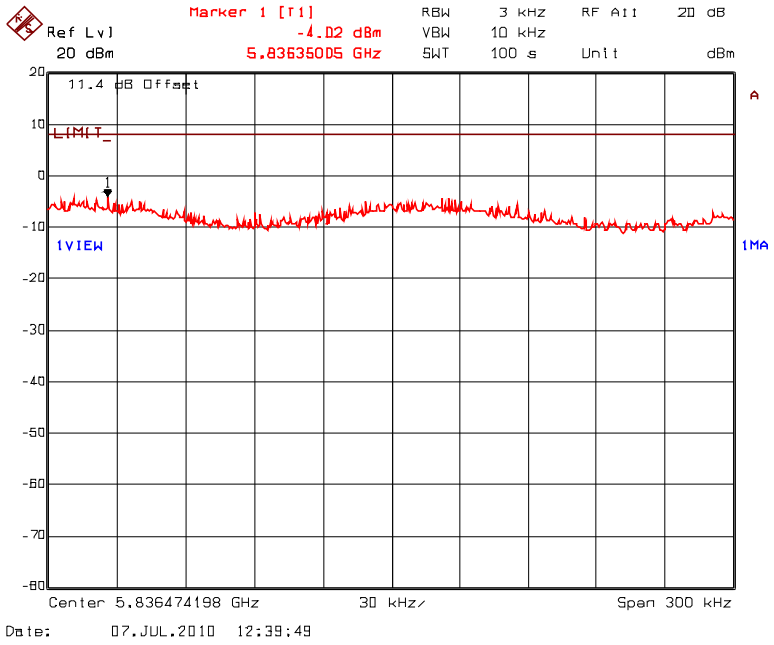
COMBINER (CHAIN 1 + CHAIN 2)

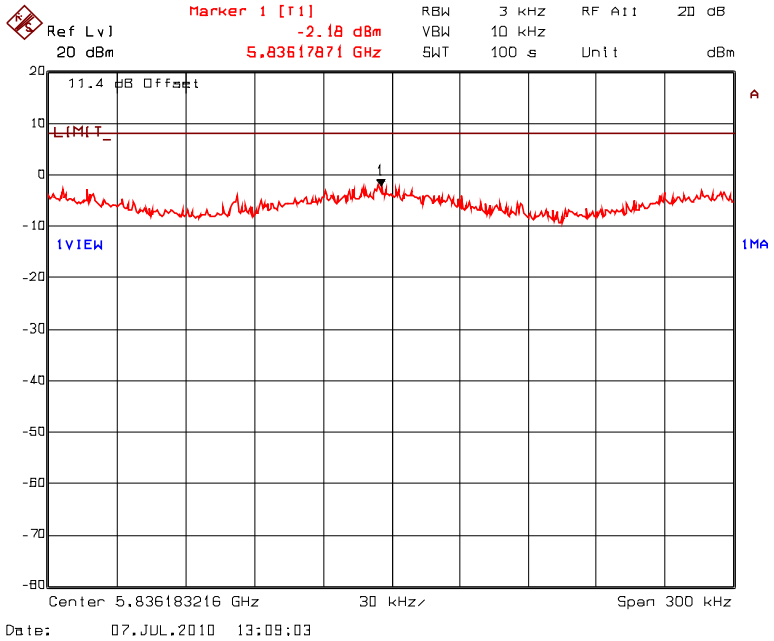


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 102(a): Transmitted Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

CHAIN 1 & CHAIN 2

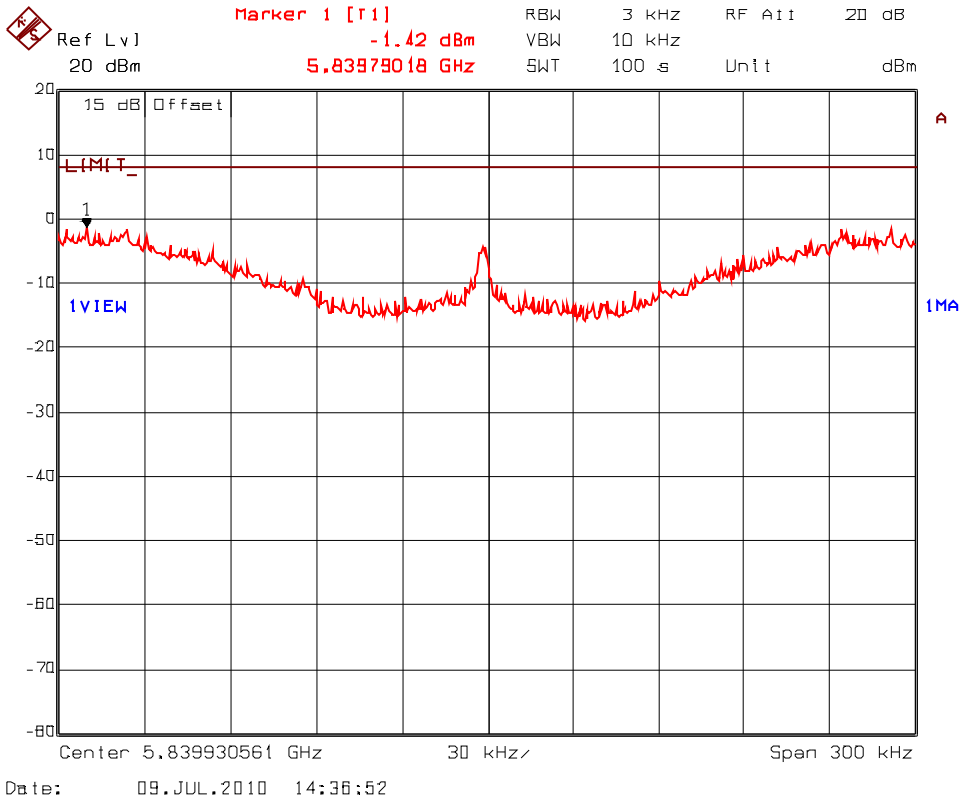




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

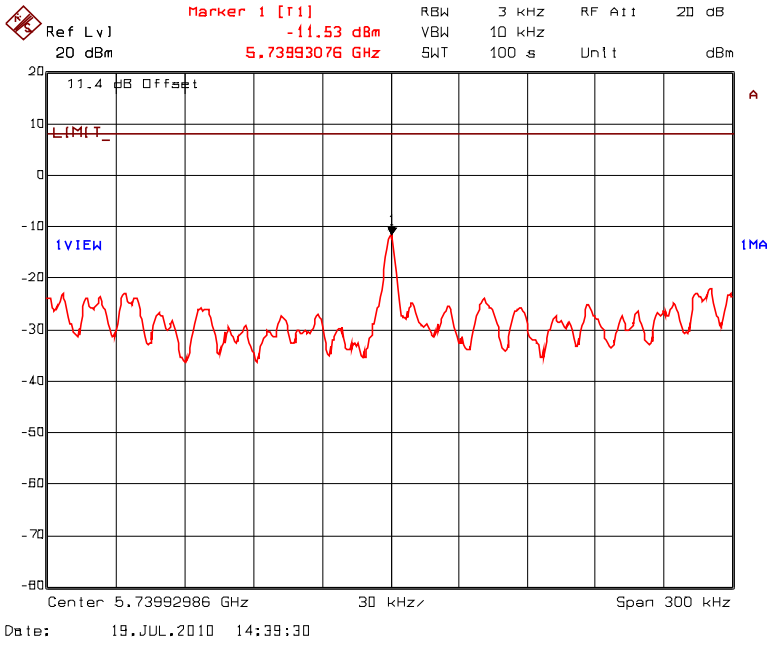
Plot # 102(b): Combined Tx Power Density in 3 kHz BW wrt. 10 MHz Channel Spacing Frequency: 5840 MHz, Modulation: BPSK 1/2 @ 6.5Mb/s

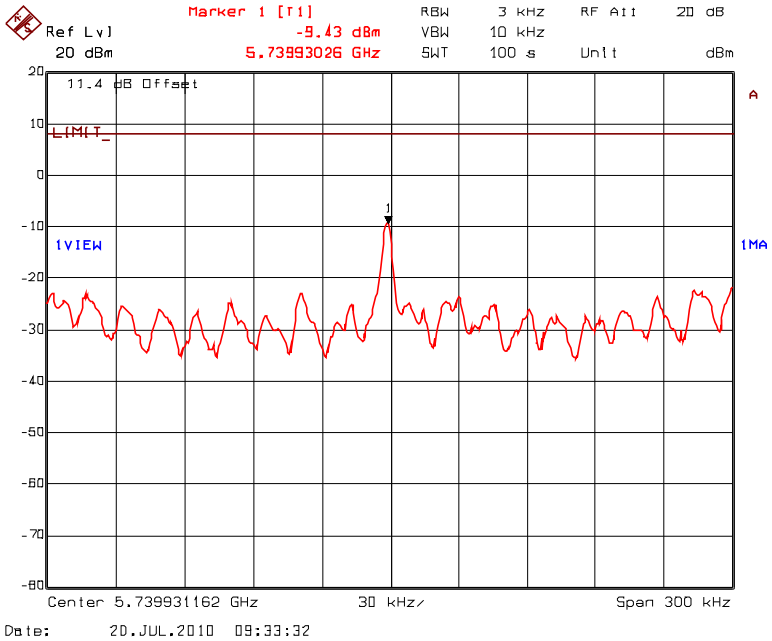
COMBINER (CHAIN 1 + CHAIN 2)



Plot # 103(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5740 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1 & CHAIN 2

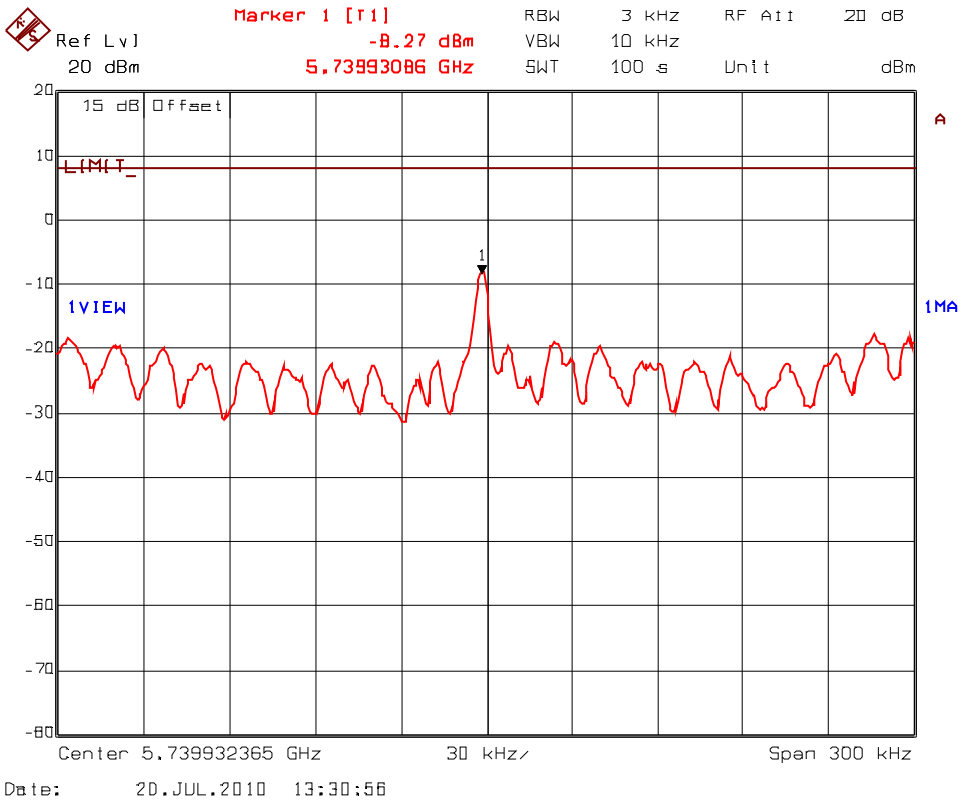




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 103(b): Combined Tx Power Density in 3 kHz BW wrt. 20MHz Channel Spacing
Frequency: 5740 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

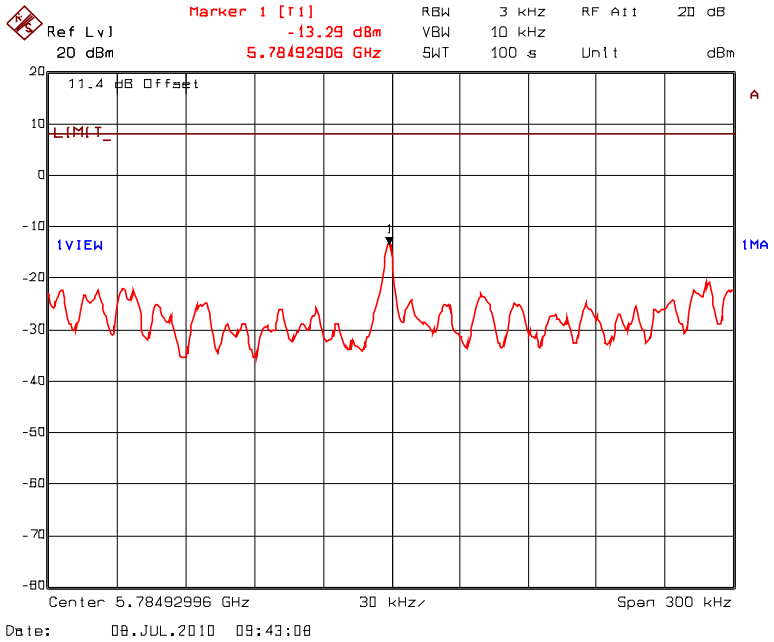
COMBINER (CHAIN 1 + CHAIN 2)

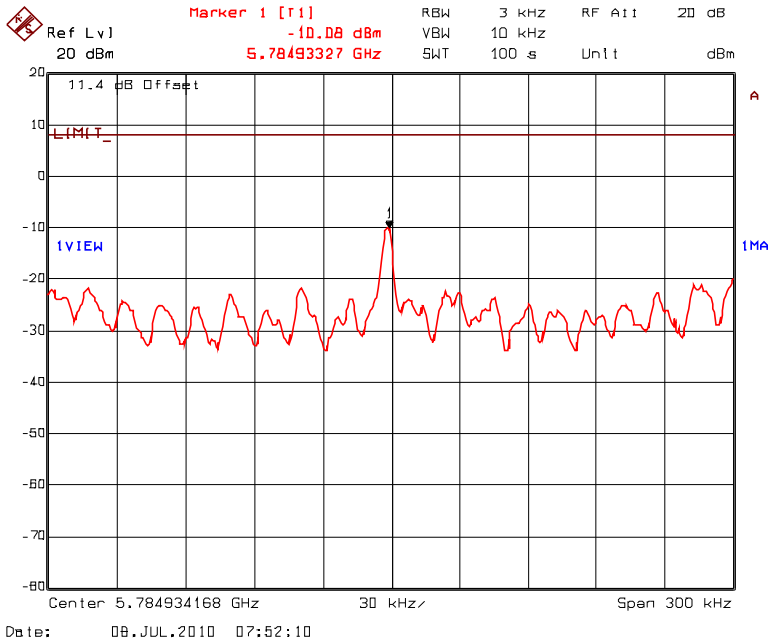


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 104(a): Transmitted Power Density in 3 kHz BW wrt. 20MHz Channel Spacing
Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1 & CHAIN 2

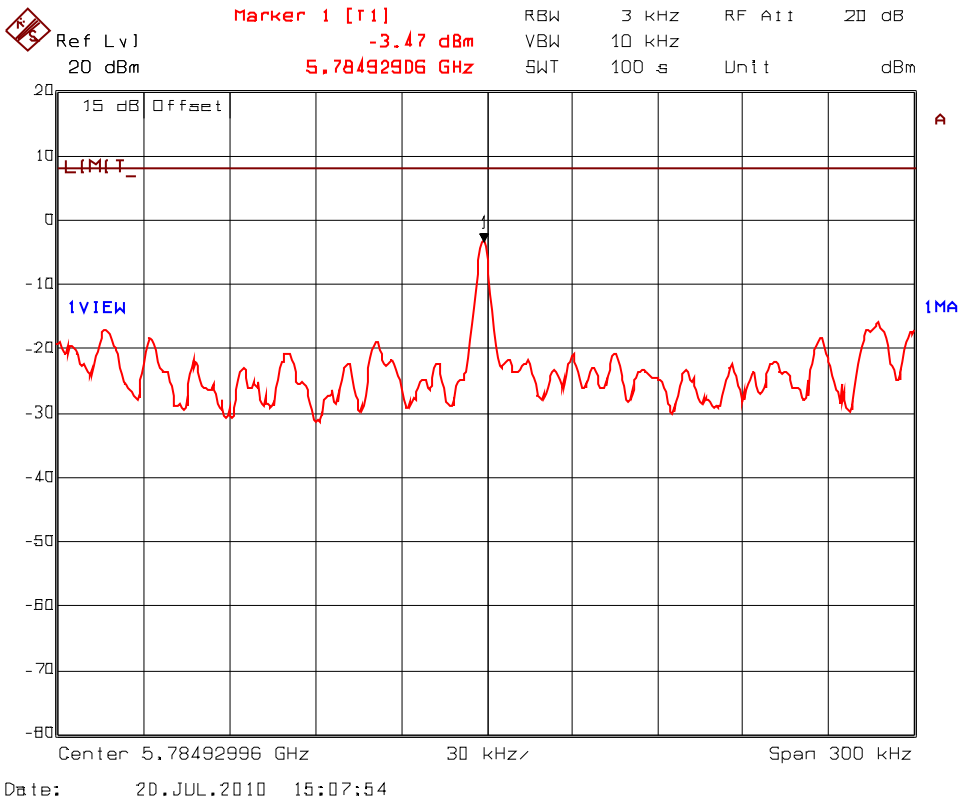




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 104(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

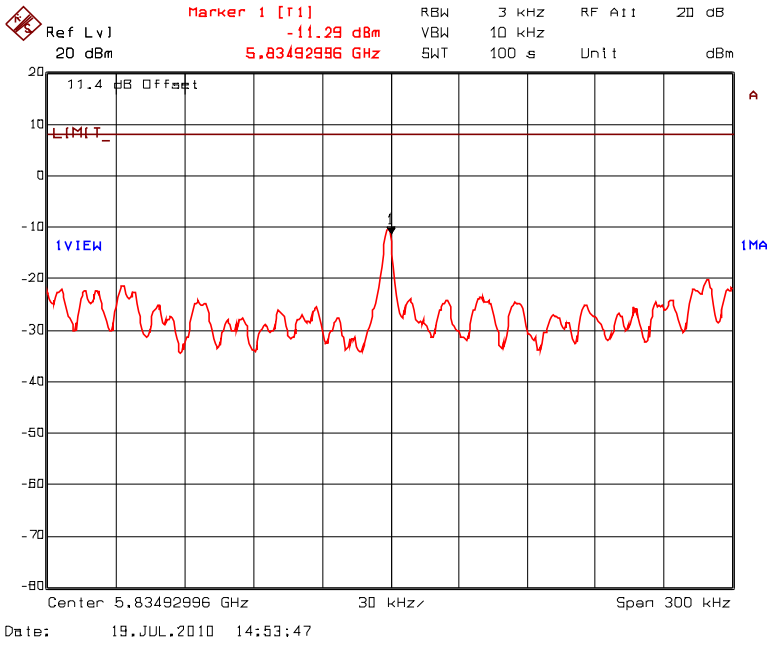
COMBINER (CHAIN 1 + CHAIN 2)

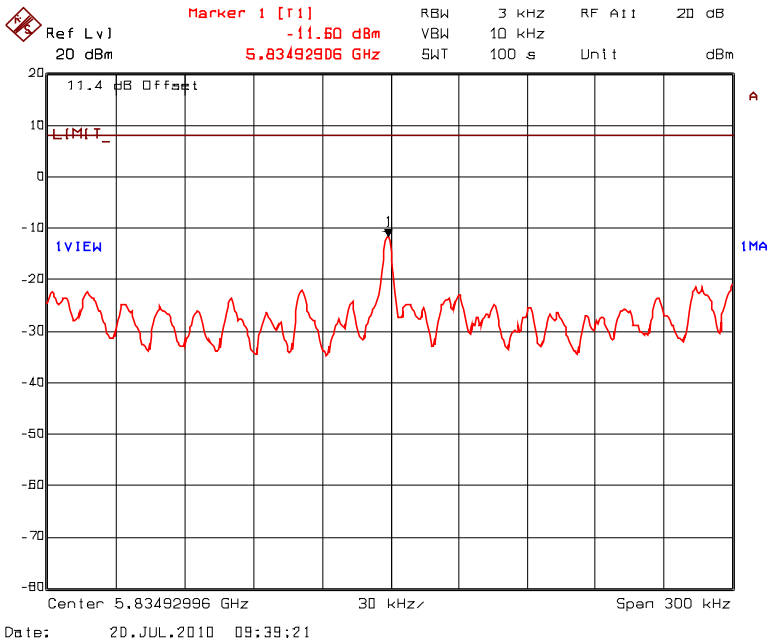


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 105(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5835 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

CHAIN 1 & CHAIN 2

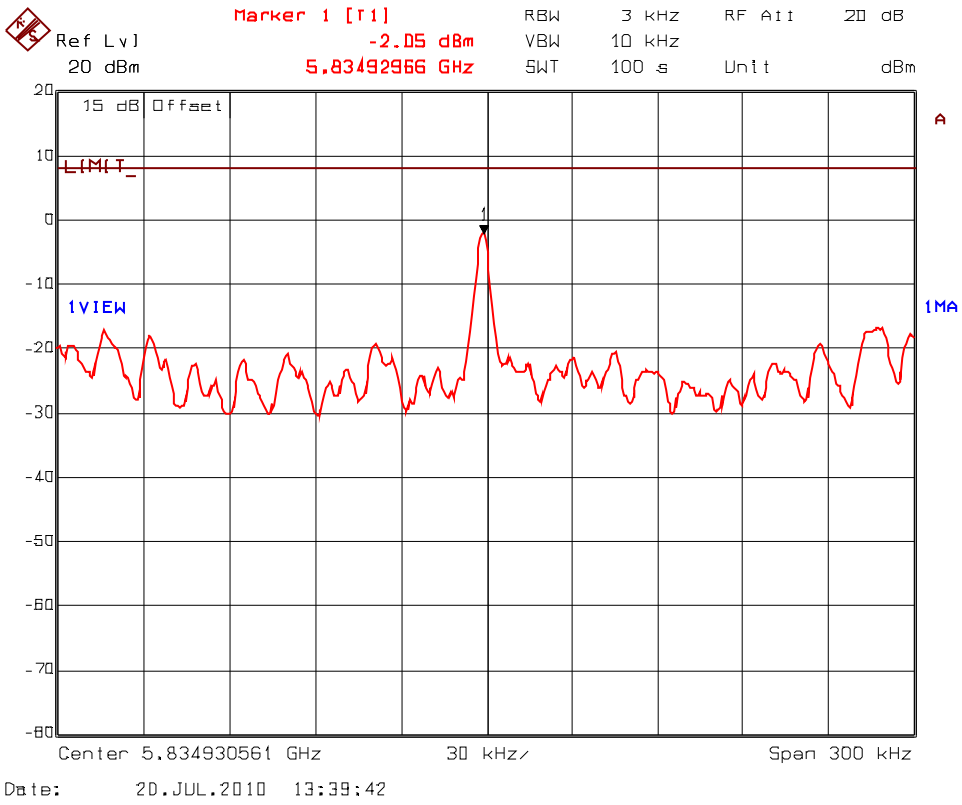




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 105(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5835 MHz, Modulation: 64QAM 5/6 @ 130Mb/s

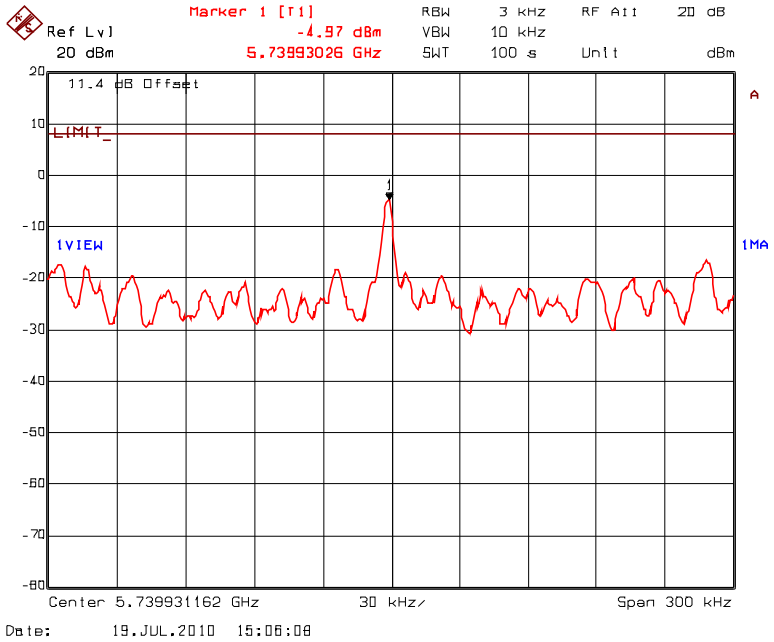
COMBINER (CHAIN 1 + CHAIN 2)

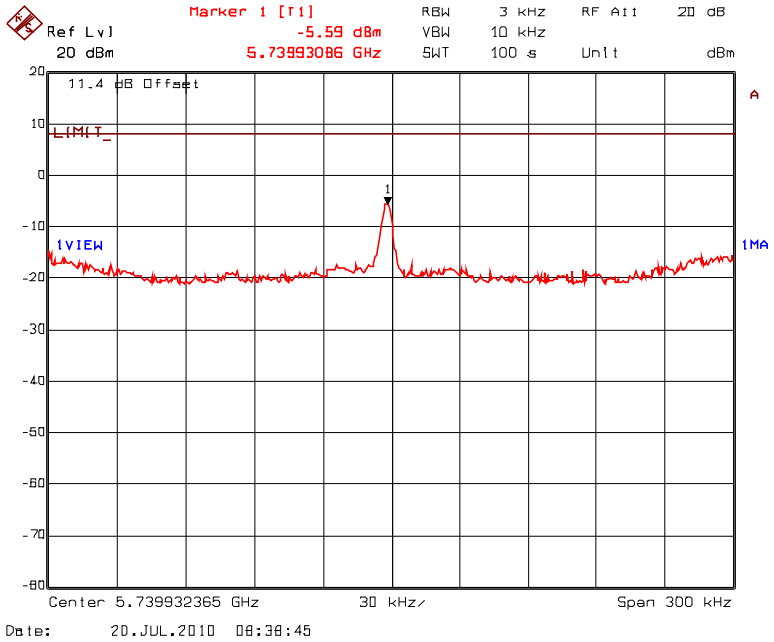


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 106(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5740 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1 & CHAIN 2

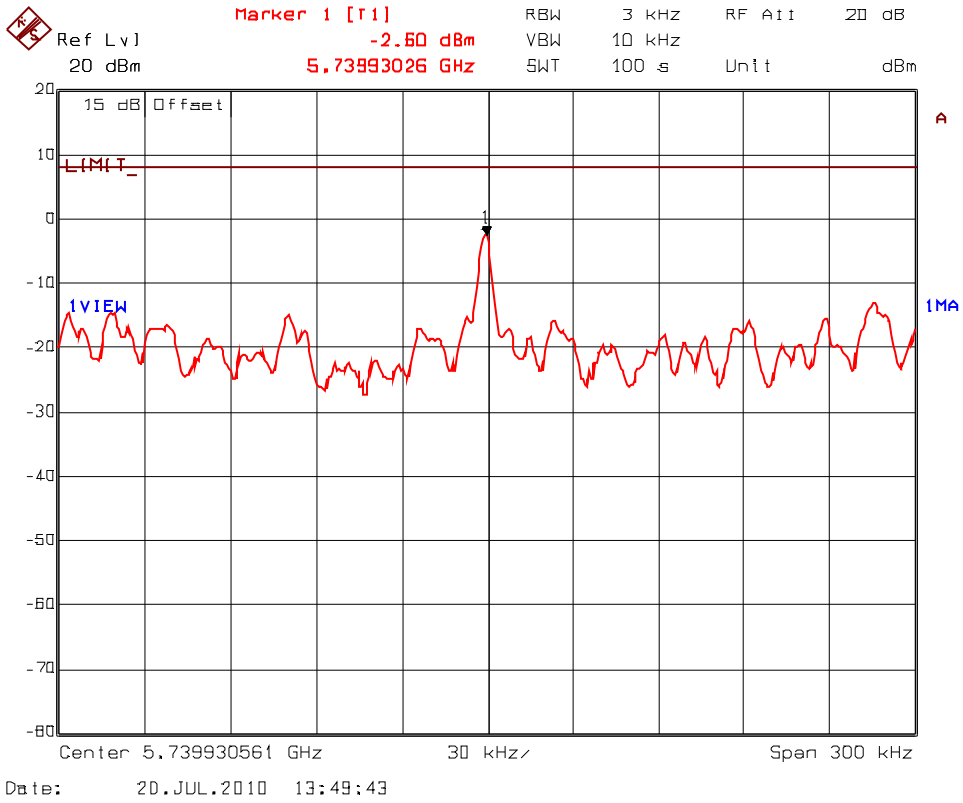




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 106(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5740 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

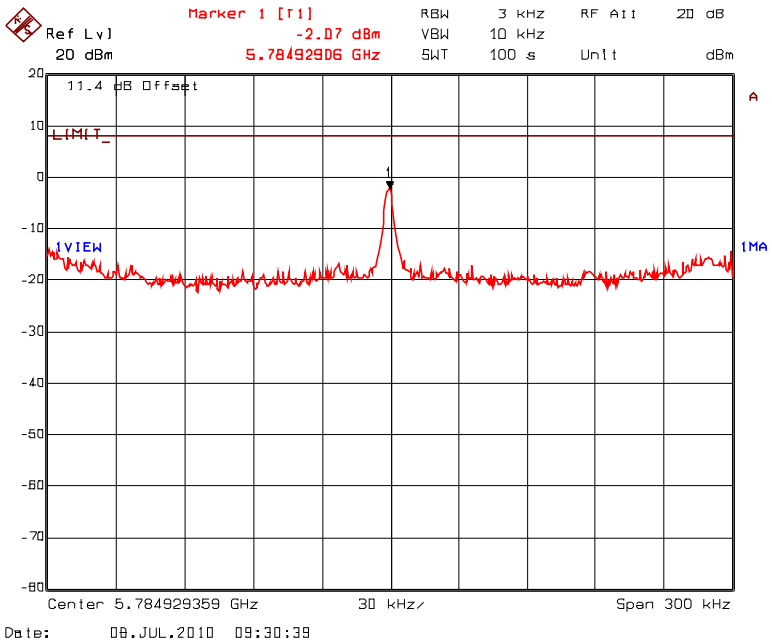
COMBINER (CHAIN 1 + CHAIN 2)

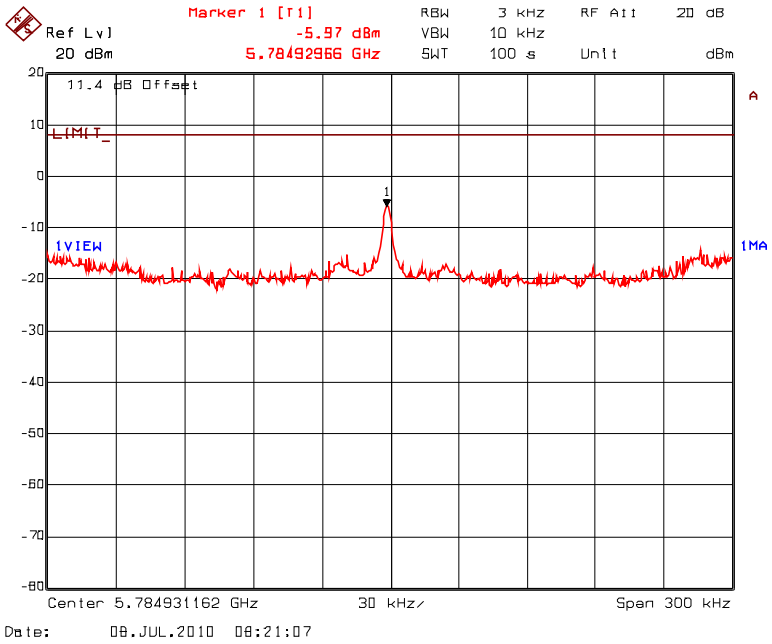


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 107(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1 & CHAIN 2

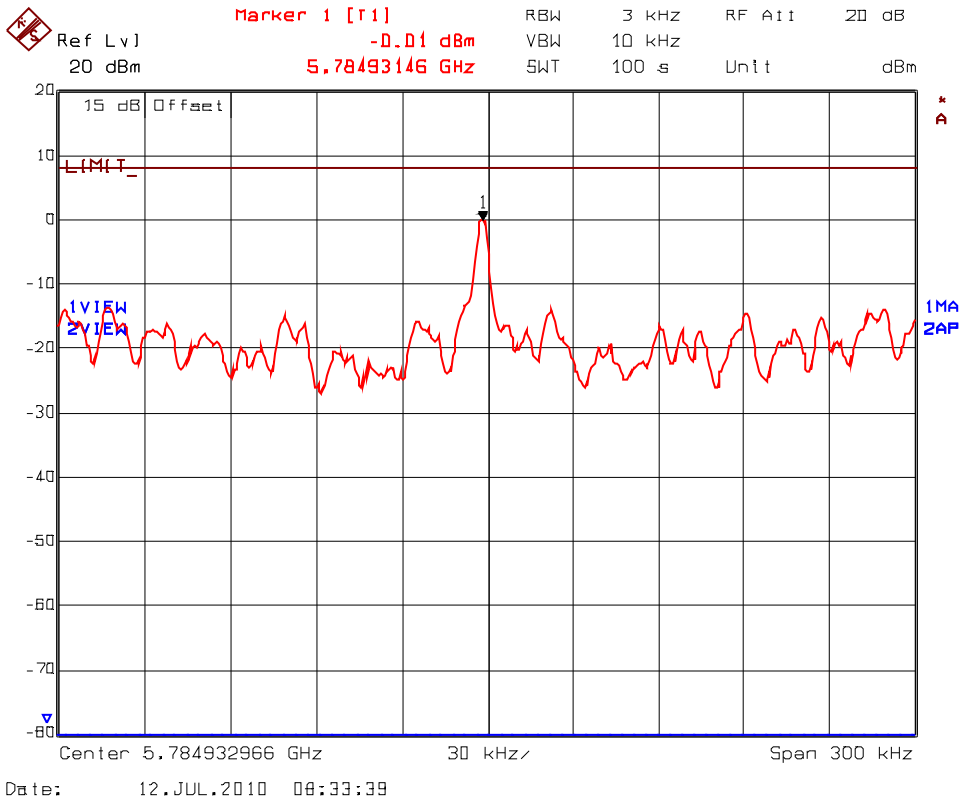




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 107(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

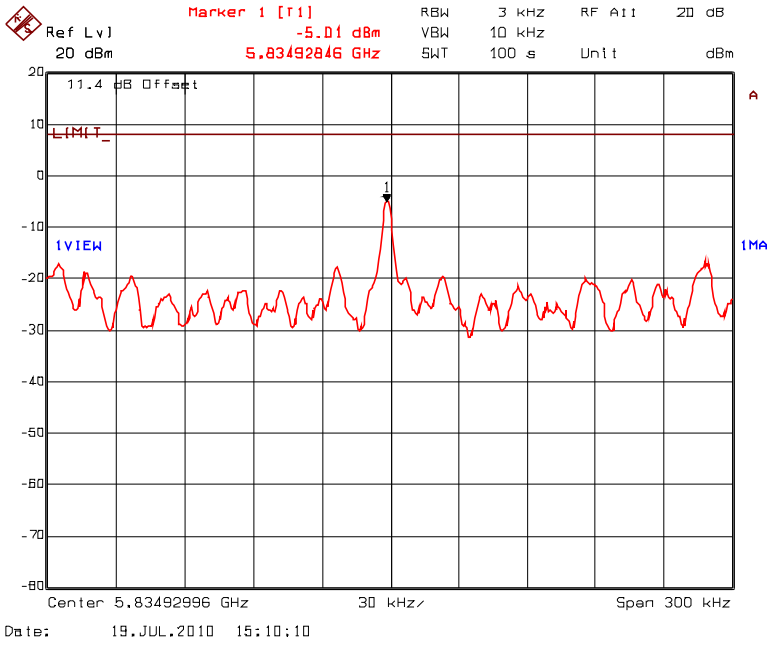
COMBINER (CHAIN 1 + CHAIN 2)

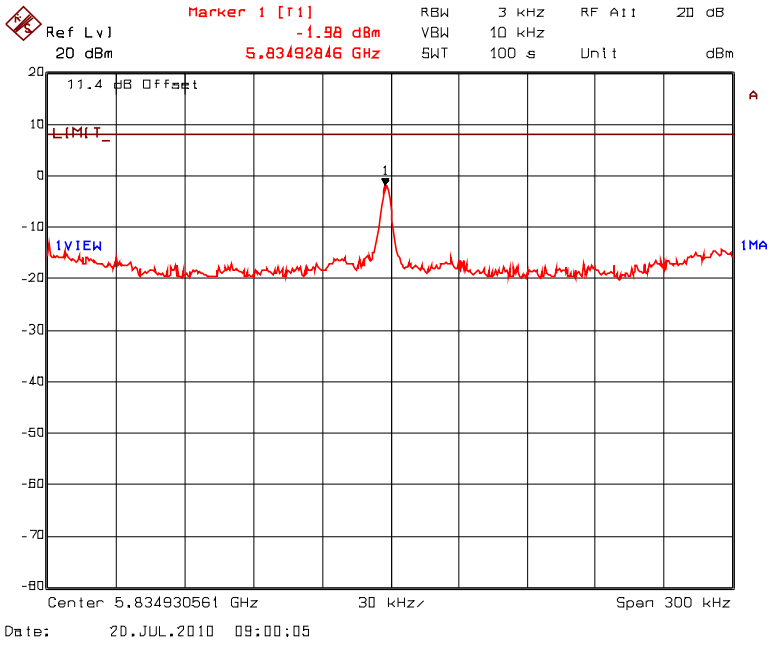


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 108(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5835 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

CHAIN 1 & CHAIN 2

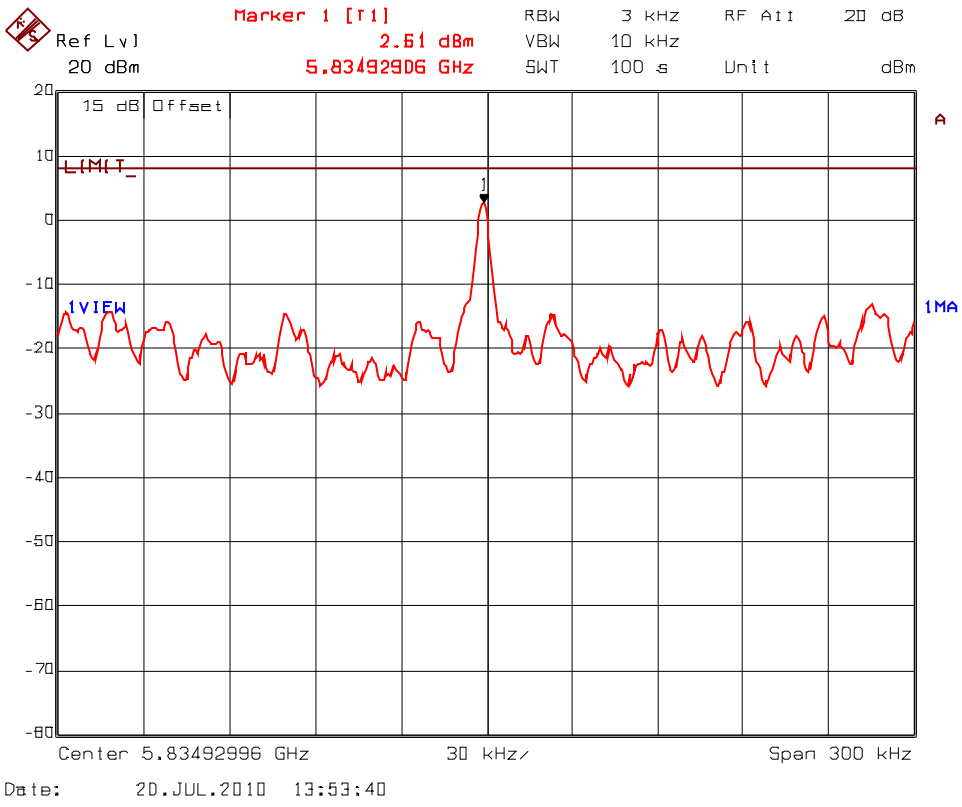




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 108(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5835 MHz, Modulation: 16QAM 3/4 @ 78Mb/s

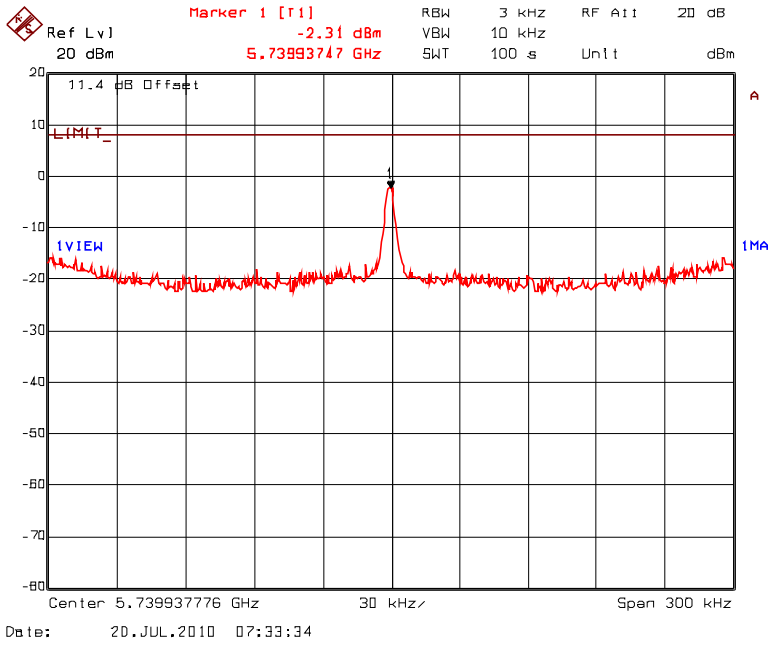
COMBINER (CHAIN 1 + CHAIN 2)

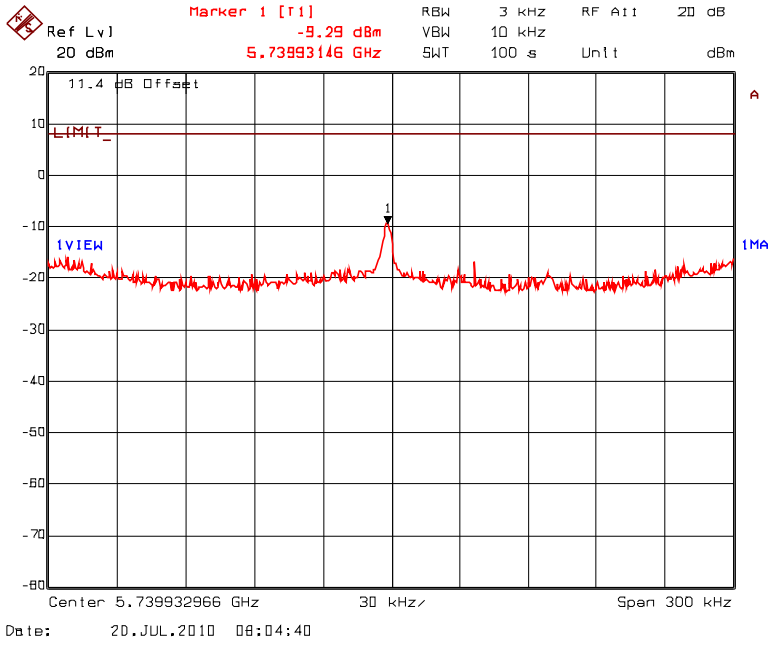


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 109(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5740 MHz, Modulation: QPSK 3/4 @ 39Mb/s

CHAIN 1 & CHAIN 2

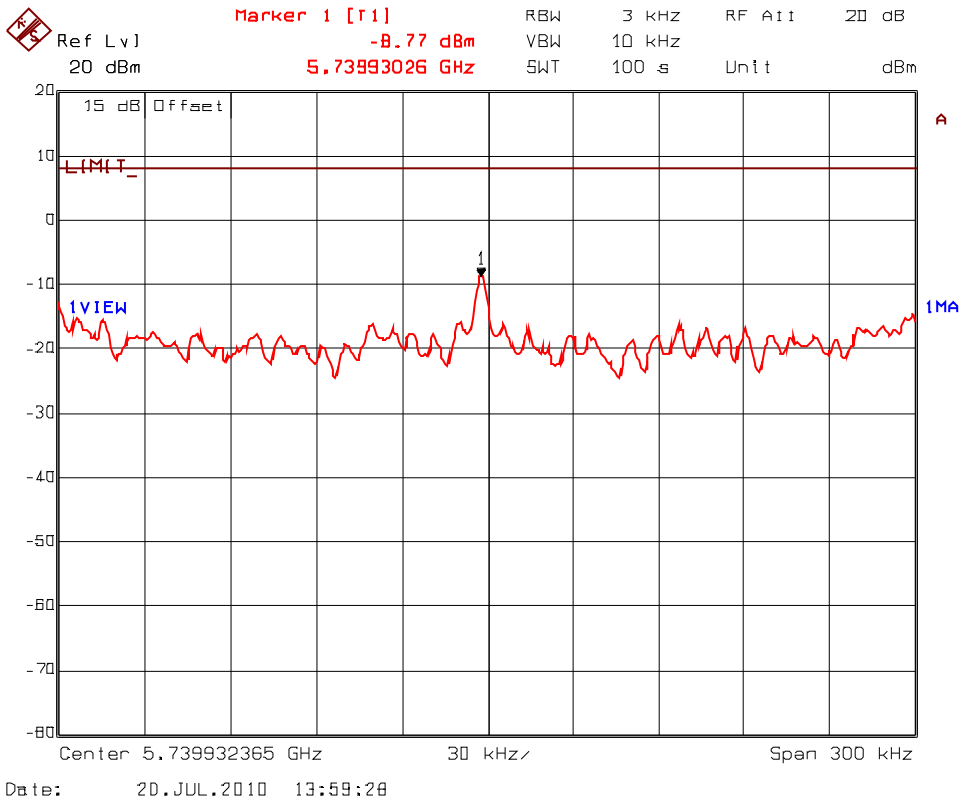




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 109(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5740 MHz, Modulation: QPSK 3/4 @ 39Mb/s

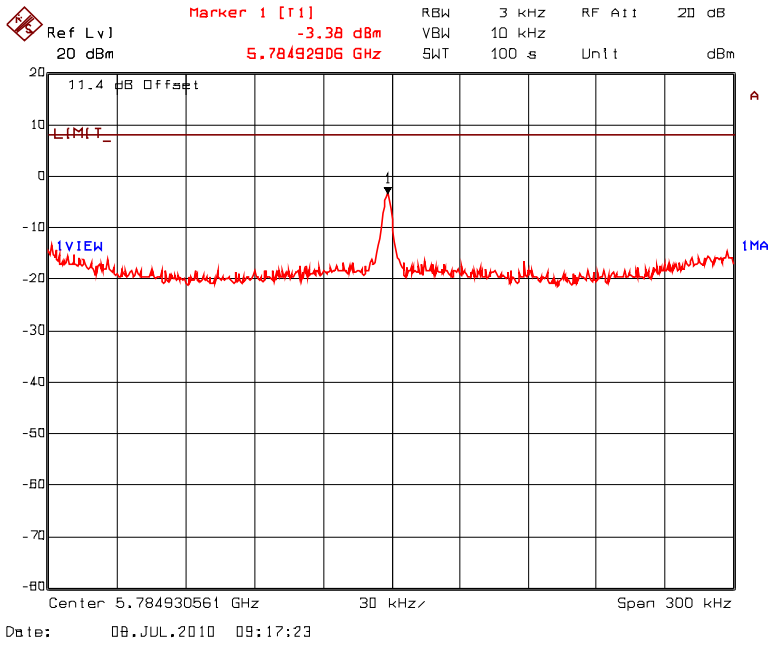
COMBINER (CHAIN 1 + CHAIN 2)

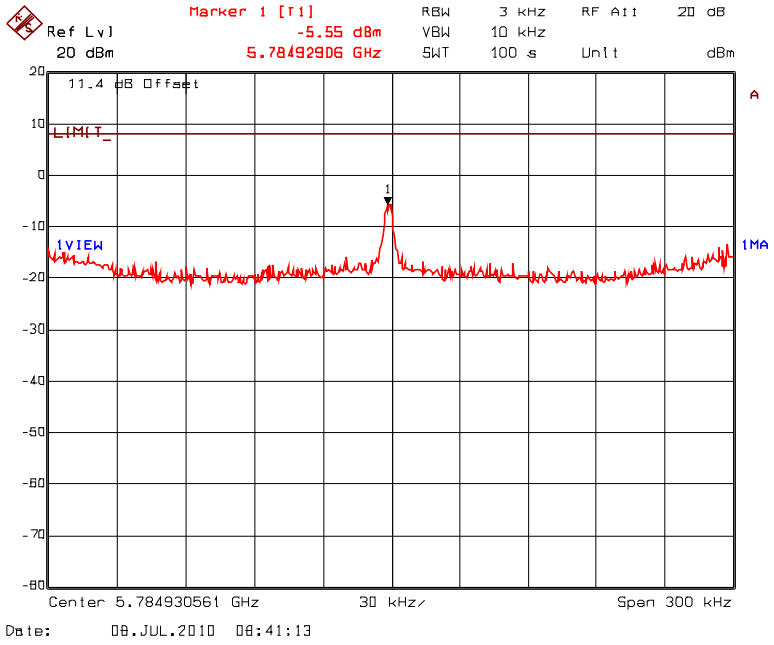


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 110(a): Transmitted Power Density in 3 kHz BW wrt. 20MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 39Mb/s

CHAIN 1 & CHAIN 2

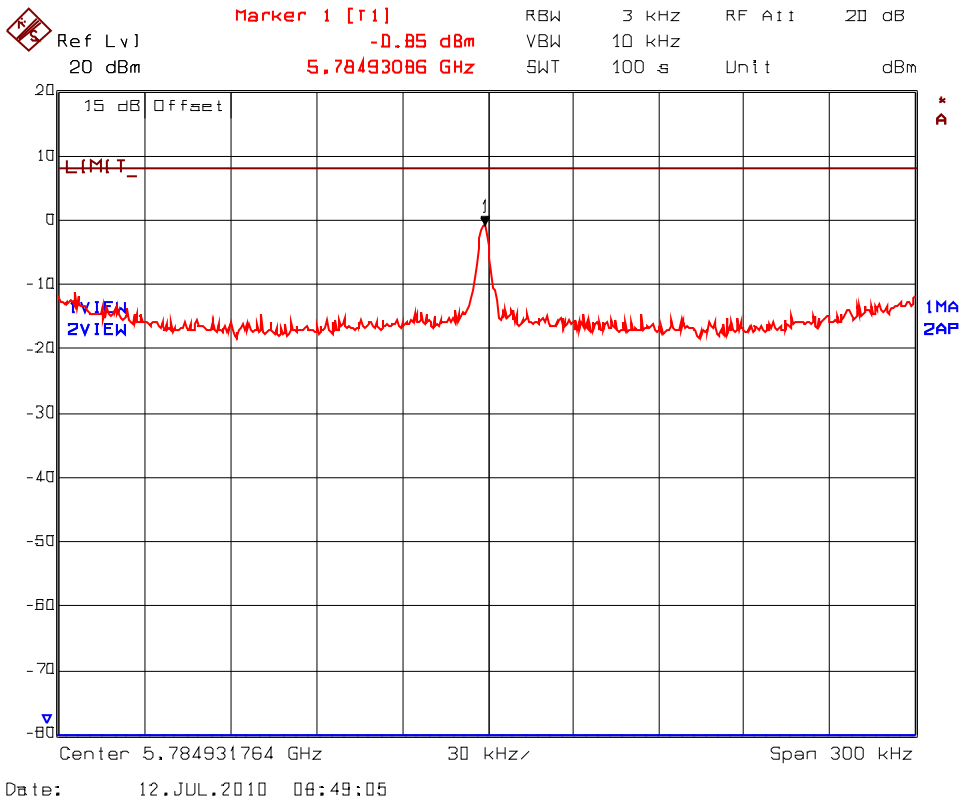




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 110(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 39Mb/s

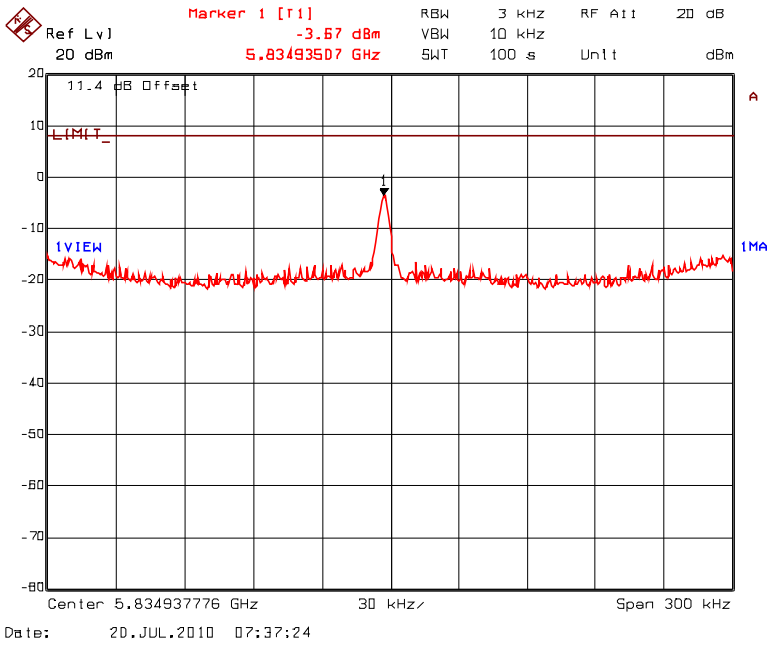
COMBINER (CHAIN 1 + CHAIN 2)

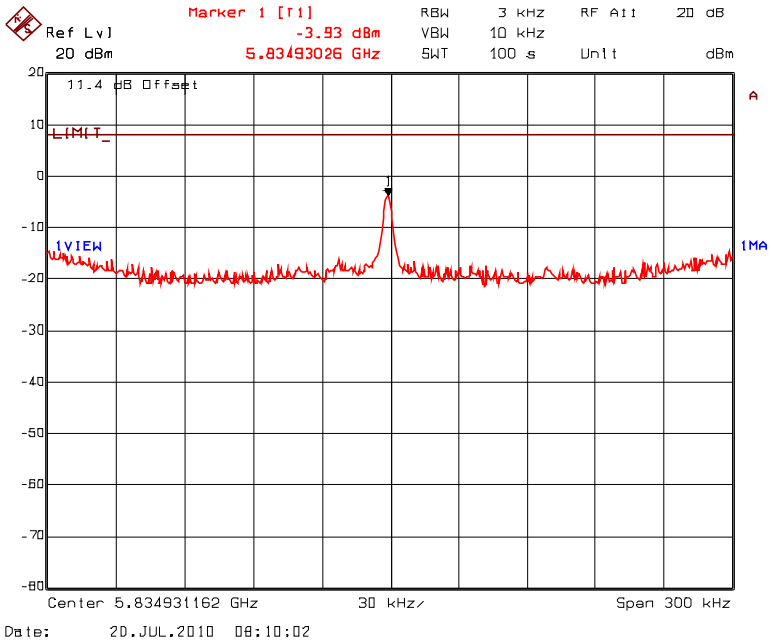


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 111(a): Transmitted Power Density in 3 kHz BW wrt. 20MHz Channel Spacing Frequency: 5835 MHz, Modulation: QPSK 3/4 @ 39Mb/s

CHAIN 1 & CHAIN 2

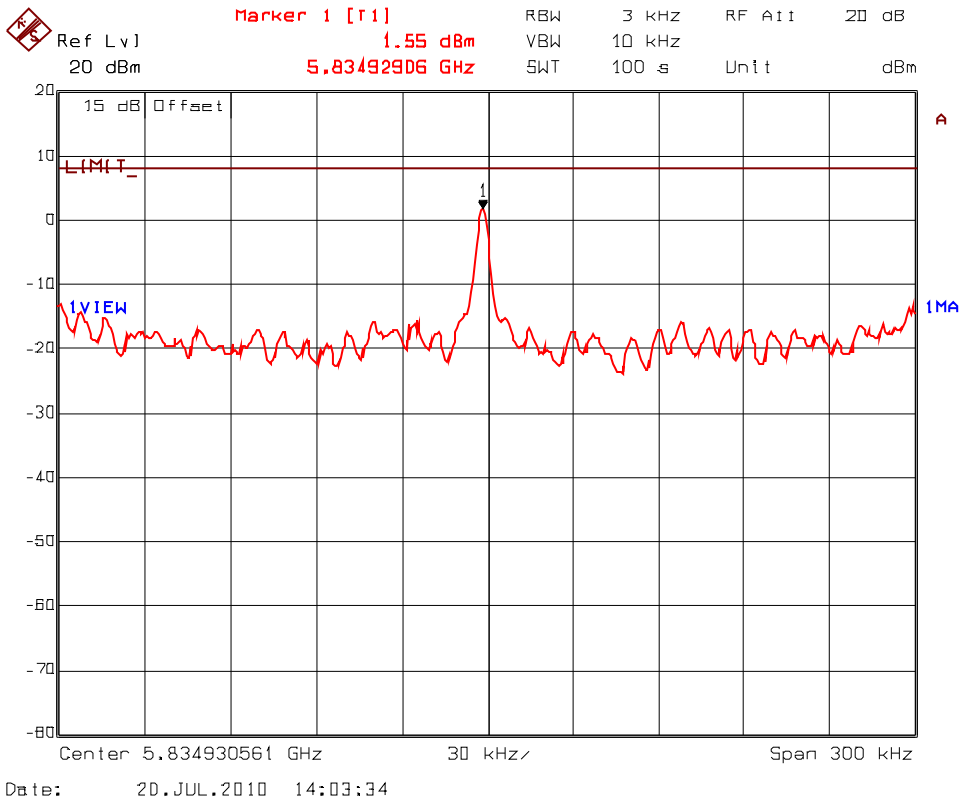




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 111(b): Combined Tx Power Density in 3 kHz BW wrt. 20MHz Channel Spacing Frequency: 5835 MHz, Modulation: QPSK 3/4 @ 39Mb/s

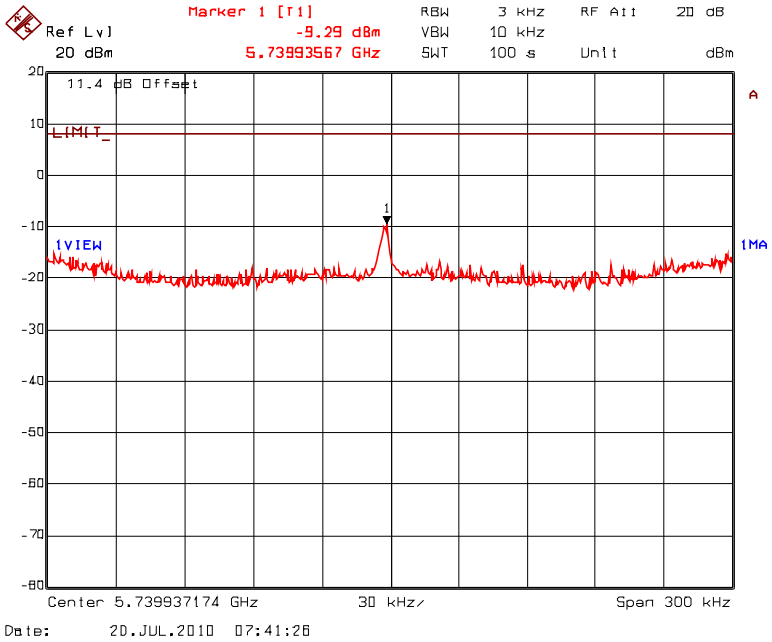
COMBINER (CHAIN 1 + CHAIN 2)

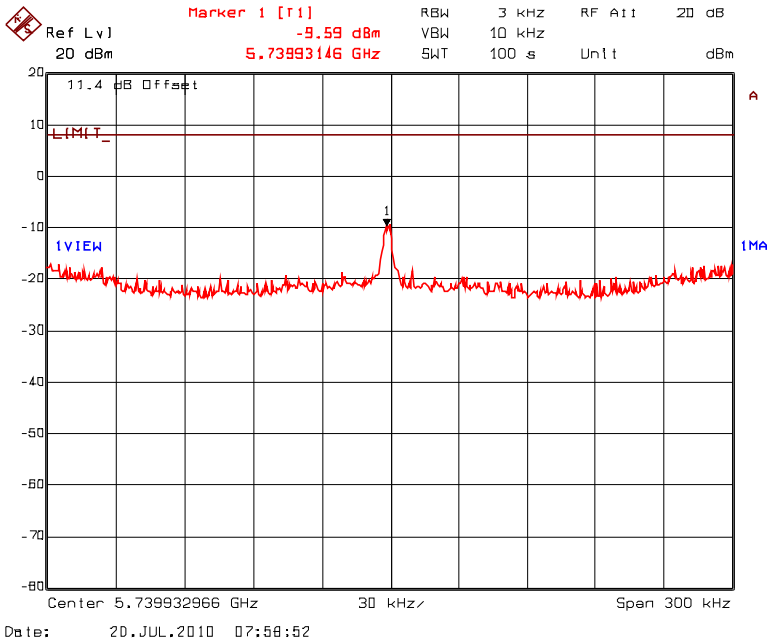


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 112(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13Mb/s

CHAIN 1 & CHAIN 2

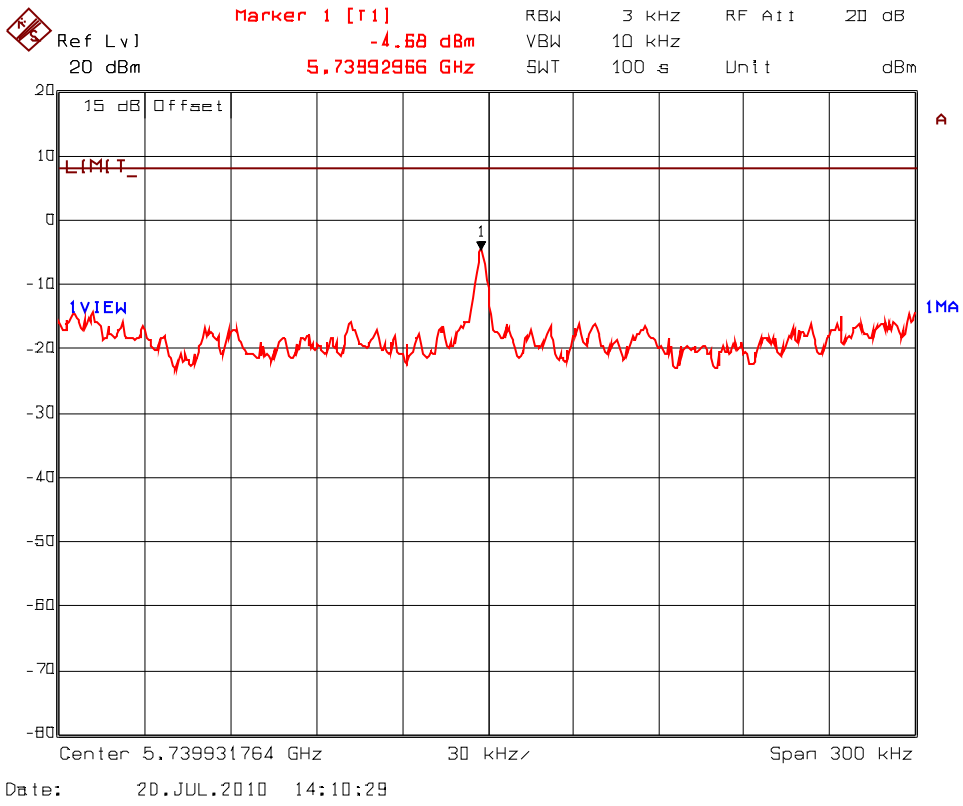




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 112(b): Combined Tx Power Density in 3 kHz BW wrt. 20MHz Channel Spacing
Frequency: 5740 MHz, Modulation: BPSK 1/2 @ 13Mb/s

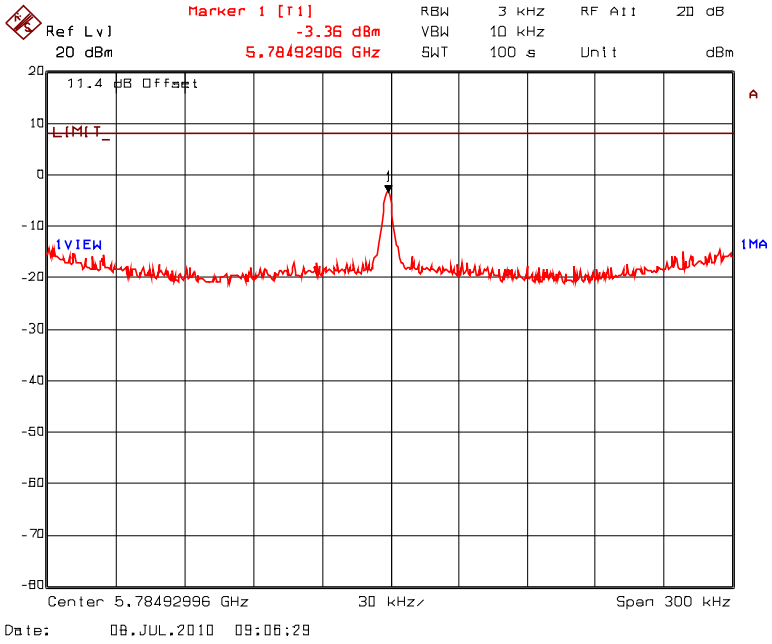
COMBINER (CHAIN 1 + CHAIN 2)

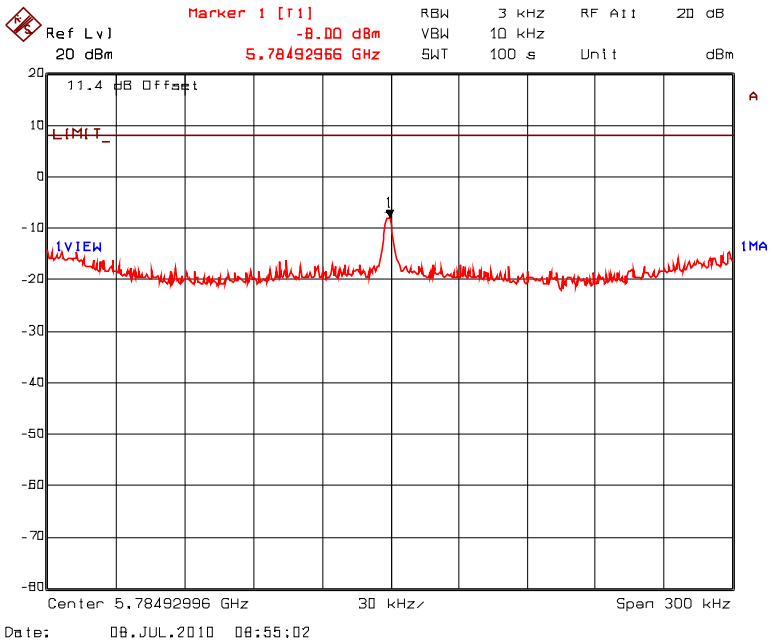


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 113(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13Mb/s

CHAIN 1 & CHAIN 2

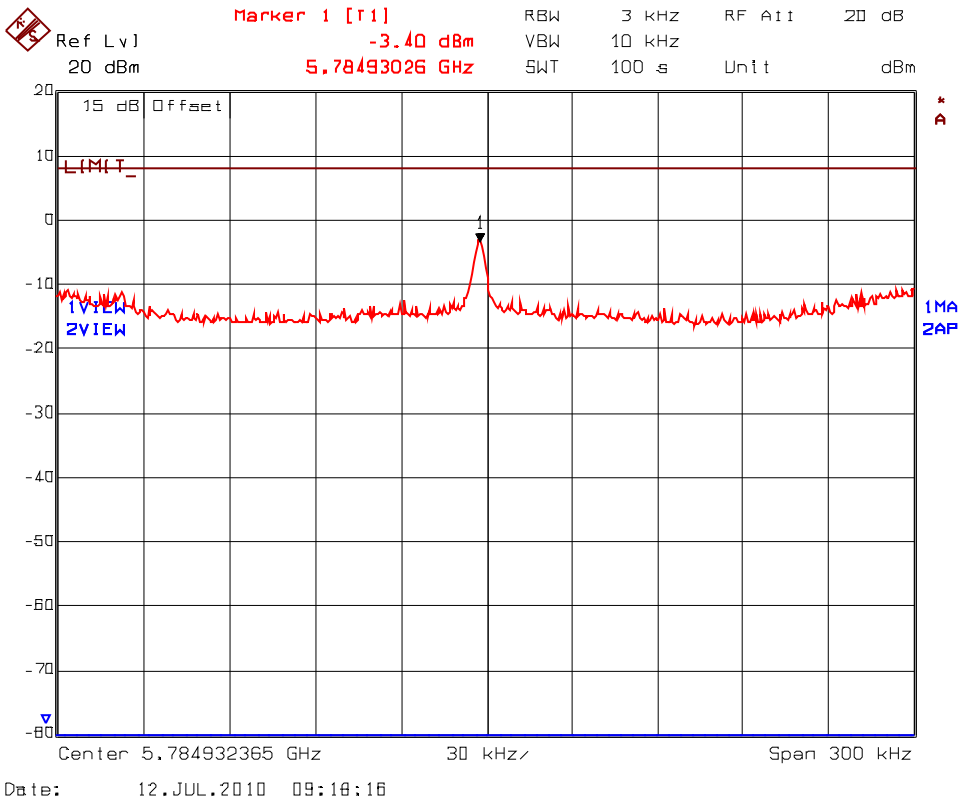




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 113(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 13Mb/s

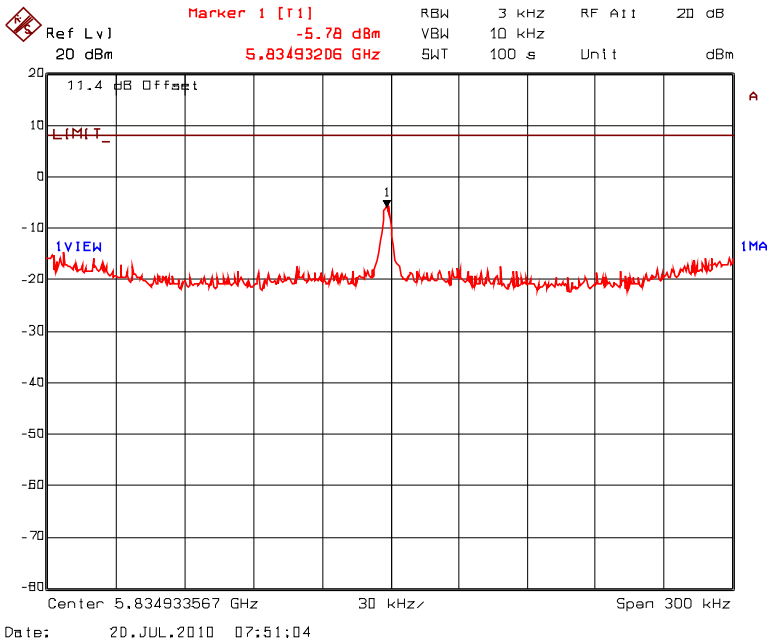
COMBINER (CHAIN 1 + CHAIN 2)

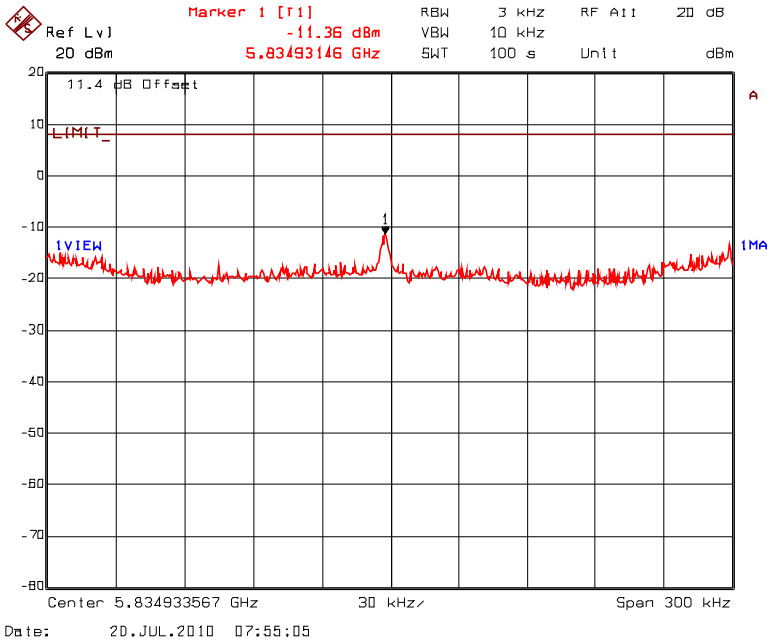


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 114(a): Transmitted Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13Mb/s

CHAIN 1 & CHAIN 2

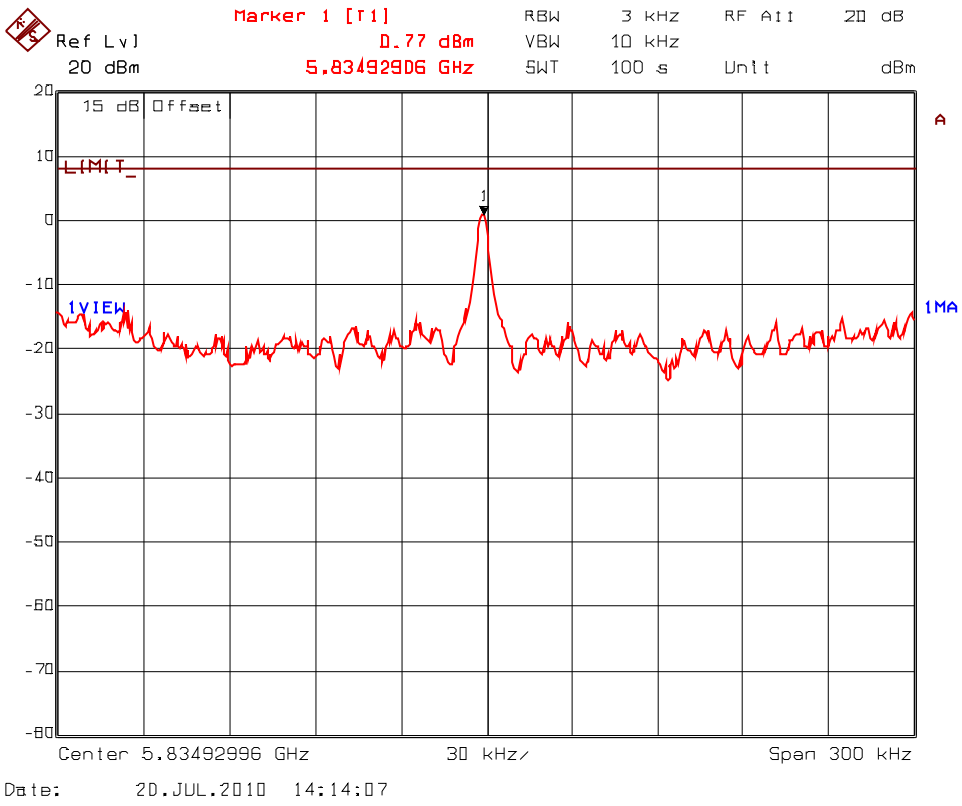




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 114(b): Combined Tx Power Density in 3 kHz BW wrt. 20 MHz Channel Spacing Frequency: 5835 MHz, Modulation: BPSK 1/2 @ 13Mb/s

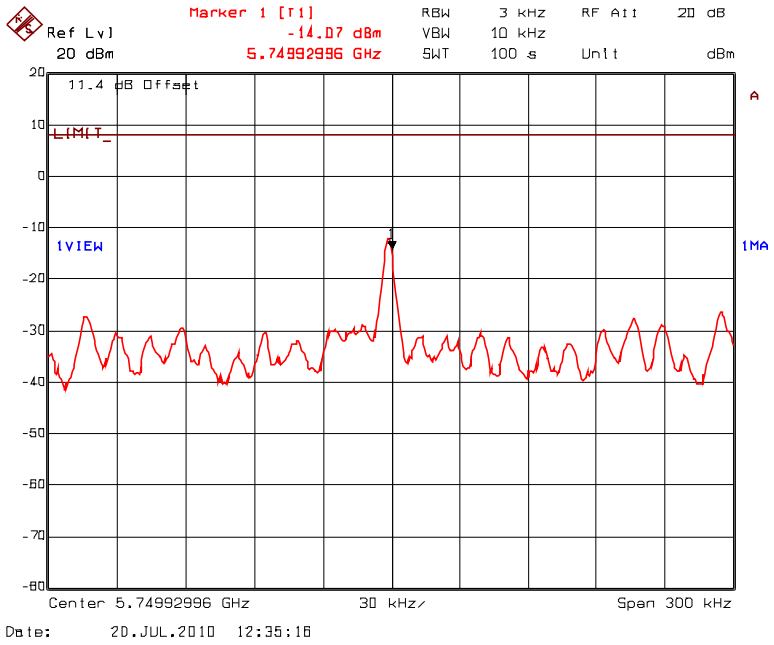
COMBINER (CHAIN 1 + CHAIN 2)

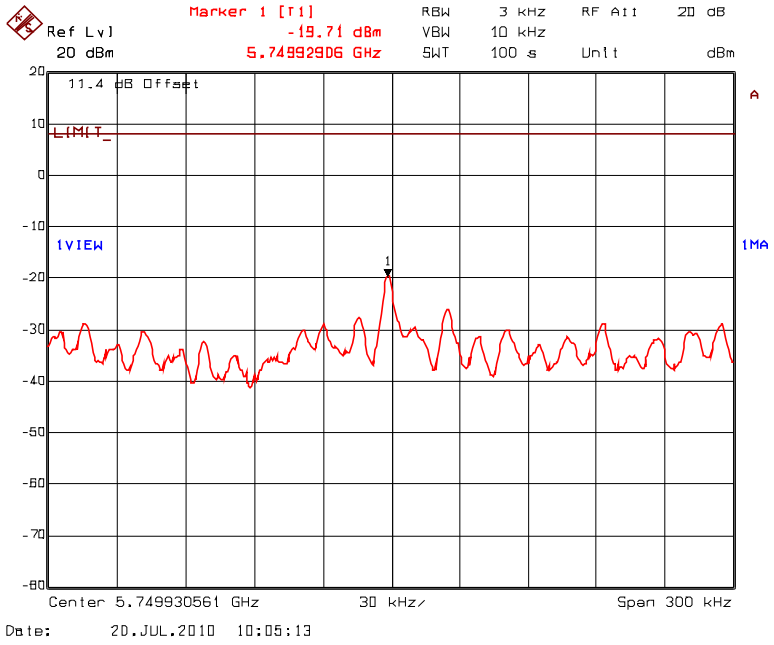


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 115(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5750 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1 & CHAIN 2

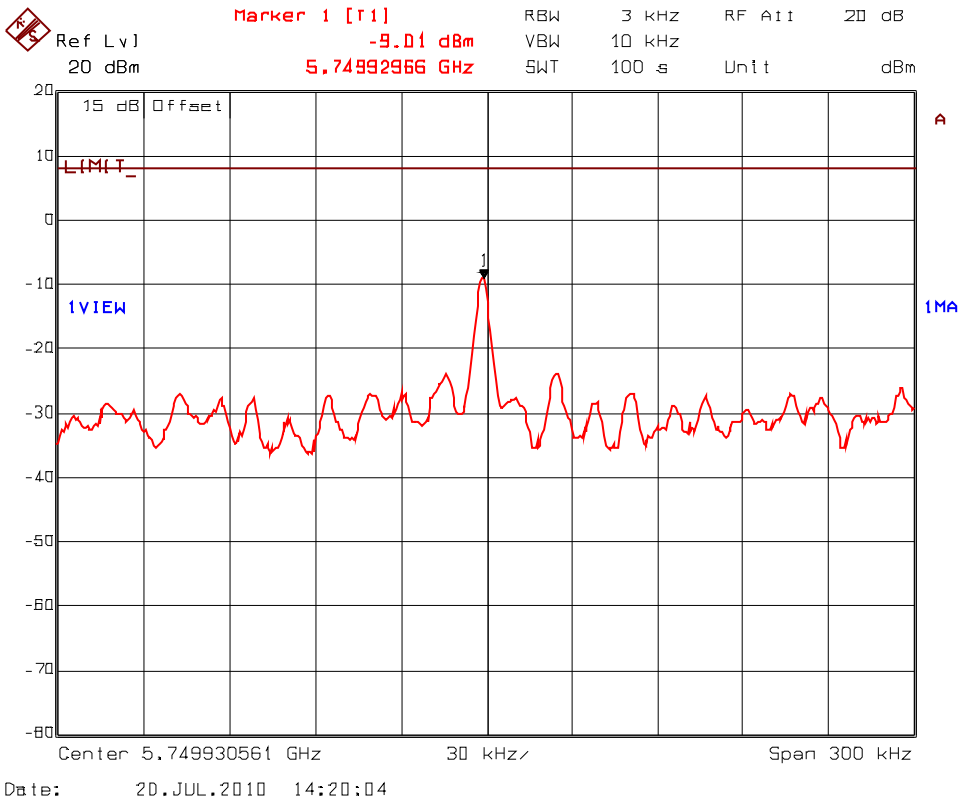




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 115(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5750 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

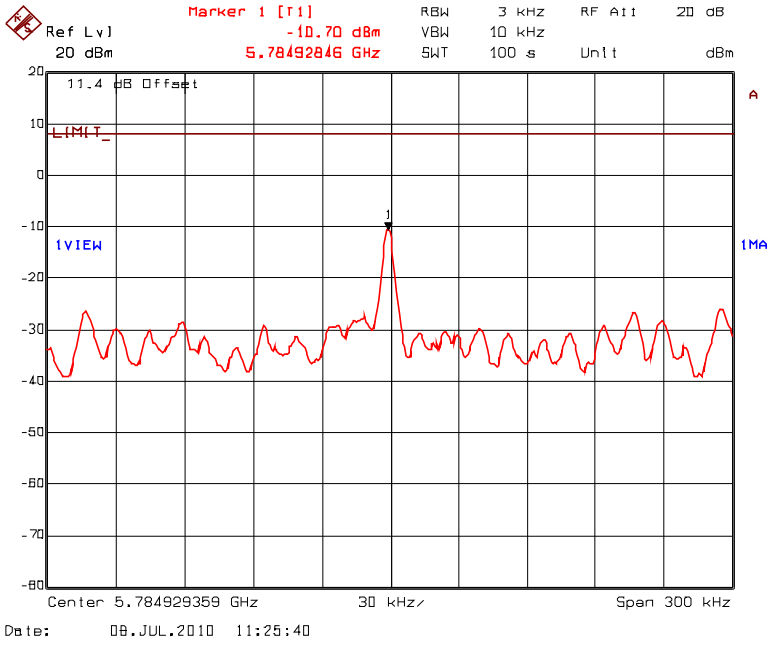
COMBINER (CHAIN 1 + CHAIN 2)

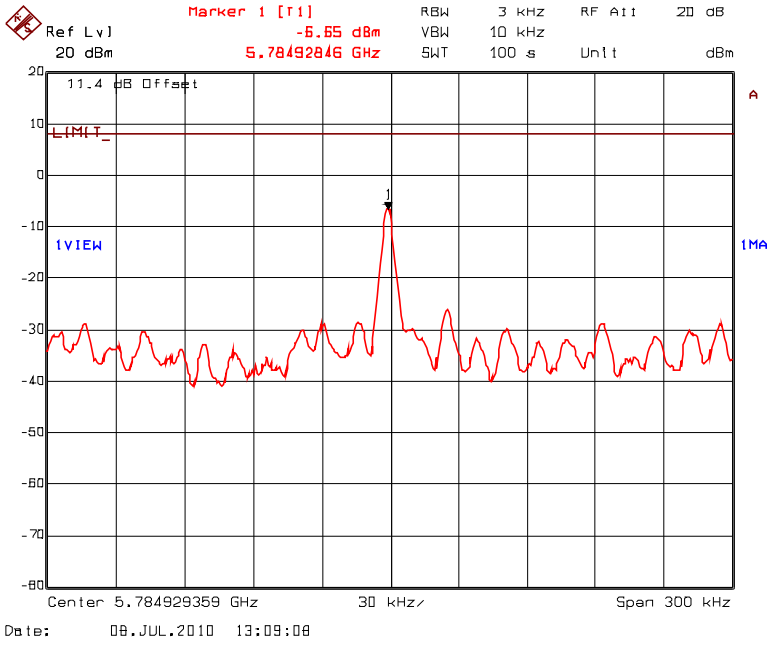


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 116(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1 & CHAIN 2

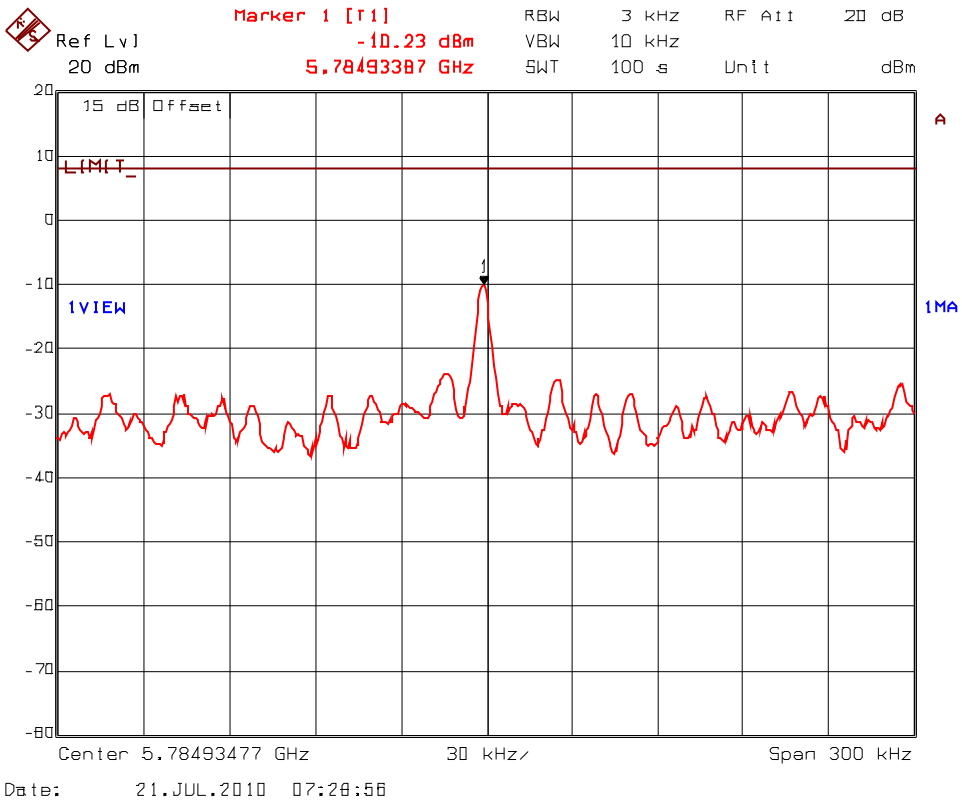




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 116(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

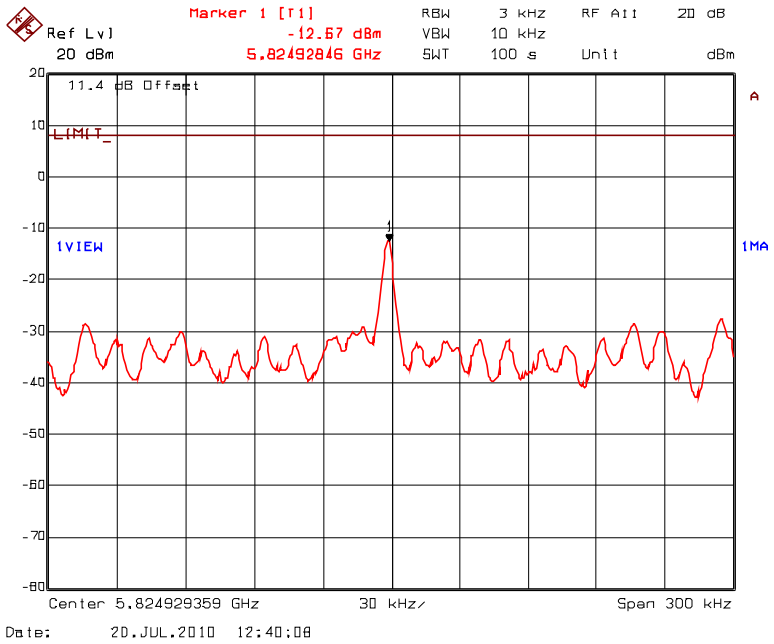
COMBINER (CHAIN 1 + CHAIN 2)

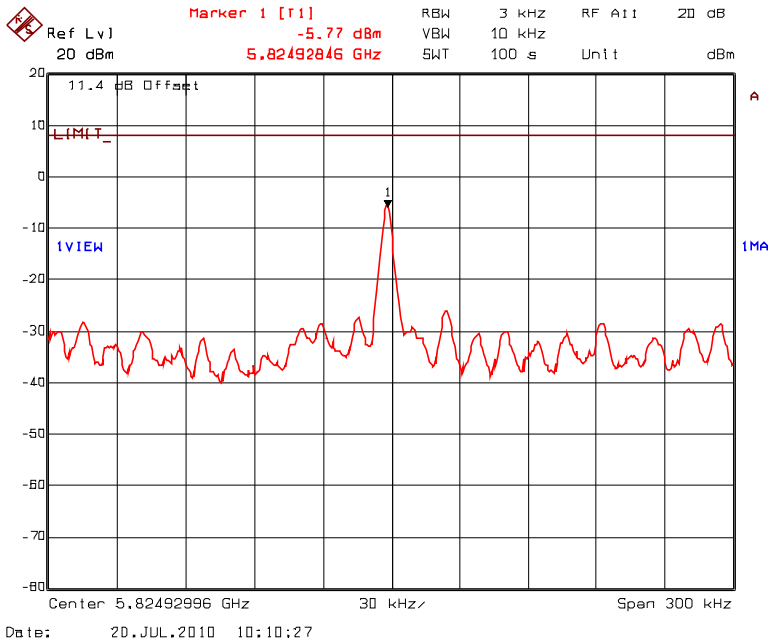


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 117(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

CHAIN 1 & CHAIN 2

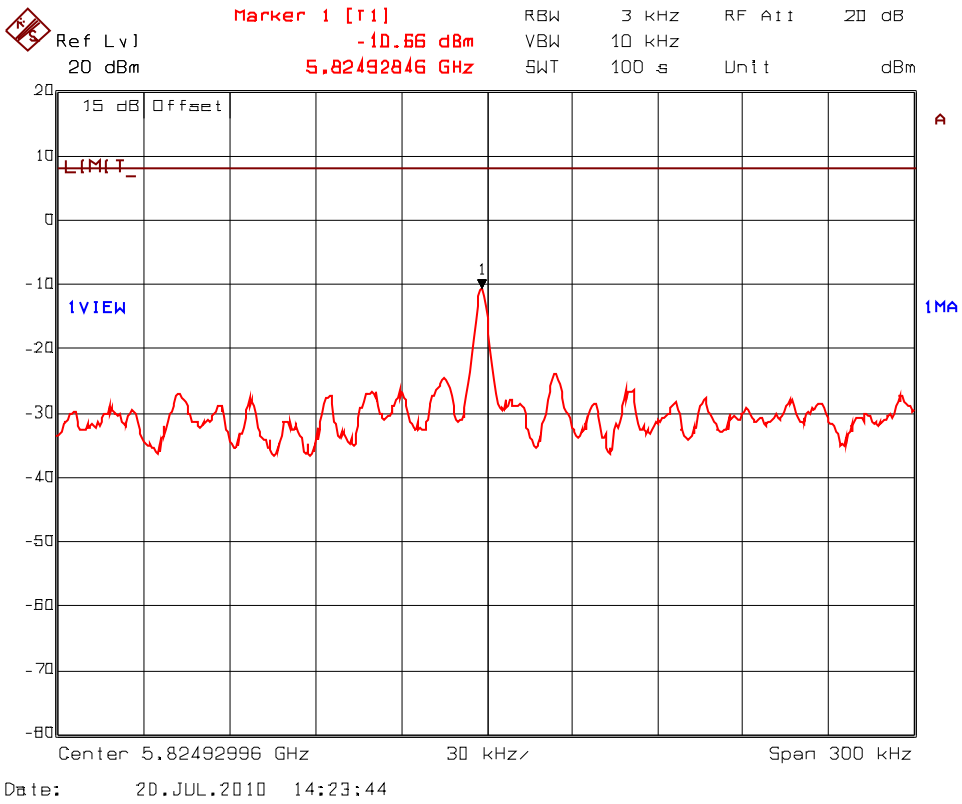




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 117(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: 64QAM 5/6 @ 300Mb/s

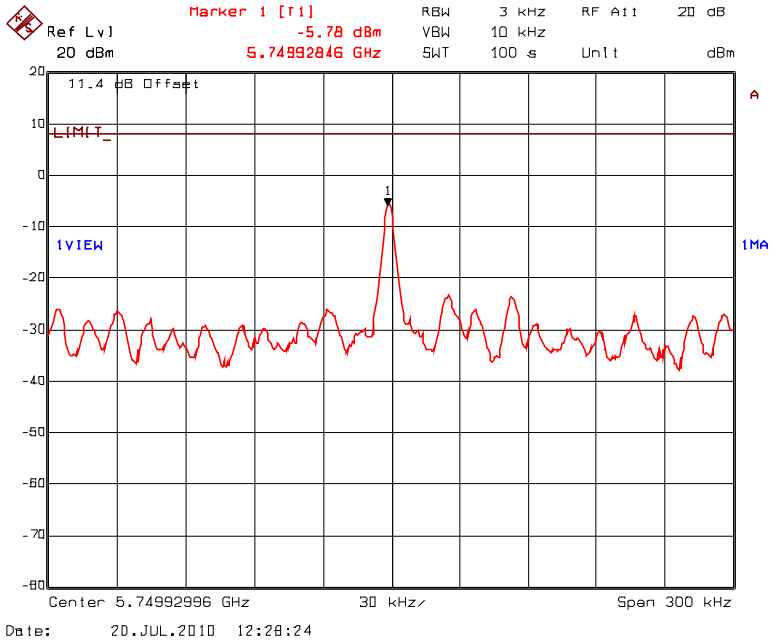
COMBINER (CHAIN 1 + CHAIN 2)

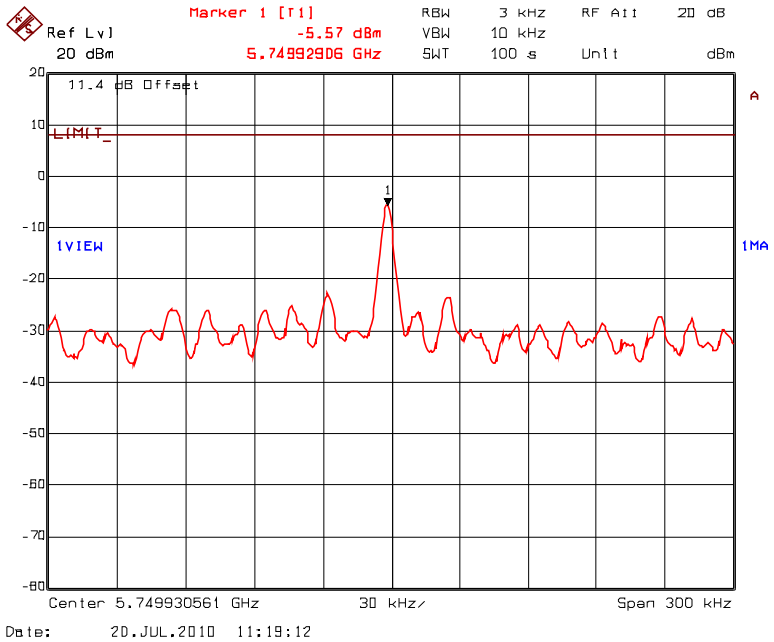


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 118(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5750 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1 & CHAIN 2

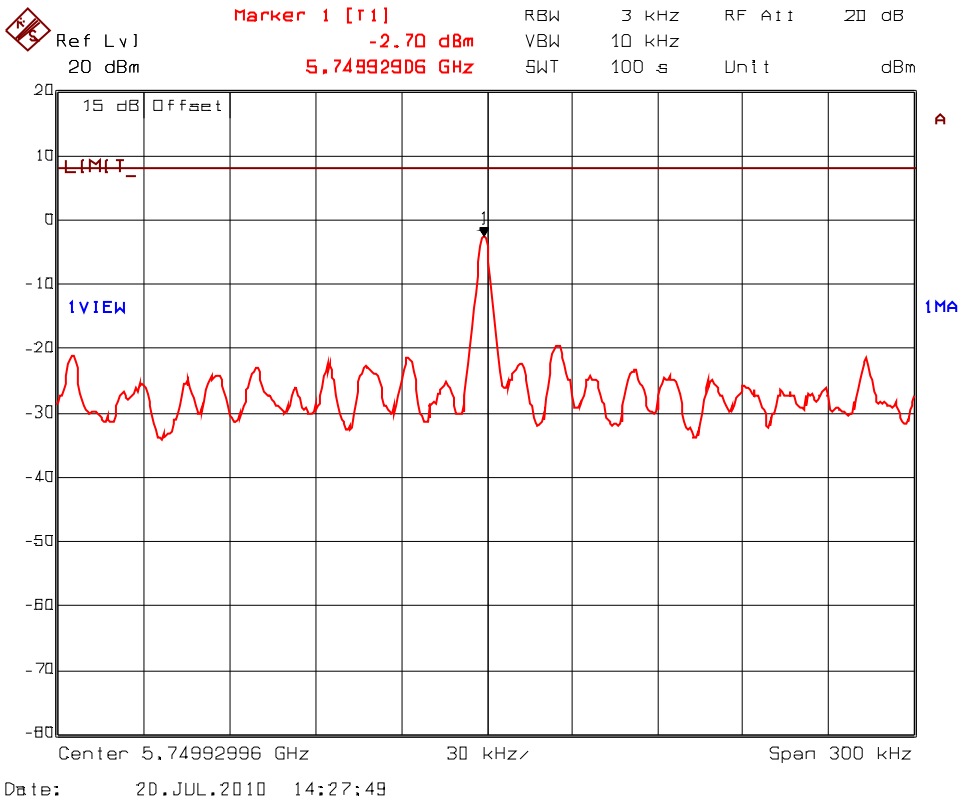




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 118(b): Combined Tx Power Density in 3 kHz BW wrt. 40MHz Channel Spacing Frequency: 5750 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

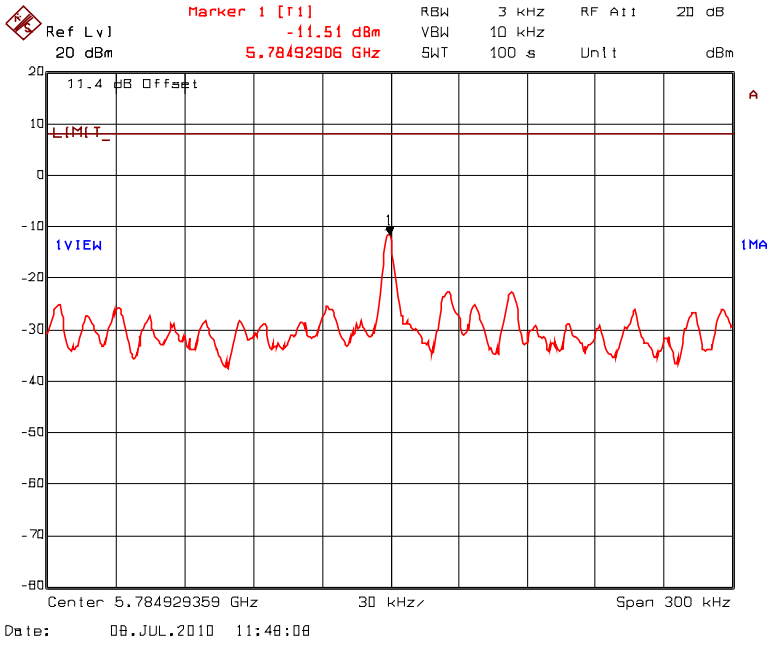
COMBINER (CHAIN 1 + CHAIN 2)

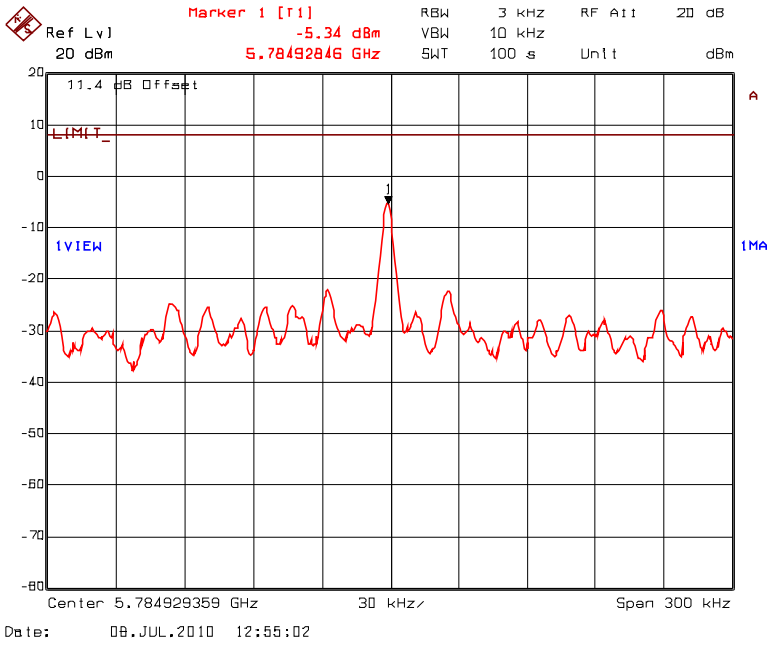


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 119(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1 & CHAIN 2

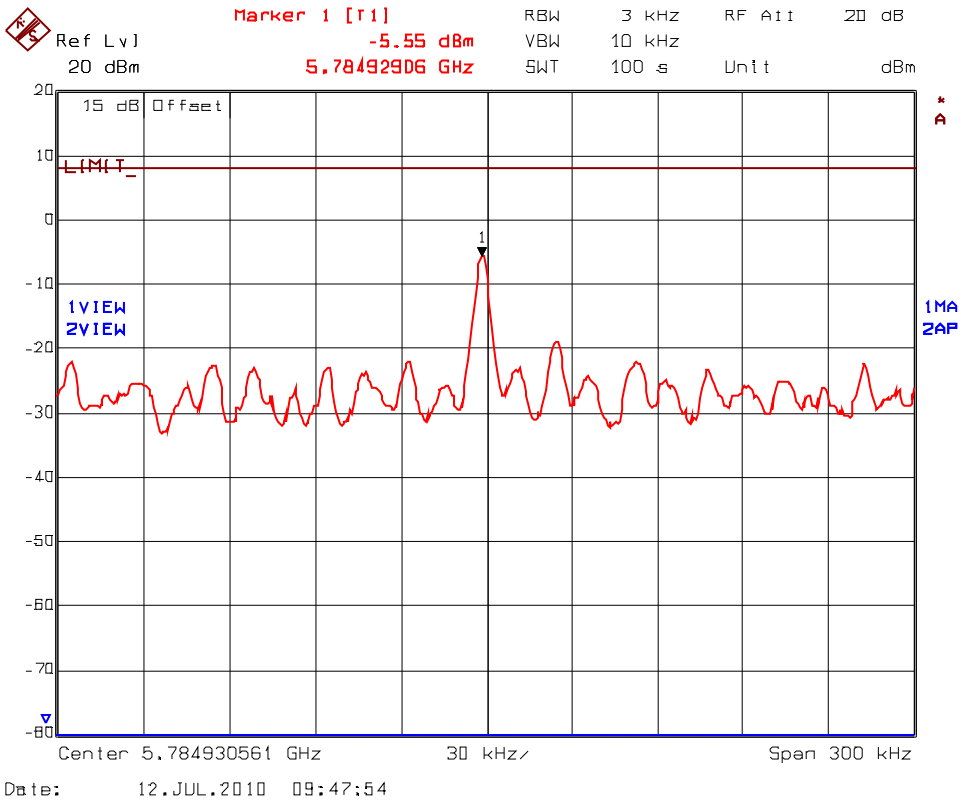




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 119(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5785 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

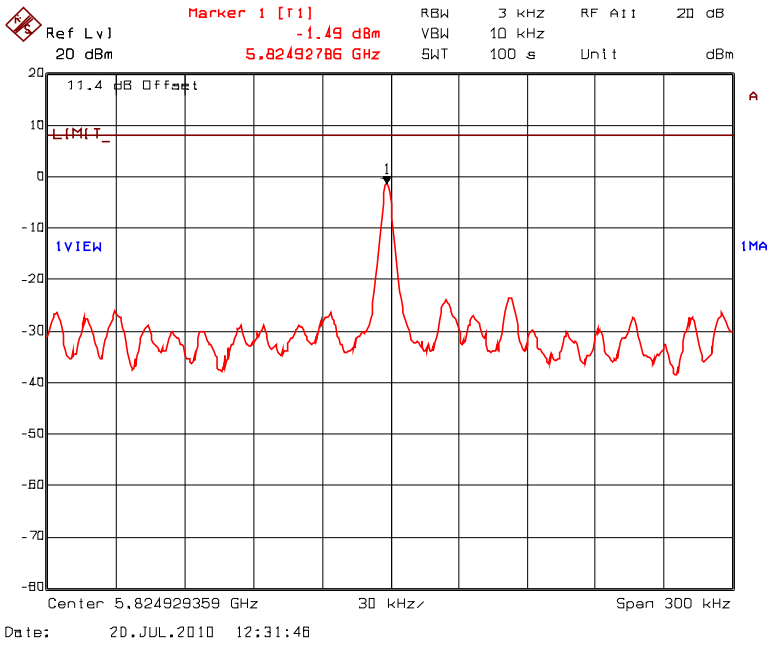
COMBINER (CHAIN 1 + CHAIN 2)

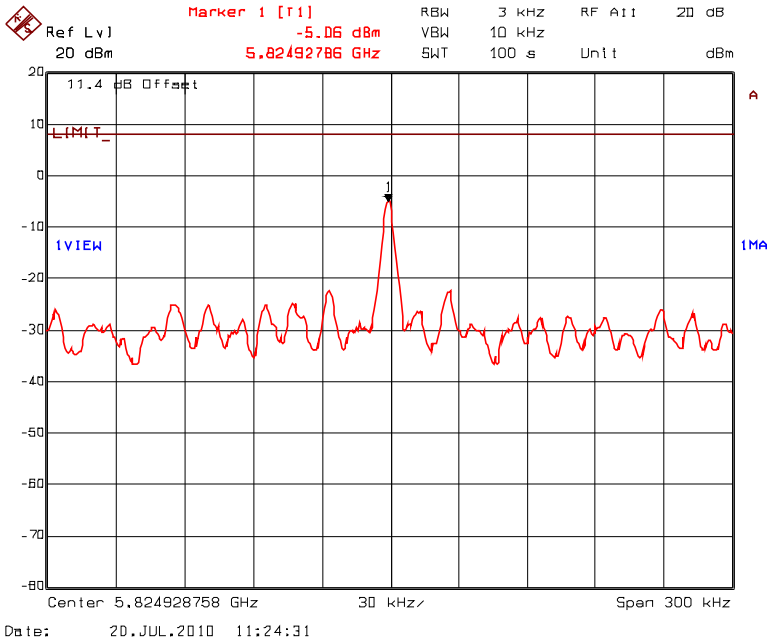


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 120(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

CHAIN 1 & CHAIN 2

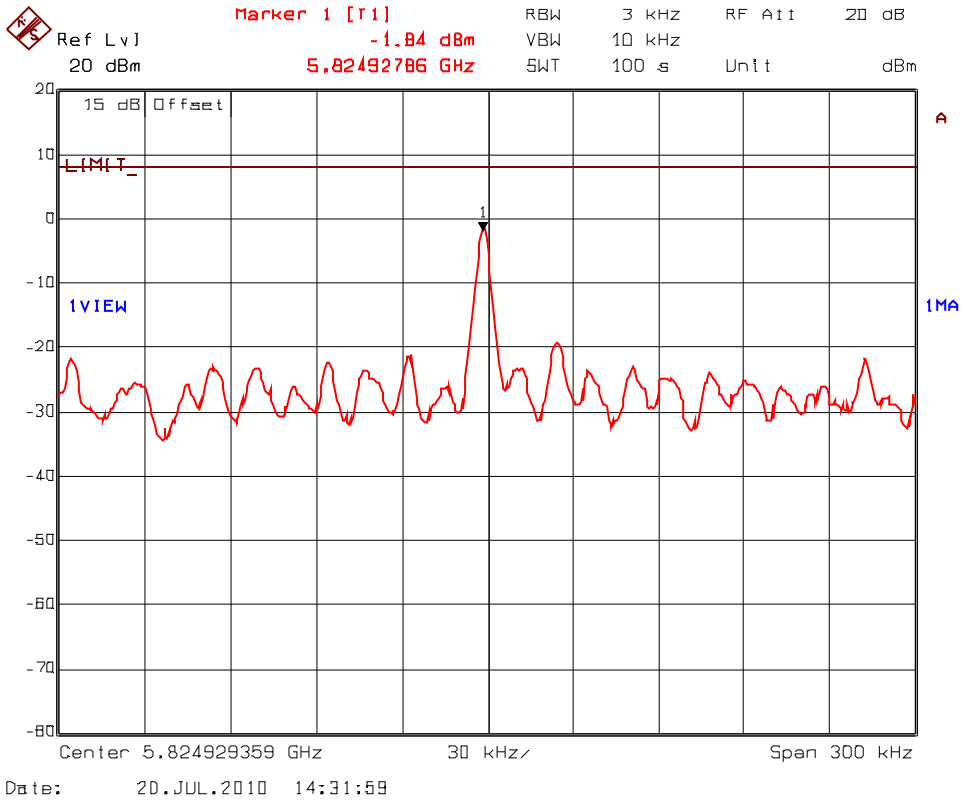




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 120(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5825 MHz, Modulation: 16QAM 3/4 @ 180Mb/s

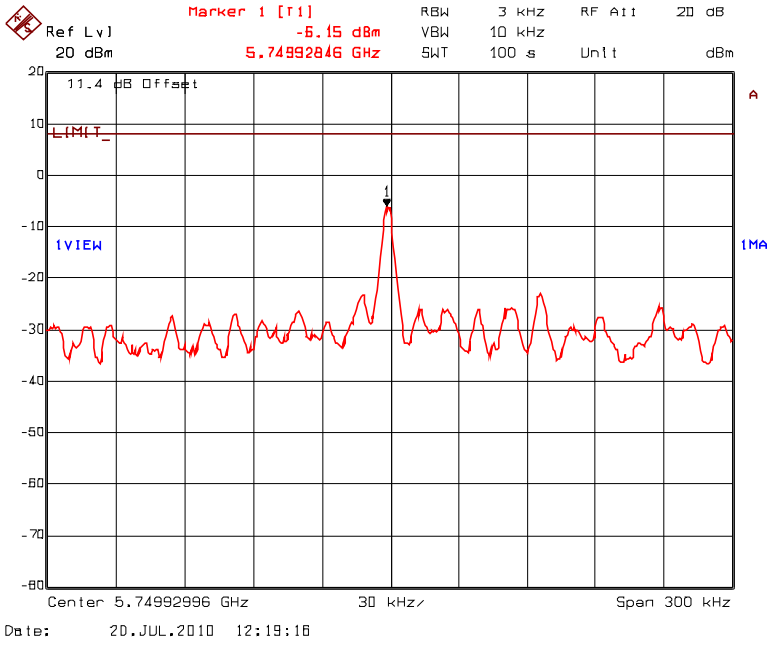
COMBINER (CHAIN 1 + CHAIN 2)

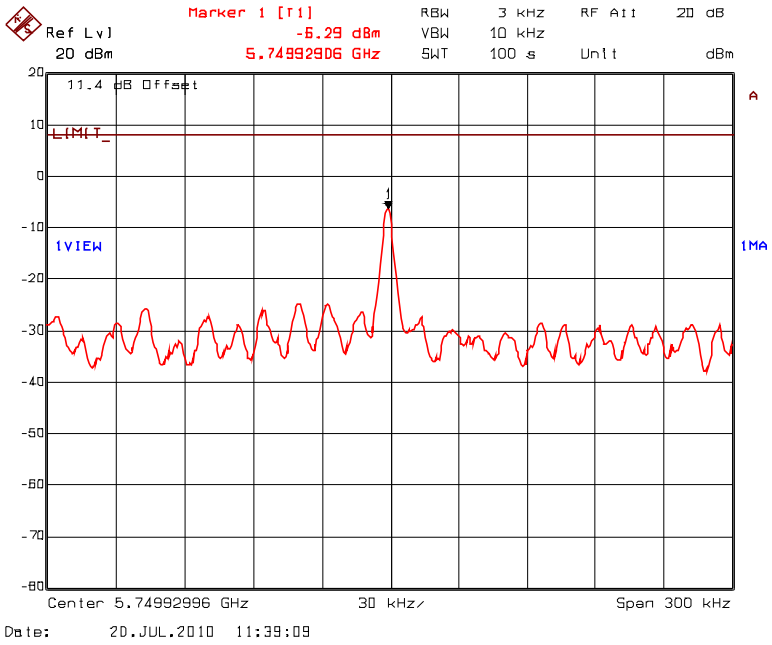


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 121(a): Transmitted Power Density in 3 kHz BW wrt. 40MHz Channel Spacing Frequency: 5750 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1 & CHAIN 2

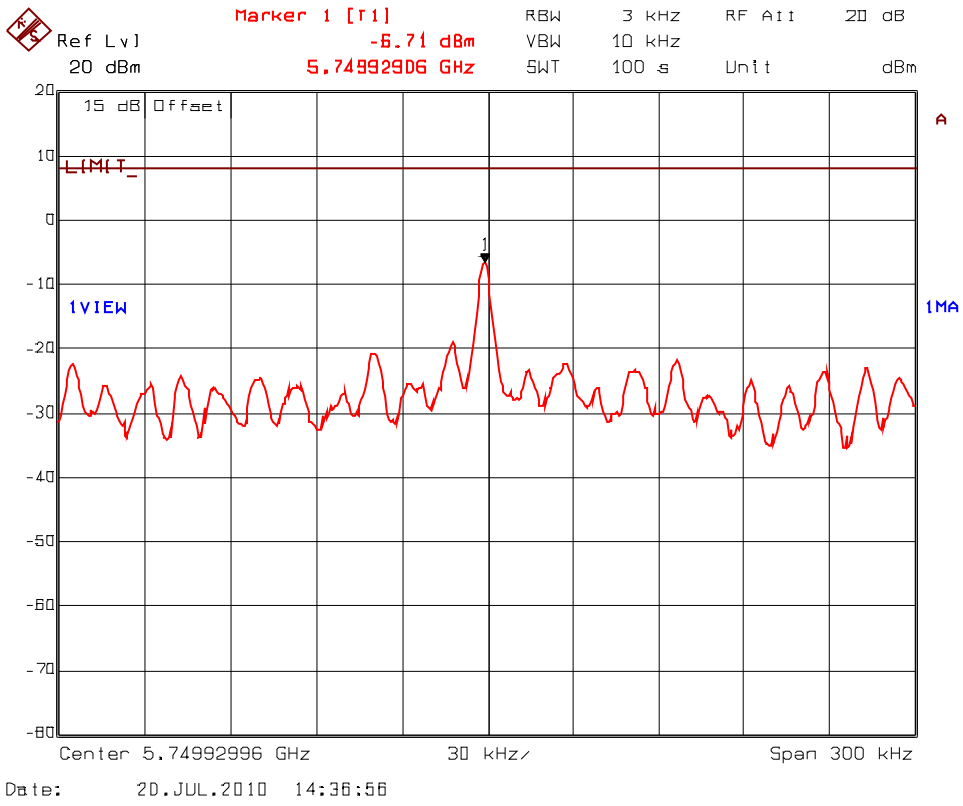




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 121(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5750 MHz, Modulation: QPSK 3/4 @ 90Mb/s

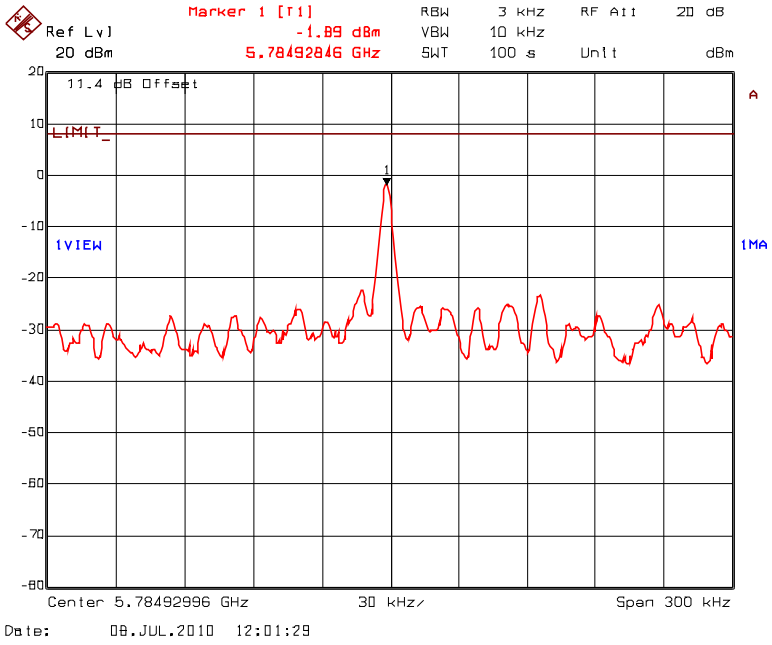
COMBINER (CHAIN 1 + CHAIN 2)

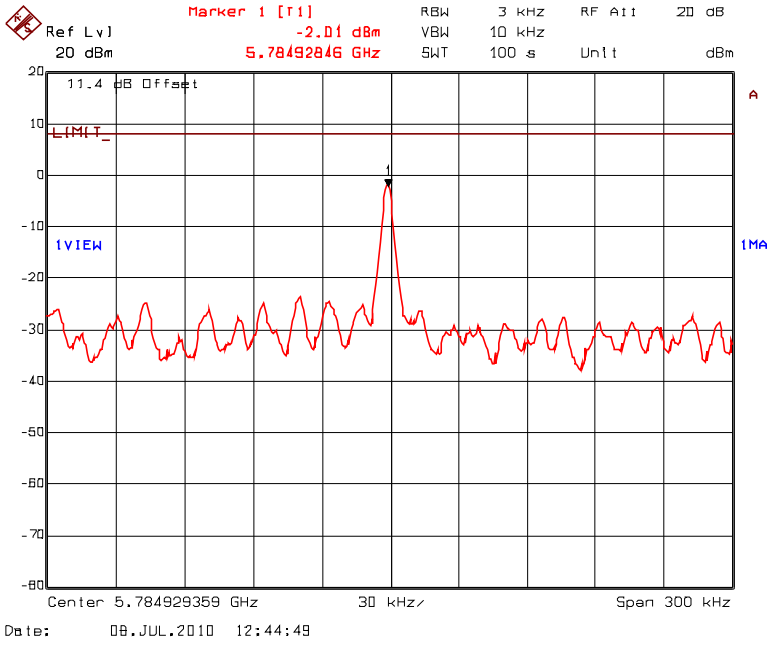


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 122(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1 & CHAIN 2

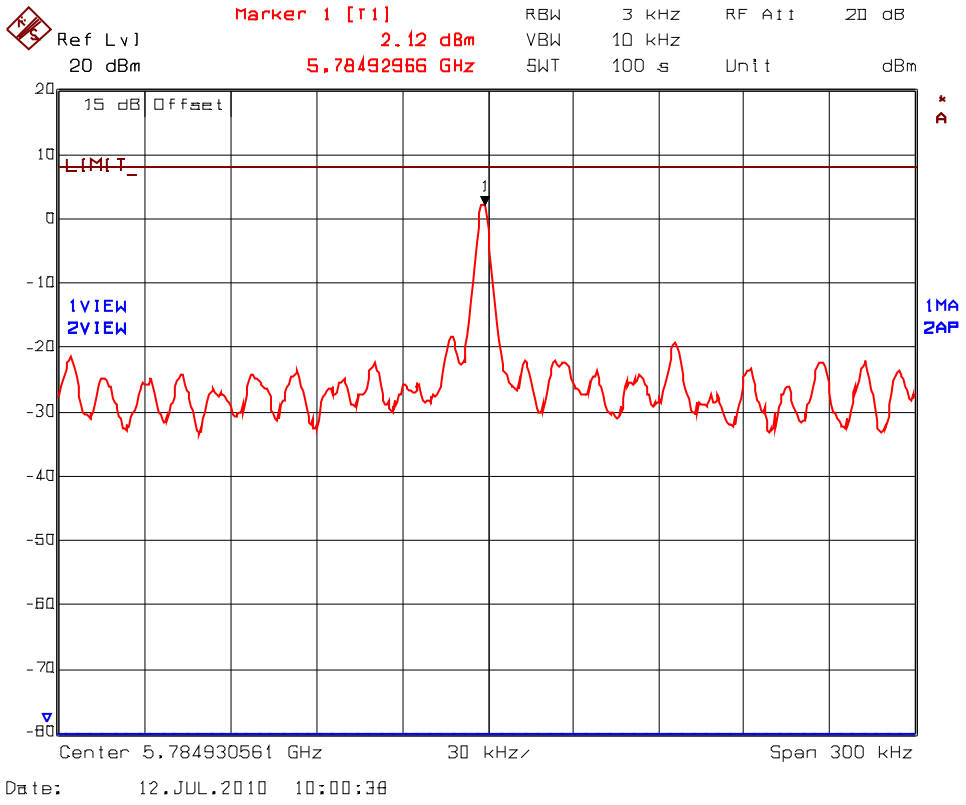




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 122(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5785 MHz, Modulation: QPSK 3/4 @ 90Mb/s

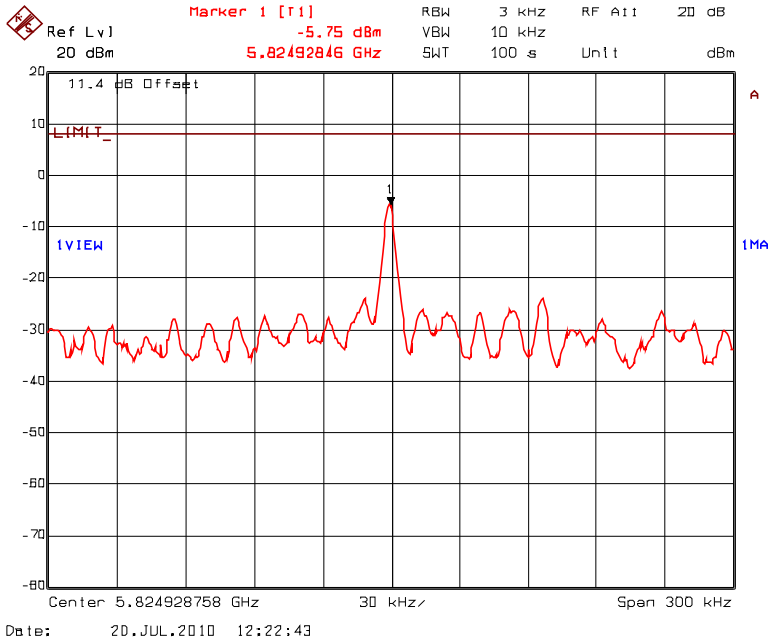
COMBINER (CHAIN 1 + CHAIN 2)

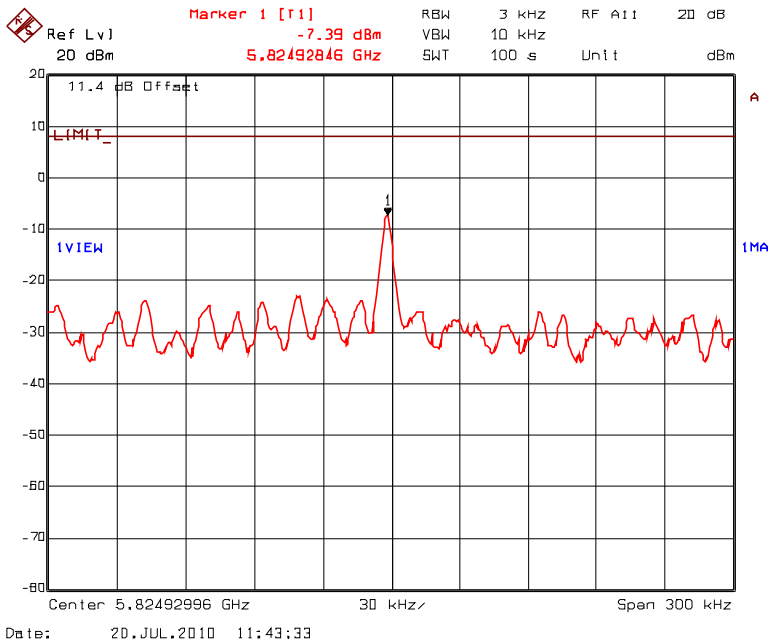


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 123(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: QPSK 3/4 @ 90Mb/s

CHAIN 1 & CHAIN 2

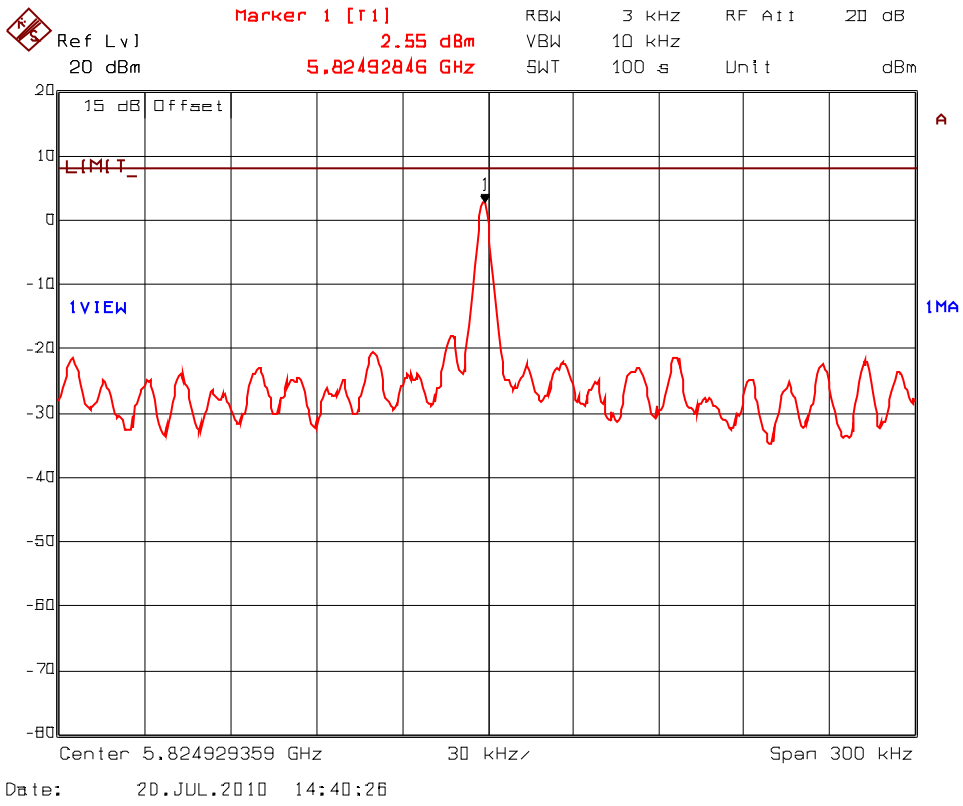




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 123(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: QPSK 3/4 @ 90Mb/s

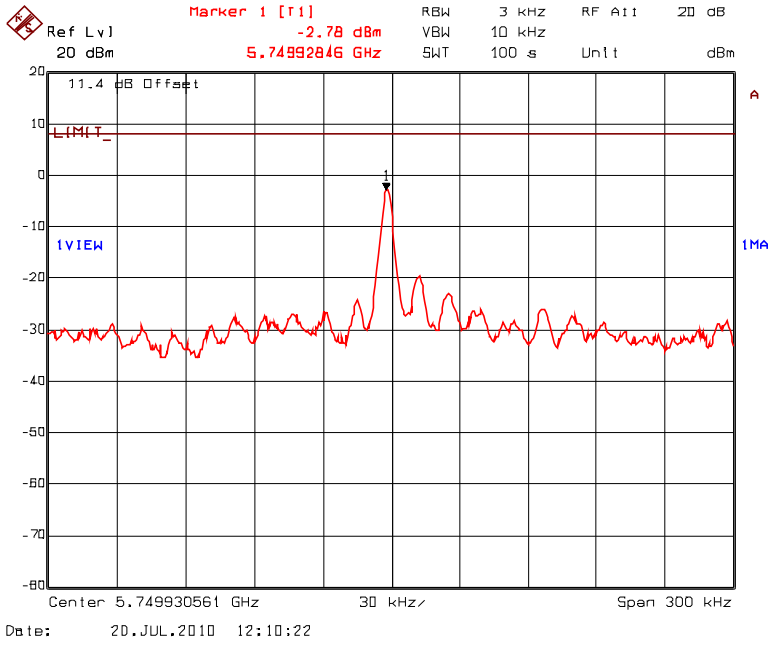
COMBINER (CHAIN 1 + CHAIN 2)

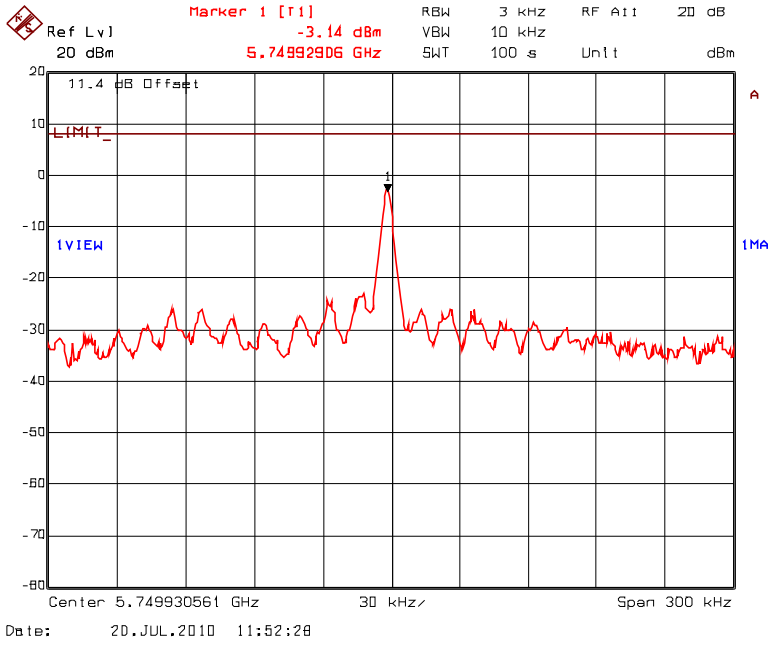


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 124(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1 & CHAIN 2

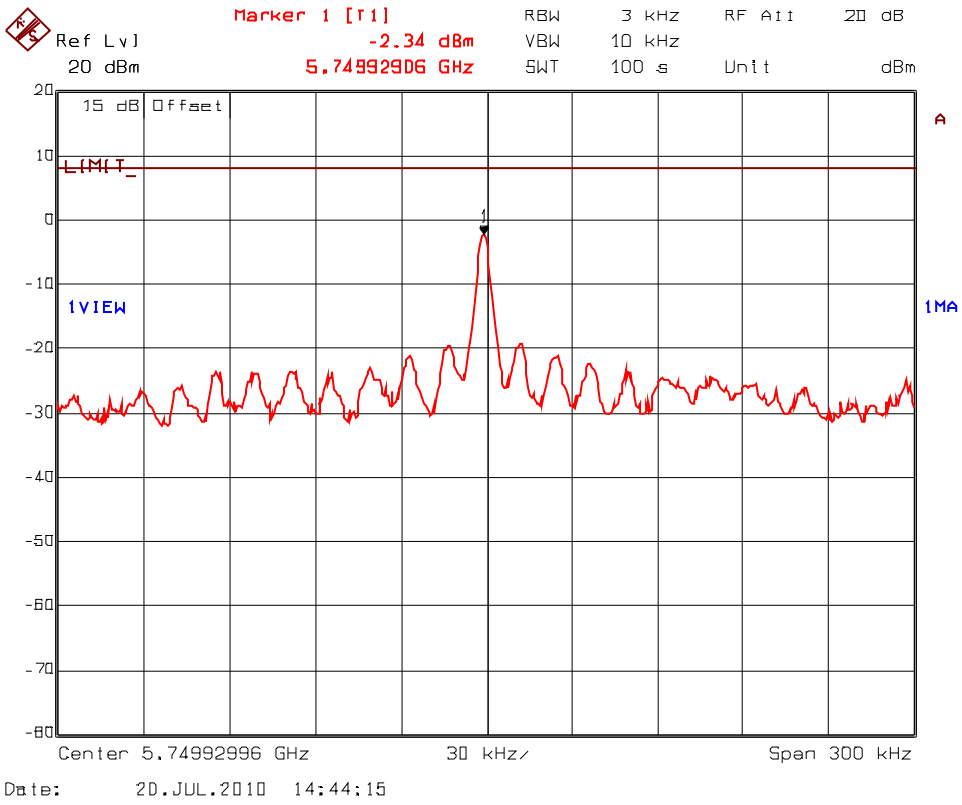




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 124(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5750 MHz, Modulation: BPSK 1/2 @ 30Mb/s

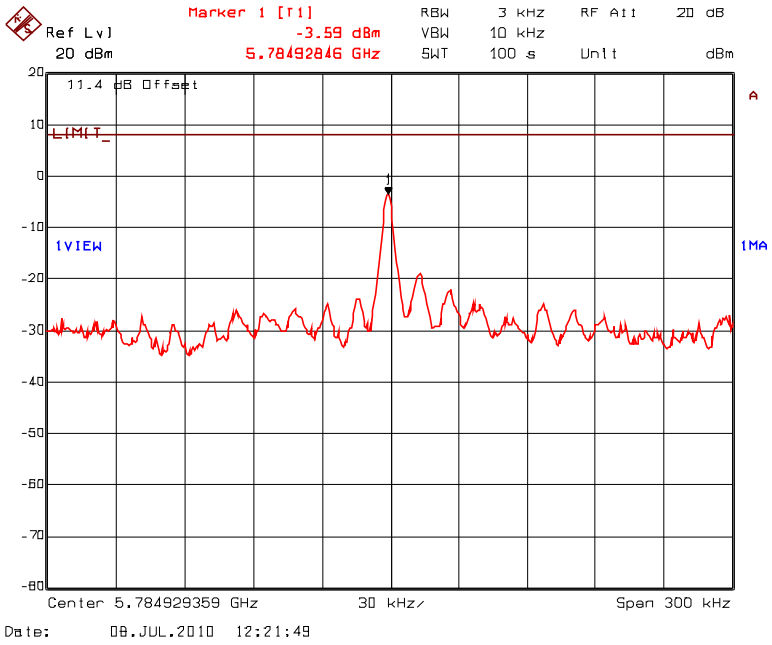
COMBINER (CHAIN 1 + CHAIN 2)

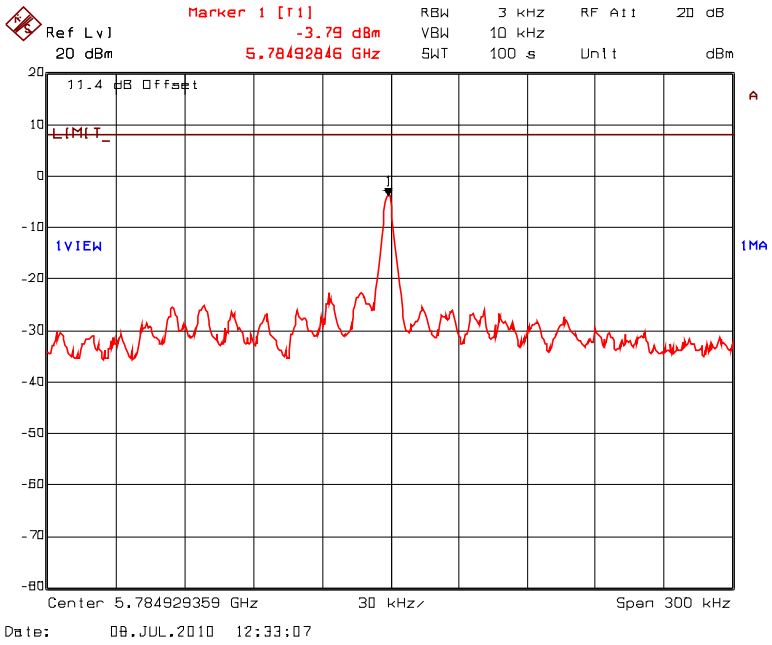


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 125(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1 & CHAIN 2

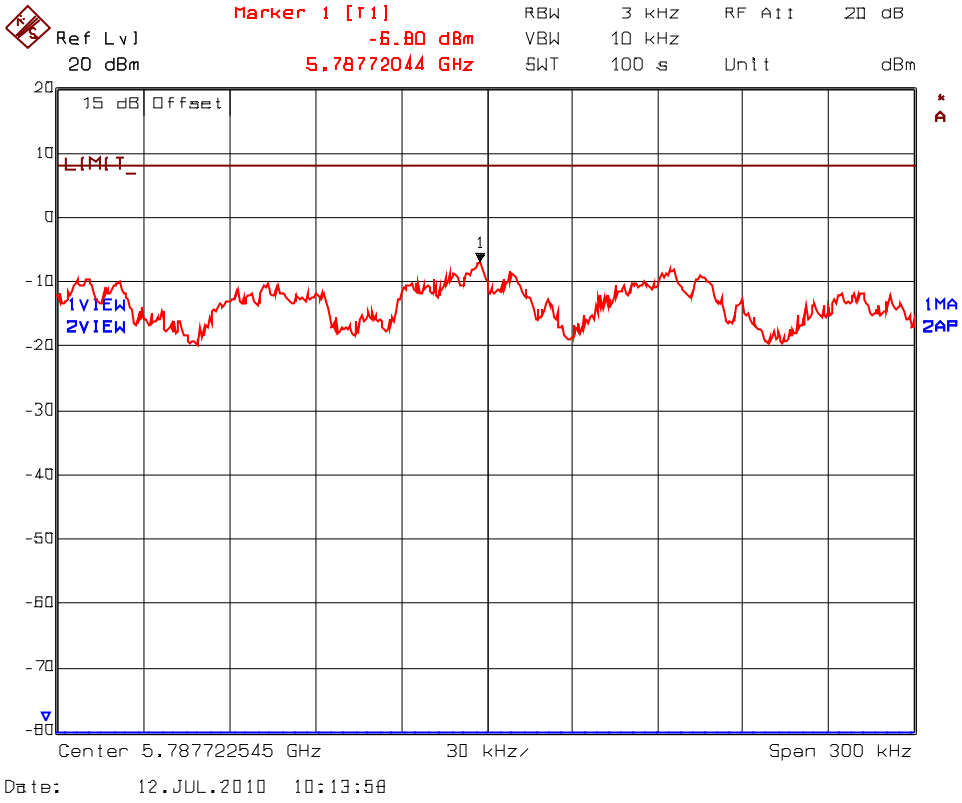




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 125(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing
Frequency: 5785 MHz, Modulation: BPSK 1/2 @ 30Mb/s

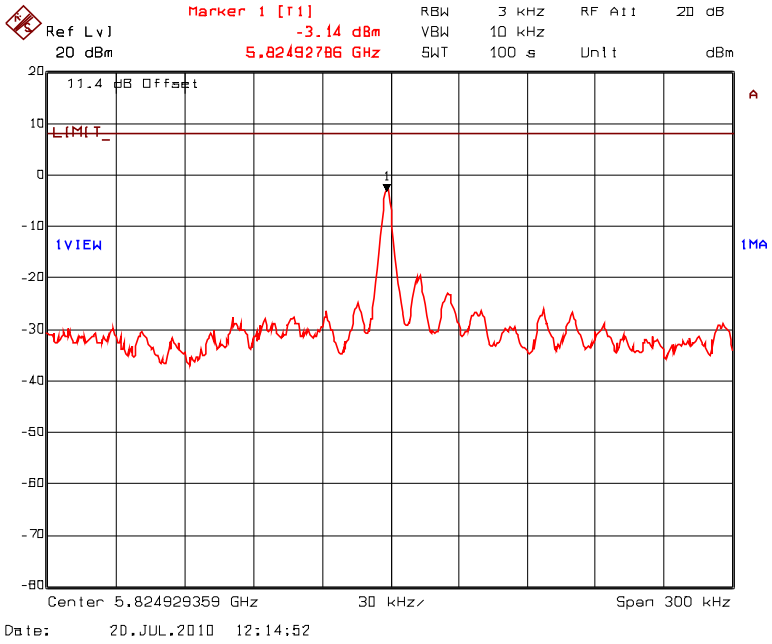
COMBINER (CHAIN 1 + CHAIN 2)

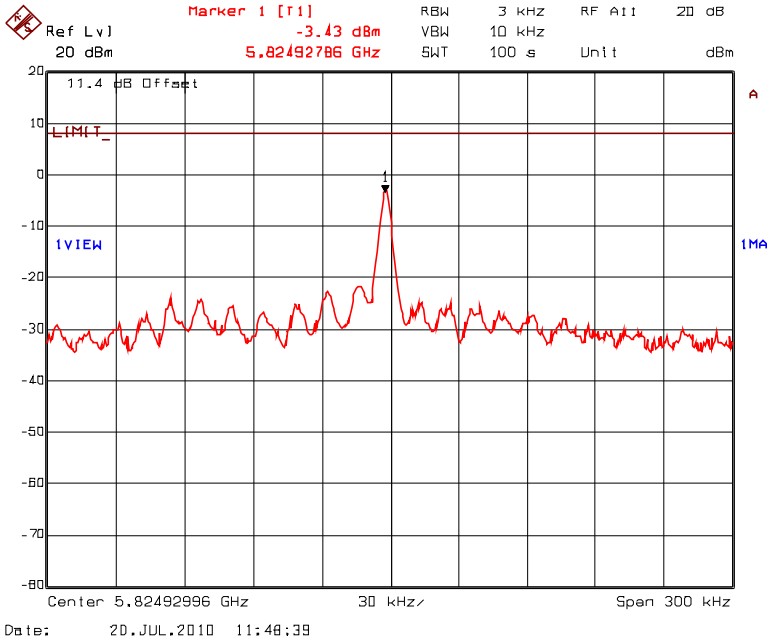


- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 126(a): Transmitted Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

CHAIN 1 & CHAIN 2

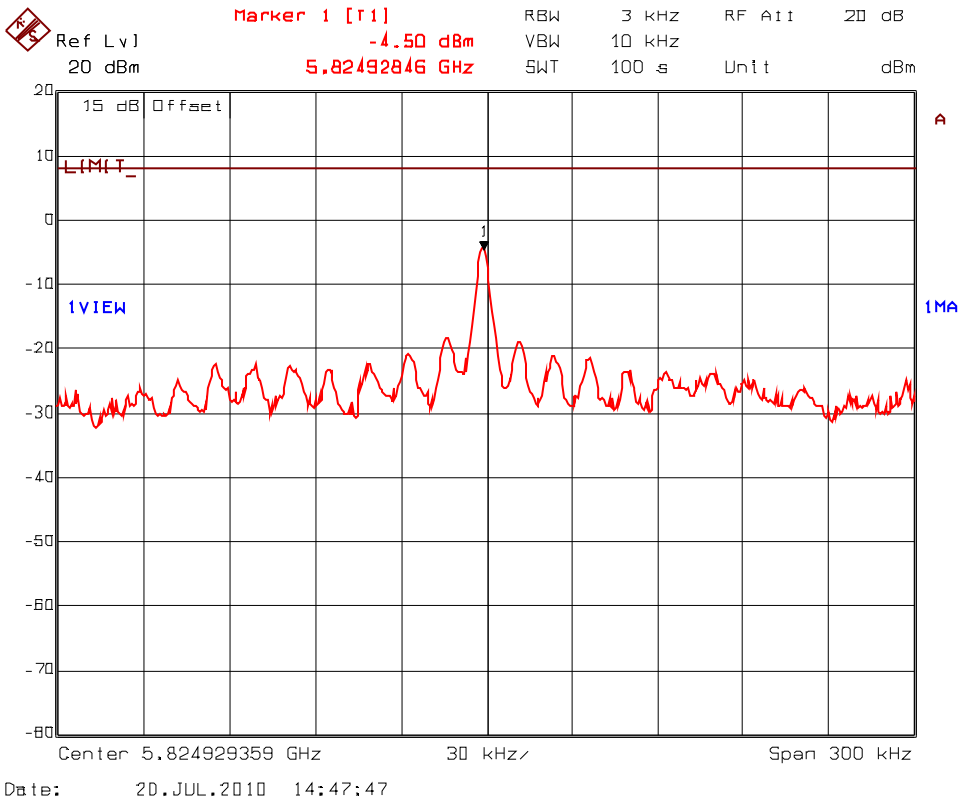




- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot # 126(b): Combined Tx Power Density in 3 kHz BW wrt. 40 MHz Channel Spacing Frequency: 5825 MHz, Modulation: BPSK 1/2 @ 30Mb/s

COMBINER (CHAIN 1 + CHAIN 2)



- *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)).

As per MIMO testing guidelines Radiated Emissions measurement shall be performed based on the highest maximum output power at given mode as documented in the output power measurement.

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. 15.247(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 --

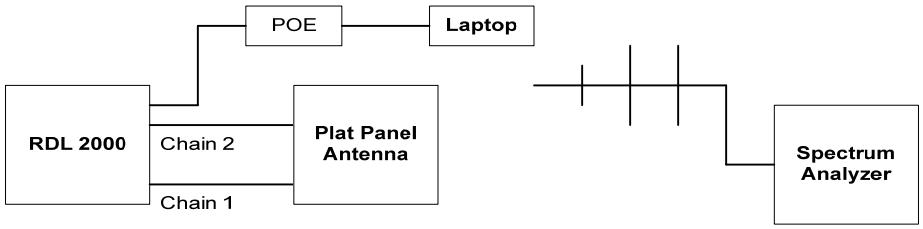
FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

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. Block Diagram of Test Setup



4.11.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz with external mixer	Aug 10, 2010
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	March 09, 2011
RF Amplifier	Hewlett Packard	84498	3008A00769	1 – 26.5 GHz	Nov 02, 2011
RF Amplifier	AH System	PAM-0118	225	20 MHz – 18 GHz	Apr 18, 2011
High Pass	K & L	11SH10-8000/T18000	3	Cut off 6 GHz	N/A
Biconi-Log Antenna	Emco	3142C	00026873	26 – 3000 MHz	Apr 18, 2011
Horn Antenna	Emco	3155	9701-6570	1 – 18 GHz	Nov 20, 2010

4.11.5. Photographs of Test Setup

Refer to the test-setup photographs for setup and arrangement of equipment under tests and its ancillary equipment.

4.11.6. Test Data

Notes:

(1) As we noticed that the RF output powers measured is highest with BPSK 1/2, 3.2 Mbps and 6dB Bandwidths and Band-edge Emissions are very much the same for all different modulations. Therefore radiated emissions with BPSK 1/2, 3.2 Mbps modulation was tested as worst case for each Channel Spacing to represent for all other modulations.

(2) Radiated spurious emission tests including restricted band edge tests, tests were performed with the multiple tx chains are transmitting simultaneously.

(3) The radiated band-edge and out-of-band spurious emissions were measured from the Model RDL-2000 with the highest gain of antenna in each family as below:

- Highest gain antenna in family #1: Redline, Flat Panel Antenna, Model No. A2308MFD, Antenna Gain: 23 dBi
- Highest gain antenna in family #2: Redline, Parabolic Disk Antenna, Model: A3FT3204LTPD, Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi

4.11.6.1. Transmitter Radiated Spurious Emissions

4.11.6.1.1. Test Configuration #1: Redline Edge Flat Panel Antenna, Model No. A2308MFD Antenna Gain: 23 dBi, Minimum Cable Loss: 0 dBi

4.11.6.1.1.1. Carrier Frequency of 5730 MHz (Lowest)

Fundamental Frequency:	5730 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5730	141.1	--	V	--	--	--	--
5730	139.6	--	H	--	--	--	--
11460*	69.2	45.4	V	54.0	121.1	-8.6	Pass
11460*	64.3	44.2	H	54.0	121.1	-9.8	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.1.1.2. Carrier Frequency of 5785 MHz (Middle)

Fundamental Frequency:	5785 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5785	141.6	--	V	--	--	--	--
5785	139.2	--	H	--	--	--	--
11570*	71.0	45.1	V	54.0	121.6	-8.9	Pass
11570*	65.8	43.8	H	54.0	121.6	-10.2	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.1.1.3. Carrier Frequency of 5845 MHz (Highest)

Fundamental Frequency:	5845 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5845	141.9	--	V	--	--	--	--
5845	139.6	--	H	--	--	--	--
11690*	69.3	51.3	V	54.0	121.9	-2.7	Pass
11690*	67.8	50.4	H	54.0	121.9	-3.6	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.1.2. Test Configuration #2: Redline Parabolic Disk Antenna, Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi

4.11.6.1.2.1. Carrier Frequency of 5730 MHz (Lowest)

Fundamental Frequency:	5730 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5730	150.1	--	V	--	--	--	--
5730	152.4	--	H	--	--	--	--
11460*	63.4	51.2	V	54.0	132.4	-2.8	Pass
11460*	64.0	47.6	H	54.0	132.4	-6.4	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.1.2.2. Carrier Frequency of 5785 MHz (Middle)

Fundamental Frequency:	5785 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5785	151.3	--	V	--	--	--	--
5785	152.5	--	H	--	--	--	--
11570*	63.9	49.9	V	54.0	132.5	-4.1	Pass
11570*	63.9	46.7	H	54.0	132.5	-7.3	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.1.2.3. Carrier Frequency of 5845 MHz (Highest)

Fundamental Frequency:	5845 MHz
Frequency Test Range:	30 MHz – 40 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
5845	151.7	--	V	--	--	--	--
5845	152.8	--	H	--	--	--	--
11690*	64.8	49.0	V	54.0	132.8	-5.0	Pass
11690*	65.5	52.0	H	54.0	132.8	-2.0	Pass

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits shown in § 15.209.

4.11.6.2. Transmitter Radiated Band-edge Spurious Emissions

Conforms. Please refer to Plots # 127 (a),(b),(c)&(d) to # 134 (a),(b),(c)&(d) for detailed measurements of radiated band-edge emissions.

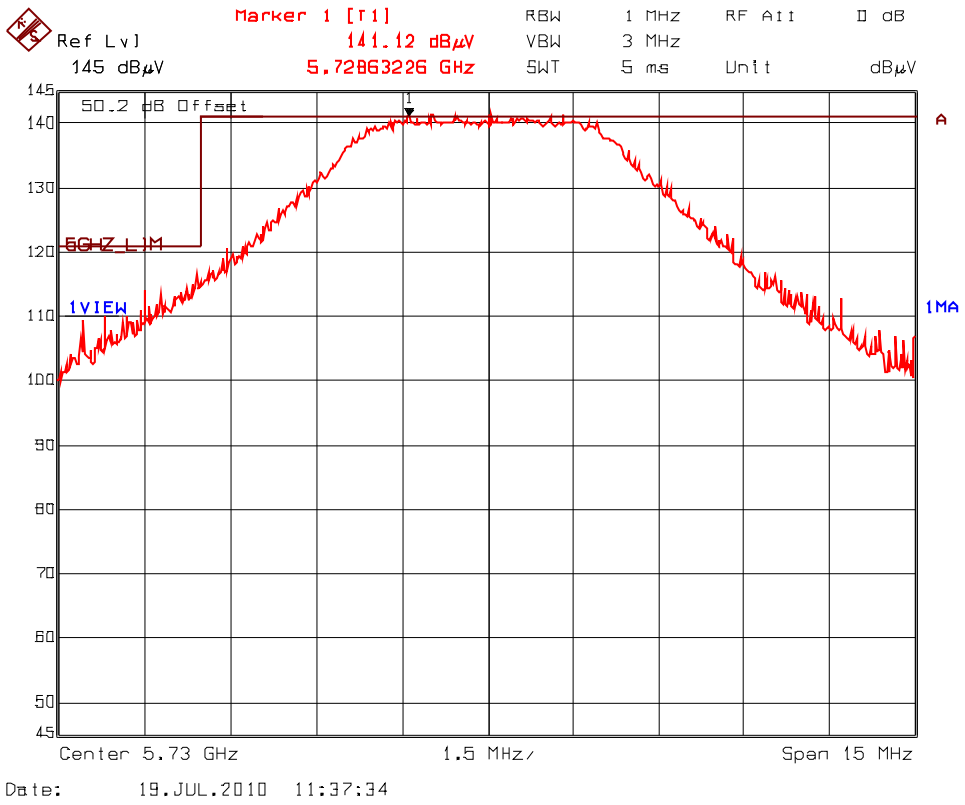
Remarks:

- All spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- EUT is tested in three orthogonal positions.
- The following test results are the worst-case measurements.
- Band-edges compliance condition: EUT connected to antennas via antenna feed-line must have a minimum cable loss as specified in the test configurations and the following table.

Antenna Type	Antenna Gain (dBi)	Minimum Required Cable Loss (dB)
Flat Panel Antenna	23.0	--
Parabolic Disk Antenna	32.0	7.0

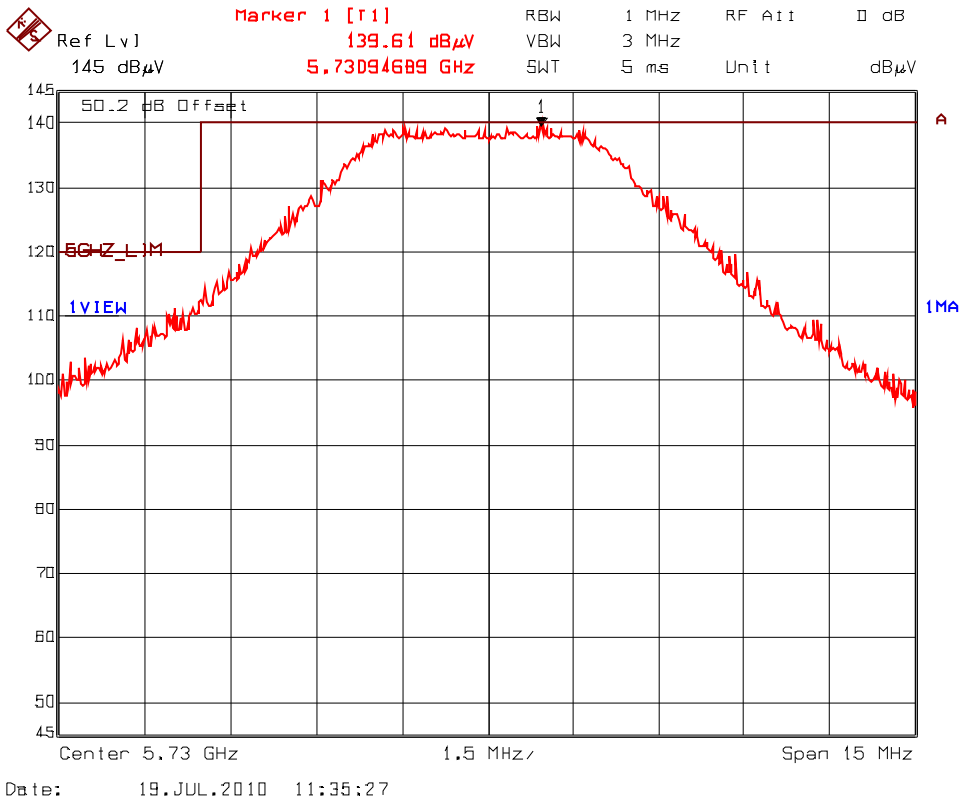
Plot # 127(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 5 MHz, Freq.: 5730 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



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

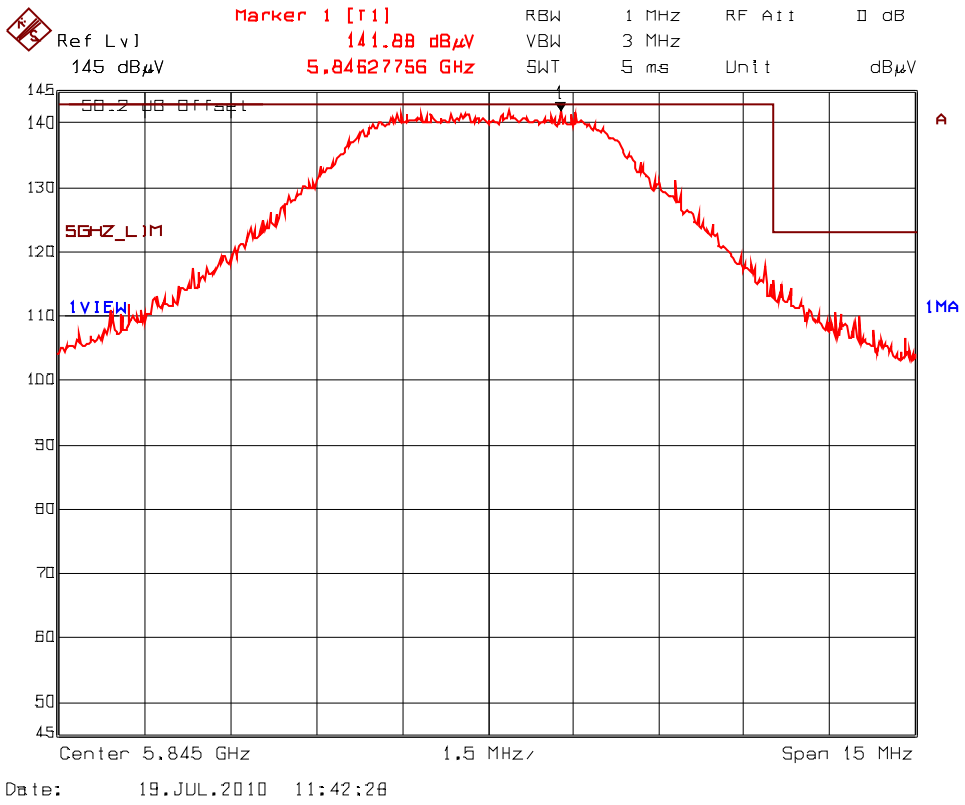
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 5 MHz, Freq.: 5730 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



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

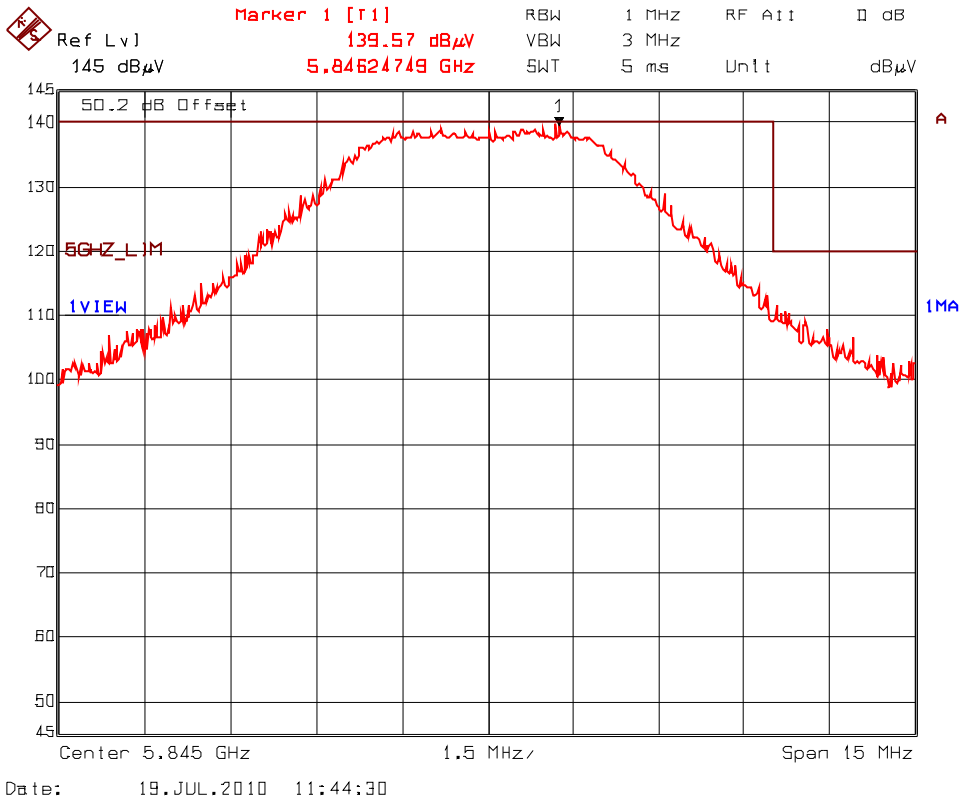
Plot # 127(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 5 MHz, Freq.: 5845 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



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

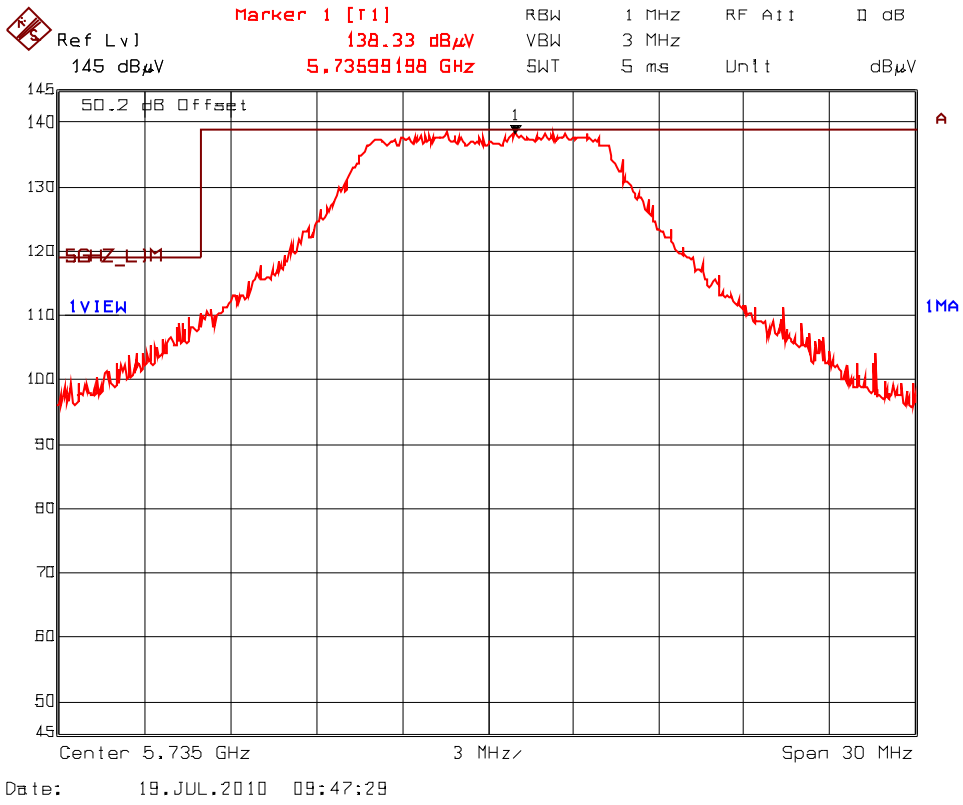
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 5 MHz, Freq.: 5845 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



- *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

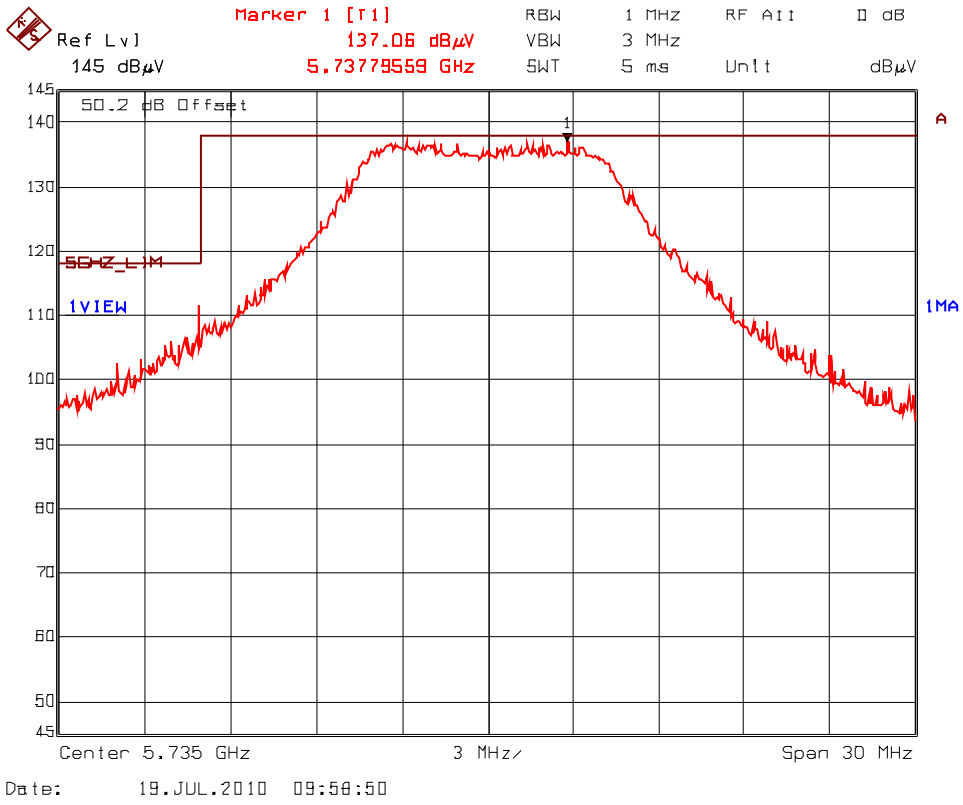
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 10 MHz, Freq.: 5735 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



- *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

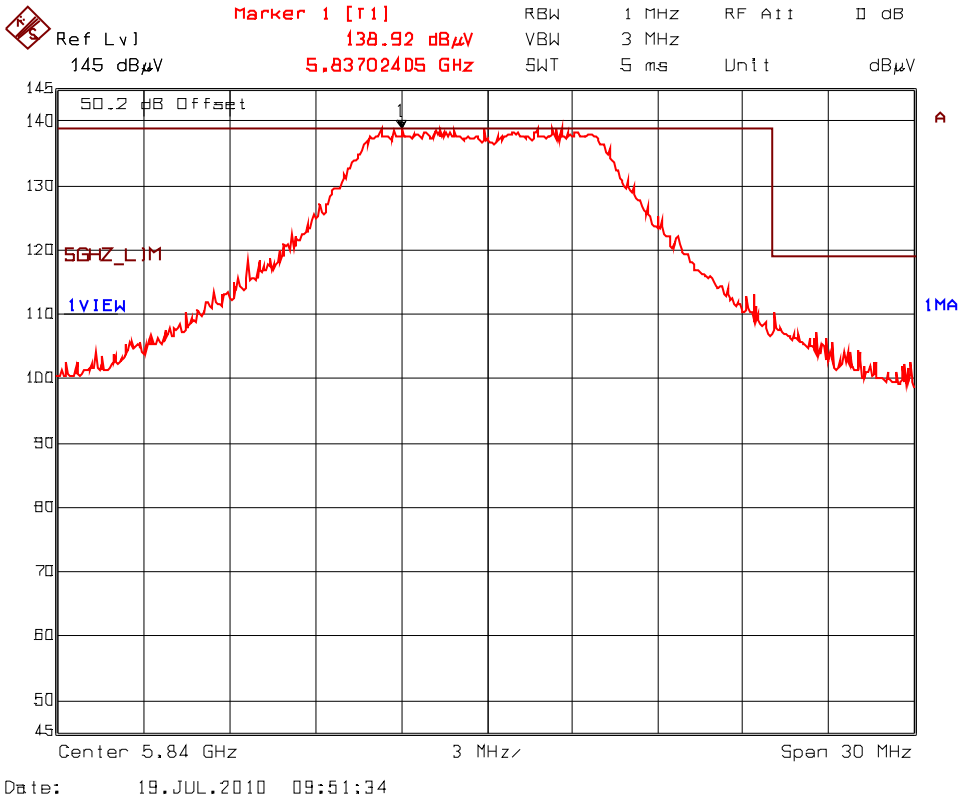
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 10 MHz, Freq.: 5735 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



- *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

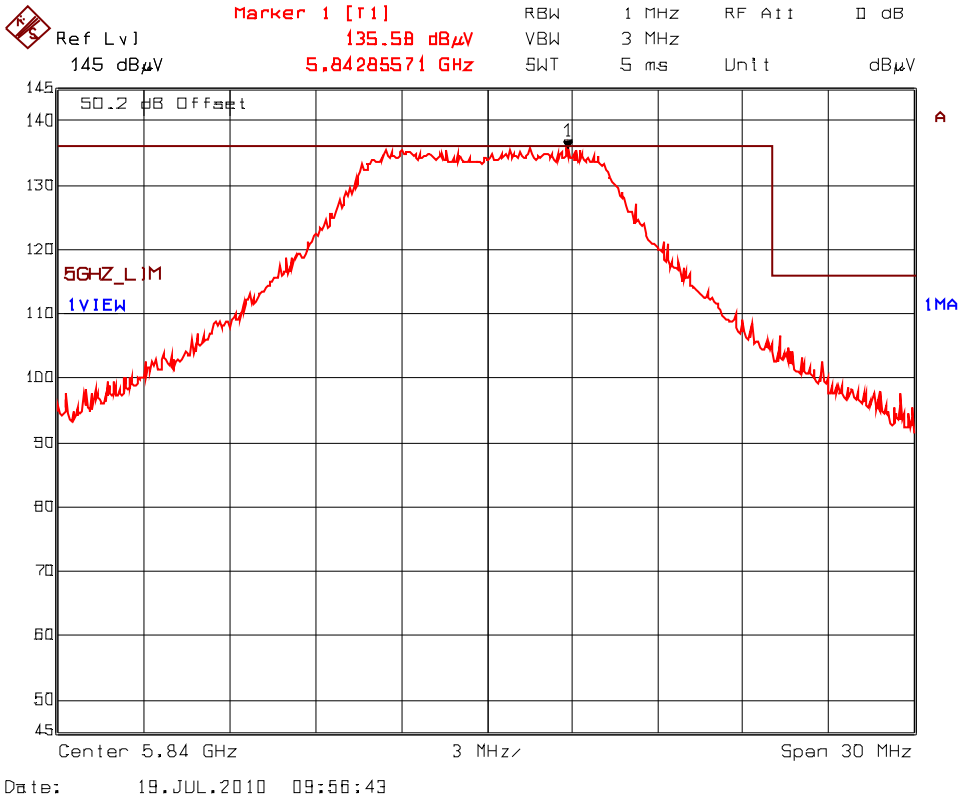
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 10 MHz, Freq.: 5840 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



- *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

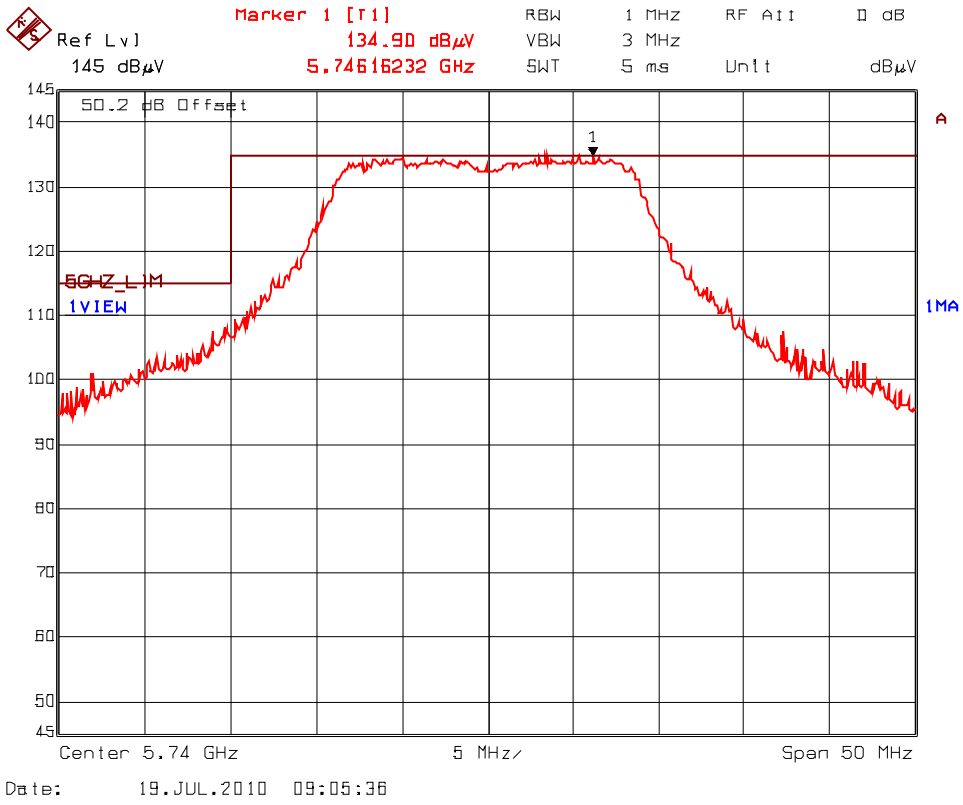
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 10 MHz, Freq.: 5840 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



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

Plot # 129(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

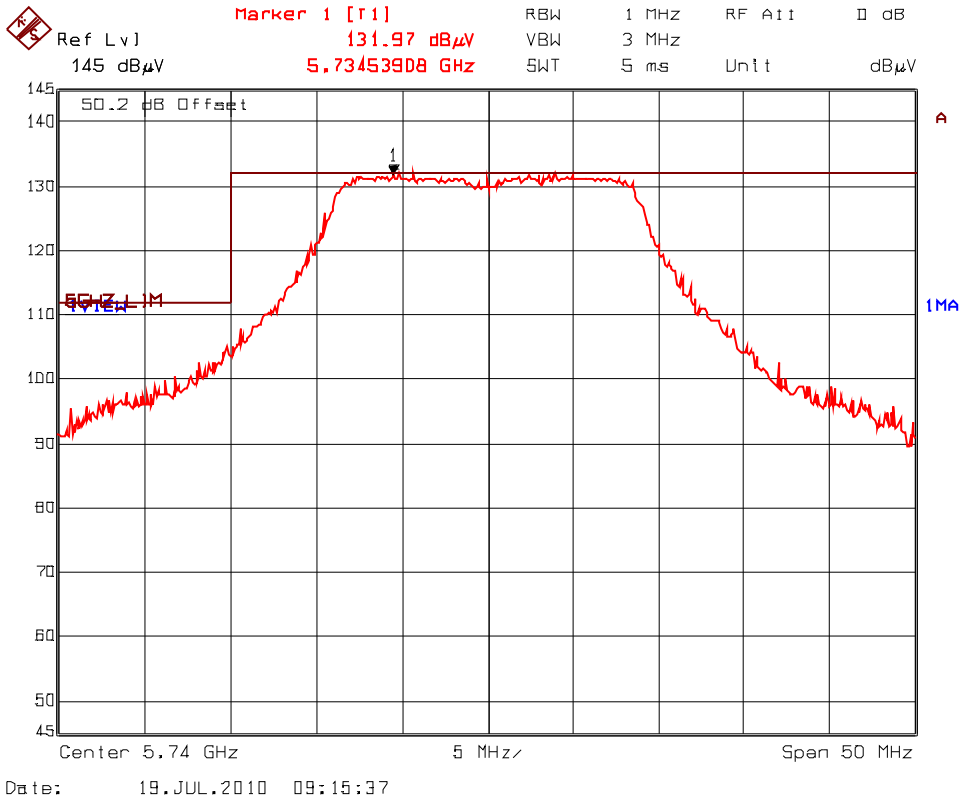
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 20 MHz, Freq.: 5740 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



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

Plot # 129(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

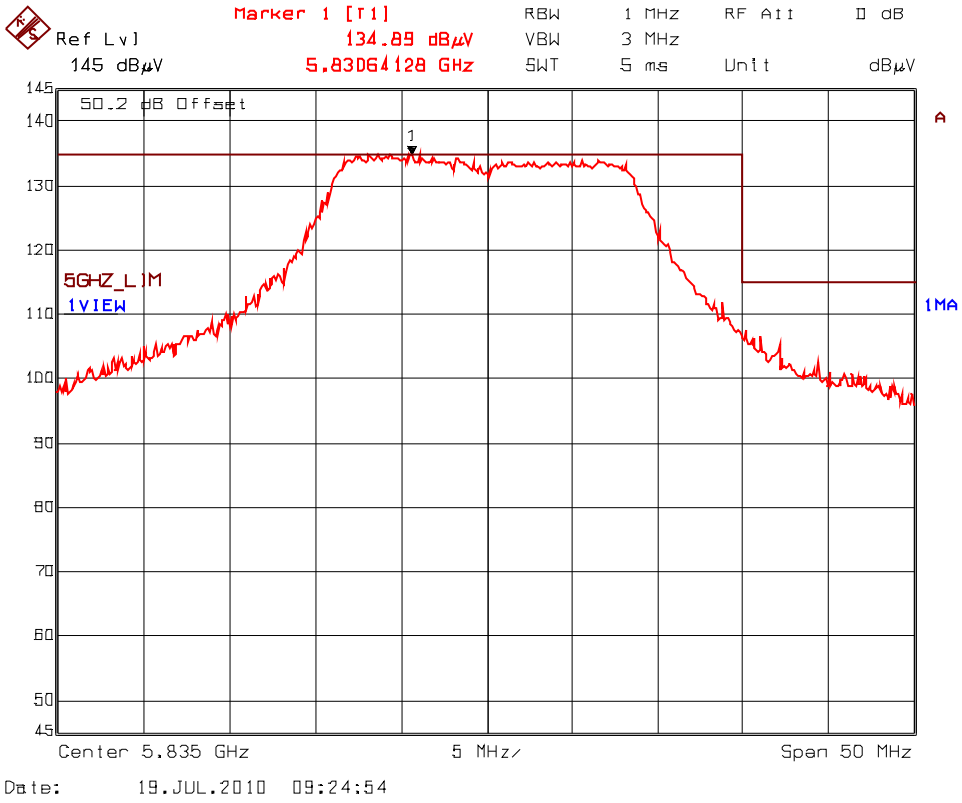
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 20 MHz, Freq.: 5740 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



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

Plot # 129(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

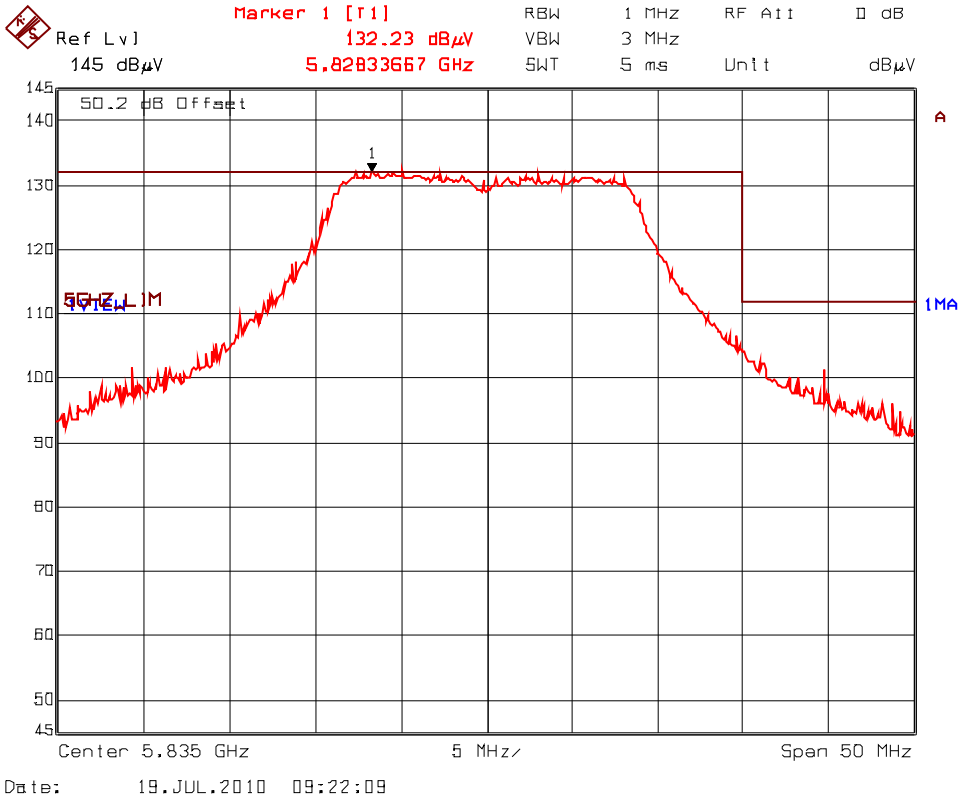
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 20 MHz, Freq.: 5835 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



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

Plot # 129(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

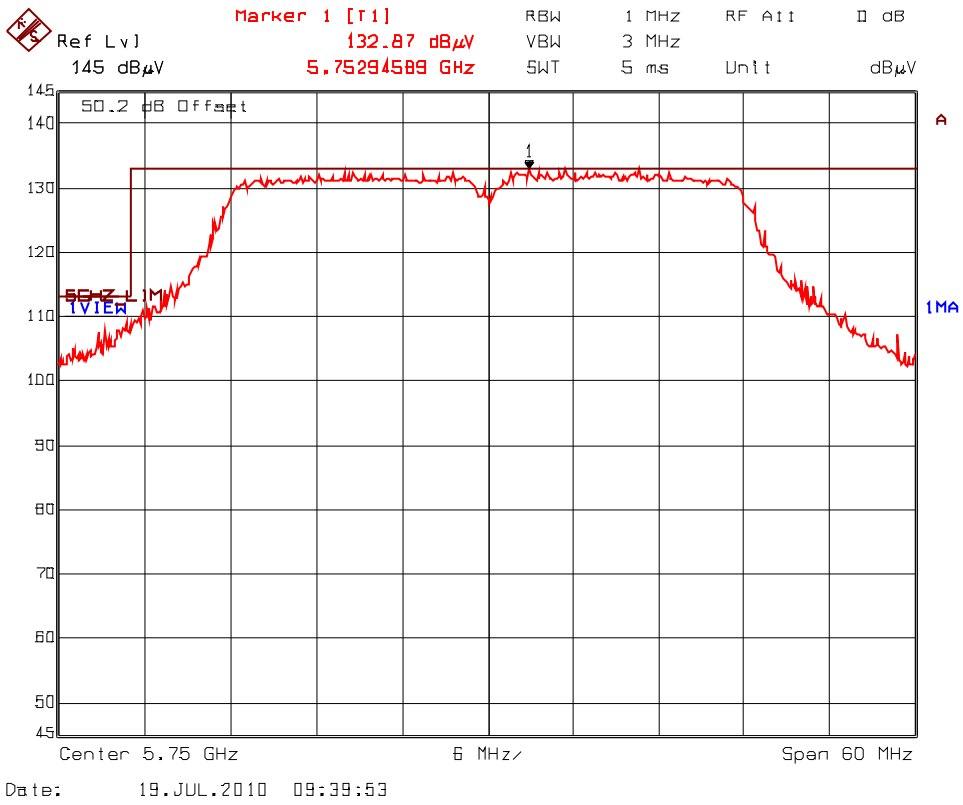
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 20 MHz, Freq.: 5835 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



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

Plot # 130(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

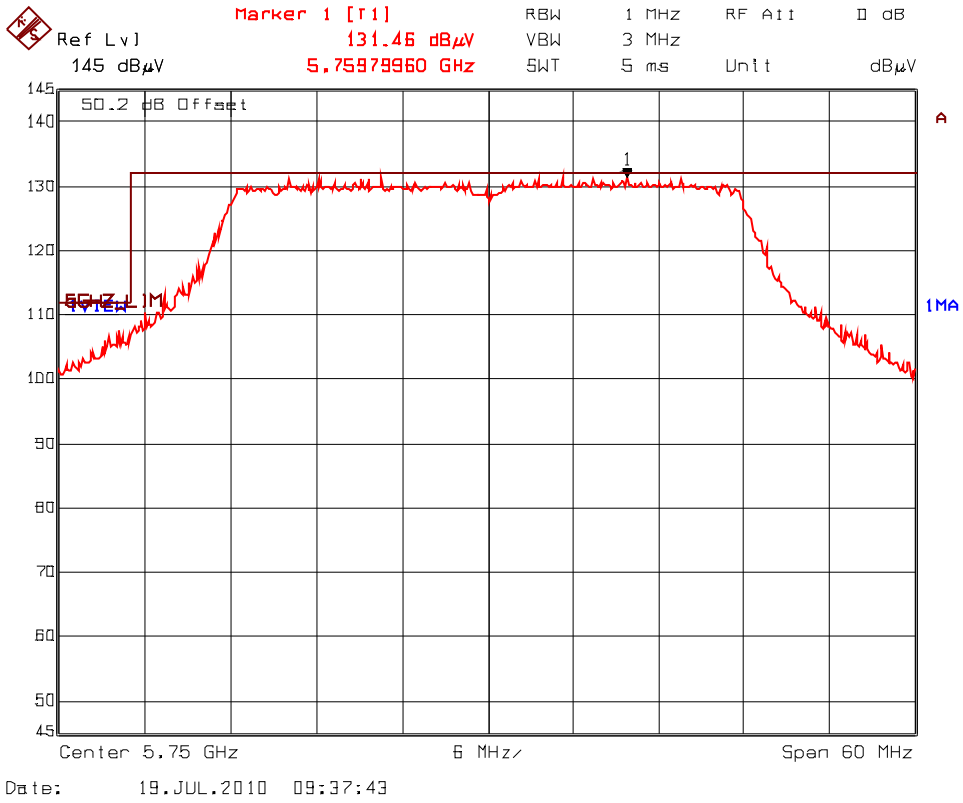
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 40 MHz, Freq.: 5750 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

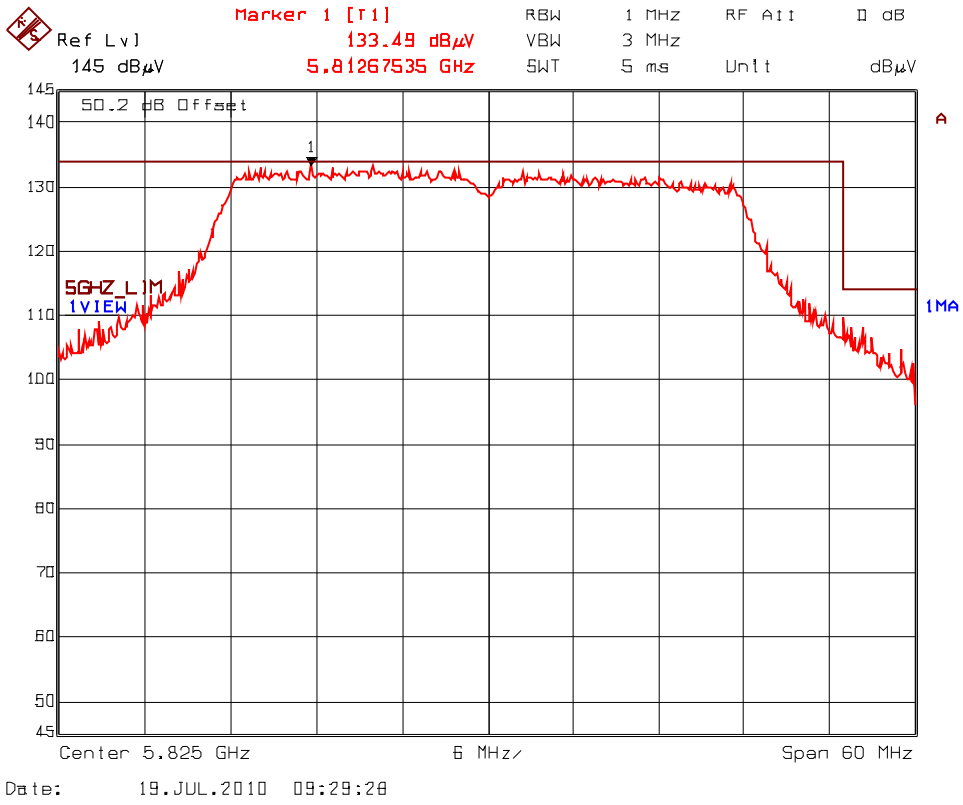
Plot # 130(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 40 MHz, Freq.: 5750 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



Plot # 130(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

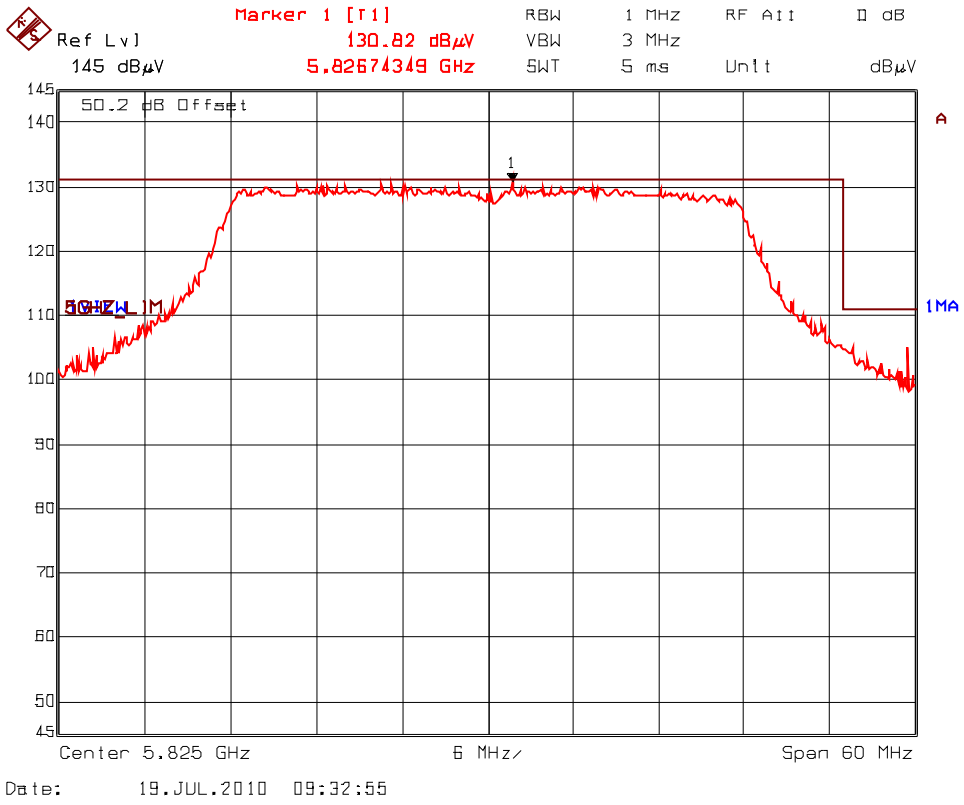
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 40 MHz, Freq.: 5825 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

Plot # 130(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

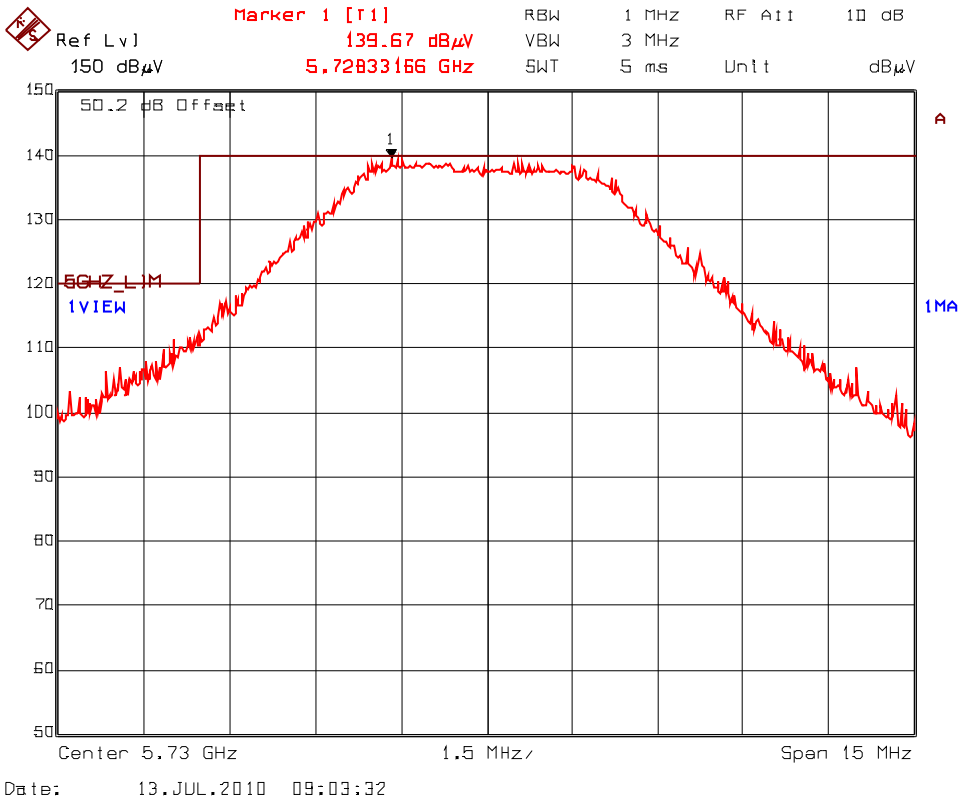
- Test Config #1: Redline Flat Panel Antenna Model A2308MFD, Gain: 23 dBi
- Channel Spacing: 40 MHz, Freq.: 5825 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

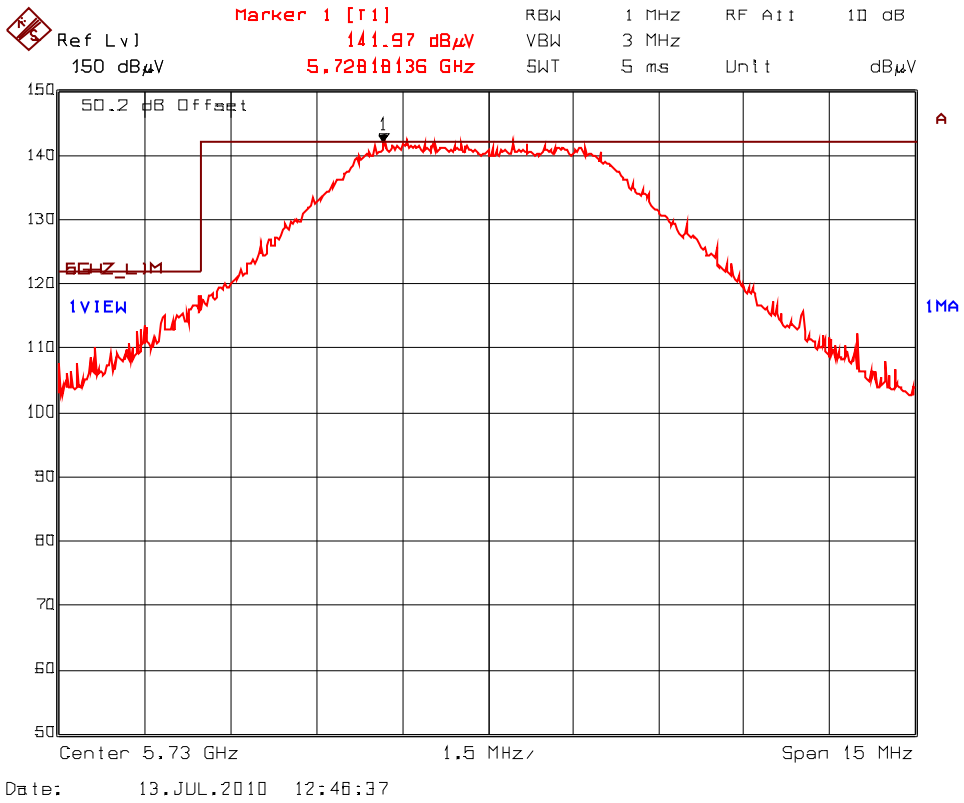
Plot # 131(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 5 MHz, Freq.: 5730 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



Plot # 131(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

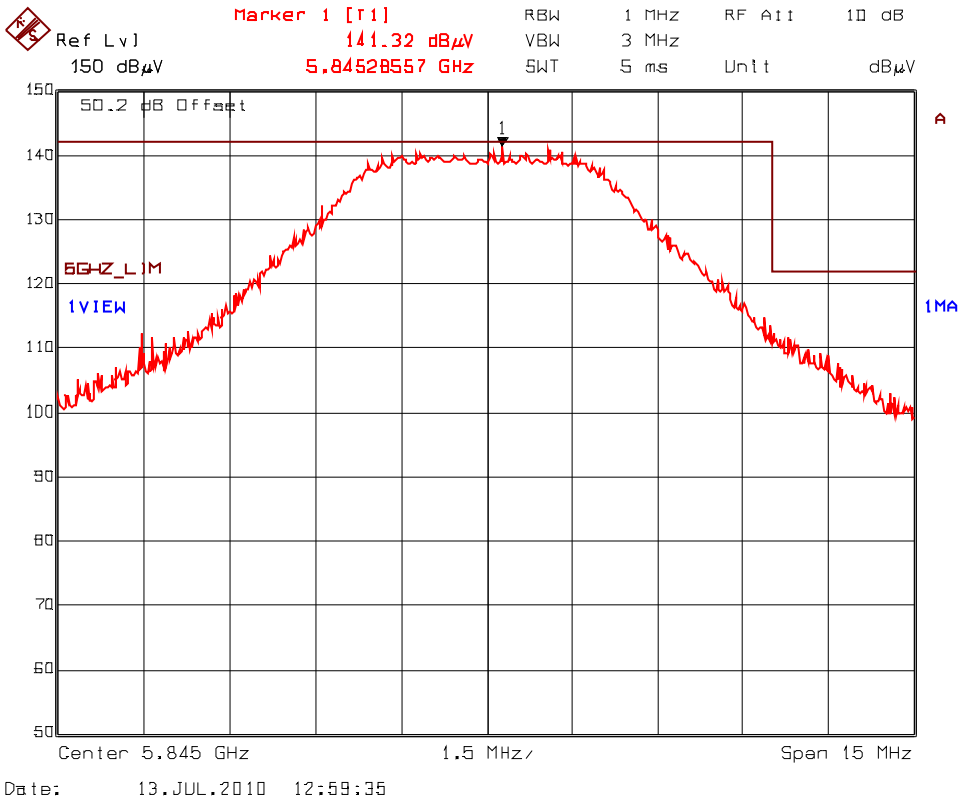
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 5 MHz, Freq.: 5730 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



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

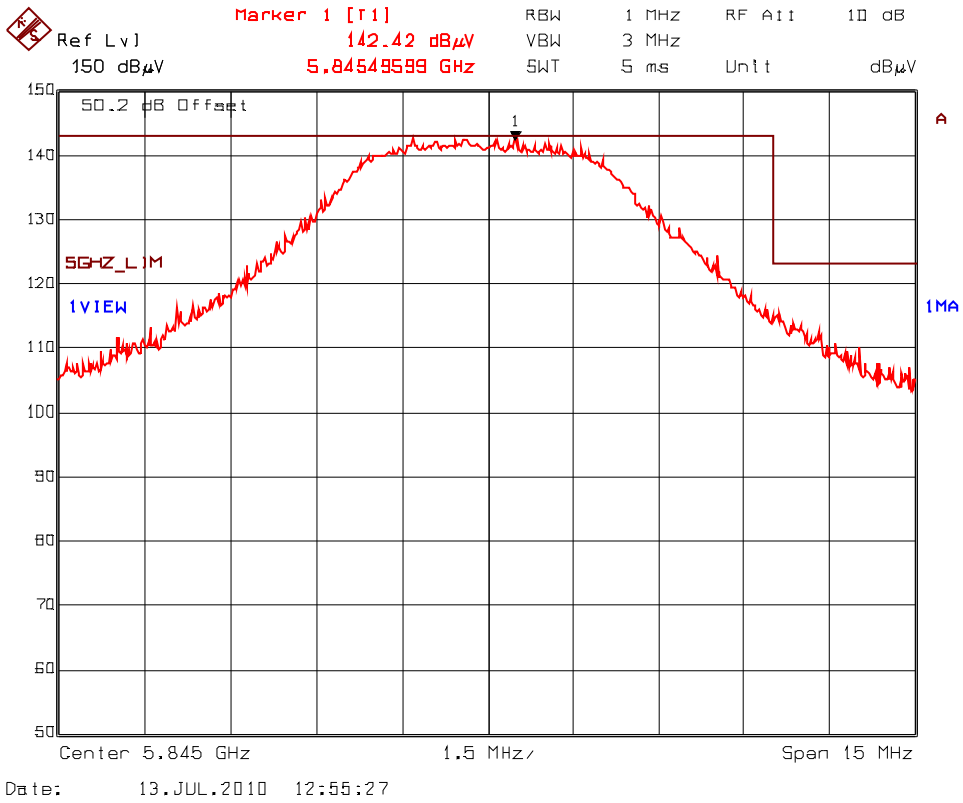
Plot # 131(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 5 MHz, Freq.: 5845 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



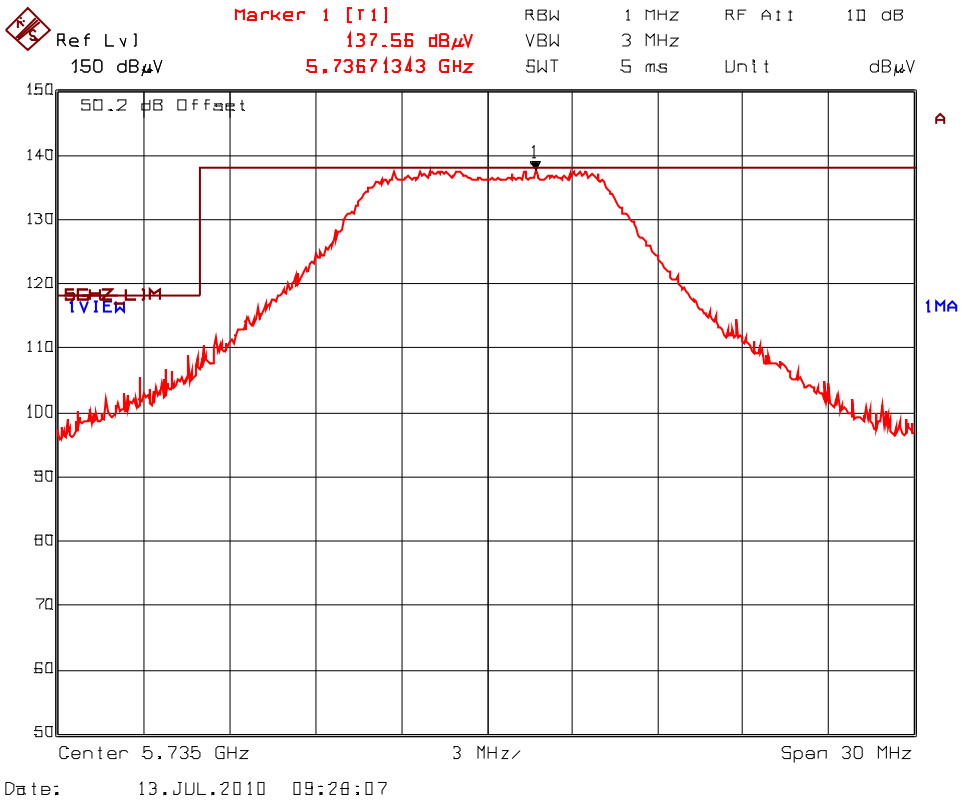
Plot # 131(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 5 MHz, Freq.: 5845 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



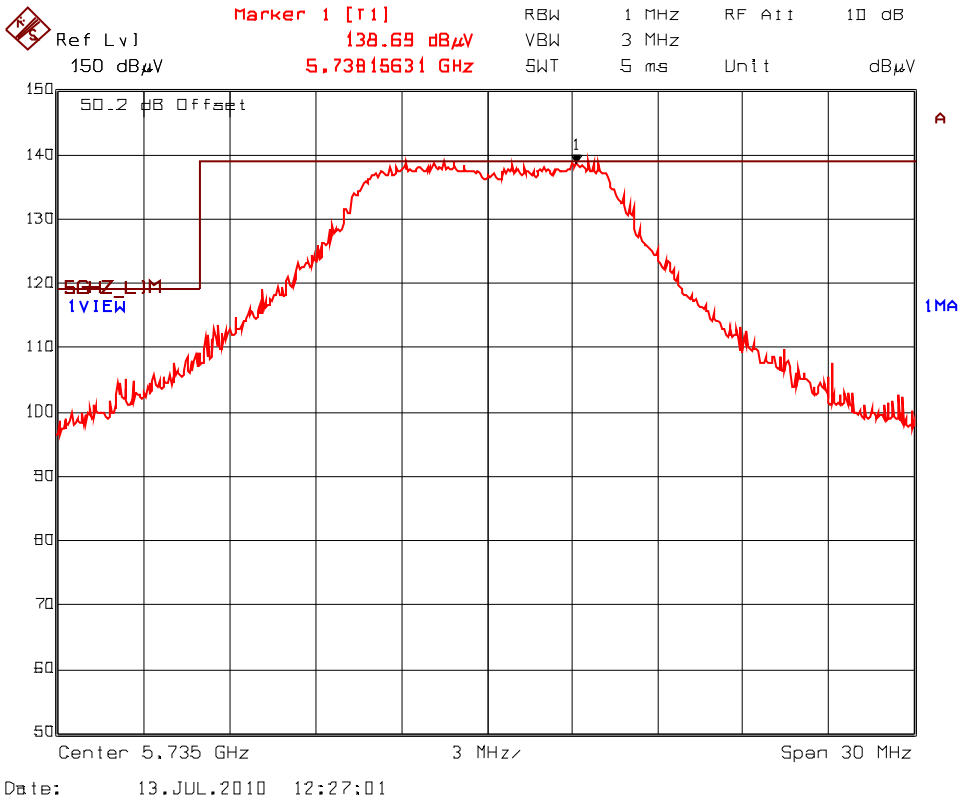
Plot # 132(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 10 MHz, Freq.: 5735 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



Plot # 132(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

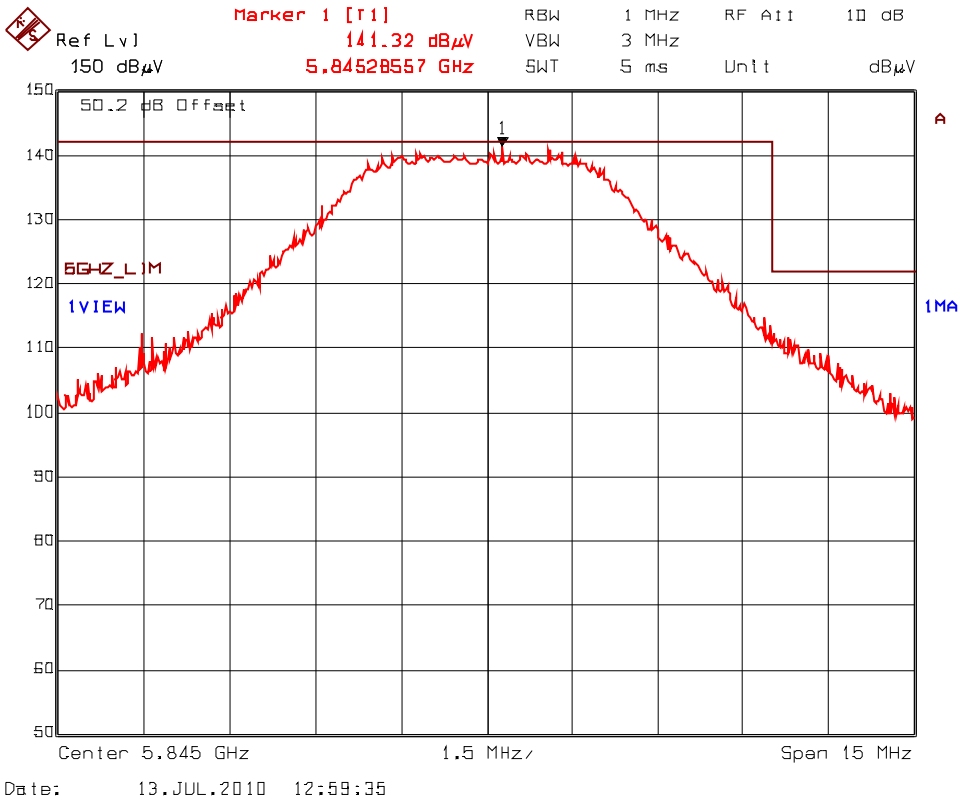
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 10 MHz, Freq.: 5735 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



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

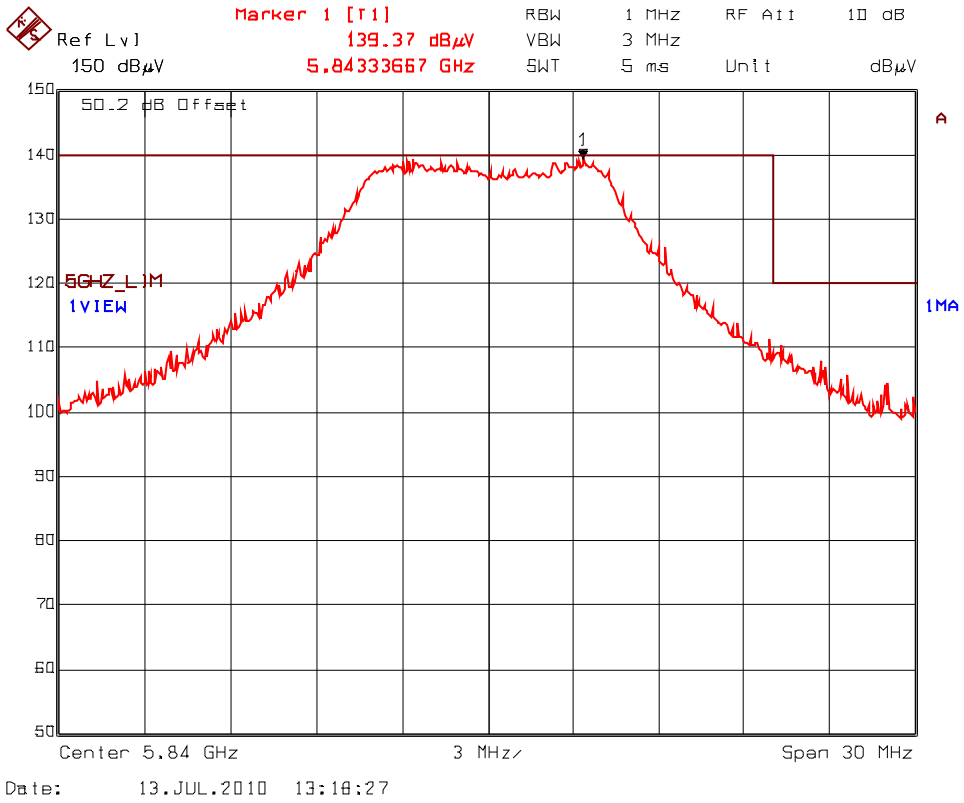
Plot # 132(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 10 MHz, Freq.: 5840 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



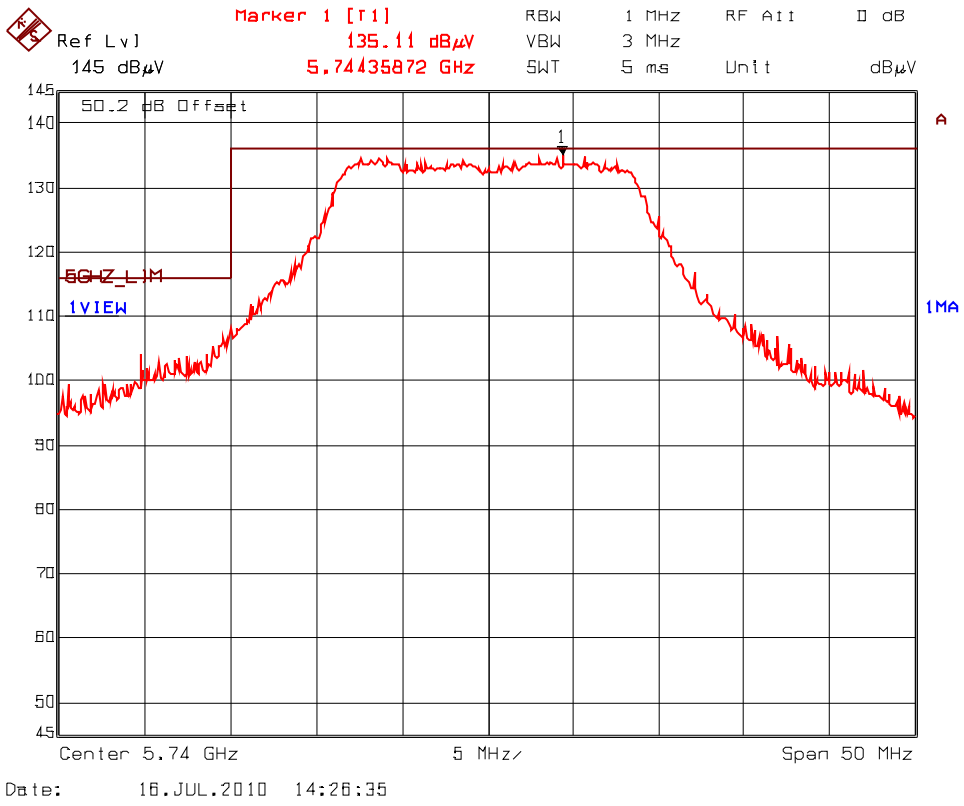
Plot # 132(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 10 MHz, Freq.: 5840 MHz, Modulation: BPSK 1/2, Data rate 6.5 Mbps



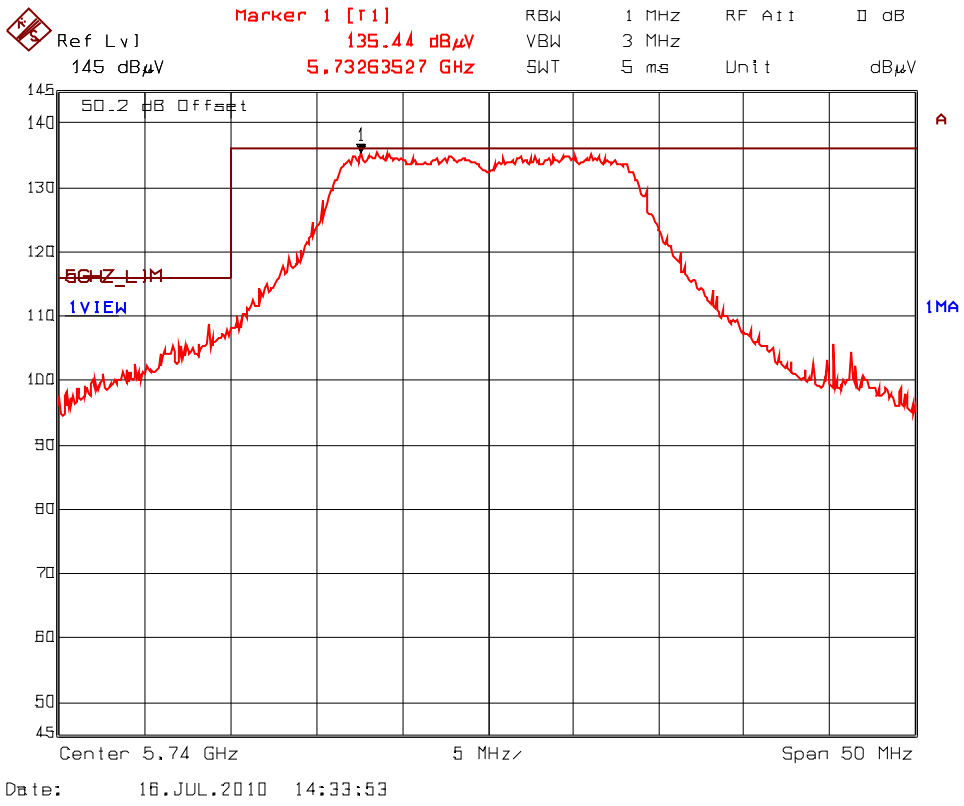
Plot # 133(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 20 MHz, Freq.: 5740 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



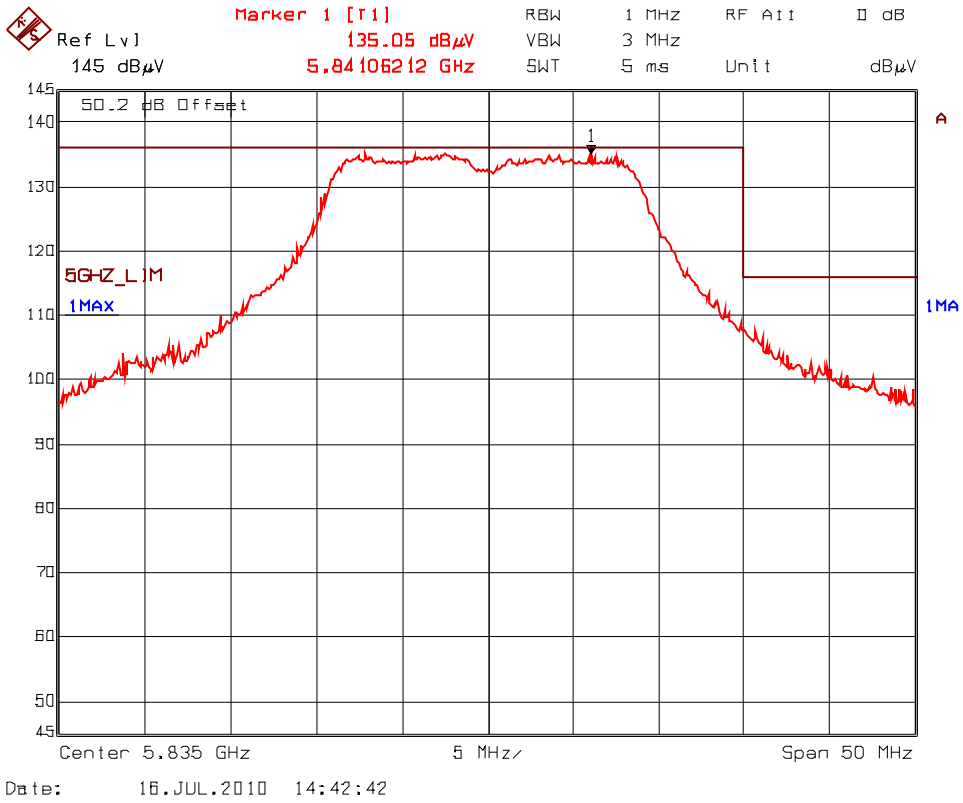
Plot # 133(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 20 MHz, Freq.: 5740 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



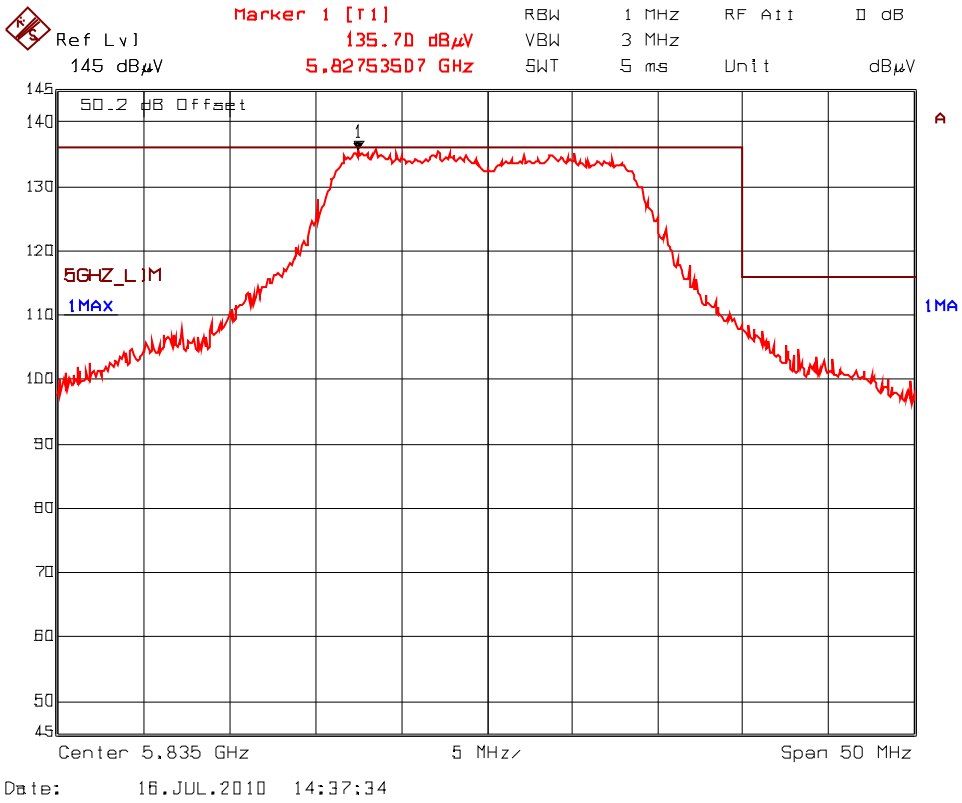
Plot # 133(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 20 MHz, Freq.: 5835 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



Plot # 133(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

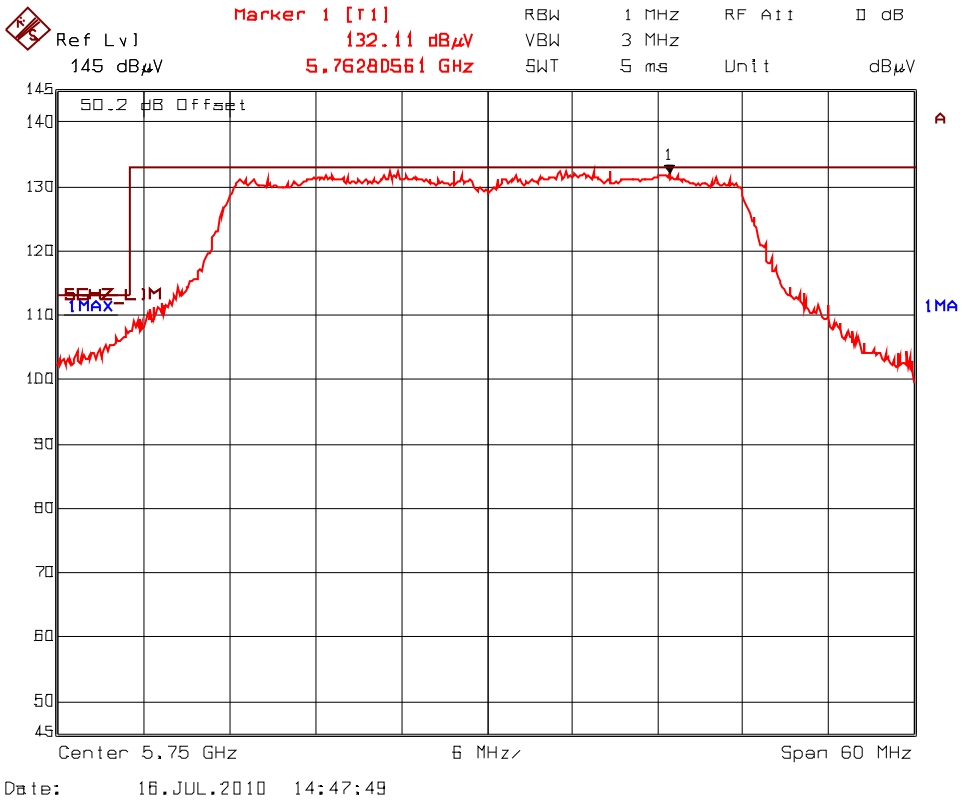
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 20 MHz, Freq.: 5835 MHz, Modulation: BPSK 1/2, Data rate 13 Mbps



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

Plot # 134(a): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

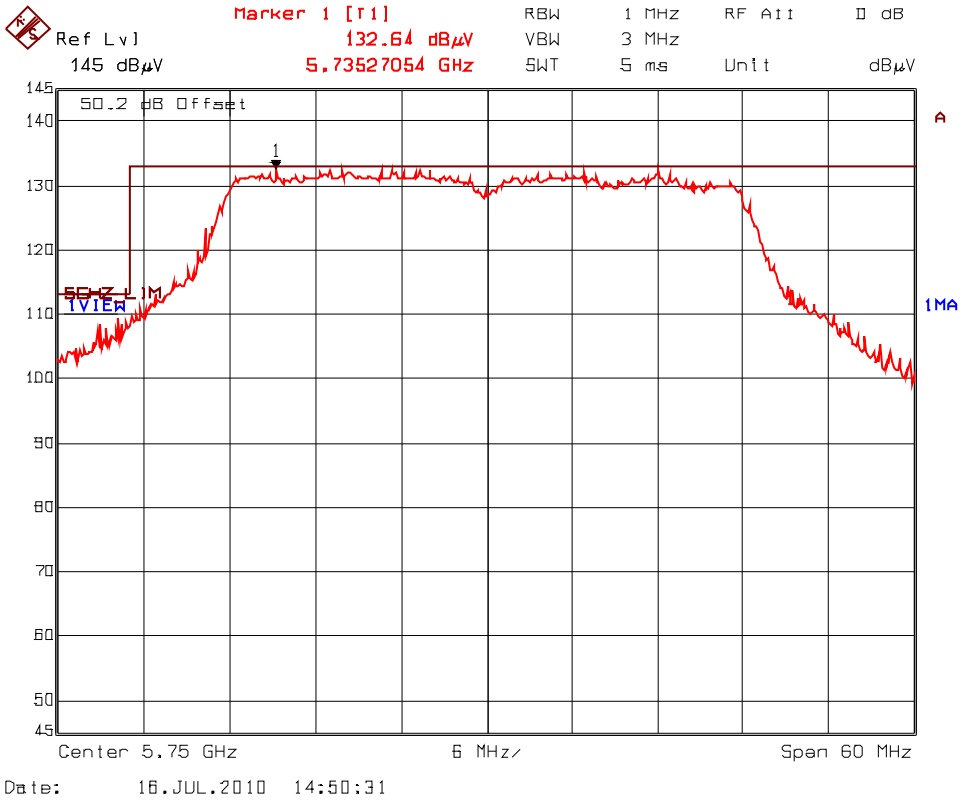
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 40 MHz, Freq.: 5750 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

Plot # 134(b): Radiated Lower Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

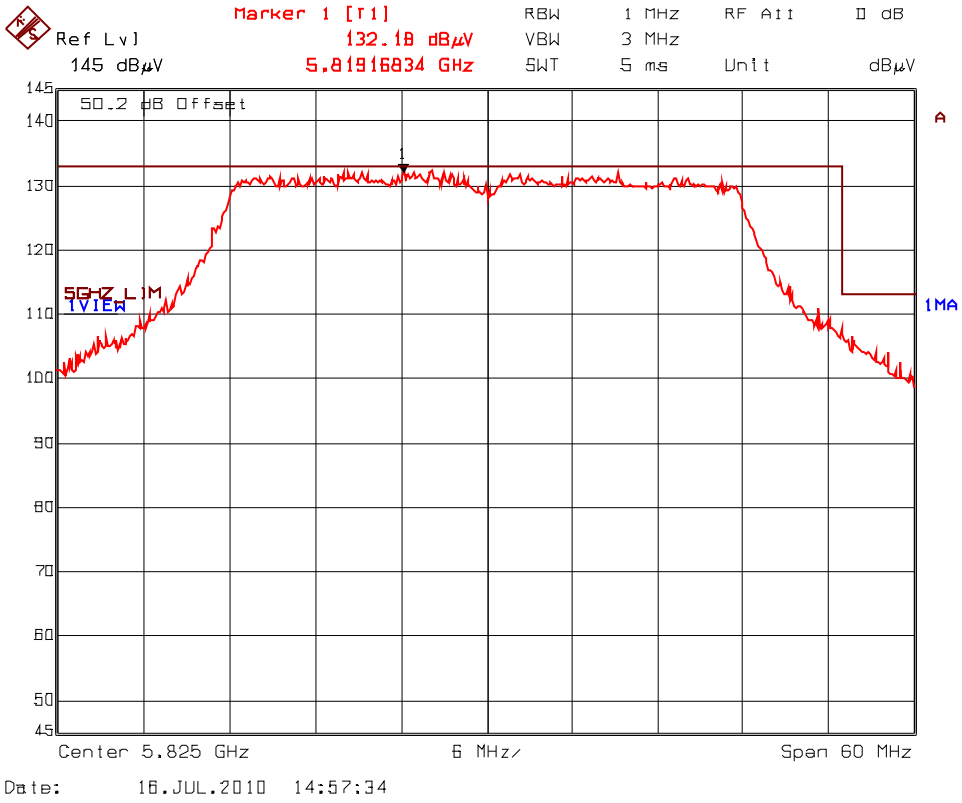
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD
  Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 40 MHz, Freq.: 5750 MHz, Modulation: BPSK 1/2, Data rate 3.2 Mbps



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

Plot # 134(c): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Vertical Polarization

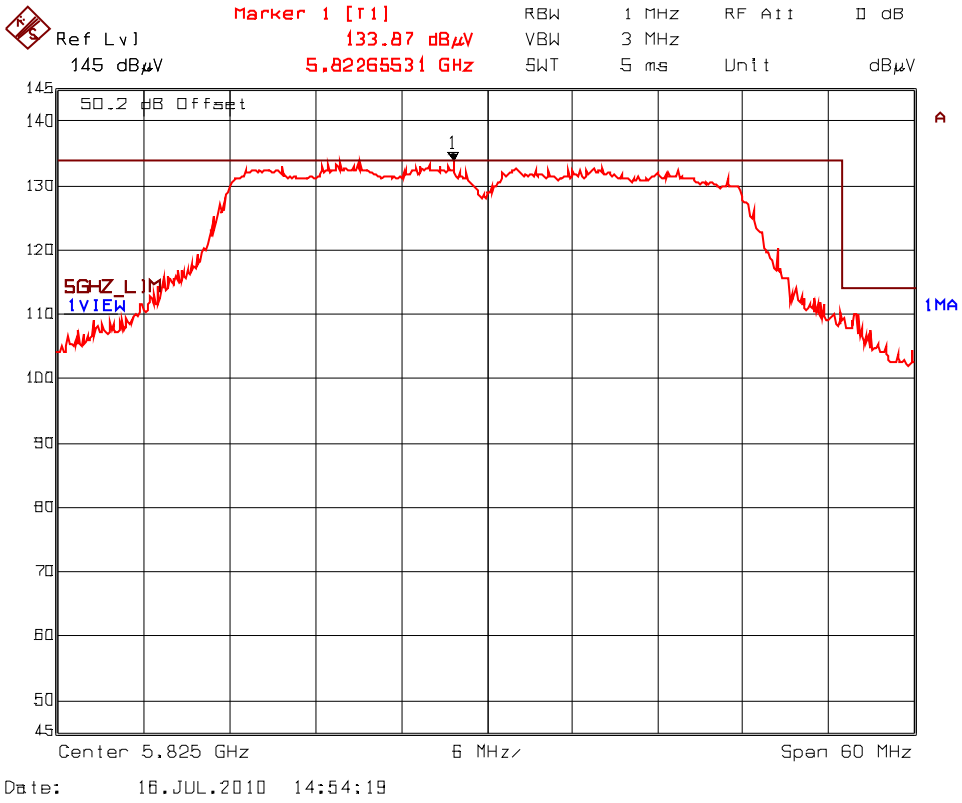
- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 40 MHz, Freq.: 5825 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

Plot # 134(d): Radiated Upper Band-edge Emissions @ 3 Meter – Rx Antenna: Horizontal Polarization

- Test Config #2: Redline Parabolic Disk Antenna Model No. A3FT3204LTPD Antenna Gain: 32 dBi, Minimum Cable Loss: 7 dBi
- Channel Spacing: 40 MHz, Freq.: 5825 MHz, Modulation: BPSK 1/2, Data rate 30 Mbps



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

EXHIBIT 5. MEASUREMENT UNCERTAINTY

5.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY (0.15-30 MHZ)

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Due Date
EMI Receiver System/Spectrum Analyzer with built-in Amplifier	Hewlett Packard	8546A	3650A00371	9KHz-6.5GHz	January 25, 2011
Attenuator	Pasternack	PE7010-20	---	DC to 2 GHz 20dB attenuation	January 04, 2011
L.I.S.N. Used	EMCO	3810/2	2209	9 KHz – 30 MHz	December 18, 2010

	Line Conducted Emission Measurement Uncertainty (150 KHz – 30 MHz):	Measured	Limit
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 1.57**	**± 1.8**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.14**	**± 3.6**

5.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Due Date
EMI Receiver	Rohde & Schawrz	ESU40	100037	20 Hz to 40 GHz	March 09, 2011
Pre Amplifier	AH System	PAM-0118	225	20 MHz to 18 GHz	March 08, 2011
Biconilog Antenna	EMCO	3142C	00026873	26 – 3000 MHz	April 18, 2011
Horn Antenna	EMCO	3115	5955	1GHz – 18 GHz	October 09, 2010
Semi-Anechoic Chamber	TDK	FCC: 91038 IC: 2049A-3	--	--	May 01, 2011

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 2.15**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.30**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 2.39**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.78**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 1.87**	Under consideration
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.75**	Under consideration

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