Test of Exalt EX-5i

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: EXLT18-A3 Rev A

TEST REPORT

FROM

Test of Exalt EX-5i

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: EXLT18-A3 Rev A

Note: this report only contains data with regard to the 5,250 to 5,350 MHz & 5,470 to 5,725 MHz operational mode of the radio. 5.8 GHz test data is reported in MiCOM Labs test report EXLT02-A2

This report supersedes None

Manufacturer: Exalt Communications, Inc
580 Division Street
Campbell, California 95008
USA

Product Function: 5 GHz Point to Point Fixed Link Radio

Copy No: pdf Issue Date: 24th April '07

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
440 Boulder Court, Suite 200
Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

ACCREDITED
CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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ACCREDITATION & LISTINGS

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

MICOM LABS
Pleasanton, CA

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 14th day of September 2005.

American Association for Laboratory Accreditation
Corporate SEAL 1978 District of Columbia
A2LA

President
For the Accreditation Council
Certificate Number 2381.01
Valid to: November 30, 2007

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

LISTINGS

MiCOM Labs test facilities are listed by the following organizations;

North America

United States of America
Federal Communications Commission (FCC) Listing #: 102167

DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	24th April 2007	First issue.

1. TEST RESULT CERTIFICATE

Manufacturer:	Exalt Communications, Inc 580 Division Street Campbell, California 95008 USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	EX-5i 5 GHz Point to Point Fixed Link Radio	Telephone:	+1 925 462 0304
Model:	EX-5i	Fax:	+1 925 462 0306
S/N:	001, SM44060052, SM44060043		
Test Date(s):	9th May to 1st June '06 & 13th to 16th April '07	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407 & IC RSS-210	**EQUIPMENT COMPLIES**

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

ACCREDITED
CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs,

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2006	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	Issue 6 Sept. 2005	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	Issue 1 Sept. 2005	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2003	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vi)	CISPR 22/ EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(x)	A2LA	14th September 2005	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description		
Purpose:	Test of the Exalt Communications Inc Exalt EX-5i to FCC Part 15.407, FCC Memorandum Opinion and Order 06-96; and Industry Canada RSS-210 regulations.		
Applicant:	As Manufacturer		
Manufacturer:	Exalt Communications, Inc 580 Division Street Campbell, California 95008 USA		
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA		
Test report reference number:	EXLT18-A3 Rev A		
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210		
Dates of test (from - to):	9th May to 1st June '06 & 13th to 16th April '07		
No of Units Tested:	3		
Type of Equipment:	5 GHz Point to Point Fixed Link Radio		
Manufacturers Trade Name:	Model EX-5i		
Model:	EX-5i		
Software Rev	DFS 1.0		
Location for use:	Outdoors		
Declared Frequency Range(s):	5,250 to 5,350 MHz; 5,470 to 5,725 MHz		
Type of Modulation:	QPSK; 16QAM; 64QAM		
Declared Nominal Output Power:	5,250 to 5,350 MHz +13 dBm 5,470 to 5,725 MHz +13 dBm		
EUT Modes of Operation:	QPSK; 16QAM; and 64QAM modulation available at 8 MHz, 16 MHz, 32 MHz, & 64 MHz Bandwidths.		
Transmit/Receive Operation:	Time Division Duplex (TDD)		
Rated Input Voltage and Current:	48 Vdc 0.8 A and/or 24Vdc 1.6A. .		
Operating Temperature Range:	Declared range -25 to +65ºC		
ITU Emission Designator:	BW (MHz)	5,250 – 5,350	5,470 – 5,725
	8	7M8W7D	8M3W7D
	16	15M7W7D	16M7W7D
	32	30M9W7D	33M0W7D
	64	60M8W7D	65M0W7D
Microprocessor(s) Model:	MPC852T		
Clock/Oscillator(s):	25MHz, 1.544 MHz, 2.048 MHz, 12.880 MHz, 44.736 MHz, 34.368 MHz, 100 MHz, 120 MHz		
Frequency Stability:	±7 ppm		
Equipment Dimensions:	17” x 14” x 1¾”		
Weight:	11.3 lbs		
Primary function of equipment:	Point to Point Transmission of T1/E1/Ethernet Data		

3.2. Scope of Test Program

The scope of the test program was to test the Exalt Communications EX-5i radio in the frequency ranges 5,250 – 5,350 MHz and 5,470 – 5,725 MHz for compliance against FCC 47 CFR; DFS requirements per FCC Memorandum Opinion and Order FCC 06-96., and Industry Canada RSS-210 specifications

The Exalt Communications EX-5i employs QPSK, 16QAM & 64QAM modulation in the frequency ranges 5.250 to 5.350 GHz, and 5470 – 5725 MHz.

U-NII devices operating in the 5,250-5,350 MHz and 5,470 -5,725 MHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

The Exalt Communications EX-5i operates as a Master device with full radar detection and Dynamic Frequency Selection (DFS) capability.

System testing was performed with the Master device continuously transmitting the designated FCC MPEG (Testfile.mpg) streaming video test file to the client device using the NTIA specified media player (klcodec261f.exe).

For the 5250-5350 MHz and 5470 – 5725 MHz bands, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

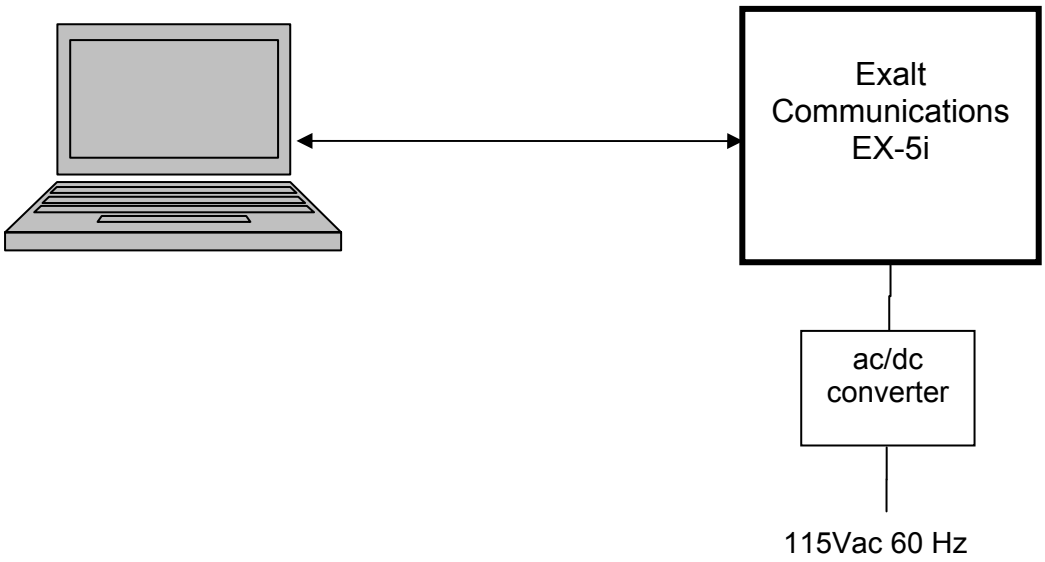
The test results for the 5,250 to 5,350 MHz band (excluding DFS) were previously reported for this product in MiCOM Labs Test report EXLT02-A5.

Exalt Communications Model EX-5i
5 GHz Point to Point Fixed Link Radio

3.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	5 GHz Point to Point Microwave Radio	Exalt Communications Inc	EX-5i	001
Support	Power supply	International Power Sources	CUP70-18 B2	70480-0000106

Test Measurement Set Up



3.4. Antenna Details

Antenna Type	Gain (dBi)	Manufacturer	Model No.	Serial No.
Parabolic	37.5	Radio Waves	SP6-5.2	14734
Panel	28.0	MTI	MT-486001	00213

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 10/100 BT: 2 ports
2. T1/E1: 4 ports
3. DS3 (in and out)
4. Sync (in and out)
5. Console (RS-232)
6. Alarms

3.6. Test Configurations

Matrix of test configurations

Band	BW (MHz)	Modulation								
		QPSK			16QAM			64QAM		
		Low (MHz)	Mid (MHz)	High (MHz)	Low (MHz)	Mid (MHz)	High (MHz)	Low (MHz)	Mid (MHz)	High (MHz)
5.3	8	5260	5296	5332	5260	5296	5332	5260	5296	5332
	16	5265	5296	5327	5265	5296	5327	5265	5296	5327
	32	5272	5290	5308	5272	5290	5308	5272	5290	5308
	64		5290			5290			5290	
5.6	8	5488	5602	5715						
	16	5493	5602	5710						
	32	5512	5608	5703						
	64	5553	5618	5683						

It was established at the start of the test program that the QPSK modulation scheme has the highest Radiated Emission and Peak Emission levels. For the sake of brevity in reporting the test results the report includes results for all of the QPSK configurations shown in the table above, and selected worst case test results for 16QAM and 64QAM configurations.

Only worst case plots are provided for each test parameter identified within this report. A selection of test results for the alternate modulations has been included in Appendix A. Plots not included are held on file by the test laboratory and are available upon request with client permission.

DFS Test Configurations

The 99% Bandwidth was measured for all radio configuration (three modulations and four different bandwidths) with the radio set at the channel frequency closest to 5,600 MHz to determine the narrowest bandwidth measurement for which the DFS detection bandwidth should be measured at.

The narrowest bandwidth measurements were selected according to the following table. The bandwidth measurements are held on file.

X – Configuration selected for DFS detection bandwidth measurement.

	8 MHz	16 MHz	32 MHz	64 MHz
QPSK	X		X	X
16QAM		X		
64QAM				

3.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. None.

3.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

3.9. Subcontracted Testing or Third Party Data

Radiated emissions are tested below and verified above 1 GHz at TUV Rheinland of North America's 10m chamber located at the following address;-

2305 Mission College Blvd.
Santa Clara
California 95054
USA

TUV Rheinland of North America IC Registration Number: IC 4453-1

4. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210**.and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a) **A9.2(2)** **4.4**	26dB and 99% Emission BW	Emission bandwidth measurement	Conducted	Complies	5.1.1
15.407(a) **A9.2(2)** **4.6**	Peak Transmit Power	Peak Power Measurement	Conducted	Complies	5.1.2
15.407(a) **A9.2(2)**	Peak Power Spectral Density	PPSD	Conducted	Complies	5.1.3
15.407(a)(6)	Peak Excursion Ratio	<13dB in any 1MHz bandwidth	Conducted	Complies	5.1.4
15.407(g) **15.31** **A9.5 (e)** **4.5**	Frequency Stability	Limits: contained within band of operation at all times.	Verification Manufacturer declaration	Complies	5.1.5
15.407(f) **5.5**	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Calculation	Complies	5.1.6

List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(b)(2) **15.205(a)** **15.209(a)** **2.2, 2.6** **A9.3(2)** **4.7**	Radiated Emissions		Radiated		5.1.7
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.7.1*
	Peak Field Strength Measurements				*5.1.7.2*
	Radiated Band Edge	Band edge results		Complies	*5.1.7.3*
Industry Canada only **RSS-Gen §4.8, §6**	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.7.4*
15.407(b)(6) **15.205(a)** **15.209(a)** **2.2**	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*5.1.7.5*
15.407(b)(6) **15.207** **7.2.2**	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	5.1.8

List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407(h)(2)** and **FCC Memorandum Opinion and Order FCC 06-96 (Compliance Measurement procedures for unlicensed national information infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection).**

DFS testing was perform on four different configurations; 8 MHz QPSK; 16MHz 16QAM; 32 MHz QPSK; 64 MHz QPSK.

Section	Test Items	Description	Condition	Result	Test Report Section
7.8.1	Detection Bandwidth	UNII Detection Bandwidth	Conducted	Complies	6.7.1
7.8.2.1	Performance Requirements Check	Initial Channel Availability Check Time	Conducted	Complies	6.7.2
7.8.2.2		Radar Burst at the Beginning of the Channel Availability Check Time	Conducted	Complies	6.7.3
7.8.2.3		Radar Burst at the End of the Channel Availability Check Time	Conducted	Complies	6.7.4
7.8.3	In-Service Monitoring	In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Conducted	Complies	6.7.5
7.8.4	Radar Detection	Statistical Performance Check	Conducted	Complies	6.7.6

Note 1: *Test results reported in this document relate only to the items tested*
Note 2: *The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria*

5. TEST RESULTS

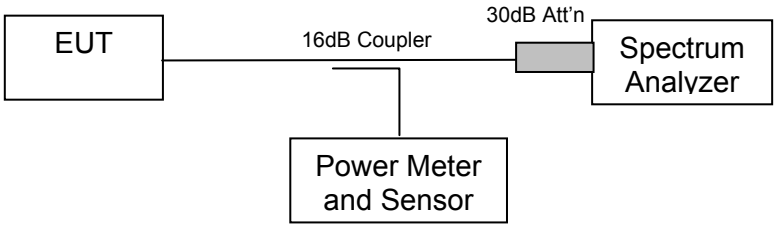
5.1. Device Characteristics

5.1.1. 26 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 § A9.2(2)
Industry Canada RSS-Gen 4.4

Test Procedure
The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The spectrum analyzer utilized the 6 dB resolution bandwidth filter for all measurements.

Test Measurement Set up



Measurement set up for 26 dB and 99 % bandwidth test

Radio parameters.
Power Level: maximum
Duty Cycle: 100% (test mode)

Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

TABLE OF RESULTS – 5.3 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,260	8.61723447	On File	7.71543086	On File
5,296	8.61723447	01	7.76553106	01
5,332	8.61723447	On File	7.71543086	On File

Plot 01
5,296 MHz 8 MHz QPSK 26 dB and 99% Bandwidth

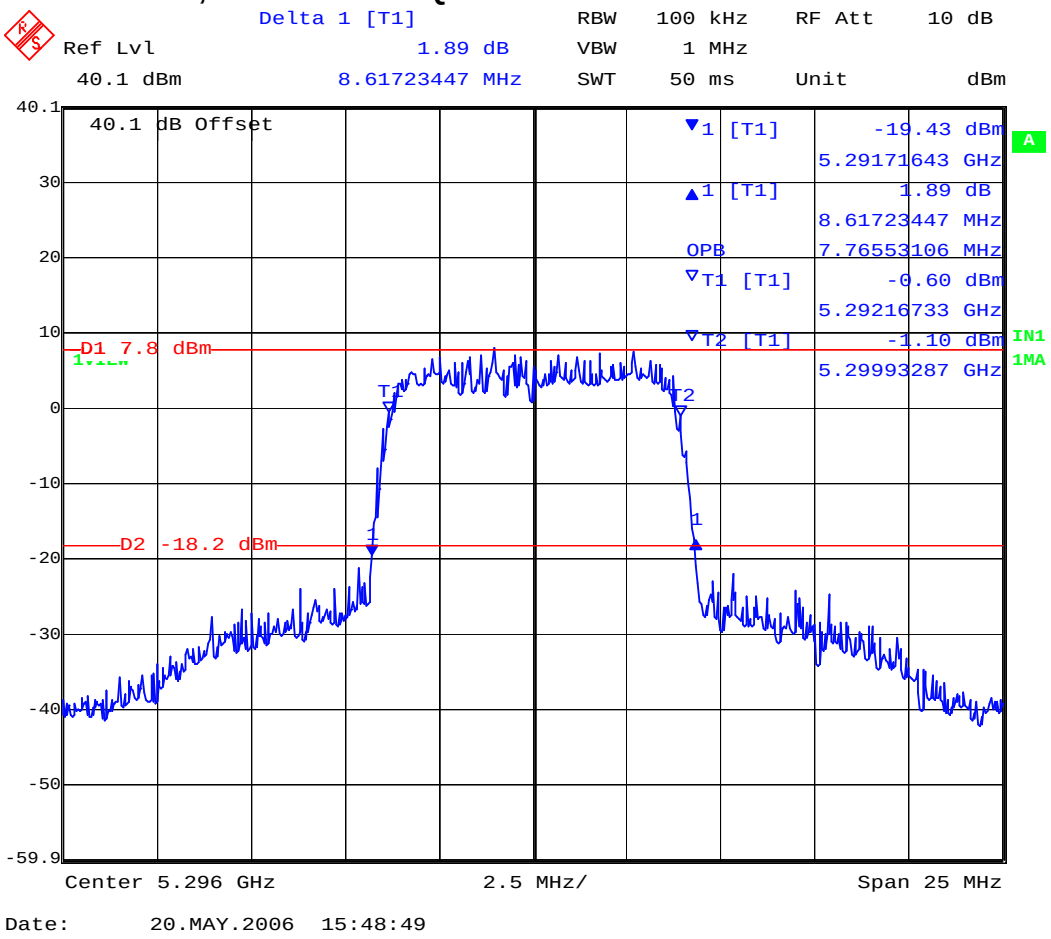


TABLE OF RESULTS – 5.3 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,265	17.15926854	On File	15.43086172	On File
5,296	17.16881263	02	15.63126253	02
5,327	17.03053607	On File	15.43086172	On File

Plot 02
5,296 MHz 16 MHz QPSK 26 dB and 99% Bandwidth

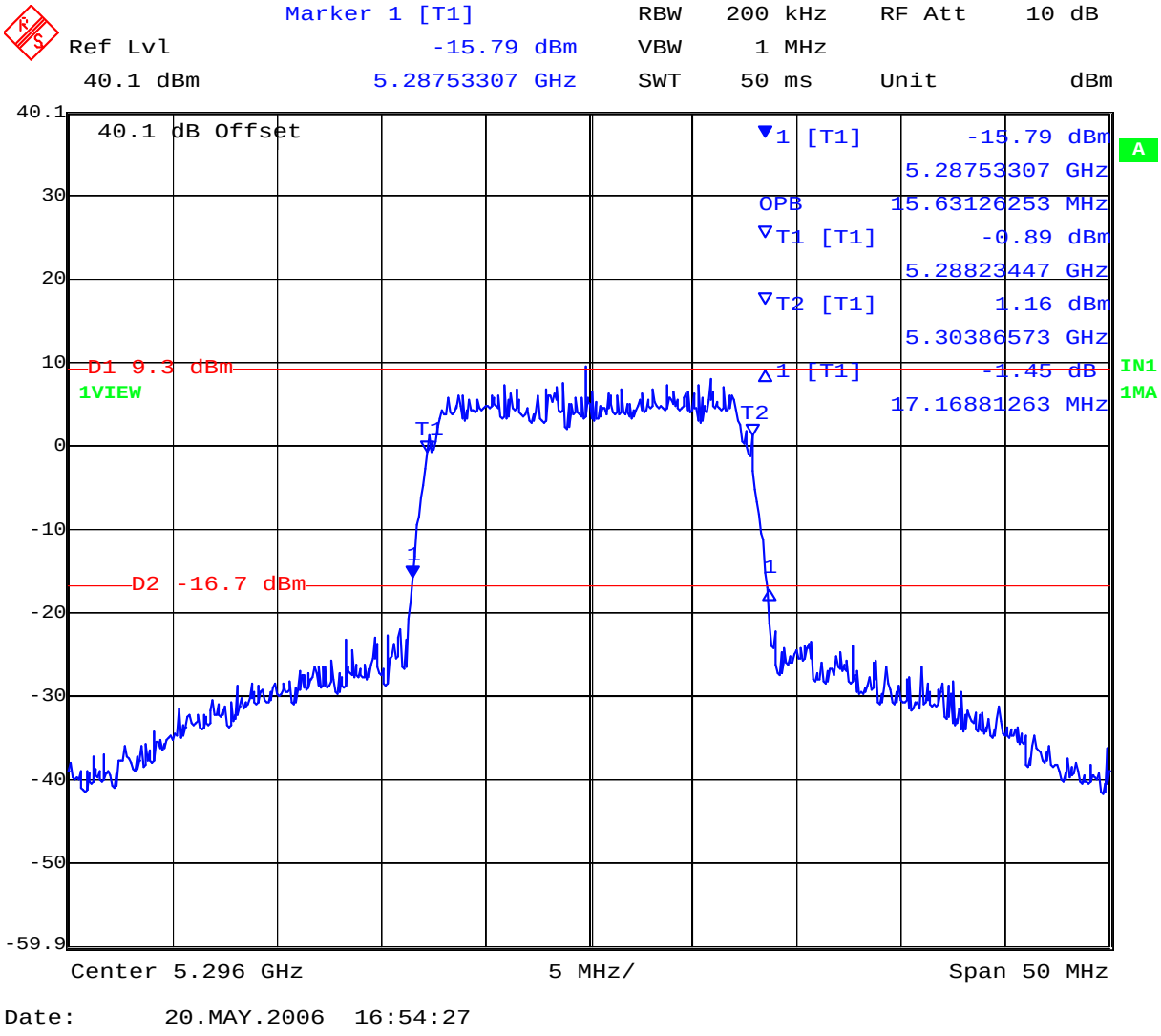


TABLE OF RESULTS – 5.3 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,272	34.11823647	On File	30.66132265	On File
5,290	34.41883768	On File	30.81162325	On File
5,308	34.41883768	03	30.81162325	03

Plot 03
5,308 MHz 32 MHz QPSK 26 dB and 99% Bandwidth

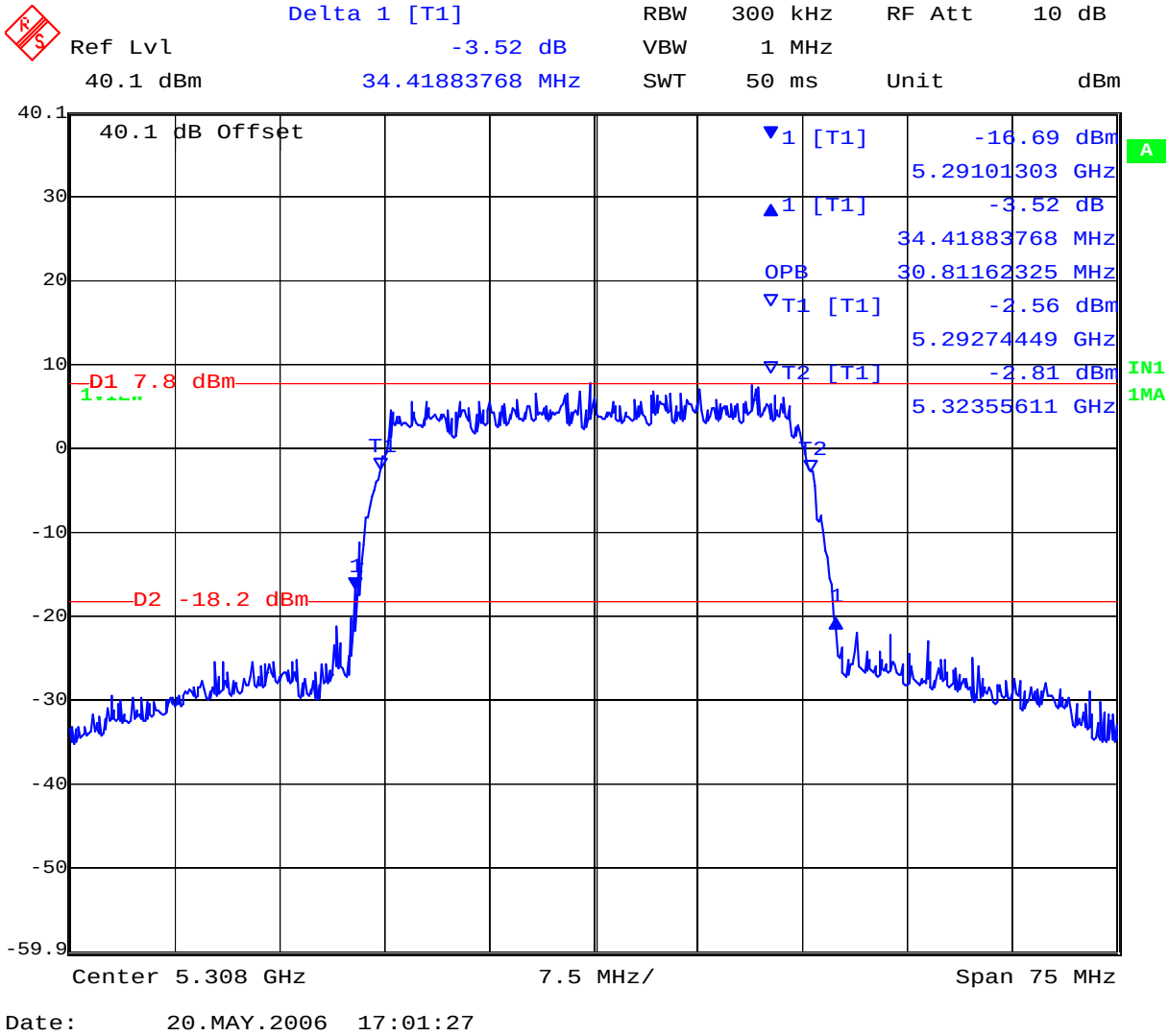
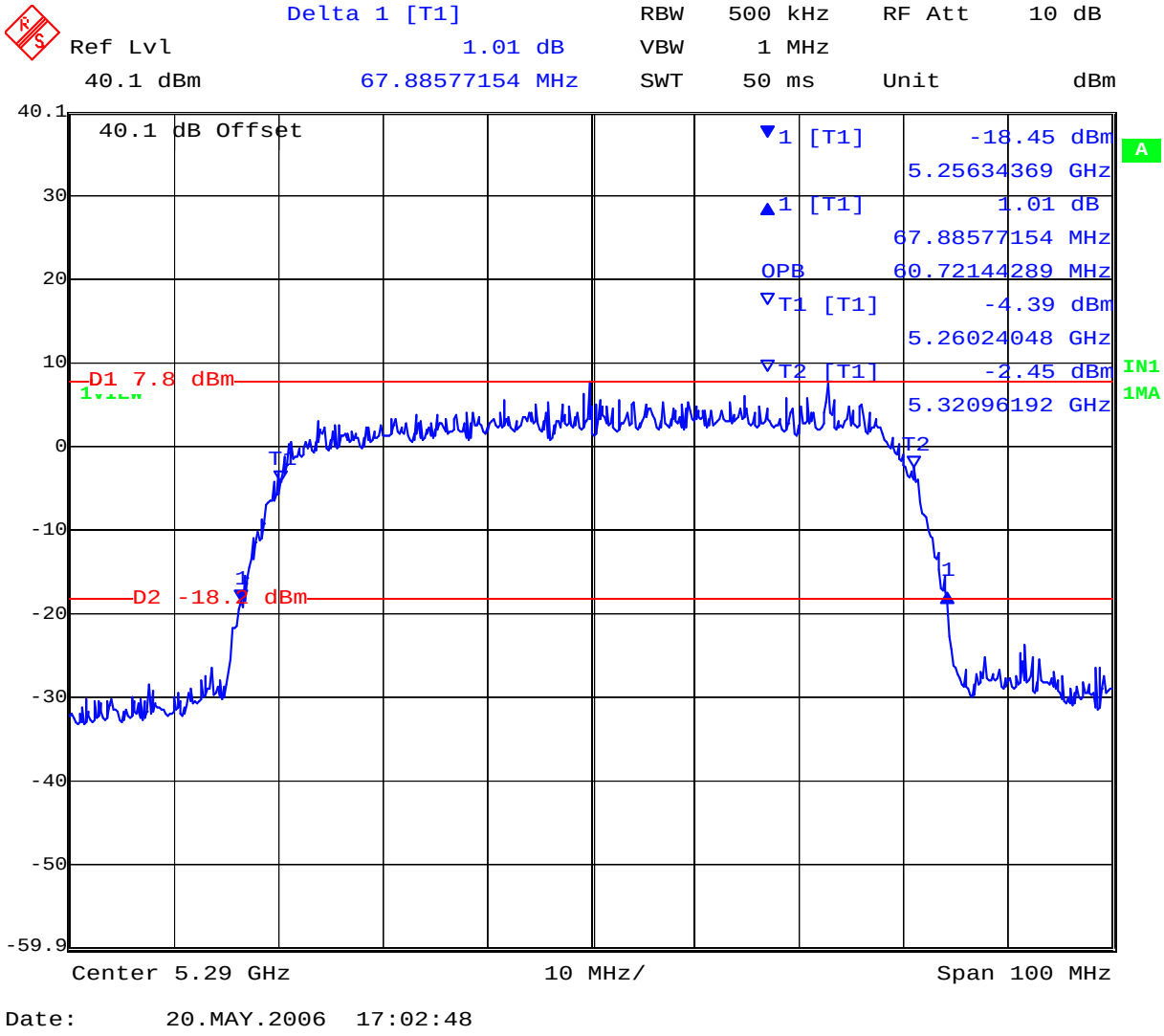


TABLE OF RESULTS – 5.3 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,290	67.88577154	04	60.72144289	04

Plot 04
5,290 MHz 64 MHz QPSK 26 dB and 99% Bandwidth



Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

TABLE OF RESULTS – 5.6 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,488	9.0681	On File	8.2665	On File
5,602	9.0681	05	8.2665	05
5,715	9.0681	On File	8.2665	On File

Plot 05
5,602 MHz 8 MHz QPSK 26 dB and 99% Bandwidth

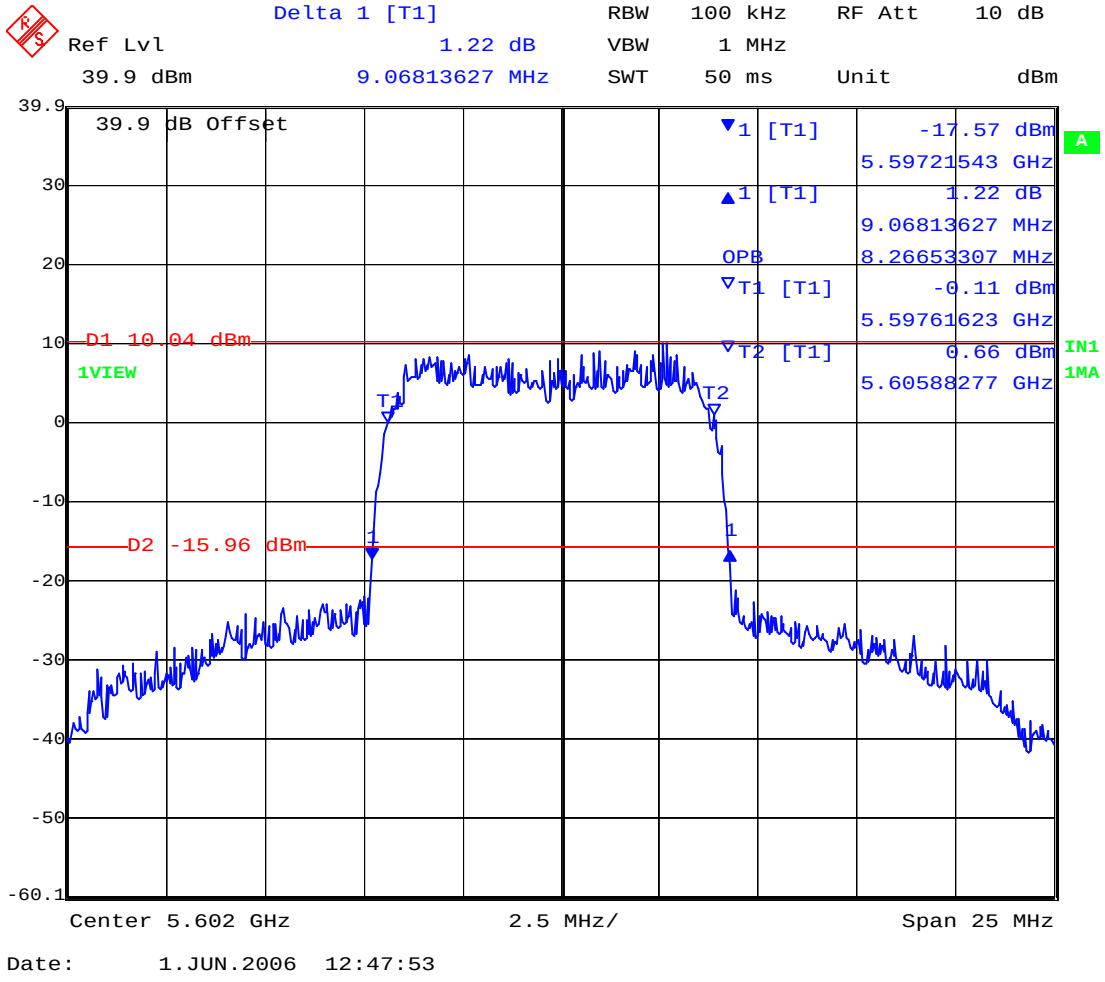


TABLE OF RESULTS – 5.6 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,493	18.0361	On File	16.6333	On File
5,602	18.0361	06	16.6333	06
5,710	18.1363	On File	16.5331	On File

Plot 06
5,602 MHz 16 MHz QPSK 26 dB and 99% Bandwidth

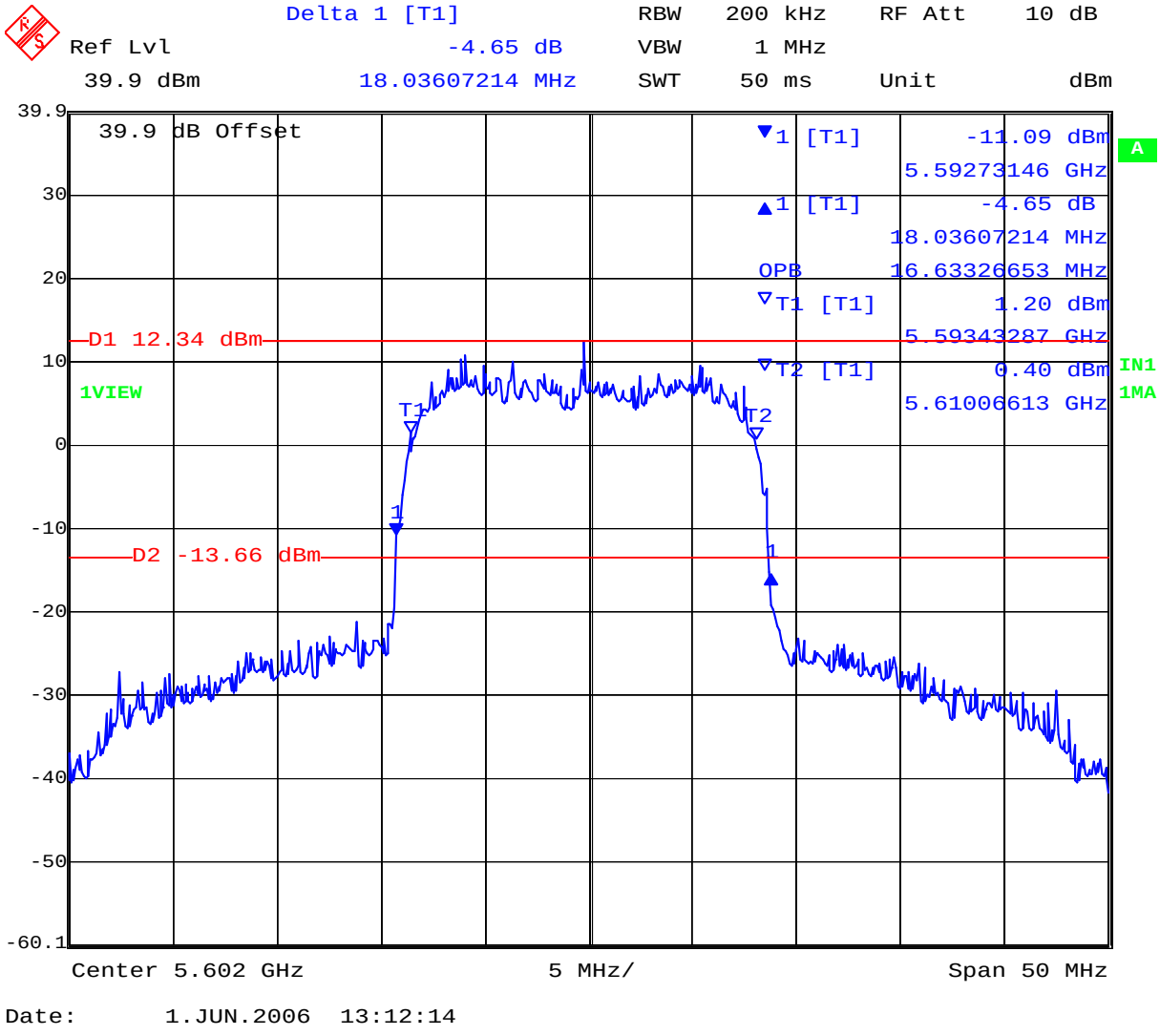


TABLE OF RESULTS – 5.6 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,512	35.9218	On File	32.9158	On File
5,608	35.9218	07	32.9158	07
5,703	35.7715	On File	32.7655	On File

Plot 07
5,608 MHz 32 MHz QPSK 26 dB and 99% Bandwidth

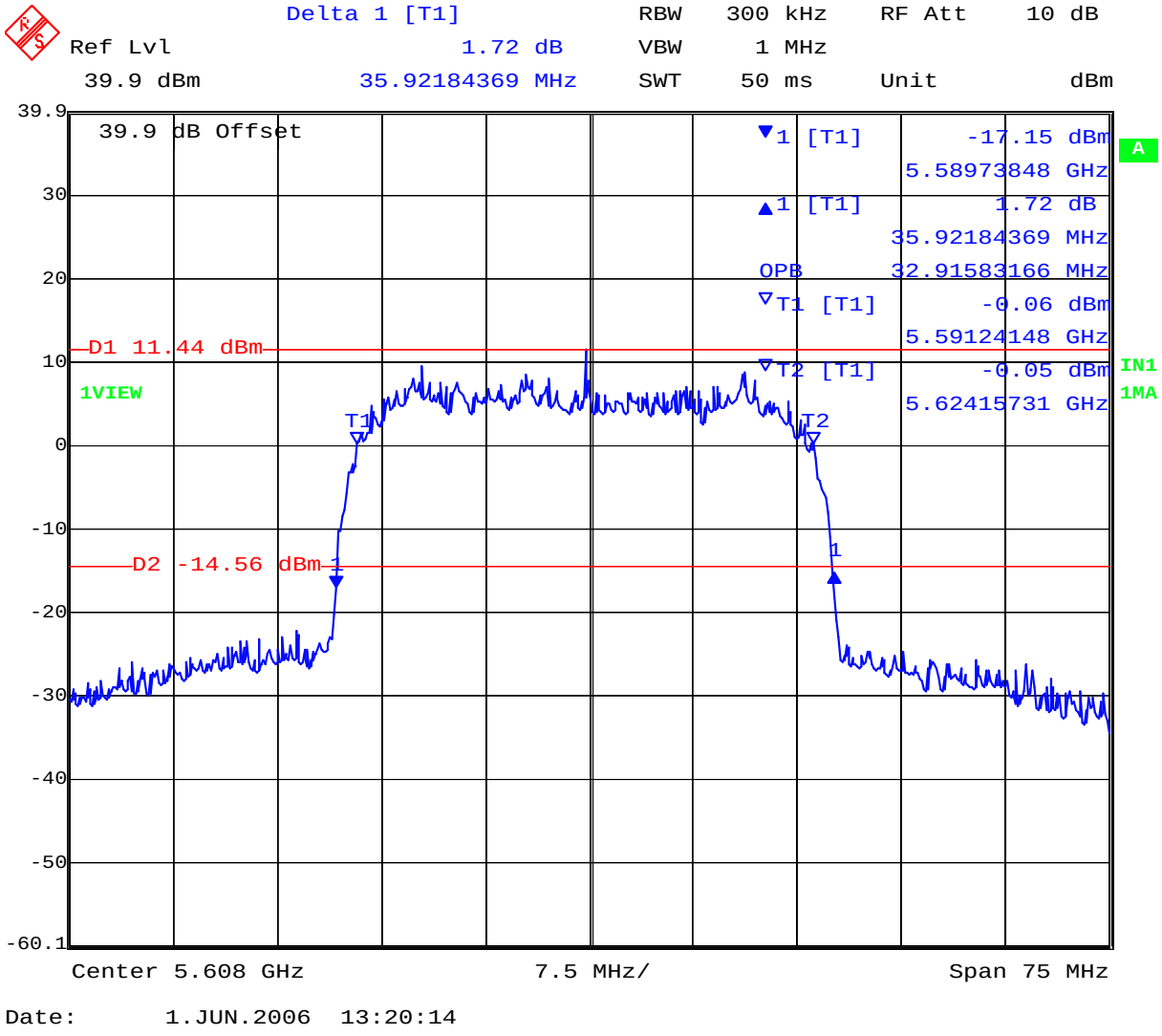
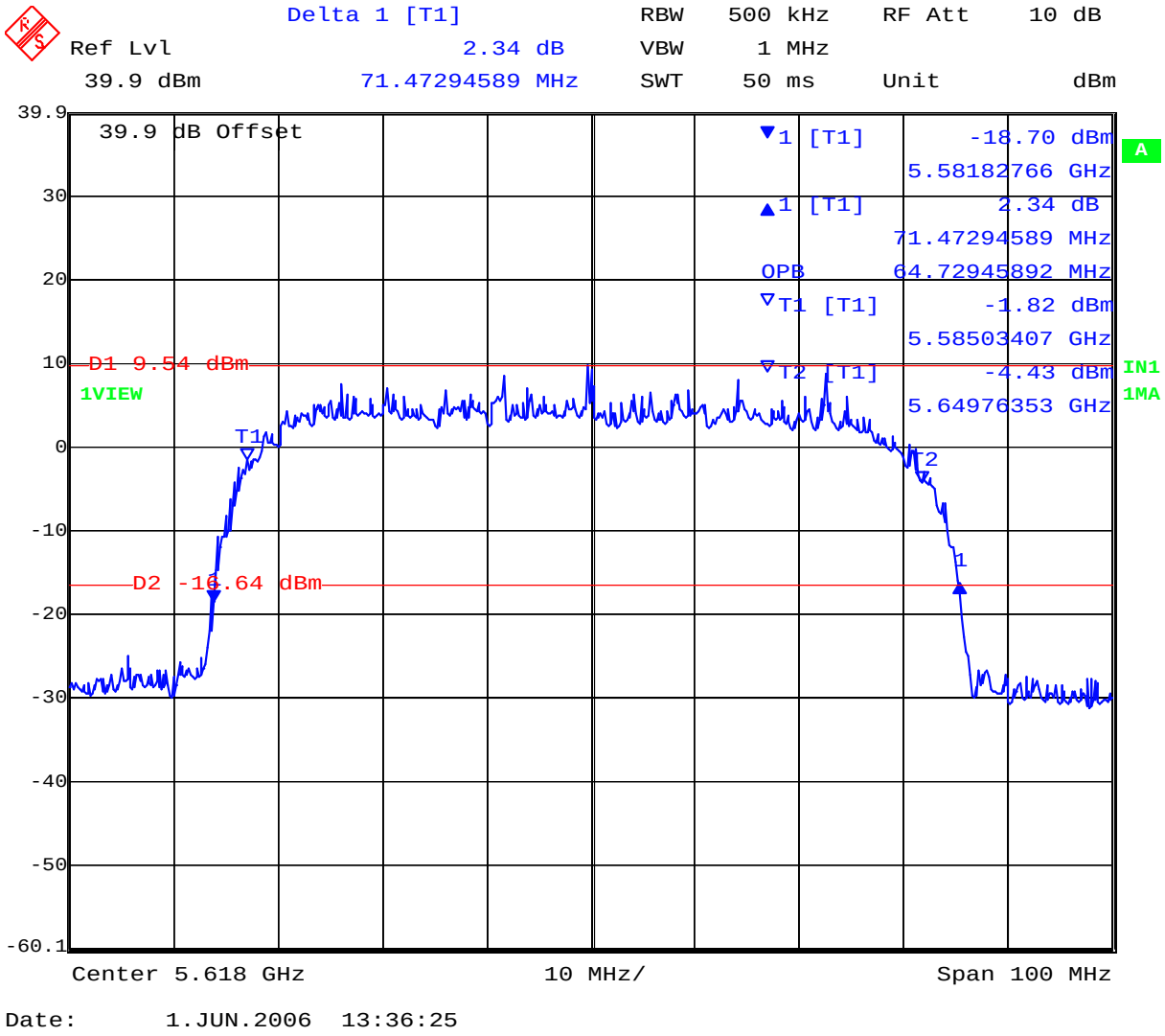


TABLE OF RESULTS – 5.6 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	26 dB Bandwidth (MHz)	26 dB Plot #	99 % BW (MHz)	99 % BW Plots
5,553	71.3427	On File	64.7295	On File
5,618	71.4729	08	64.7295	08
5,683	71.8036	On File	64.9299	On File

Plot 08
5,618 MHz 64 MHz QPSK 26 dB and 99% Bandwidth



Specification

Limits

FCC, Part 15 §15.407 (a)(2) and Industry Canada RSS-210 § A9.2(2)

For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Industry Canada RSS-Gen 4.4

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

5.1.2. Peak Output Power

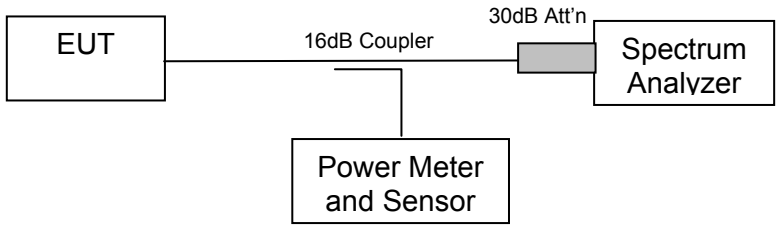
FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 §9.9(2)
Industry Canada RSS-Gen 4.6

Test Procedure

The transmitter terminal of EUT was connected to the input of the average power meter. The measurement results included all associated offsets.

Measurements were made while EUT was operating in a continuous transmission mode i.e. 100 % duty cycle at the appropriate center frequency.

Test Measurement Set up



Measurement set up for Transmitter Peak Output Power

§15.407(a)(2)

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in megahertz.

Maximum Transmit Power

Limit 5250 – 5350: Lesser of 250 mW (+24dBm) or 11 + 10 Log (B) dBm

BW (MHz)	Maximum 26 dB Bandwidth (MHz)	Calculation of Limit 11 + 10 Log (B) (dBm)	Limit (dBm)
8	8.6172	+20.353	+20.35
16	17.1688	+23.347	+23.35
32	34.4188	+26.368	+24.00
64	67.8858	+29.318	+24.00

Maximum Transmit Power

Limit 5470 – 5725: Lesser of 250 mW (+24dBm) or 11 + 10 Log (B) dBm

BW (MHz)	Maximum 26 dB Bandwidth (MHz)	Calculation of Limit 11 + 10 Log (B) (dBm)	Limit (dBm)
8	9.0681	+20.57	+20.57
16	18.1363	+23.58	+23.58
32	35.9218	+26.55	+24.00
64	71.8036	+29.56	+24.00

Antenna Gain - Maximum Permissible Transmit Power

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Type	Gain (dBi)	Bandwidth (MHz)	Antenna Gain >6dBi (dB)	Max. Allowable Conducted Power (dBm)	Max. EIRP (dBm)
Panel	28	8	22	20.57-22 = -1.43	+26.57
		16		23.58-22 = +1.58	+29.58
		32 & 64		24 – 22 = +2	+30.00
Parabolic	37.5	8	31.5	20.57–31.5 = -10.93	+26.57
		16		23.58–31.5 = -7.92	+29.58
		32 & 64		24.0–31.5 = -7.5	+30.00

Radio parameters.
Power Level: maximum
Duty Cycle: 100% (test mode)

Measurement Results for Peak Output Power

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

TABLE OF RESULTS – 5.3 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,260	+14.78	+20.35	-5.57
5,296	+16.62	+20.35	-3.73
5,332	+17.38	+20.35	-2.97

TABLE OF RESULTS – 5.3 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,265	+15.23	+23.35	-8.12
5,296	+16.71	+23.35	-6.64
5,327	+17.38	+23.35	-5.97

TABLE OF RESULTS – 5.3 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,272	+15.69	+24.00	-8.31
5,290	+16.50	+24.00	-7.50
5,308	+16.98	+24.00	-7.02

TABLE OF RESULTS – 5.3 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,290	+15.90	+24.00	-8.10

TABLE OF RESULTS – 5.6 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,488	19.39	+20.57	-1.18
5,602	18.67	+20.57	-1.90
5,715	15.99	+20.57	-4.58

TABLE OF RESULTS – 5.6 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,493	19.23	+23.58	-4.35
5,602	18.62	+23.58	-4.96
5,710	16.06	+23.58	-7.52

TABLE OF RESULTS – 5.6 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,512	18.80	+24.00	-5.20
5,608	18.39	+24.00	-5.61
5,703	16.02	+24.00	-7.98

TABLE OF RESULTS – 5.6 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)	Margin (db)
5,553	18.17	+24.00	-5.83
5,618	17.35	+24.00	-6.65
5,683	15.58	+24.00	-8.42

Specification

Limits

FCC, Part 15 §15.407 (a)(2) and Industry Canada RSS-210 § A9.2(2)

For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Industry Canada RSS-Gen 4.4

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty	±1.33 dB

Traceability

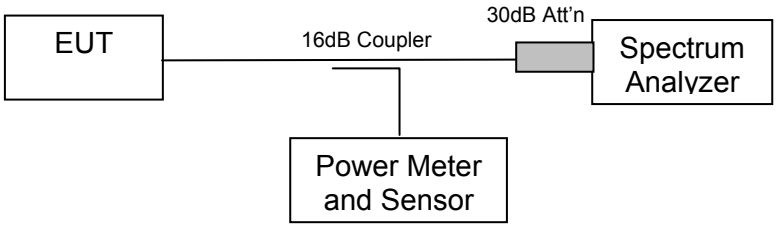
Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

5.1.3. Peak Power Spectral Density

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 § A9.2(2)

Test Procedure
The transmitter output was connected to a spectrum analyzer and the maximum level in a 3 kHz bandwidth was measured. A peak value was found over the full emission bandwidth and the frequency span reduced to obtain enhanced resolution. The Peak Power Spectral Density is the highest level found across the emission in a 1 MHz resolution bandwidth.

Test Measurement Set up



Measurement set up for Peak Power Spectral Density

Antenna Gain - Maximum Permissible Peak Power Spectral Density

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum allowable peak power in the 5250 – 5350 MHz frequency band is + 11 dBm.

Antenna Type	Gain (dBi)	Antenna Gain >6dBi (dB)	Max. Allowable Peak Power Spectral Density (dBm)
Panel	28.0	22.0	11 – 22 = -11.0
Parabolic	37.5	31.5	11 – 31.5 = -20.5

Measurement Results for Peak Power Spectral Density

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Radio parameters.
Power Level: maximum
Duty Cycle: 100% (test mode)

TABLE OF RESULTS – 5.3 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,260	5.25987475	+5.29	On File
5,296	5.29502305	+7.68	On File
5,332	5.33478056	+7.88	09

Plot 09

5,332 MHz 8 MHz Bandwidth QPSK Peak Power Spectral Density

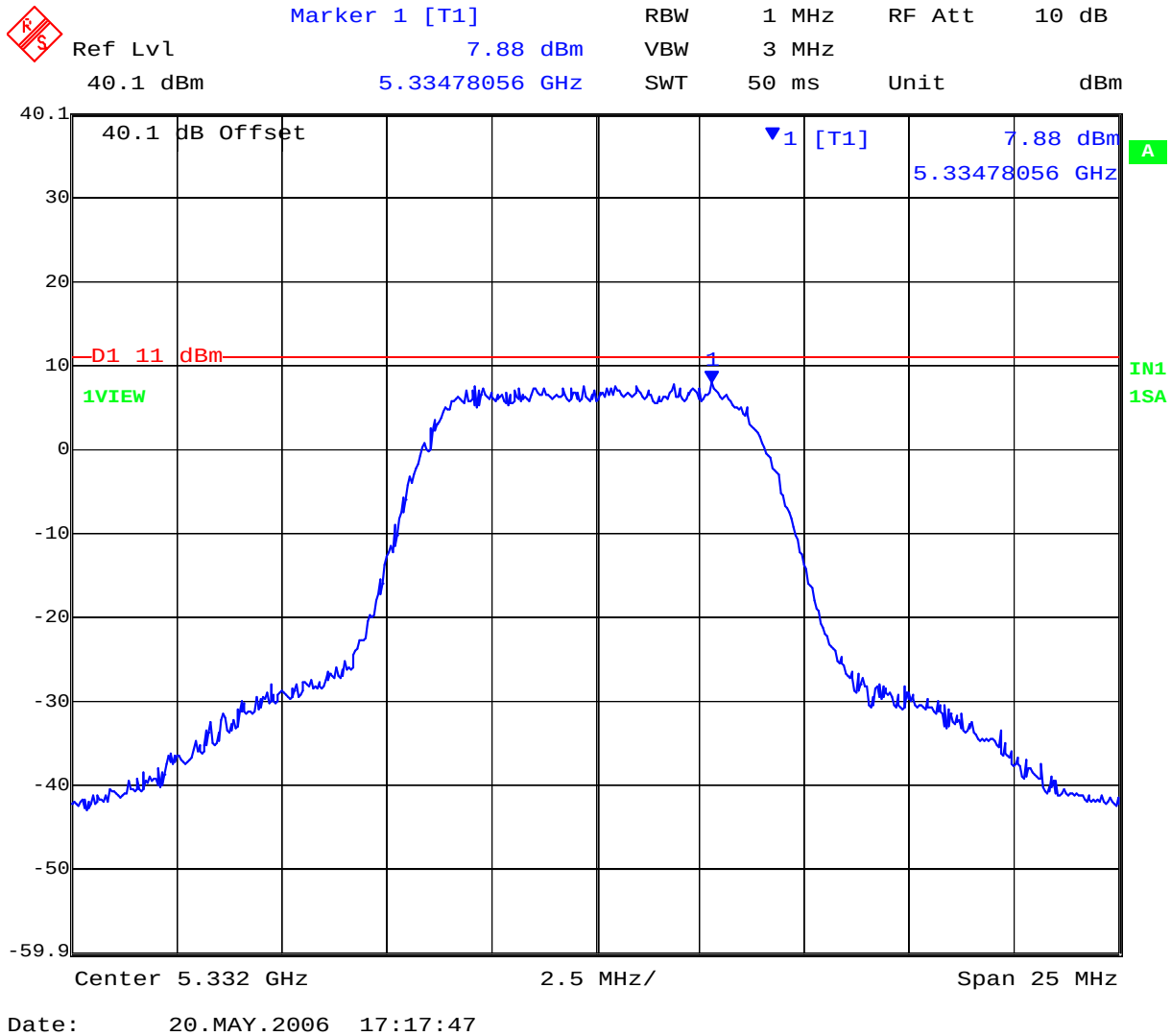


TABLE OF RESULTS – 5.3 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,265	5.26805611	+2.92	On File
5,296	5.30015832	+4.25	On File
5,327	5.32614830	+4.67	10

Plot 10

5,327 MHz 16 MHz Bandwidth QPSK Peak Power Spectral Density

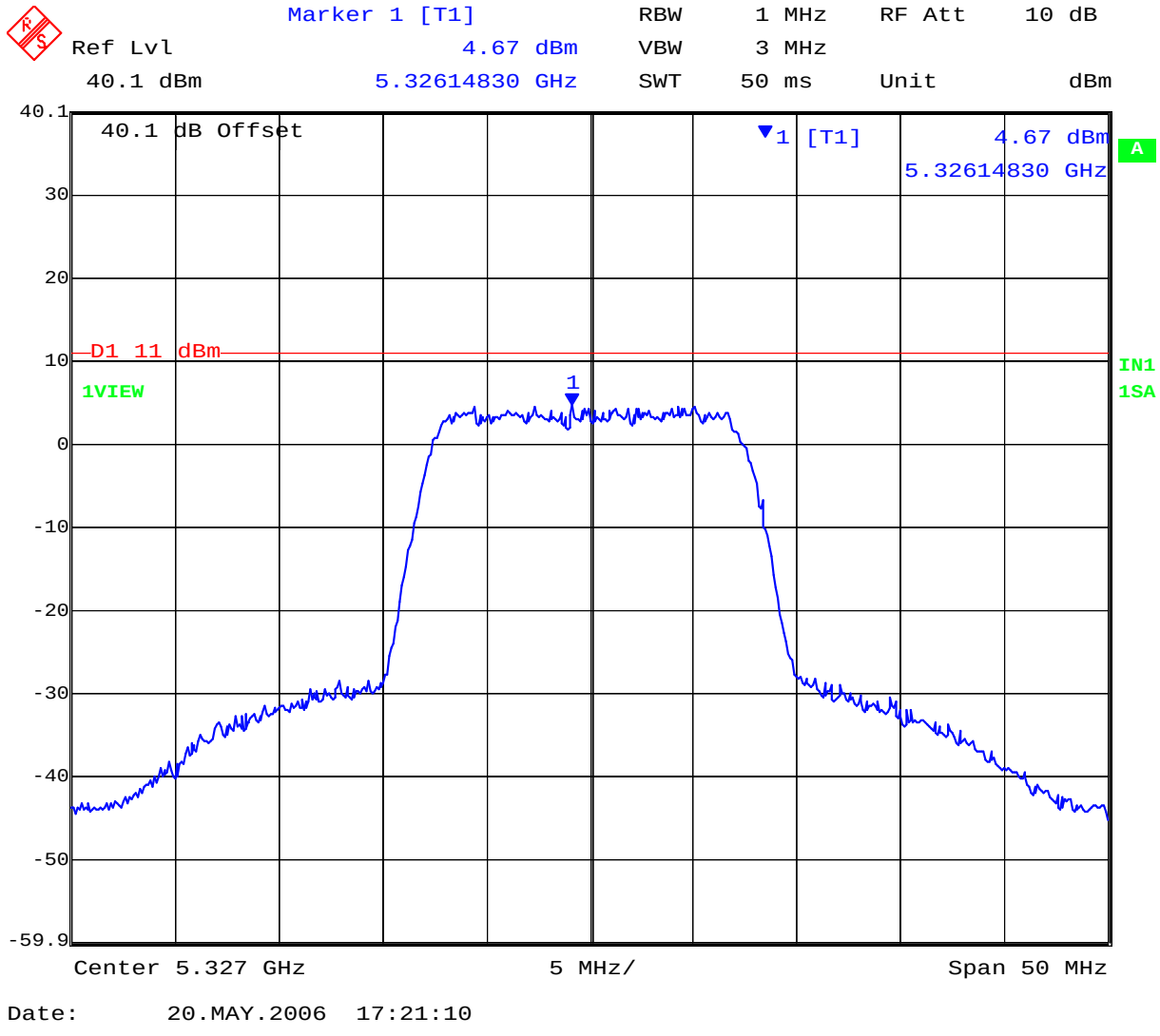


TABLE OF RESULTS – 5.3 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,272	5.28485070	+0.57	On File
5,290	5.29202906	+1.00	On File
5,308	5.31964830	+1.59	11

Plot 11

5,308 MHz 32 MHz Bandwidth QPSK Peak Power Spectral Density

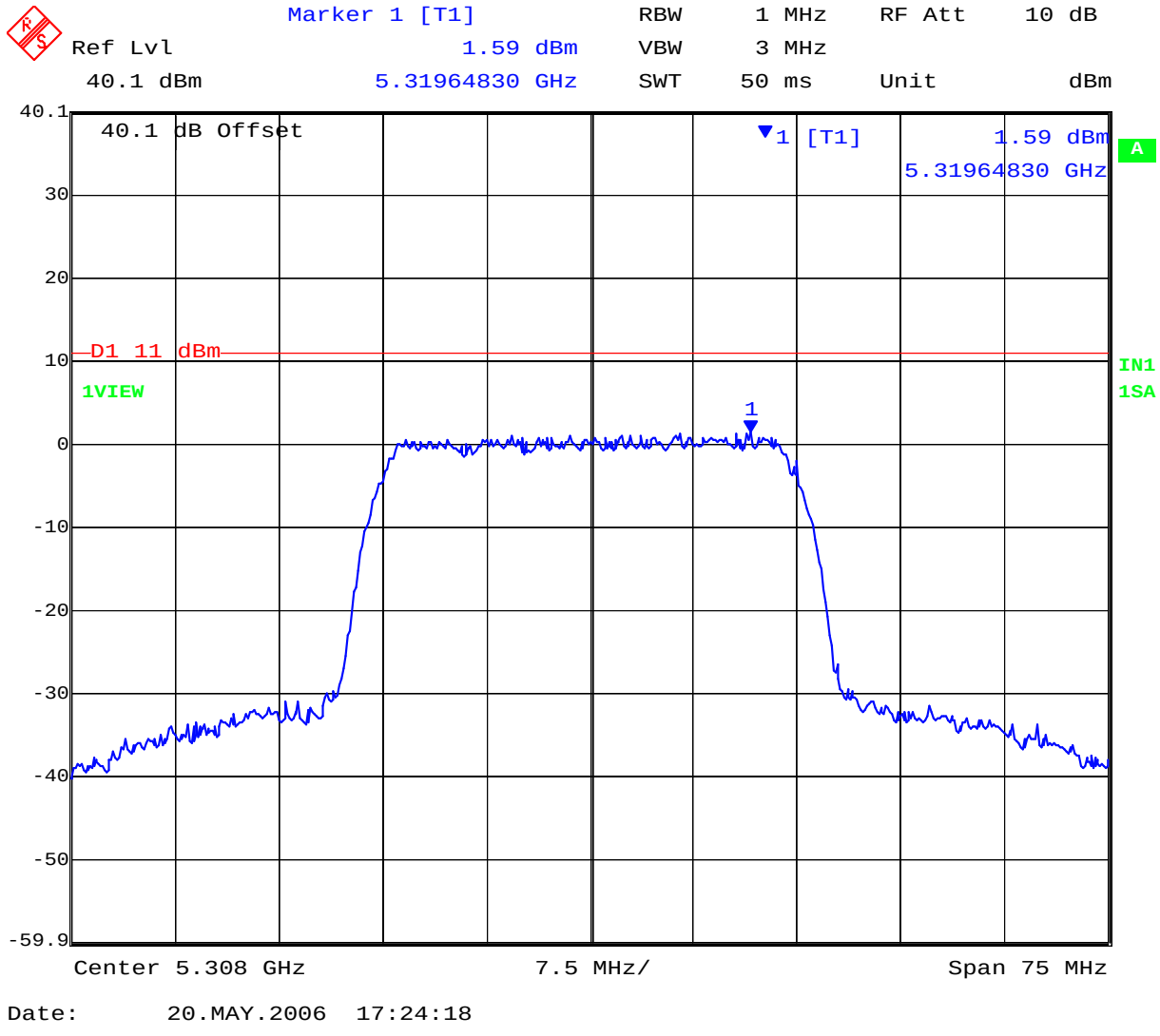


TABLE OF RESULTS – 5.3 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,290	5.30252505	-2.25	12

Plot 12

5,290 MHz 64 MHz Bandwidth QPSK Peak Power Spectral Density

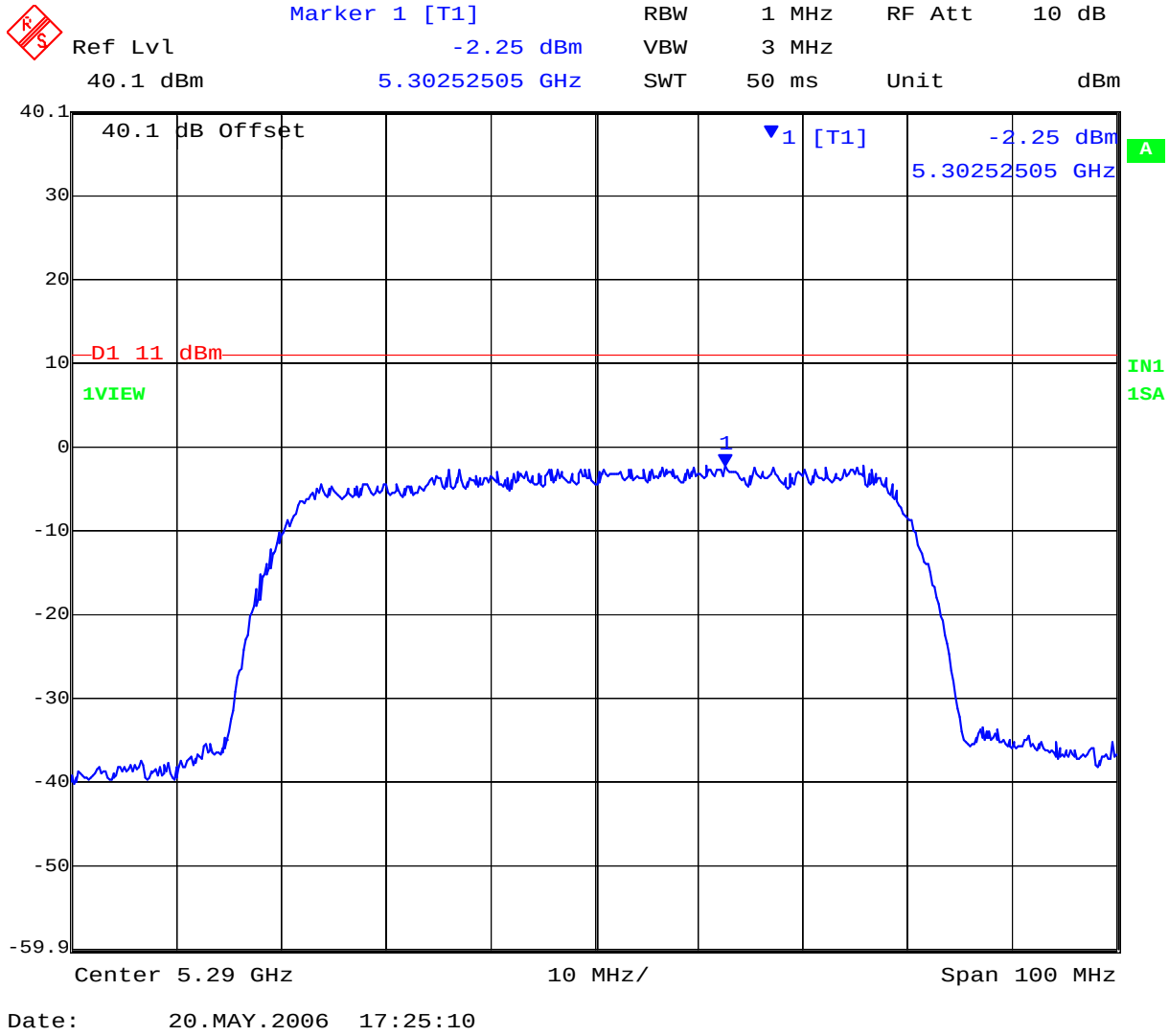


TABLE OF RESULTS – 5.6 GHz Band - 8 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,488	5485.120	+9.62	13
5,602	5598.969	+9.21	On File
5,715	5716.979	+6.40	On File

Plot 13

5,488 MHz 8 MHz Bandwidth QPSK Peak Power Spectral Density

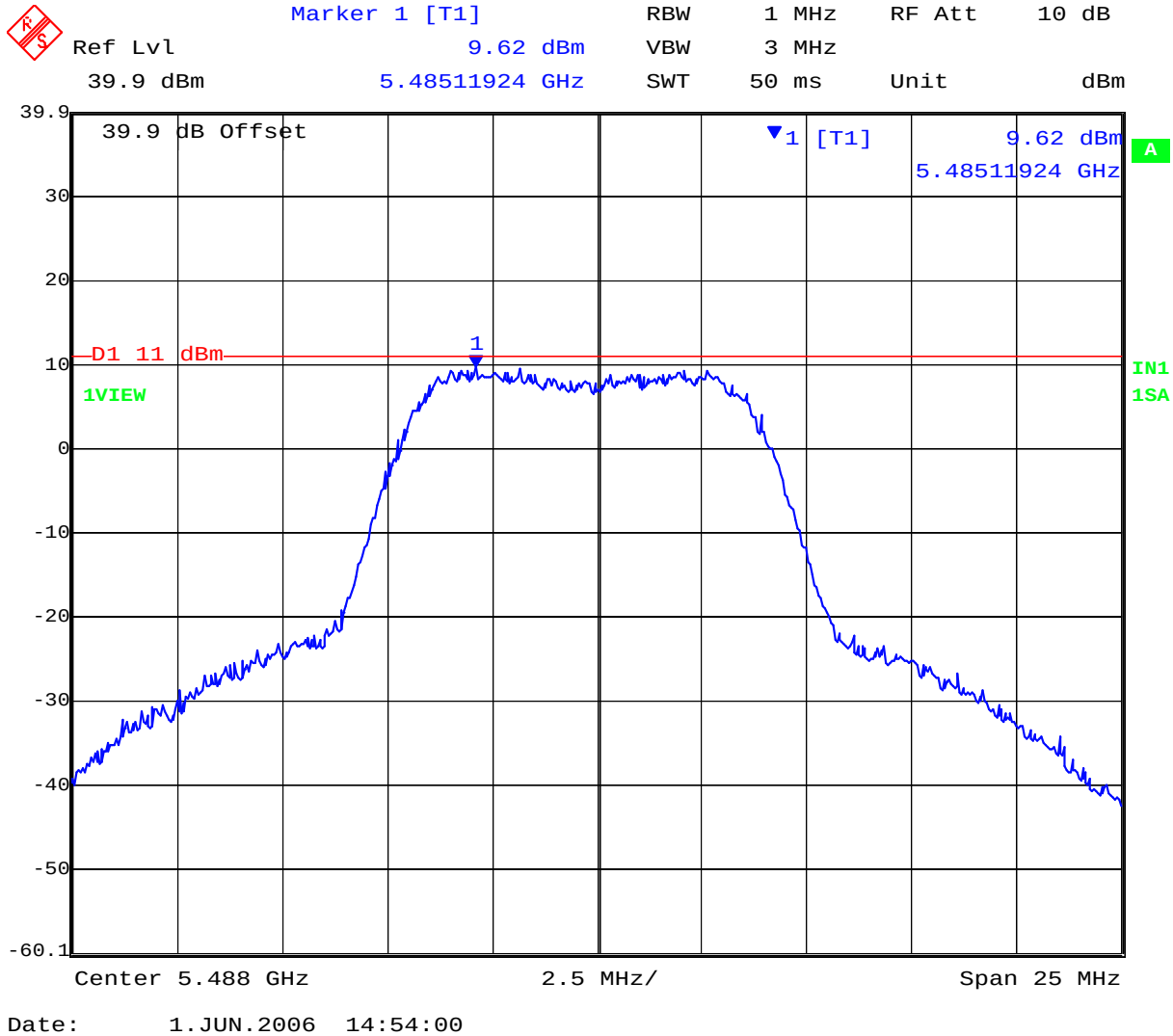


TABLE OF RESULTS – 5.6 GHz Band - 16 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,493	5486.737	+6.54	14
5,602	5595.637	+5.89	On File
5,710	5703.637	+3.08	On File

Plot 14

5,493 MHz 16 MHz Bandwidth QPSK Peak Power Spectral Density

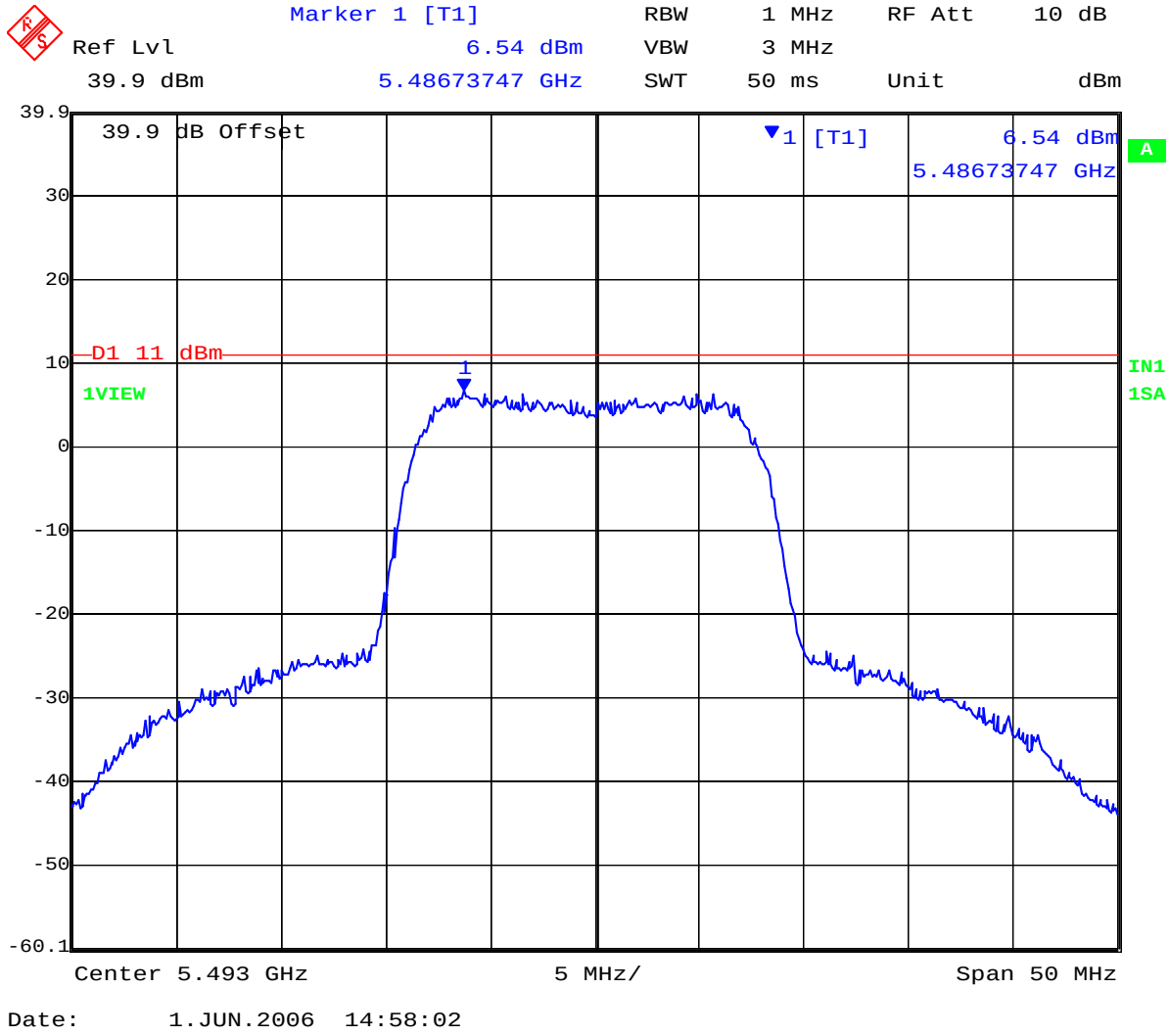


TABLE OF RESULTS – 5.6 GHz Band - 32 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,512	5498.849	+3.03	On File
5,608	5595.600	+3.16	15
5,703	5690.600	+0.45	On File

Plot 15

5,608 MHz 32 MHz Bandwidth QPSK Peak Power Spectral Density

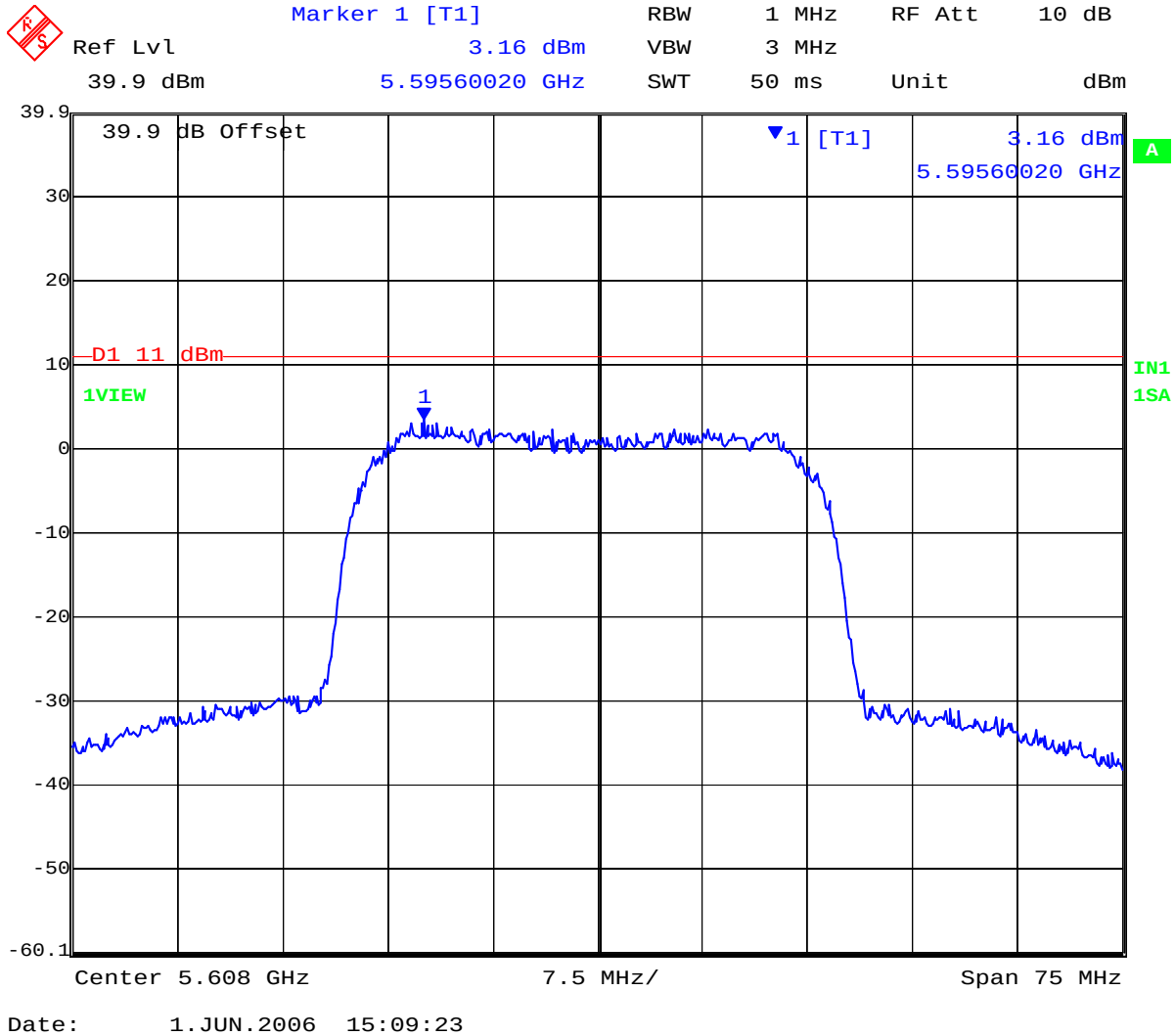
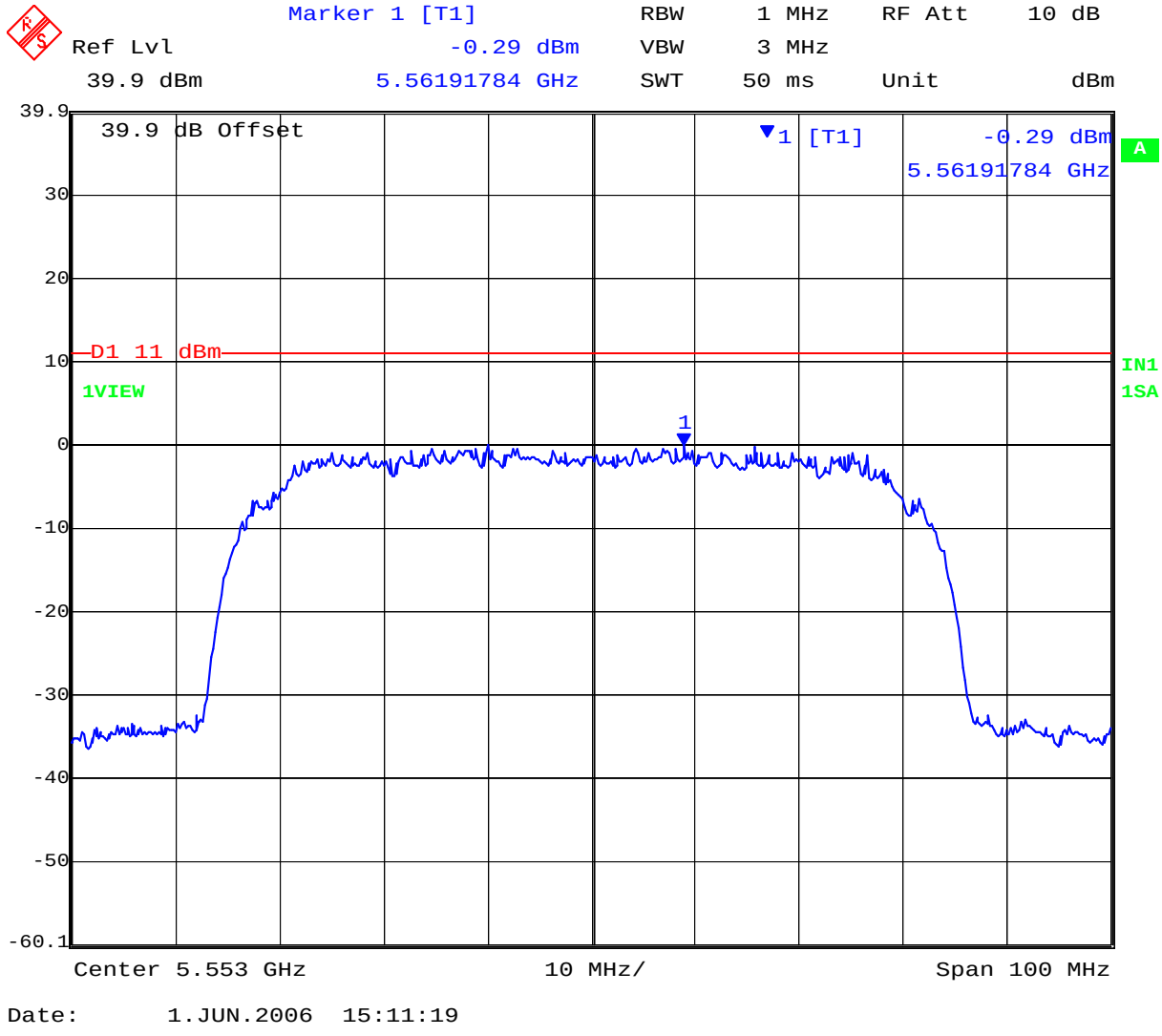


TABLE OF RESULTS – 5.6 GHz Band - 64 MHz Bandwidth QPSK

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)	Plot #
5,553	5561.918	-0.29	16
5,618	5605.876	-1.24	On File
5,683	5694.723	-2.85	On File

Plot 16

5,553 MHz 64 MHz Bandwidth QPSK Peak Power Spectral Density



Specification

FCC, Part 15 §15.407 (a)(2) and Industry Canada RSS-210 § A9.2(2)

For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

Laboratory Measurement Uncertainty for Spectral Density

Measurement uncertainty	±1.33 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

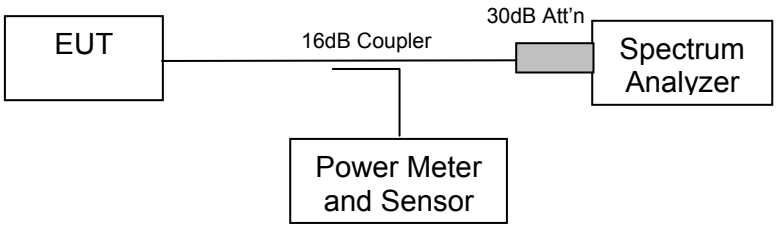
5.1.4. Peak Excursion Ratio

FCC, Part 15 Subpart C §15.407(a)(6)

Test Procedure

This is an antenna conducted measurement using a spectrum analyzer. Method 3 in Normative Reference (x) Section 2.1 was implemented to determine module Peak Excursion Ratio. The Peak Excursion Ratio is the difference in amplitude (dB) between the two traces.

Test Measurement Set up



Measurement set up for Peak Excursion Ratio

Measurement Results for Peak Excursion Ratio

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57% Pressure: 999 to 1012 mbar

Radio parameters.
Power Level: maximum
Duty Cycle: 100% (test mode)

TABLE OF RESULTS – 5.3 GHz Band - 8 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,260	+9.9	On File
5,296	+10.5	On File
5,332	+10.5	17

Plot 17

5,296 MHz - 8 MHz QPSK - Peak Excursion Ratio

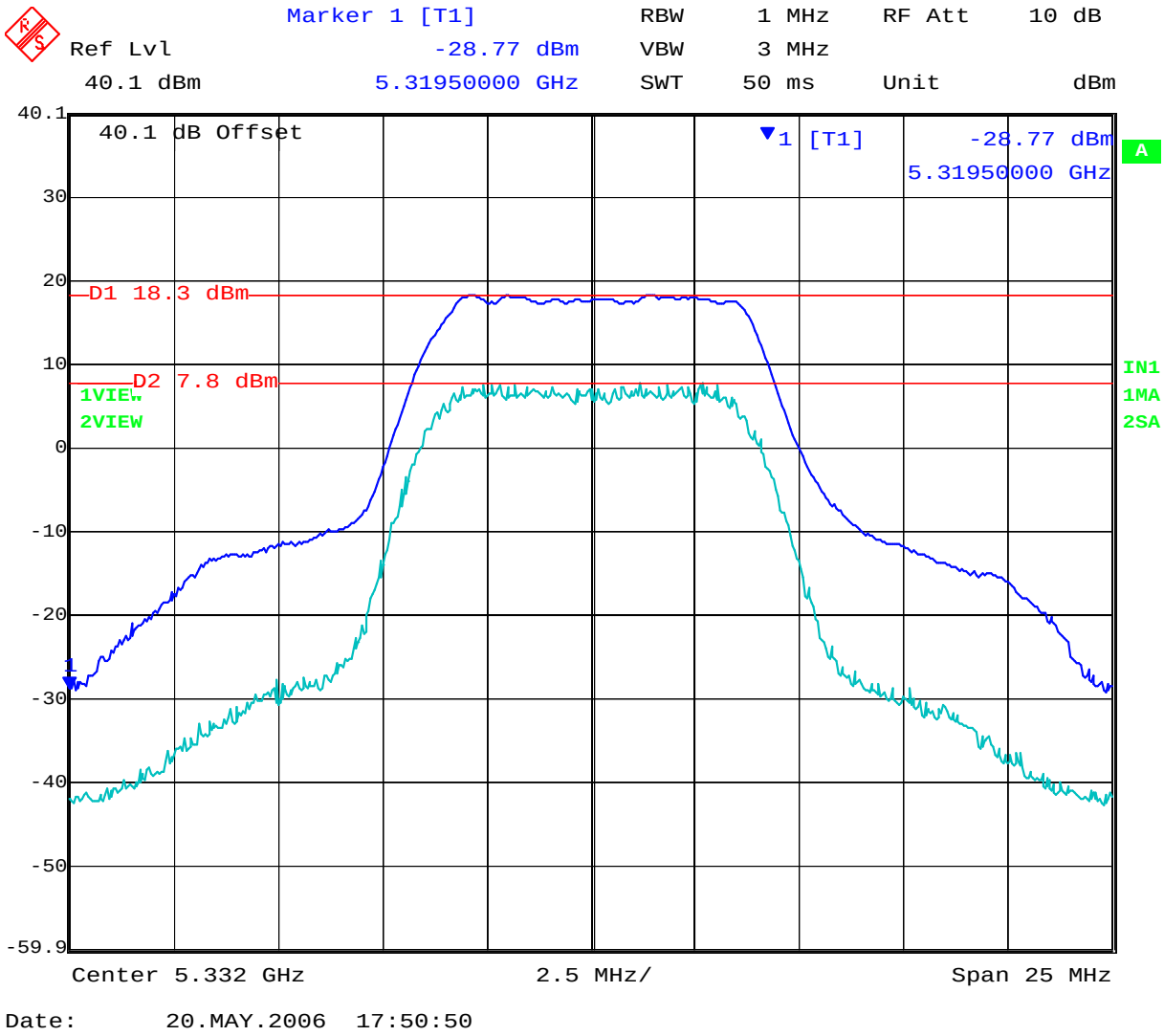


TABLE OF RESULTS – 5.3 GHz Band - 16 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,265	+12.0	On File
5,296	+10.7	On File
5,327	+12.1	18

Plot 18

5,265 MHz - 16 MHz QPSK - Peak Excursion Ratio

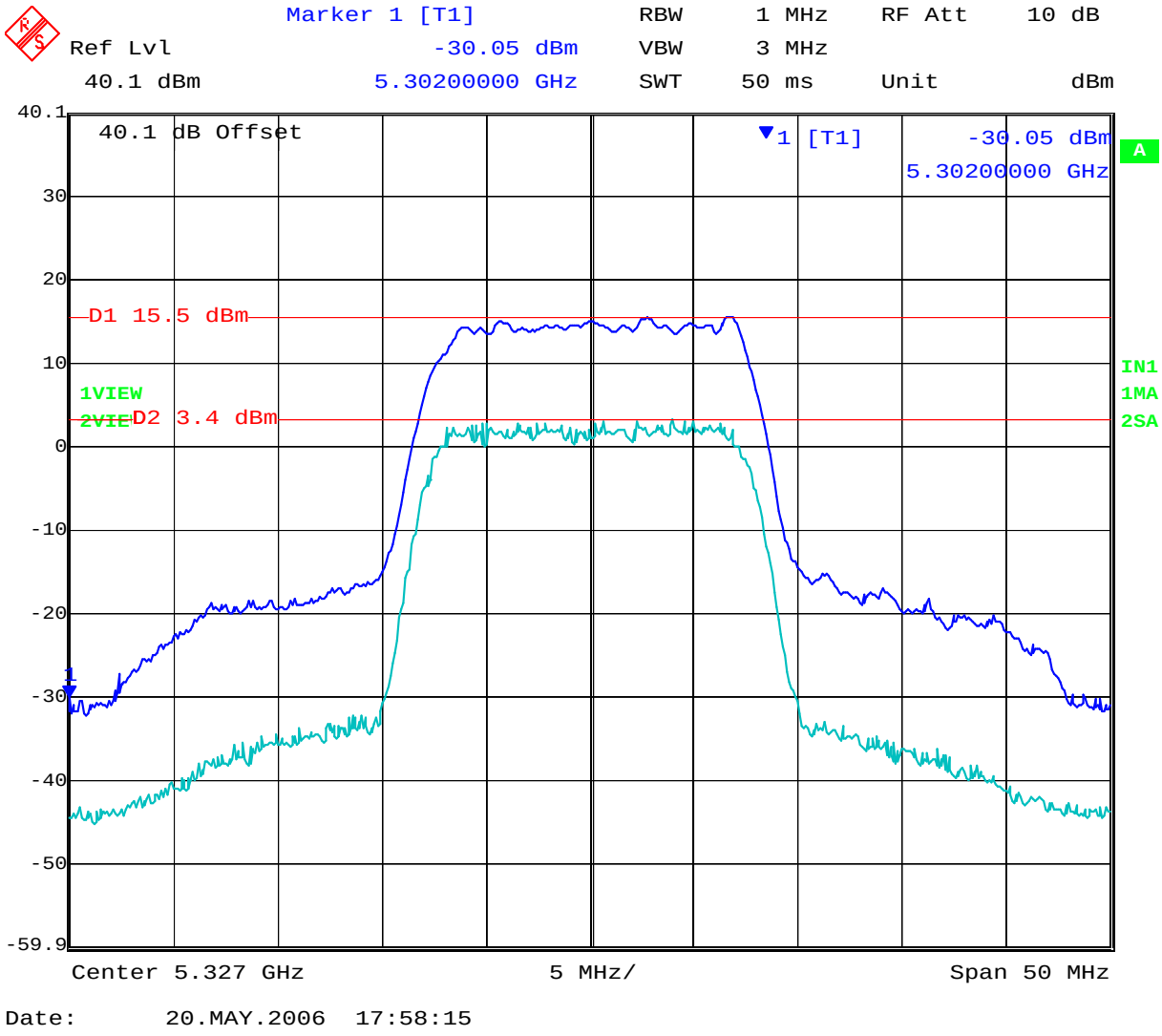


TABLE OF RESULTS – 5.3 GHz Band - 32 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,272	+12.3	On File
5,290	+12.4	19
5,308	+12.3	On File

Plot 19

5,290 MHz - 32 MHz QPSK - Peak Excursion Ratio

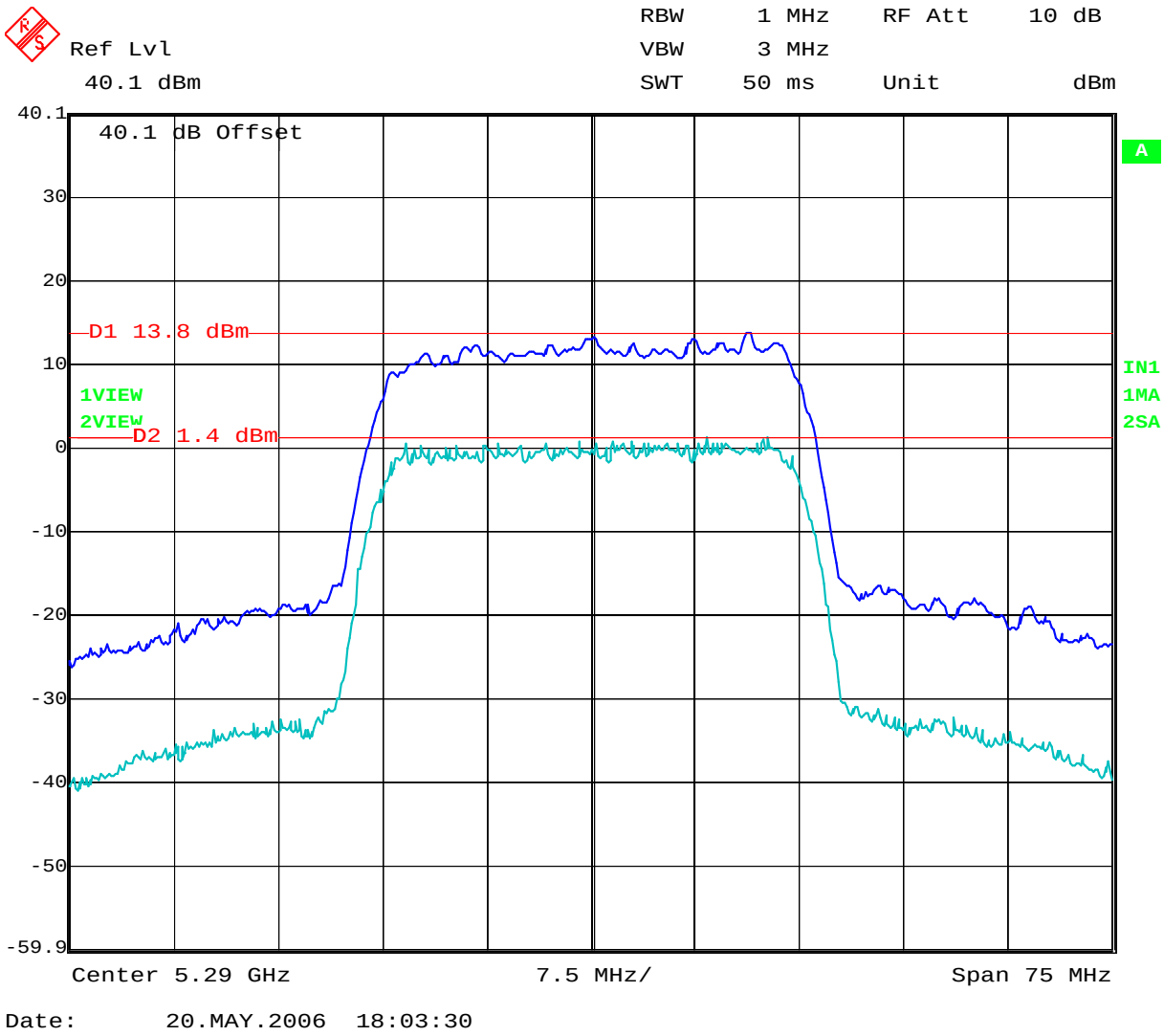


TABLE OF RESULTS – 5.3 GHz Band - 64 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,290	+12.8	20

Plot 20

5,290 MHz - 64 MHz QPSK - Peak Excursion Ratio

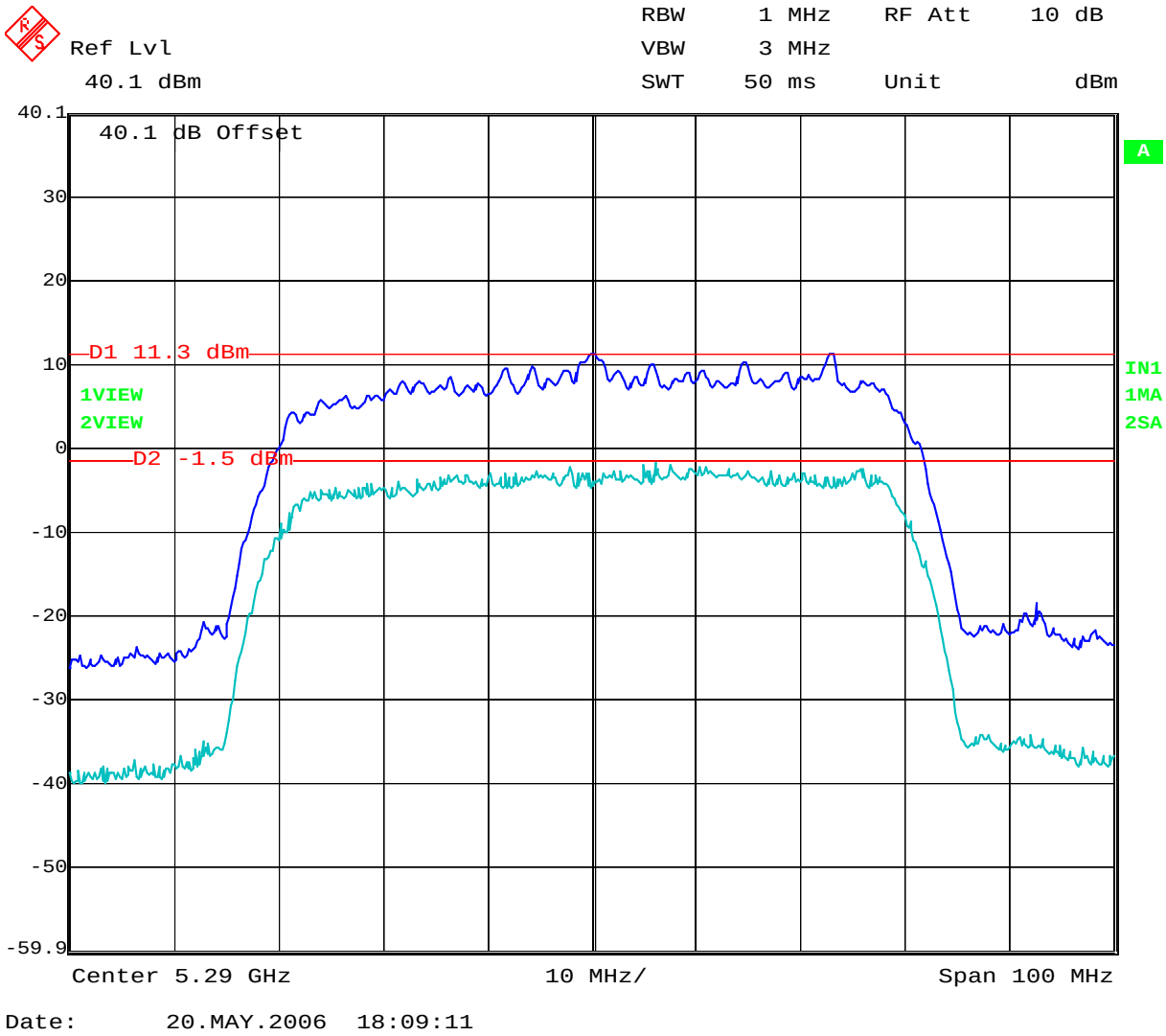


TABLE OF RESULTS – 5.6 GHz Band - 8 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,488	8.93	On File
5,602	8.65	On File
5,715	9.47	21

Plot 21

5,715 MHz - 8 MHz QPSK - Peak Excursion Ratio

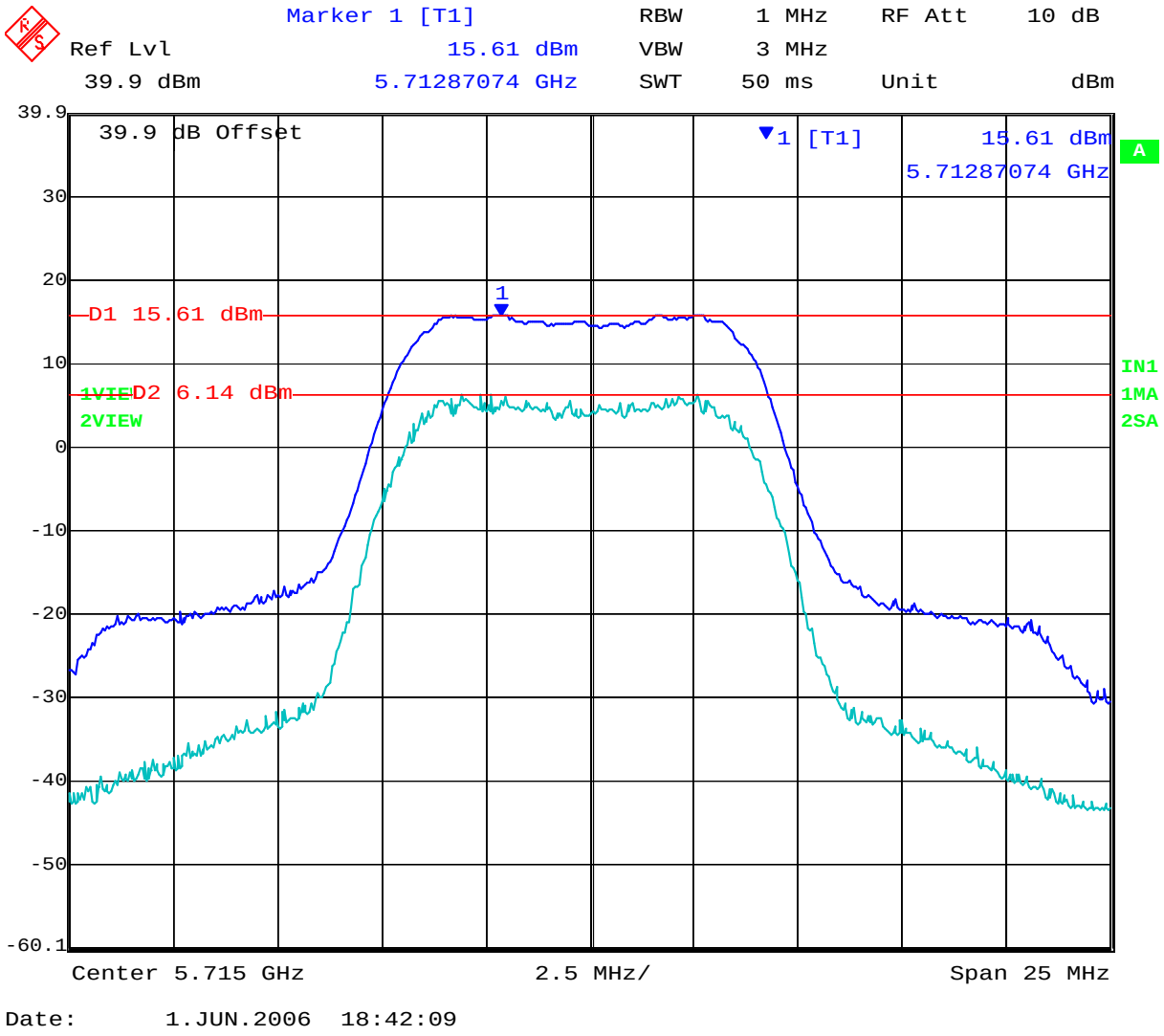


TABLE OF RESULTS – 5.6 GHz Band - 16 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,493	10.62	On File
5,602	10.77	On File
5,710	10.90	22

Plot 22

5,710 MHz - 16 MHz QPSK - Peak Excursion Ratio

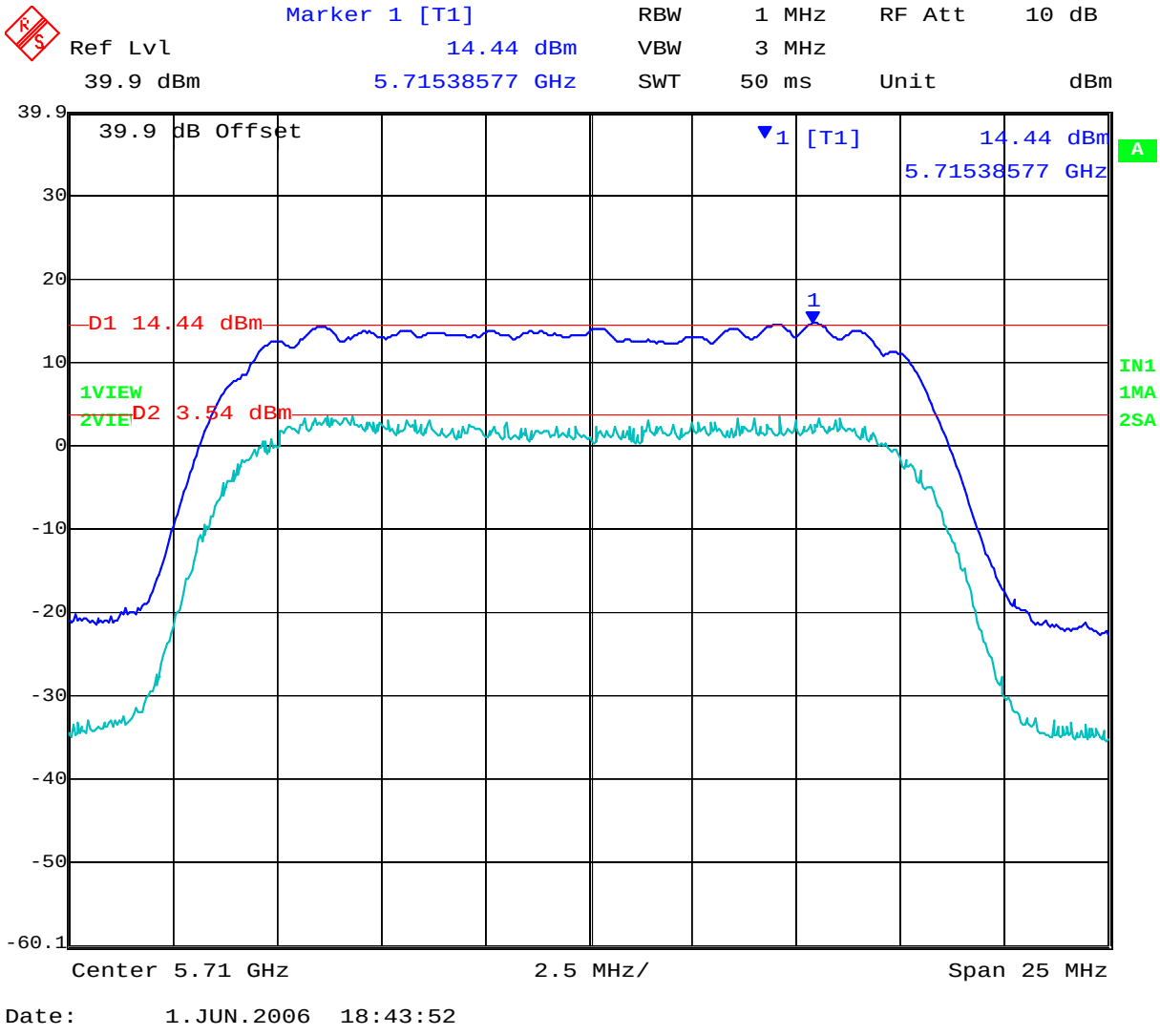


TABLE OF RESULTS – 5.6 GHz Band - 32 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,512	12.09	23
5,608	11.19	On File
5,703	11.14	On File

Plot 23

5,512 MHz - 32 MHz QPSK - Peak Excursion Ratio

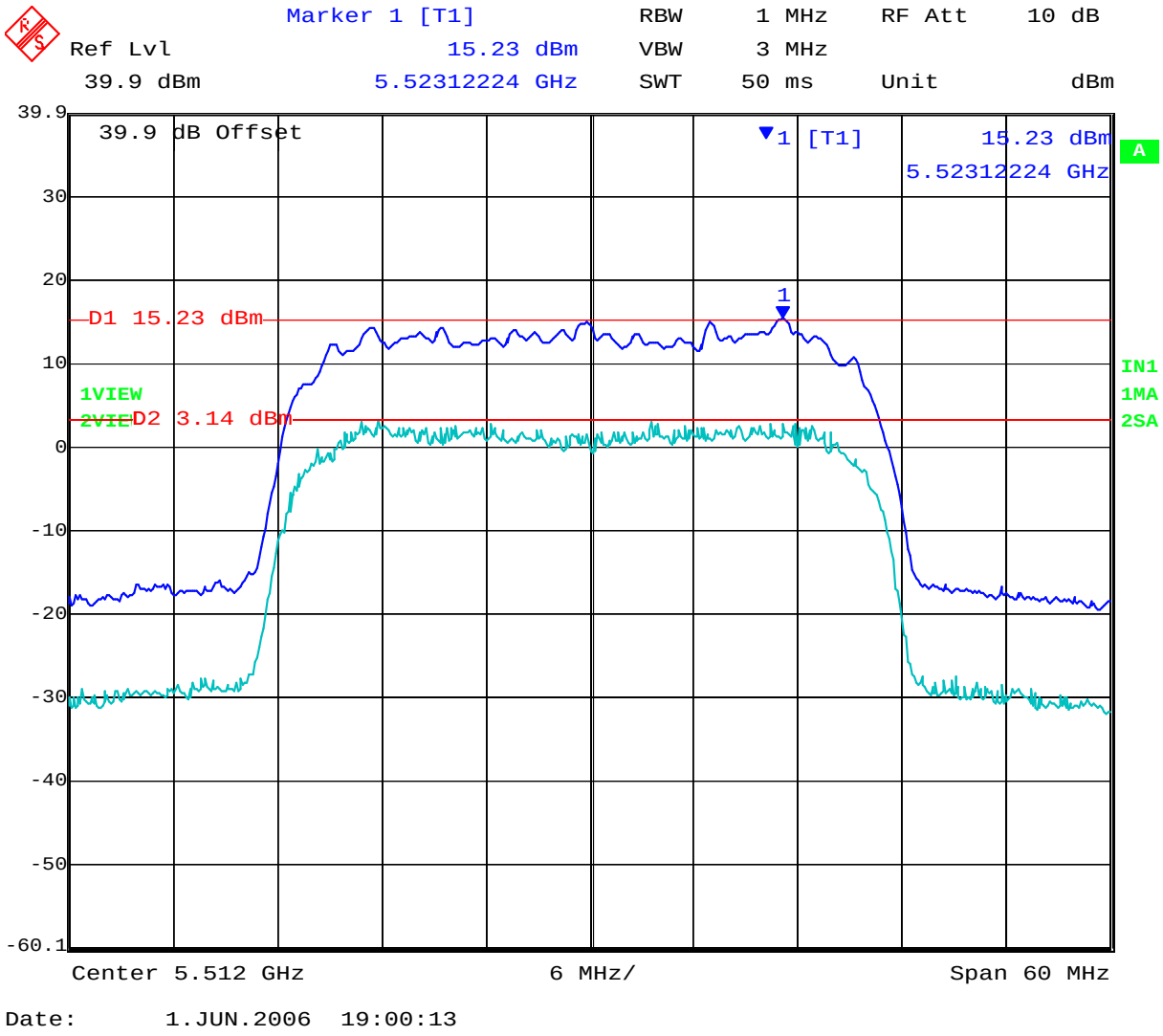
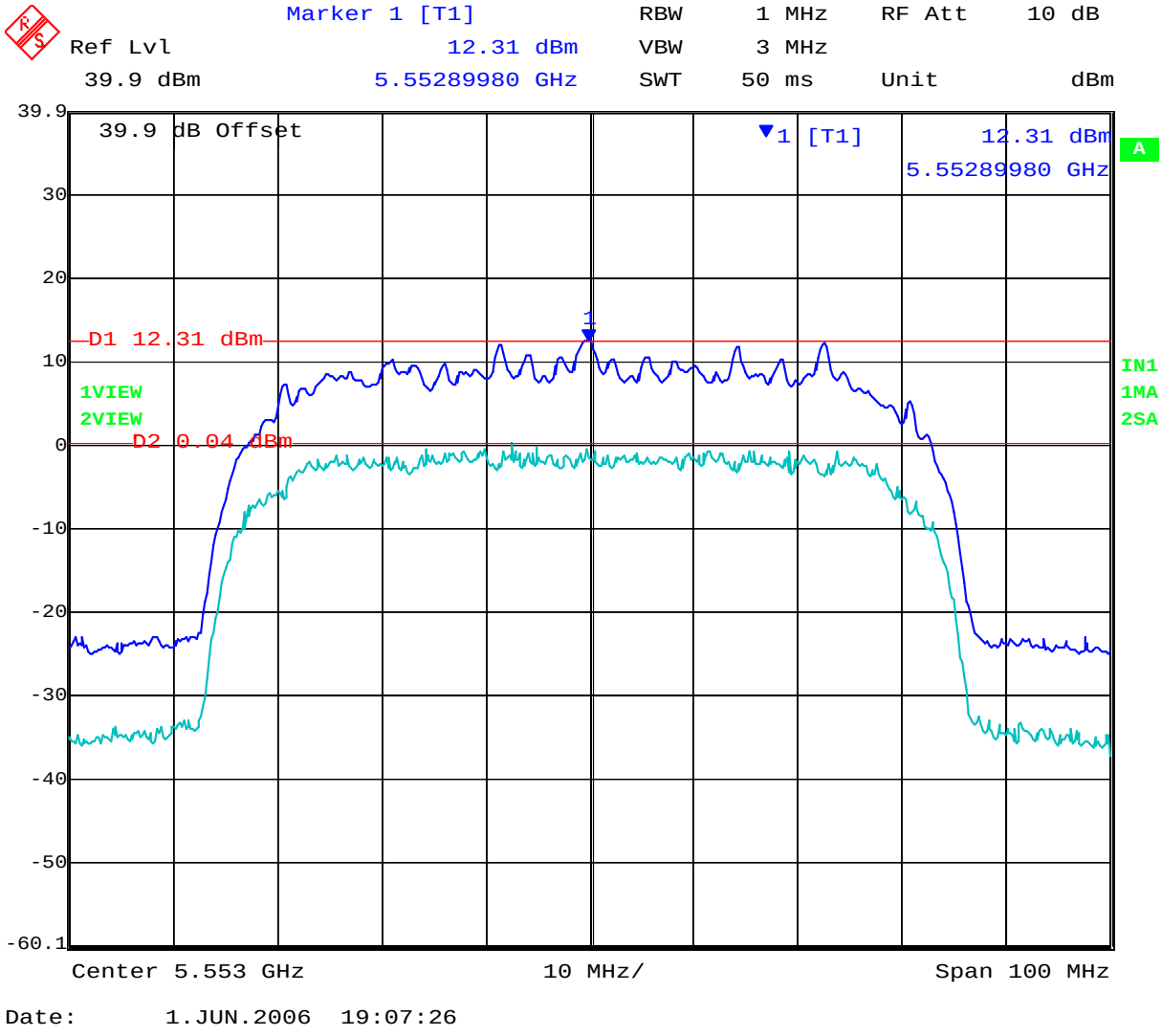


TABLE OF RESULTS – 5.6 GHz Band - 64 MHz Bandwidth QPSK

Centre Frequency (MHz)	Peak Excursion Ratio (dB)	Plot #
5,553	12.27	24
5,618	11.99	On File
5,683	12.30	On File

Plot 24

5,553 MHz - 64 MHz QPSK - Peak Excursion Ratio



Specification

Limits

§15.407 (a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	± 2.81dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

5.1.5. Frequency Stability

FCC, Part 15 Subpart C §15.407(g)
Industry Canada RSS-210 A9.5(e)

Test Procedure

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

Manufacturer Declaration

The manufacturer testifies that the frequency stability of the device is +/- 7ppm. This determination is based on the specifications of critical oscillator components in the RF transmitter stage, and these specifications have been adjusted to account for all multiplications or distortions that may occur in the upconversion process. Modulation within the EUT cannot be turned off. The center frequencies for all operational bandwidths are tuned several MHz away from the band edges to assure that out-of-band emissions are met, inclusive of any changes to frequency as a result of the frequency stability specification

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have ±7ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±7ppm at 5.350 GHz translates to a maximum frequency shift of ±37.45 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±37.45 KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the radio.

Specification

Limits

§15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

RSS-210 §9.5(e)
The frequency stability shall be better than ±10 ppm. Alternatively, the applicant can show that the unwanted emission masks of the outermost channels are complied with when tested under all conditions of normal operation as specified in the user manual.

5.1.6. Maximum Permissible Exposure

FCC, Part 15 Subpart C §15.407(f)
Industry Canada RSS-Gen §5.5

Calculations for Maximum Permissible Exposure Levels

Power Density = Pd (mW/cm^2) = EIRP/(4πd^2)

EIRP = P * G

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = 10 ^ (G (dBi)/10)

For 28 dBi (631 num.) antenna P (worst case) = +2 dBm (1.585)

For 37.5 dBi (6165 num.) antenna P(worst case) = -7.5 dBm (0.178)

Because the EUT belongs to the General Population / Uncontrolled Exposure the limit of power density is 1mW/cm^2

Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated safe distance @ max limit 1mW/ cm^2 (d=cm)
28.0	631	+2.0	1.585	8.9
37.5	5623	-7.5	0.178	8.9

Specification
Maximum Permissible Exposure Limits

§15.407 (f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307 (b), 2.1091 and 2.1093 as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

Limit S = 1mW / cm^2 from 1.310 Table 1

Note: for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.

RSS-Gen §5.5 Before equipment certification is granted, the application requirements of RSS-102 shall be met.

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty	±1.33 dB

5.1.7. Radiated Emissions

5.1.7.1. Transmitter Radiated Spurious Emissions (above 1 GHz)

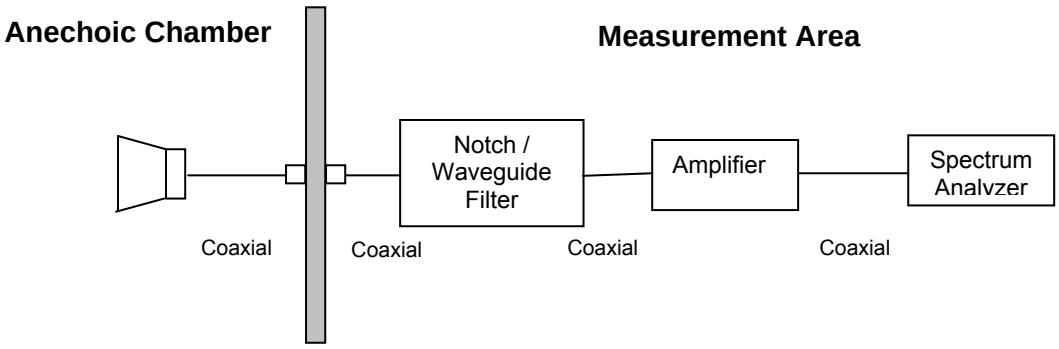
FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)
Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$E = 1000000 \times \sqrt{30P} / 3$ μV/m, where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

Antenna Configuration
28 dBi Panel
37.5 dBi Parabolic

Radio parameters.
Duty Cycle: 100% (test mode)
Power Level: As specified by the following matrix, see Section 5.1.2 Peak Output Power

Peak Power V's Antenna Gain

Antenna Type	Gain (dBi)	Bandwidth (MHz)	Max. Allowable Conducted Power (dBm)
Panel	28	8	-1.43
		16	+1.58
		32 & 64	+2.0
Parabolic	37.5	8	-10.93
		16	-7.92
		32 & 64	-7.50

Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

Ambient conditions.
Temperature: 17 to 23°C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

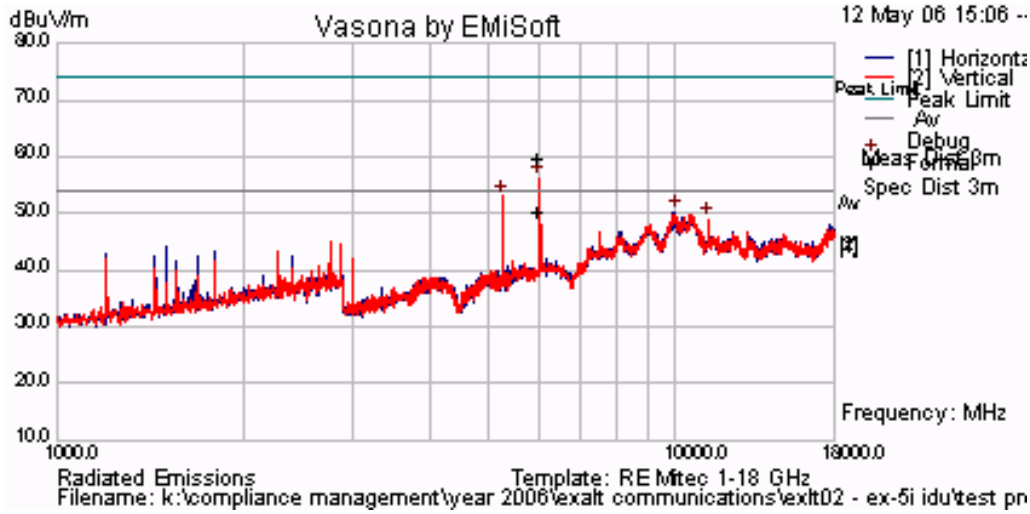
TABLE OF RESULTS – 5,260 MHz 28 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
6017.731	V	50.01	-1.85	48.16	54	-5.84

Note. The carrier in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 8 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,260 MHz Radiated Emissions for 28 dBi Antenna 8 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

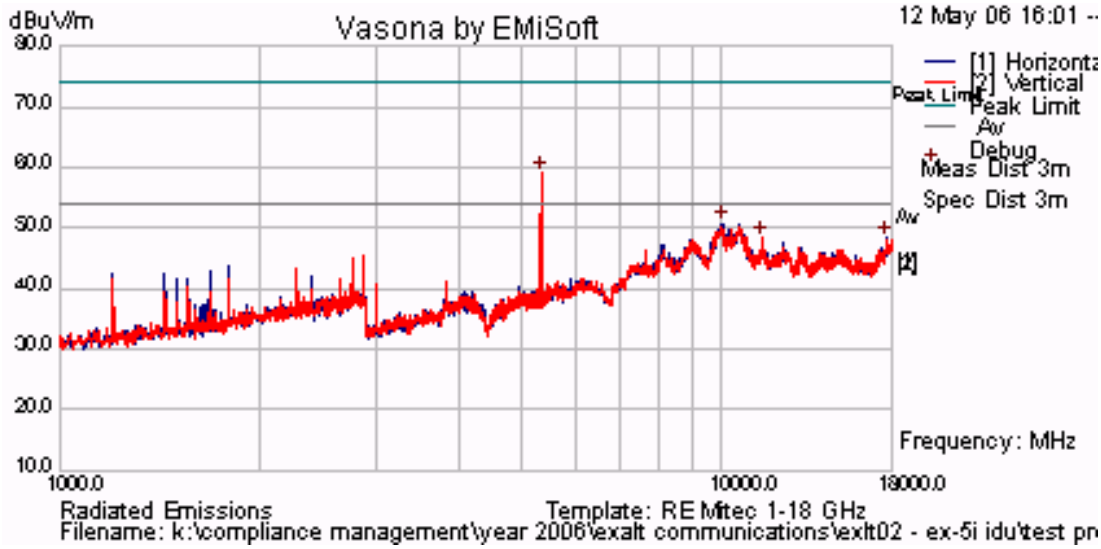
TABLE OF RESULTS – 5,327 MHz 28 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

Note. No emissions were observed above the limit. Note. The carrier in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 16 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,327 MHz Radiated Emissions for 28 dBi Antenna 16 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

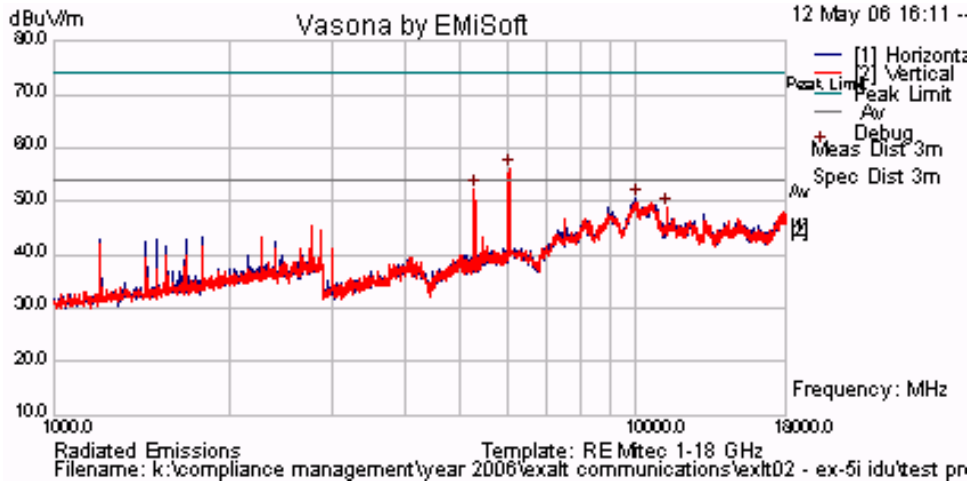
TABLE OF RESULTS – 5,272 MHz 28 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
6017.727	V	49.90	-1.85	48.05	54	-5.95

Note. The carrier in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 32 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,272 MHz Radiated Emissions for 28 dBi Antenna 32 MHz Bandwidth QPSK



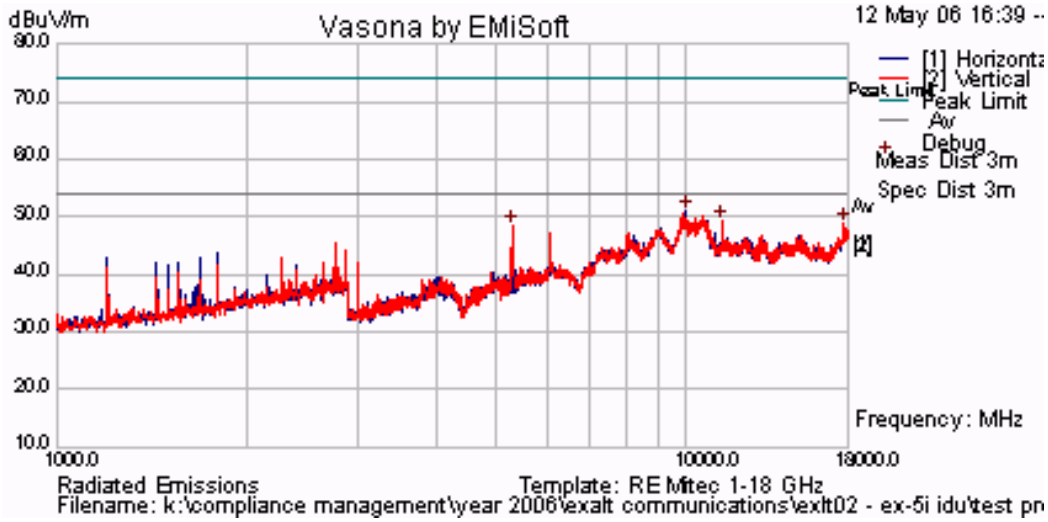
Radiated Spurious Emissions above 1 GHz (continued)

TABLE OF RESULTS –5,290 MHz 28 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

Note. No emissions were observed above the limit.

5,290 MHz Radiated Emissions for 28 dBi Antenna 64 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

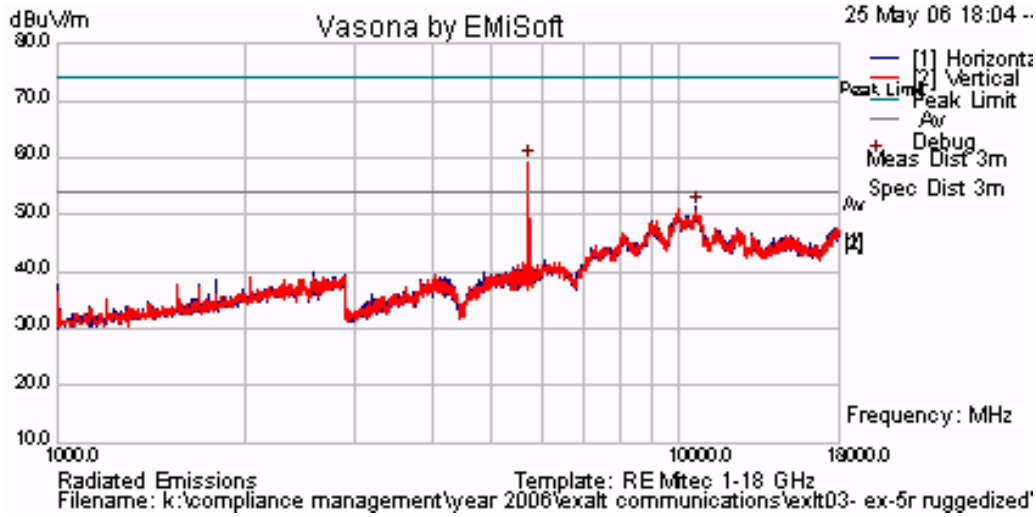
TABLE OF RESULTS –5,715 MHz 28 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

Note. The peak emission shown in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 8 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,715 MHz Radiated Emissions for 28 dBi Antenna 8 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

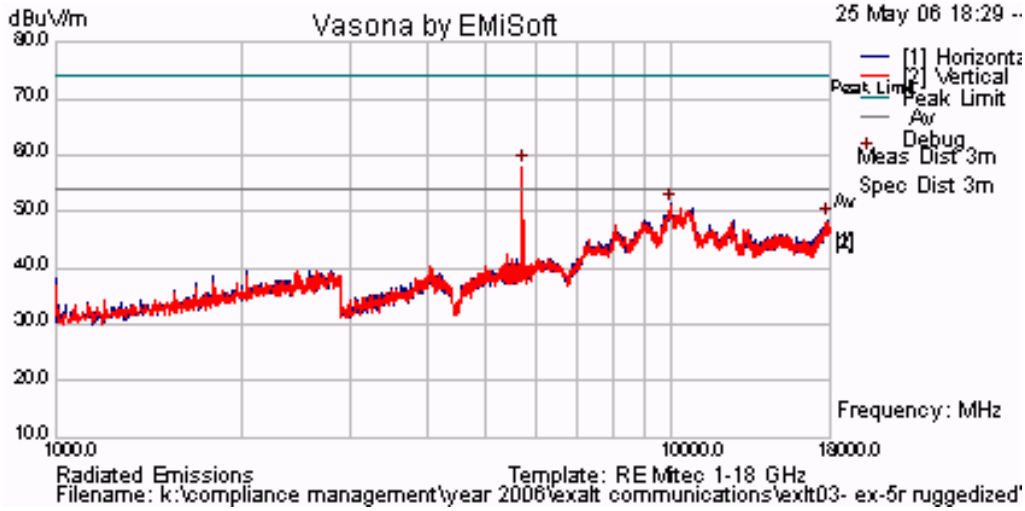
TABLE OF RESULTS –5,710 MHz 28 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

Note. The peak emission shown in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 16 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,710 MHz Radiated Emissions for 28 dBi Antenna 16 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

TABLE OF RESULTS – 5,703 MHz 28 dBi Antenna 32 MHz Bandwidth QPSK

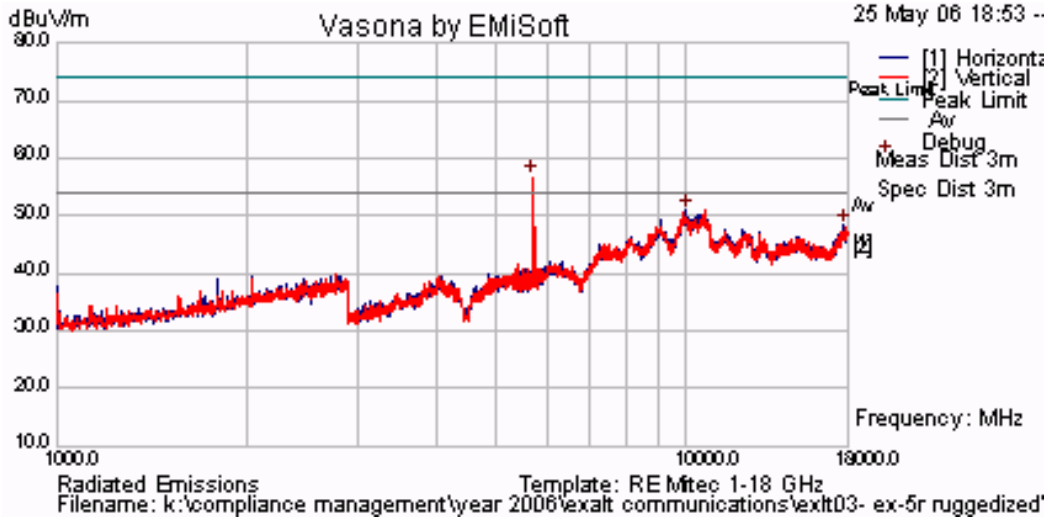
Freq. (MHz)	Pol. (H/V)	Measurement Type Peak/Avg	Field Strength (dBµV/m)	RB/ NRB	Limit (dBµV/m)	Margin (dB)
					54	

RB - Restricted Band / NRB – Non-Restricted Band.

Note. The peak emission shown in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 32 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,703 MHz Radiated Emissions for 28 dBi Antenna 32 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

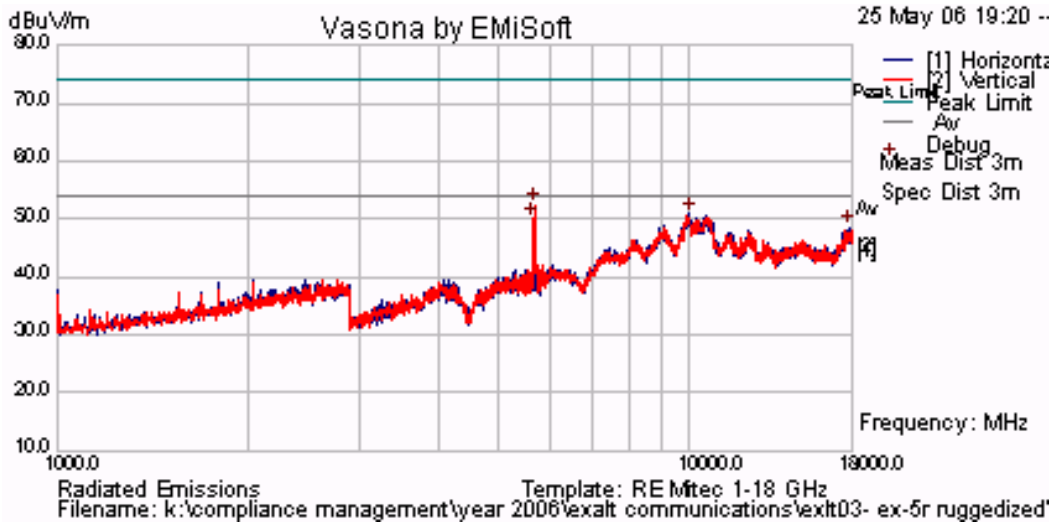
TABLE OF RESULTS – 5,683 MHz 28 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

Note. No emissions were observed above the limit.

Worst case plot shown for 64 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,683 MHz Radiated Emissions for 28 dBi Antenna 64 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

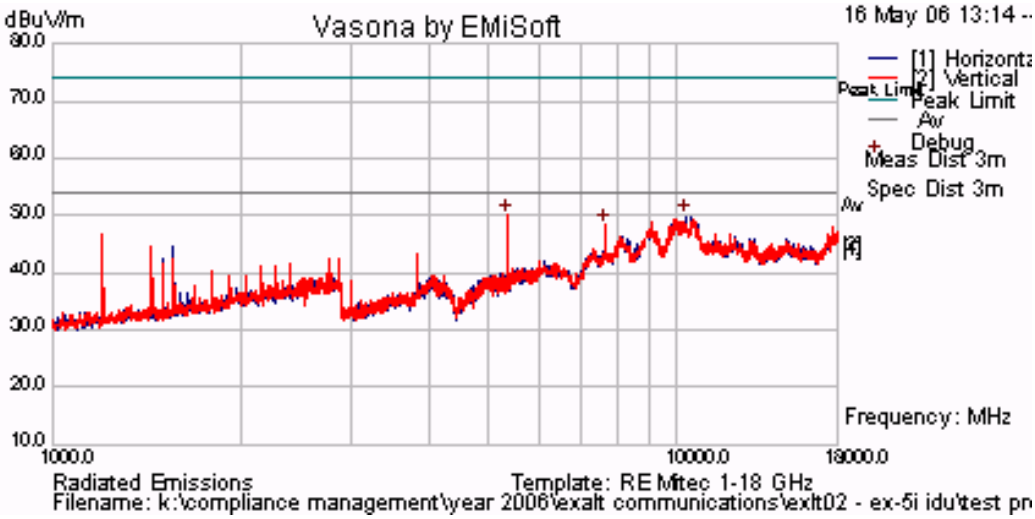
TABLE OF RESULTS – 5,332 MHz 37.5 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Worst case plot shown for 8 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,332 MHz Radiated Emissions for 37.5 dBi Antenna 8 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

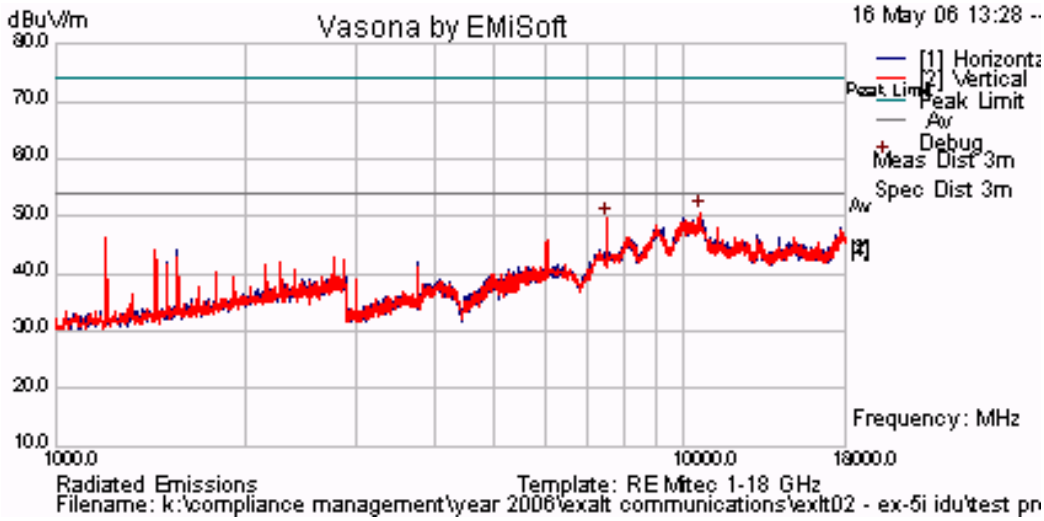
TABLE OF RESULTS – 5,265 MHz 37.5 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Worst case plot shown for 16 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,265 MHz Radiated Emissions for 37.5 dBi Antenna 16 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

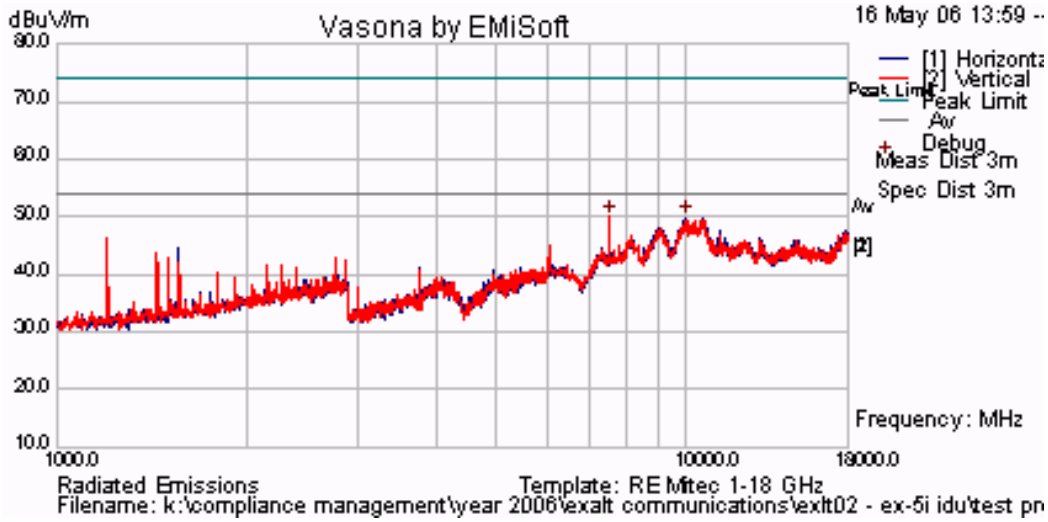
TABLE OF RESULTS – 5,272 MHz 37.5 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Worst case plot shown for 32 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5,272 MHz Radiated Emissions for 37.5 dBi Antenna 32 MHz Bandwidth QPSK



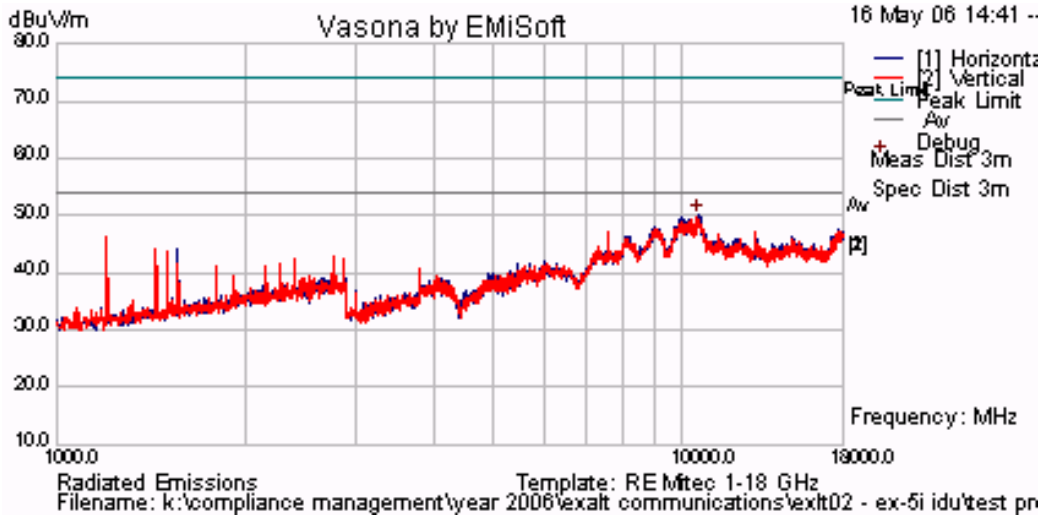
Radiated Spurious Emissions above 1 GHz (continued)

TABLE OF RESULTS – 5,290 MHz 37.5 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

5,290 MHz Radiated Emissions for 37.5 dBi Antenna 64 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

TABLE OF RESULTS –5715 MHz 37.5 dBi Antenna 8 MHz Bandwidth QPSK

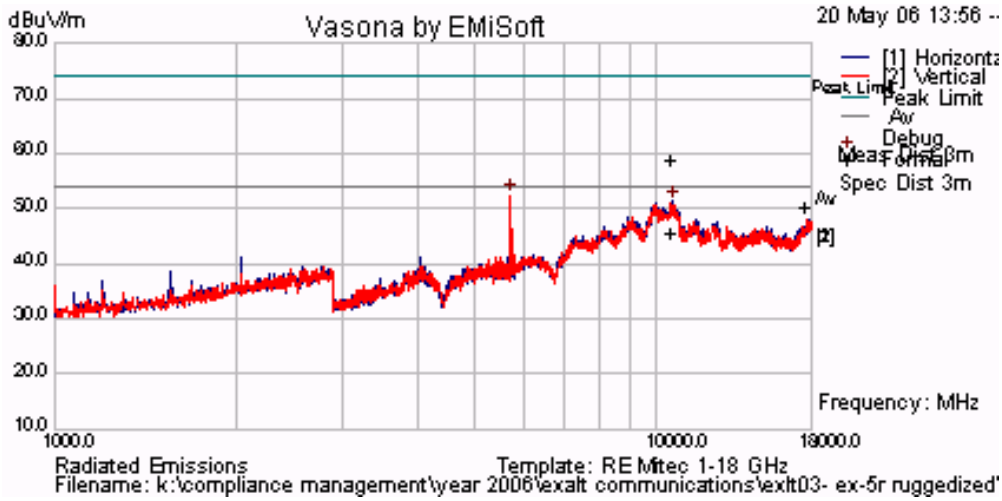
Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Note. The peak emission shown in the graph below is fundamental breaking through the notch filter.

Worst case plot shown for 8 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5715 MHz Radiated Emissions for 37.5 dBi Antenna 8 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

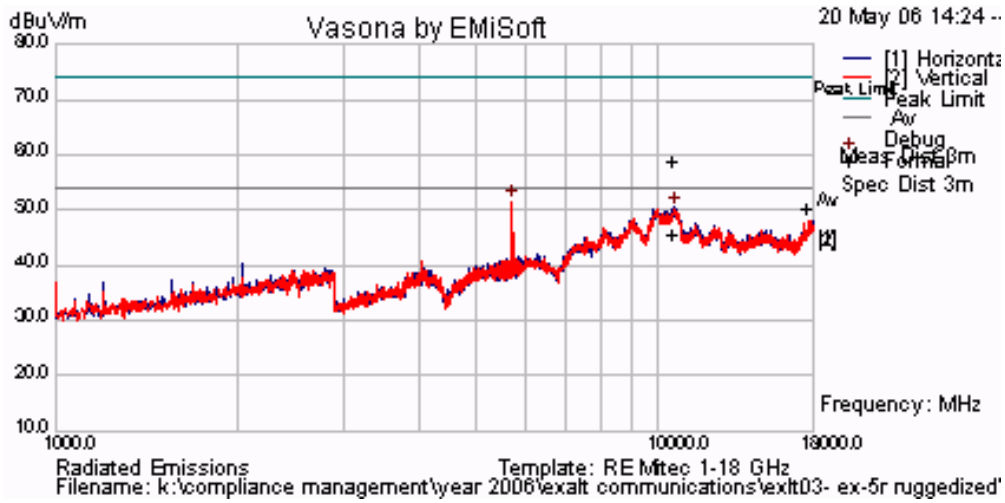
TABLE OF RESULTS –5710 MHz 37.5 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Worst case plot shown for 16 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5710 MHz Radiated Emissions for 37.5 dBi Antenna 16 MHz Bandwidth QPSK



Radiated Spurious Emissions above 1 GHz (continued)

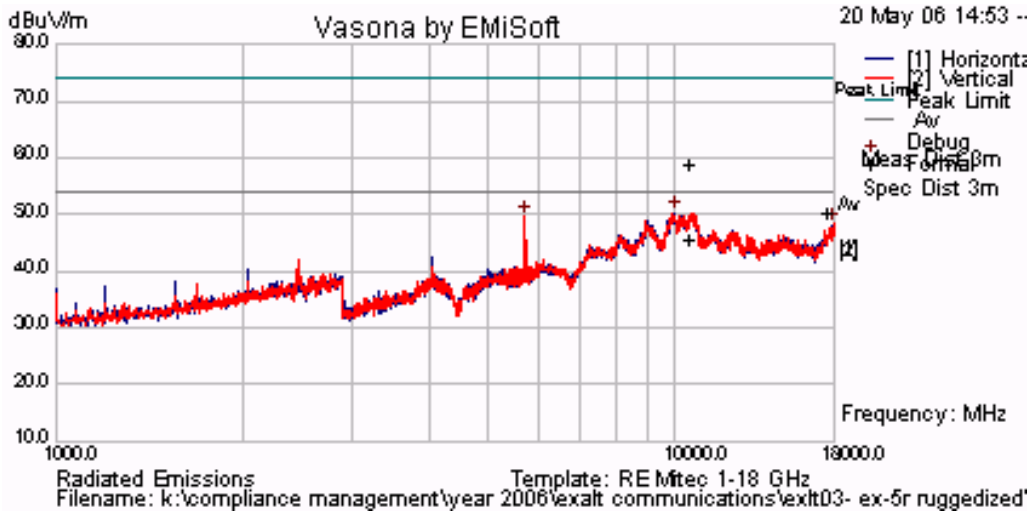
TABLE OF RESULTS –5703 MHz 37.5 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

Worst case plot shown for 32 MHz Bandwidth QPSK Modulation. All other results for this bandwidth are held on file.

5703 MHz Radiated Emissions for 37.5 dBi Antenna 32 MHz Bandwidth QPSK



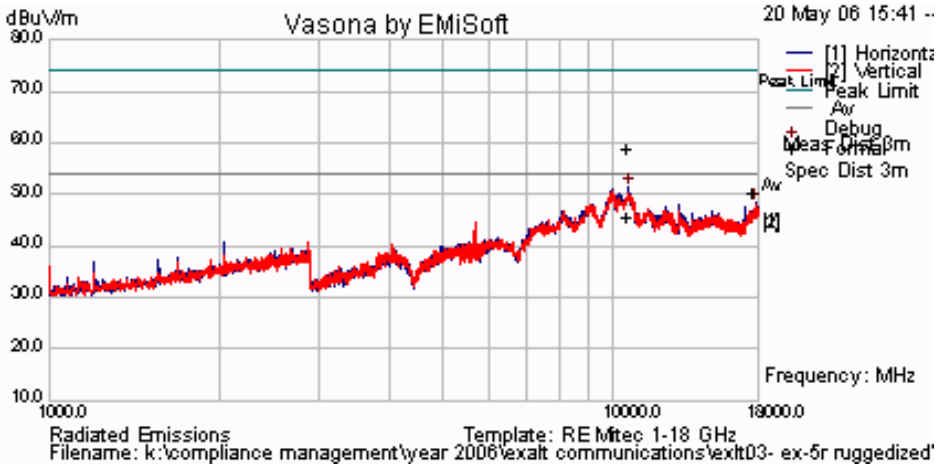
Radiated Spurious Emissions above 1 GHz (continued)

TABLE OF RESULTS –5683 MHz 37.5 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
					54	

No emissions were observed above the limit.

5683 MHz Radiated Emissions for 37.5 dBi Antenna 64 MHz Bandwidth QPSK



Specification Limits

15.407 (b)(2). All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-210 §A9.3(2) For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

RSS-Gen §4.7 The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 ‘Measurement of Radiated Emissions’	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

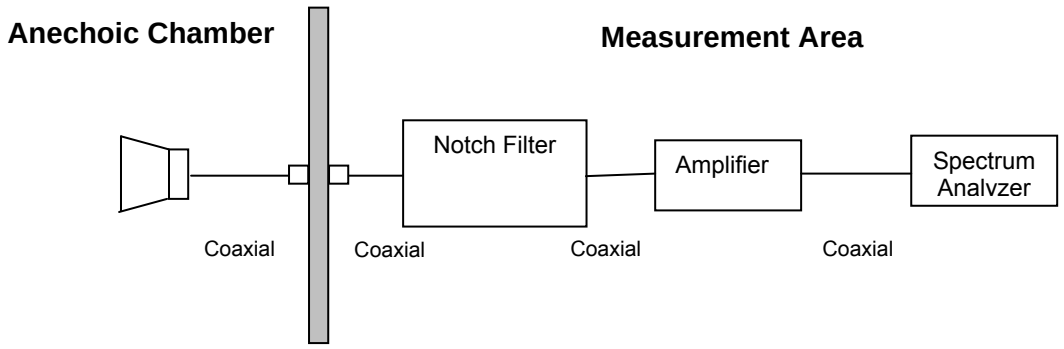
5.1.7.2. Radiated Band-Edge – Restricted Bands

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Band-stop Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Radiated Band Edge - Test Configurations

Antennas
28 dBi Panel Antenna
37.5 dBi Parabolic Antenna

Radio parameters.
Duty Cycle: 100% (test mode)
Power Level: As specified by the following matrix, see Section 5.1.2 Peak Output Power

Peak Power V's Antenna Gain

Antenna Type	Gain (dBi)	Bandwidth (MHz)	Max. Allowable Conducted Power (dBm)
Panel	28	8	-1.43
		16	+1.58
		32 & 64	+2.00
Parabolic	37.5	8	-10.93
		16	-7.92
		32 & 64	-7.50

Radiated Band Edge Test Results for 28 dBi Panel Antenna

TABLE OF RESULTS - 5.3 GHz Band - 8 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}260_{PEAK}$	5,150	62.28	74.00	-11.72
$5{,}260_{AVE}$	5,150	40.99	54.00	-13.01
$5{,}332_{PEAK}$	5,350	66.85	74.00	-7.15
$5{,}332_{AVE}$	5,350	43.38	54.00	-10.62

TABLE OF RESULTS - 5.3 GHz Band - 16 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}265_{PEAK}$	5,150	62.55	74.00	-11.45
$5{,}265_{AVE}$	5,150	40.99	54.00	-13.01
$5{,}327_{PEAK}$	5,350	70.90	74.00	-3.10
$5{,}327_{AVE}$	5,350	45.03	54.00	-8.97

TABLE OF RESULTS - 5.3 GHz Band - 32 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}272_{PEAK}$	5,150	62.28	74.00	-11.72
$5{,}272_{AVE}$	5,150	40.99	54.00	-13.01
$5{,}308_{PEAK}$	5,350	73.01	74.00	-0.99
$5{,}308_{AVE}$	5,350	48.91	54.00	-5.09

Radiated Band Edge Test Results for 28 dBi Panel Antenna (continued)

TABLE OF RESULTS - 5.3 GHz Band - 64 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}290_{PEAK}$	5,150	62.82	74.00	-11.18
$5{,}290_{AVE}$	5,150	40.99	54.00	-13.01
$5{,}290_{PEAK}$	5,350	72.87	74.00	-1.13
$5{,}290_{AVE}$	5,350	52.13	54.00	-1.87

Radiated Band Edge Test Results for 28 dBi Panel Antenna

TABLE OF RESULTS - 5.6 GHz Band - 8 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}488_{PEAK}$	5460	64.26	74	-9.74
$5{,}488_{AVE}$	5460	43.45	54	-10.55

TABLE OF RESULTS - 5.6 GHz Band - 16 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}493_{PEAK}$	5460	64.55	74	-9.45
$5{,}493_{AVE}$	5460	42.74	54	-11.26

TABLE OF RESULTS - 5.6 GHz Band - 32 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}512_{PEAK}$	5460	64.12	74	-9.88
$5{,}512_{AVE}$	5460	42.74	54	-11.26

TABLE OF RESULTS - 5.6 GHz Band - 64 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}553_{PEAK}$	5460	66.11	74	-7.89
$5{,}553_{AVE}$	5460	44.46	54	-9.54

Radiated Band Edge Test Results for 37.5 dBi Parabolic Antenna

TABLE OF RESULTS - 5.3 GHz Band - 8 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}260_{PEAK}$	5,150	62.14	74.00	-11.86
$5{,}260_{AVE}$	5,150	41.10	54.00	-12.90
$5{,}332_{PEAK}$	5,350	62.50	74.00	-11.50
$5{,}332_{AVE}$	5,350	41.82	54.00	-12.18

TABLE OF RESULTS - 5.3 GHz Band - 16 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}265_{PEAK}$	5,150	62.28	74.00	-11.72
$5{,}265_{AVE}$	5,150	41.10	54.00	-12.90
$5{,}327_{PEAK}$	5,350	63.03	74.00	-10.97
$5{,}327_{AVE}$	5,350	41.82	54.00	-12.18

TABLE OF RESULTS - 5.3 GHz Band - 32 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}272_{PEAK}$	5,150	62.42	74.00	-11.58
$5{,}272_{AVE}$	5,150	41.10	54.00	-12.90
$5{,}308_{PEAK}$	5,350	64.43	74.00	-9.57
$5{,}308_{AVE}$	5,350	42.37	54.00	-11.63

Radiated Band Edge Test Results for 37.5 dBi Parabolic Antenna (continued)

TABLE OF RESULTS - 5.3 GHz Band - 64 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}290_{PEAK}$	5,150	62.82	74.00	-11.18
$5{,}290_{AVE}$	5,150	41.10	54.00	-12.90
$5{,}290_{PEAK}$	5,350	63.31	74.00	-10.69
$5{,}290_{AVE}$	5,350	41.82	54.00	-12.18

Radiated Band Edge Test Results for 37.5 dBi Parabolic Antenna

TABLE OF RESULTS - 5.6 GHz Band - 8 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}488_{PEAK}$	5460	63.84	74	-10.16
$5{,}488_{AVE}$	5460	42.74	54	-11.26

TABLE OF RESULTS - 5.6 GHz Band - 16 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}493_{PEAK}$	5460	63.84	74	-10.16
$5{,}493_{AVE}$	5460	42.74	54	-11.26

TABLE OF RESULTS - 5.6 GHz Band - 32 MHz Bandwidth QPSK

Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}512_{PEAK}$	5460	63.98	74	-10.02
$5{,}512_{AVE}$	5460	42.74	54	-11.26

TABLE OF RESULTS - 5.6 GHz Band - 64 MHz Bandwidth QPSK

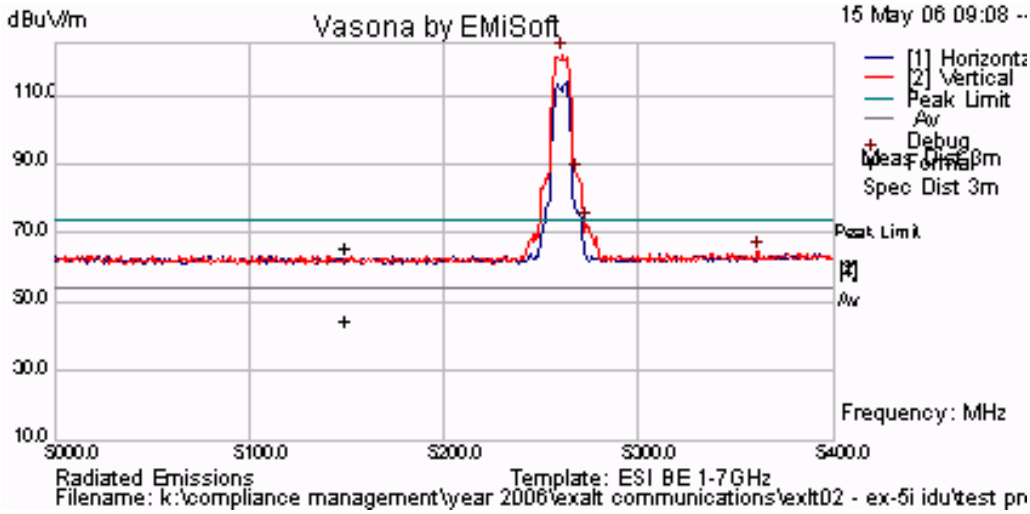
Tx Freq. (MHz)	Restricted Band Frequency (MHz)	Measured (dBuV/m)	Limit (dBuV/m)	Margin (dB)
$5{,}553_{PEAK}$	5460	64.26	74	-9.74
$5{,}553_{AVE}$	5460	42.74	54	-11.26

Peak Field Strength Measurements

Peak Field Strength for 28 dBi Antenna

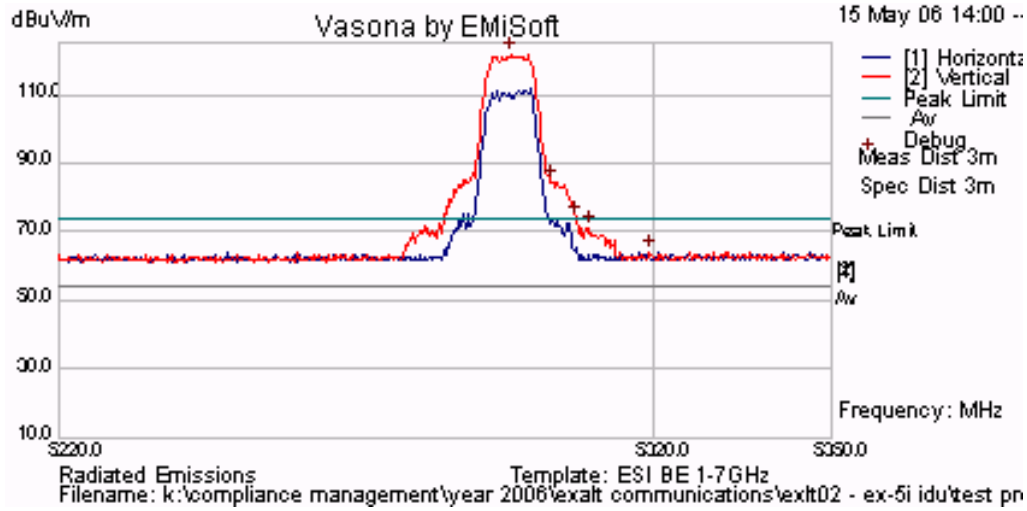
28 dBi Antenna 5,260 MHz 8 MHz Bandwidth QPSK

Peak Emission = 121.91 dBµV/m



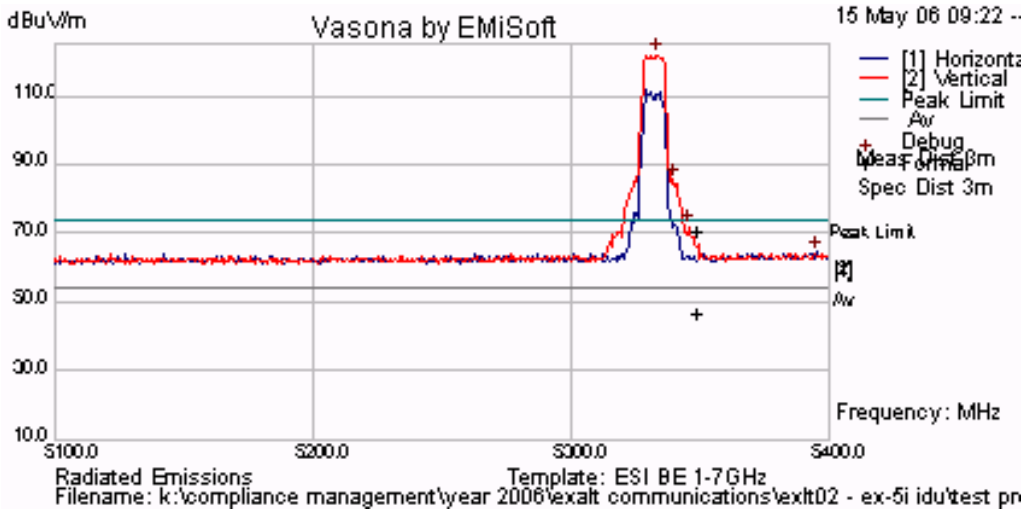
28 dBi Antenna 5,296 MHz 8 MHz Bandwidth QPSK

Peak Emission = 121.99 dBµV/m



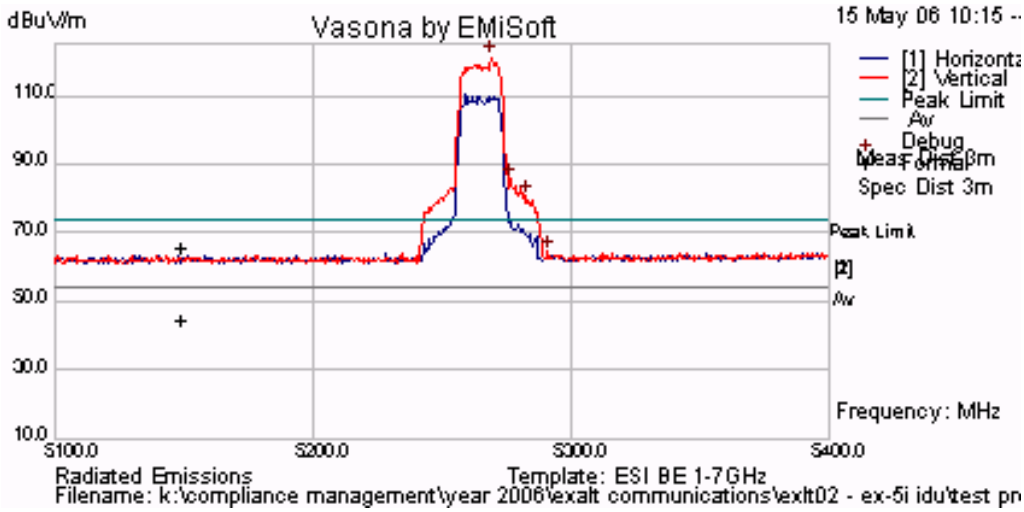
28 dBi Antenna 5,332 MHz 8 MHz Bandwidth QPSK

Peak Emission = 121.94 dBµV/m



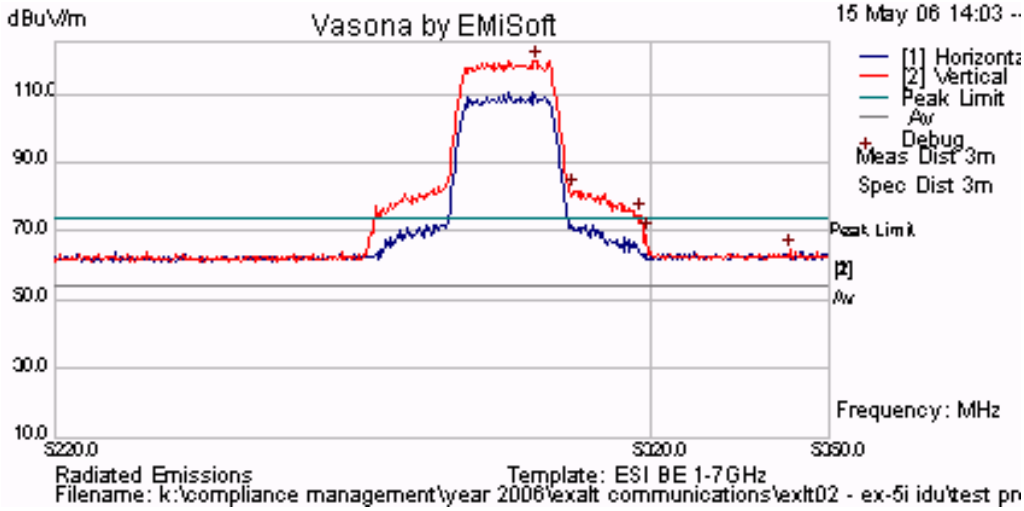
28 dBi Antenna 5,265 MHz 16 MHz Bandwidth QPSK

Peak Emission = 121.14 dBµV/m



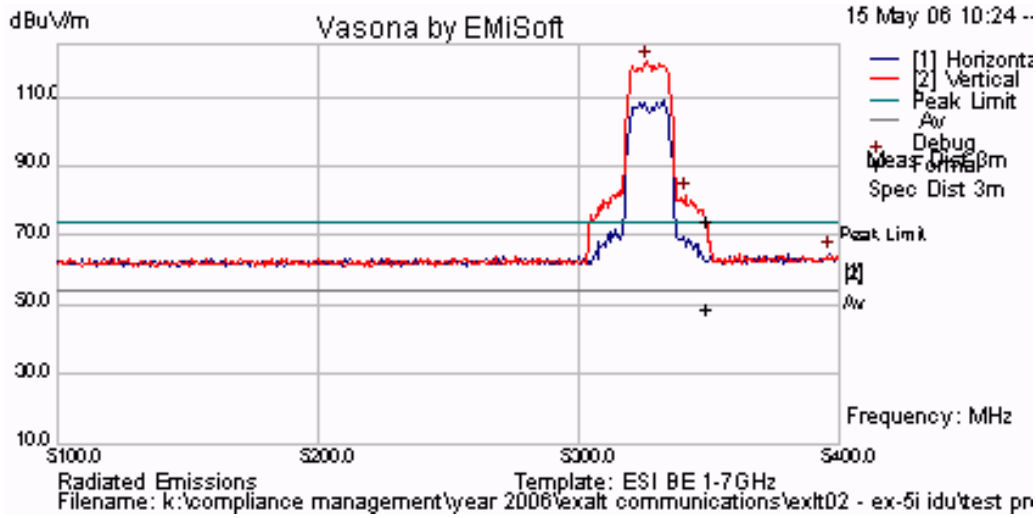
28 dBi Antenna 5,296 MHz 16 MHz Bandwidth QPSK

Peak Emission = 119.63 dBµV/m



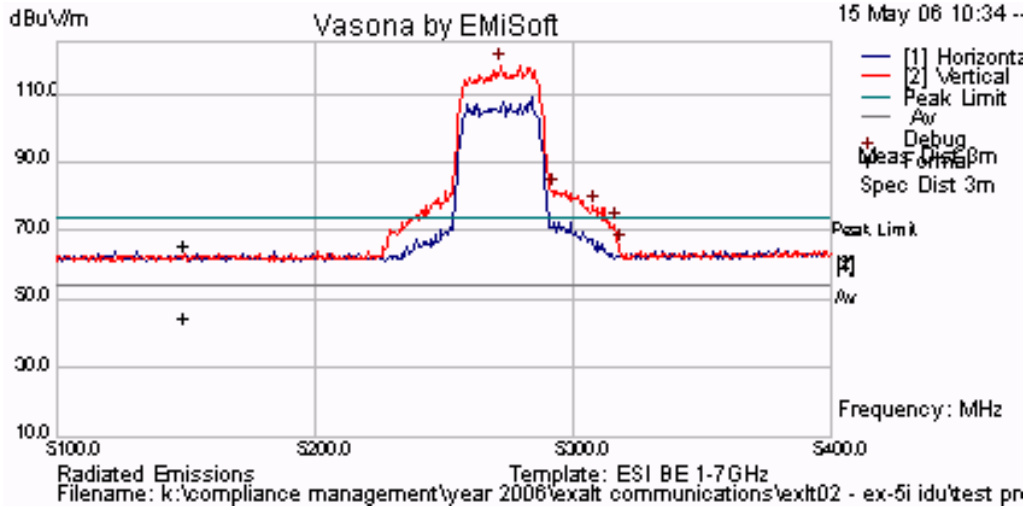
28 dBi Antenna 5,327 MHz 16 MHz Bandwidth QPSK

Peak Emission = 120.01 dBµV/m



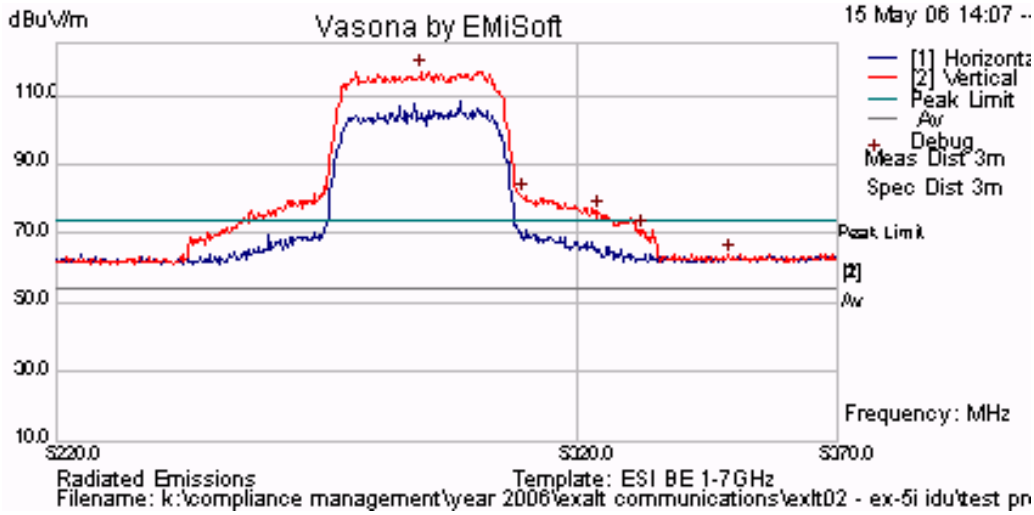
28 dBi Antenna 5,272 MHz 32 MHz Bandwidth QPSK

Peak Emission = 118.53 dBµV/m



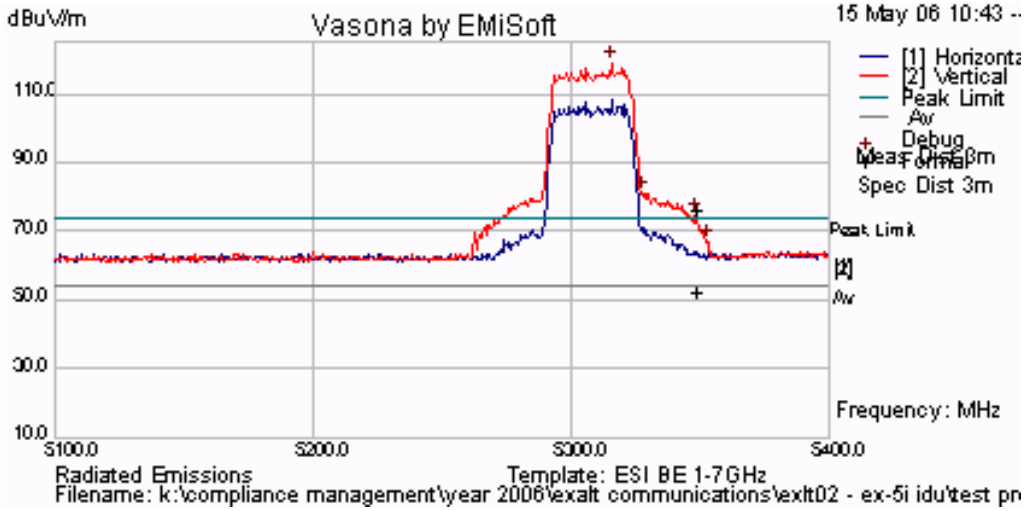
28 dBi Antenna 5,290 MHz 32 MHz Bandwidth QPSK

Peak Emission = 117.10 dBµV/m



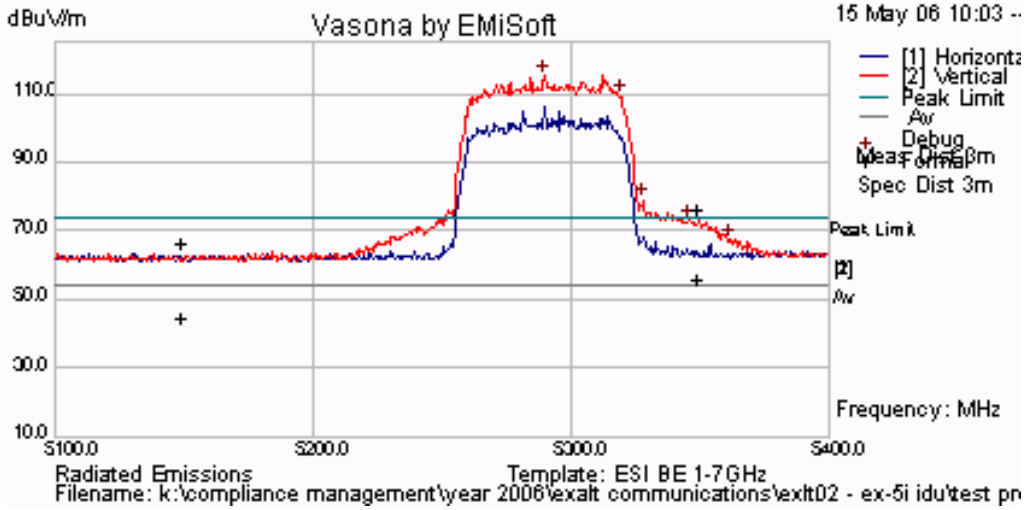
28 dBi Antenna 5,308 MHz 32 MHz Bandwidth QPSK

Peak Emission = 119.01 dBµV/m



28 dBi Antenna 5,290 MHz 64 MHz Bandwidth QPSK

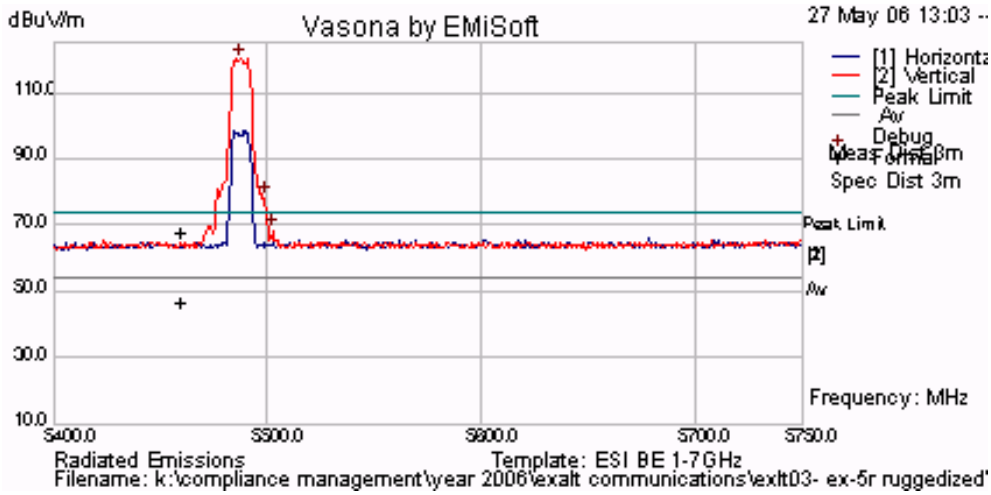
Peak Emission = 115.12 dBµV/m



Peak Field Strength for 28 dBi Antenna

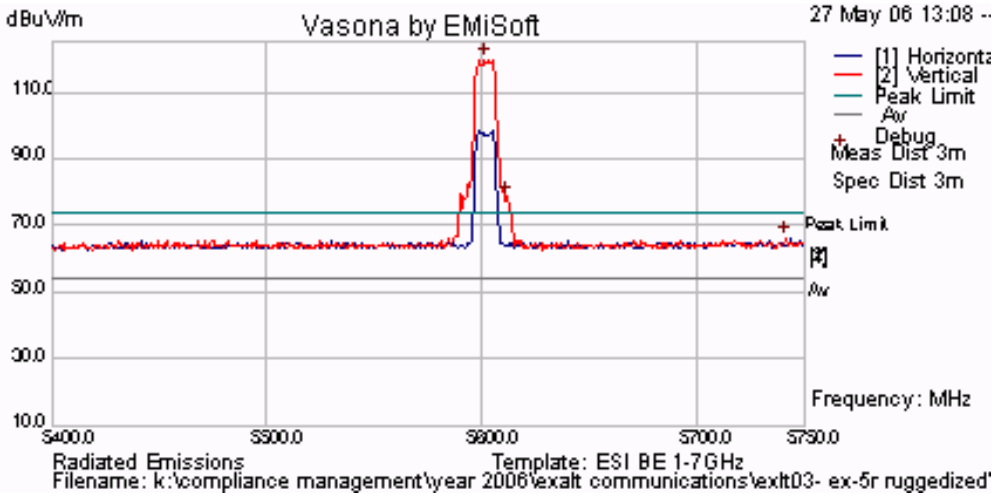
28 dBi Antenna 5,488 MHz 8 MHz Bandwidth QPSK

Peak Emission = 120.27 dBµV/m



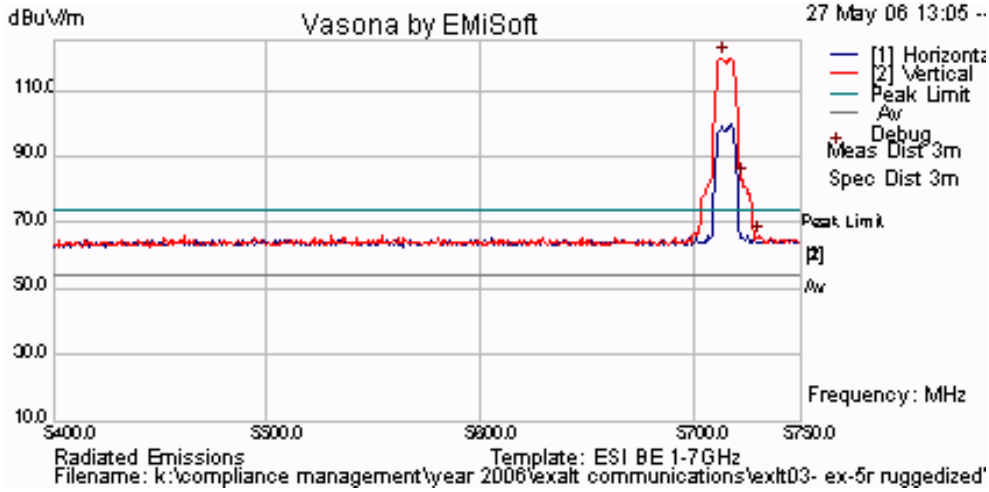
28 dBi Antenna 5,602 MHz 8 MHz Bandwidth QPSK

Peak Emission = 119.67 dBµV/m



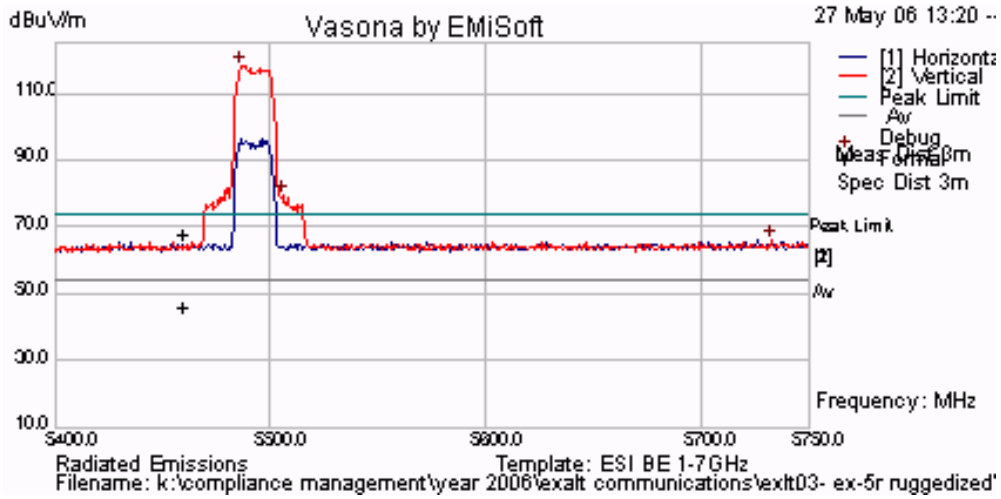
28 dBi Antenna 5,715 MHz 8 MHz Bandwidth QPSK

Peak Emission = 119.89 dBµV/m



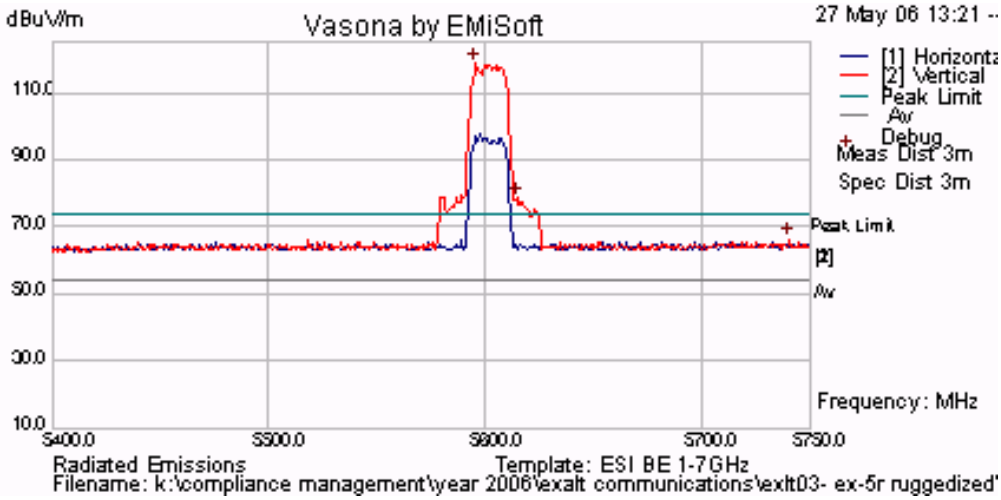
28 dBi Antenna 5,493 MHz 16 MHz Bandwidth QPSK

Peak Emission = 118.18 dBµV/m



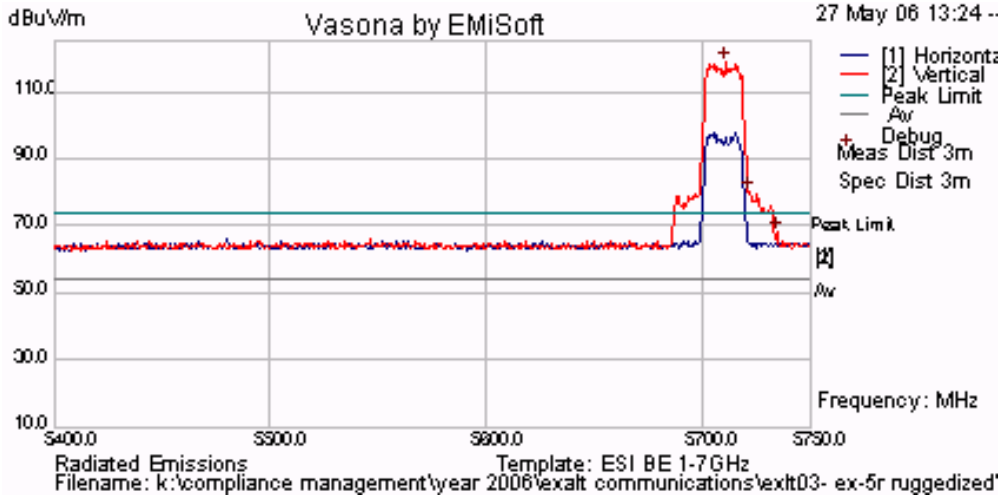
28 dBi Antenna 5,602 MHz 16 MHz Bandwidth QPSK

Peak Emission = 118.72 dBµV/m



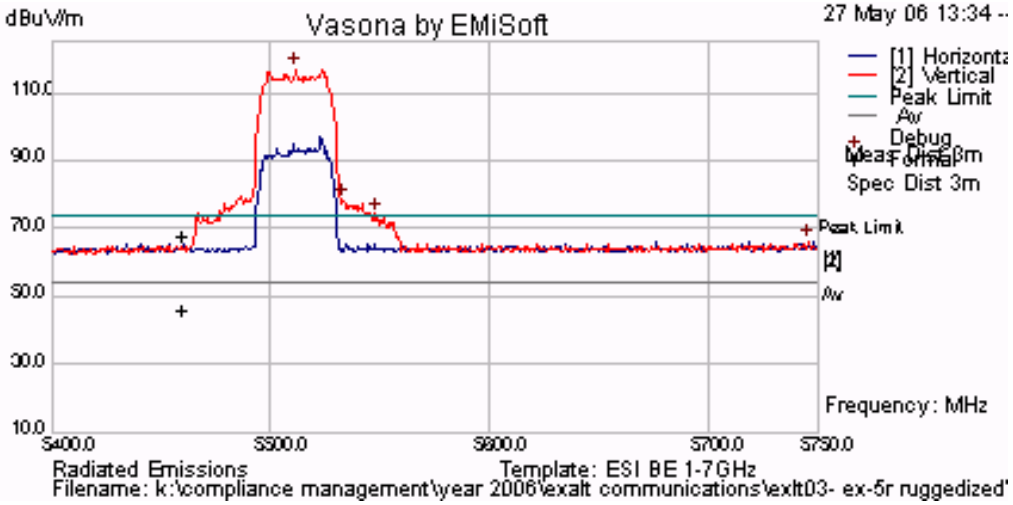
28 dBi Antenna 5,710 MHz 16 MHz Bandwidth QPSK

Peak Emission = 118.59 dBµV/m



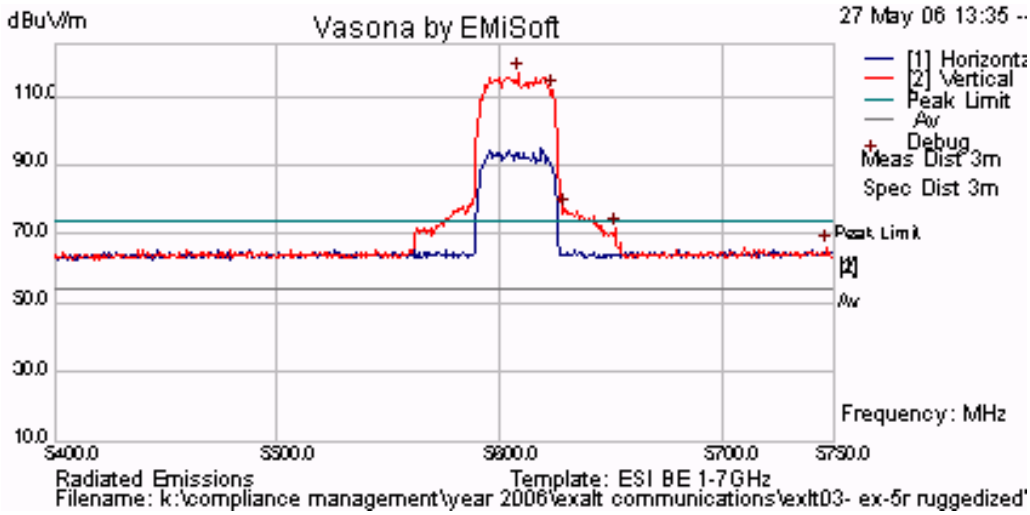
28 dBi Antenna 5,512 MHz 32 MHz Bandwidth QPSK

Peak Emission = 117.05 dBµV/m



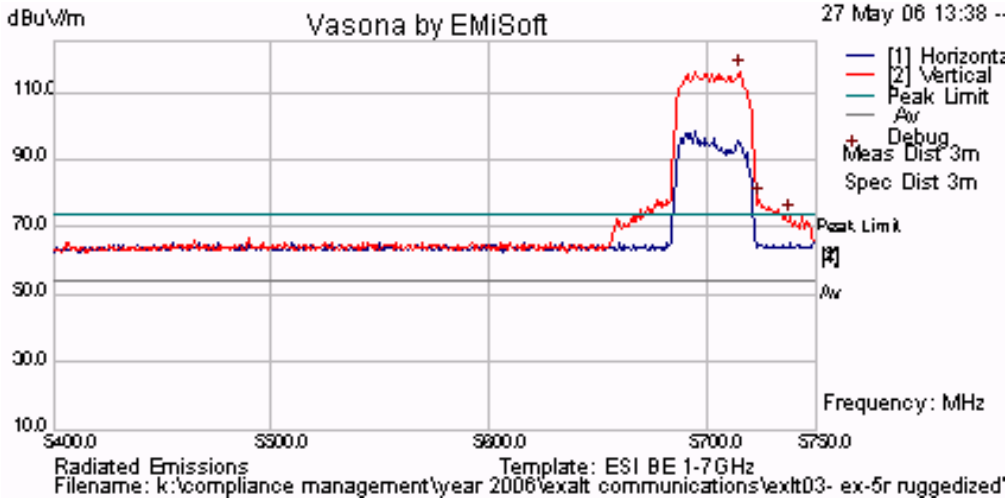
28 dBi Antenna 5,608 MHz 32 MHz Bandwidth QPSK

Peak Emission = 116.70 dBµV/m



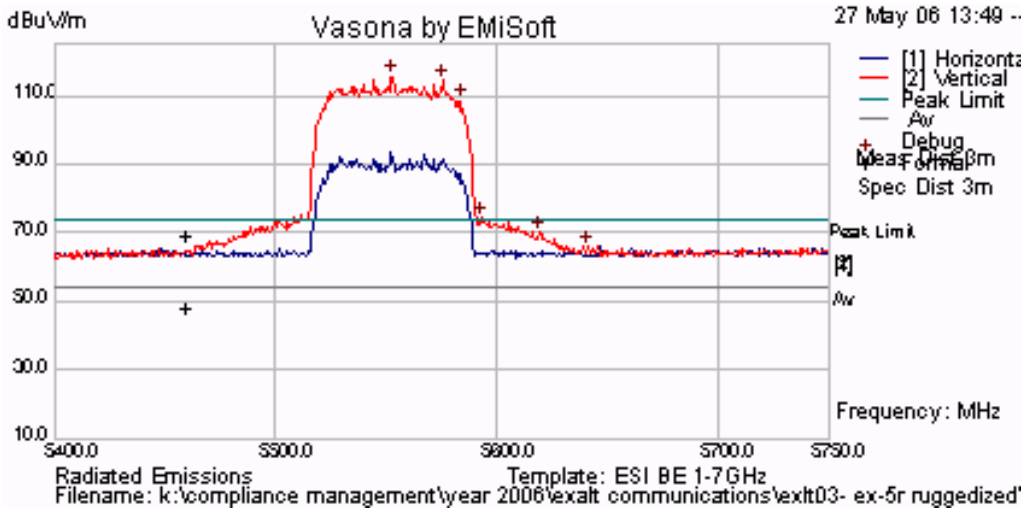
28 dBi Antenna 5,703 MHz 32 MHz Bandwidth QPSK

Peak Emission = 116.28 dBµV/m



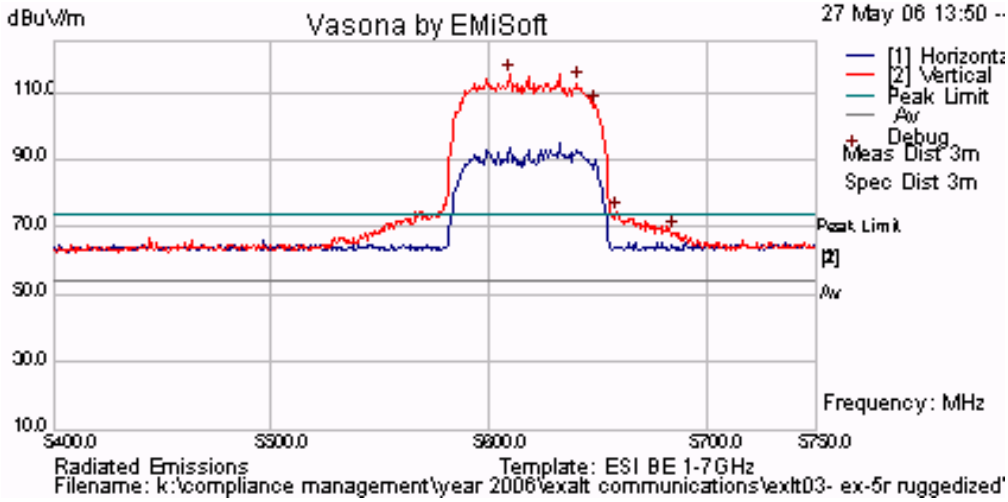
28 dBi Antenna 5,553 MHz 64 MHz Bandwidth QPSK

Peak Emission = 115.47 dBµV/m



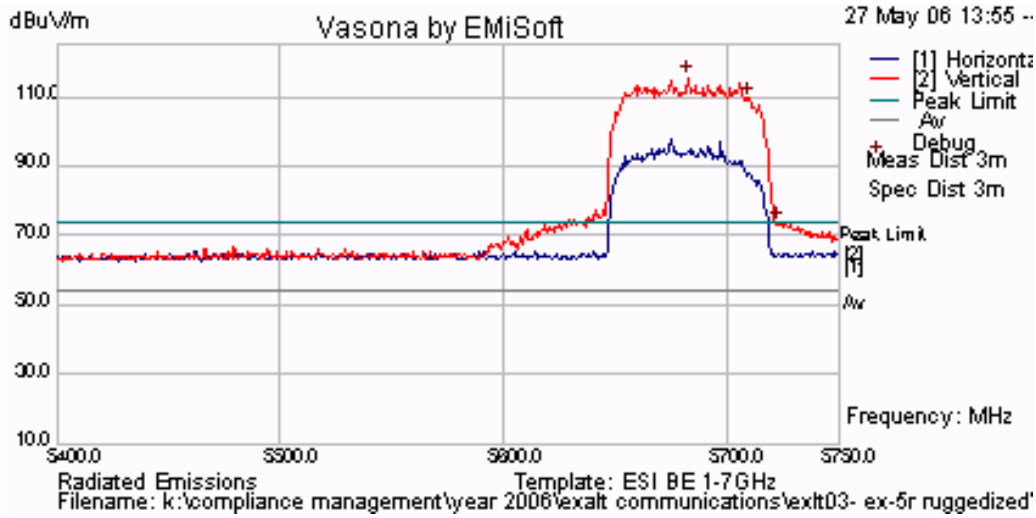
28 dBi Antenna 5,618 MHz 64 MHz Bandwidth QPSK

Peak Emission = 115.31 dBµV/m



28 dBi Antenna 5,683 MHz 64 MHz Bandwidth QPSK

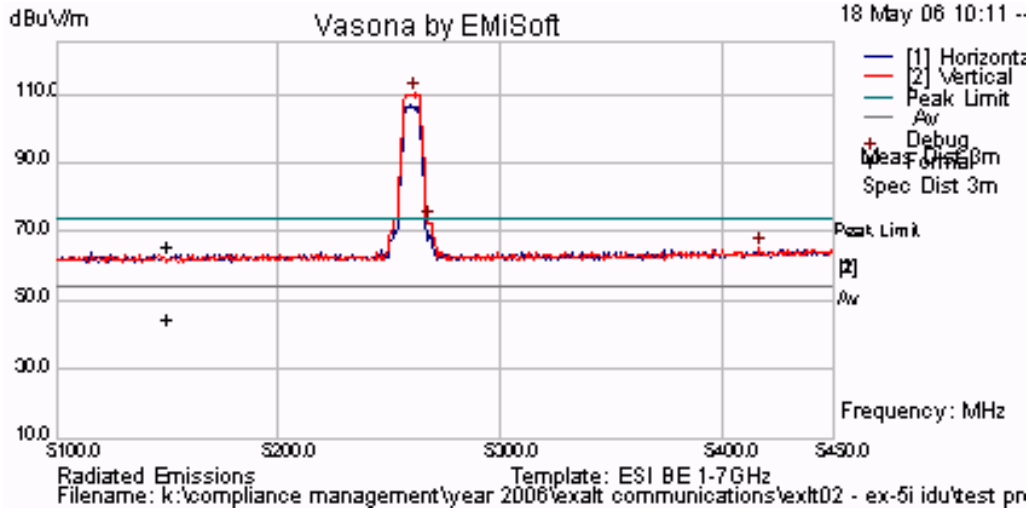
Peak Emission = 115.61 dBµV/m



Peak Field Strength for 37.5 dBi Antenna

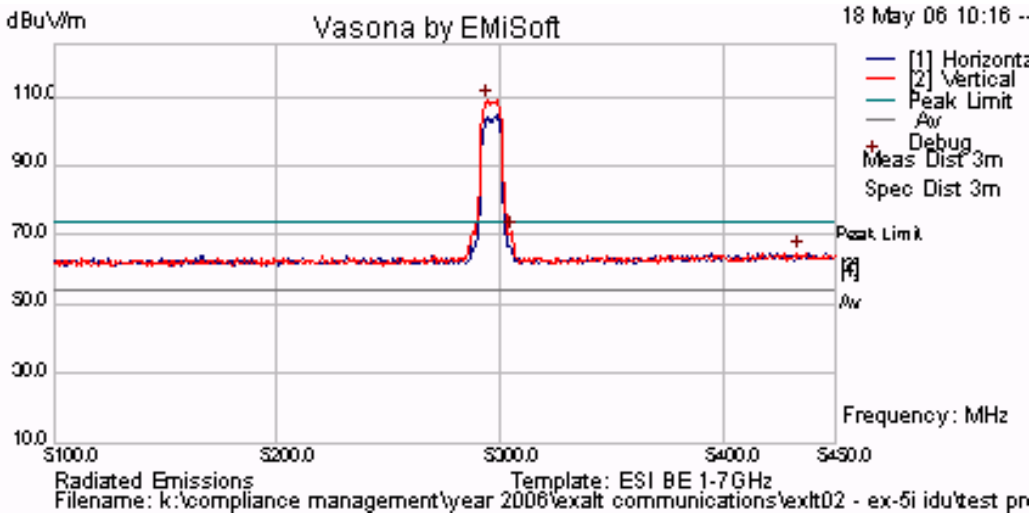
37.5 dBi Antenna 5,260 MHz 8 MHz Bandwidth QPSK

Peak Emission = 110.22 dBµV/m



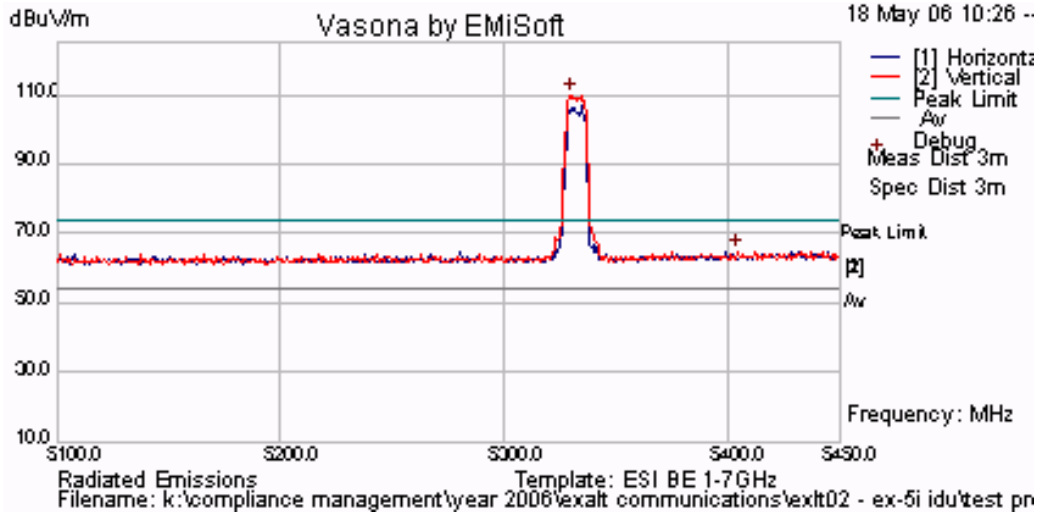
37.5 dBi Antenna 5,296 MHz 8 MHz Bandwidth QPSK

Peak Emission = 109.04 dBµV/m



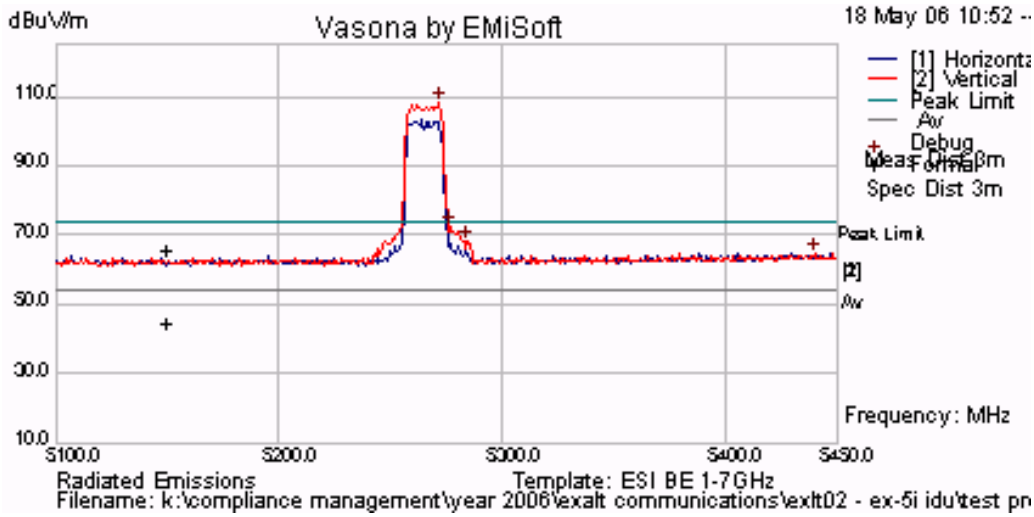
37.5 dBi Antenna 5,332 MHz 8 MHz Bandwidth QPSK

Peak Emission = 109.89 dBµV/m



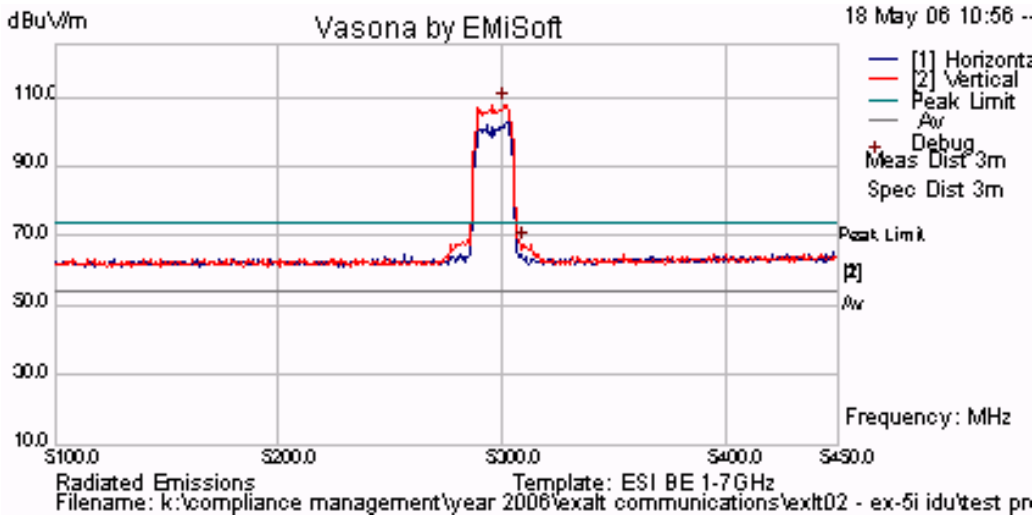
37.5 dBi Antenna 5,265 MHz 16 MHz Bandwidth QPSK

Peak Emission = 108.16 dBµV/m



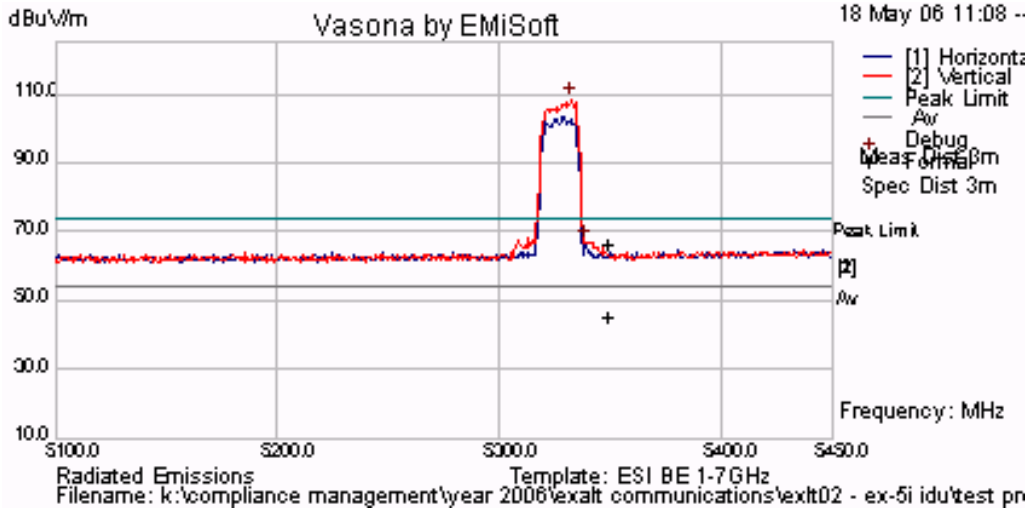
37.5 dBi Antenna 5,296 MHz 16 MHz Bandwidth QPSK

Peak Emission = 107.74 dBµV/m



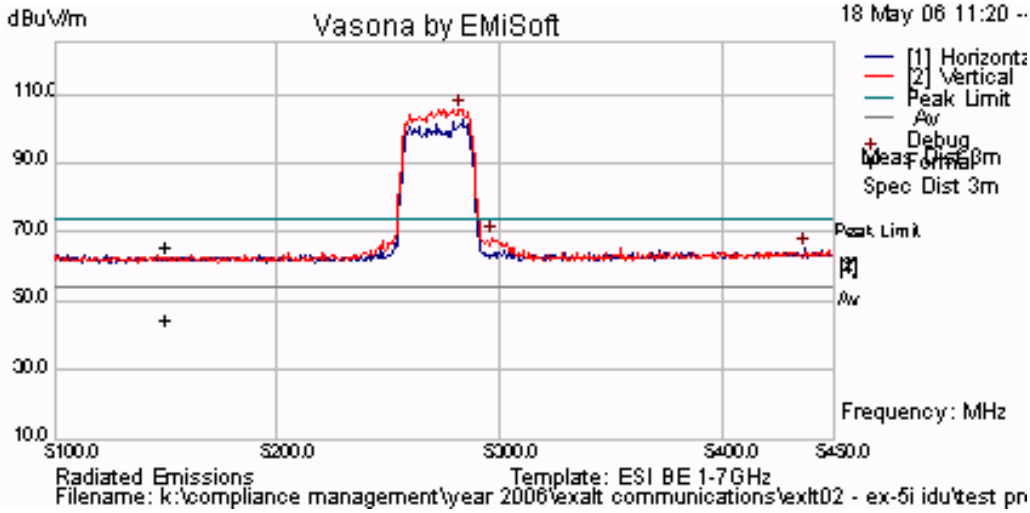
37.5 dBi Antenna 5,327 MHz 16 MHz Bandwidth QPSK

Peak Emission = 108.52 dBµV/m



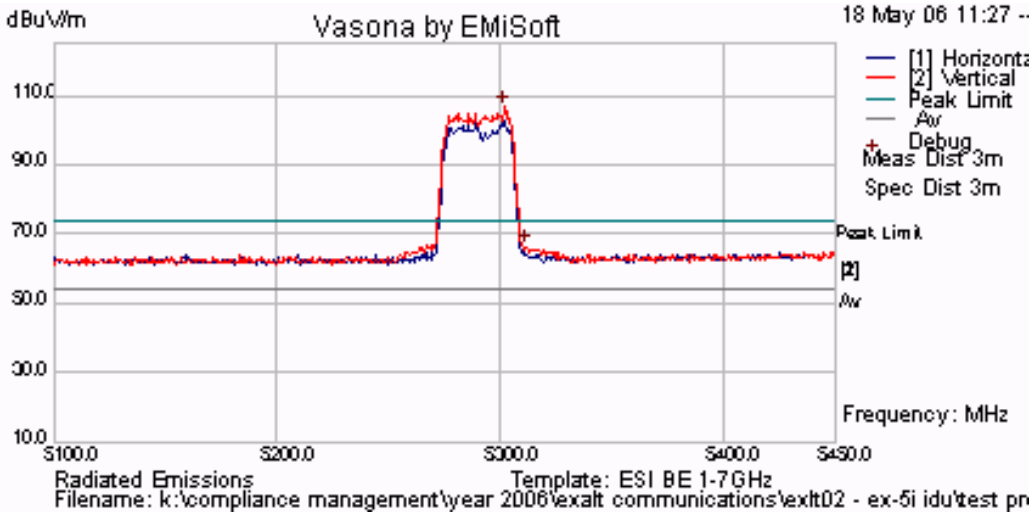
37.5 dBi Antenna 5,272 MHz 32 MHz Bandwidth QPSK

Peak Emission = 105.39 dBµV/m



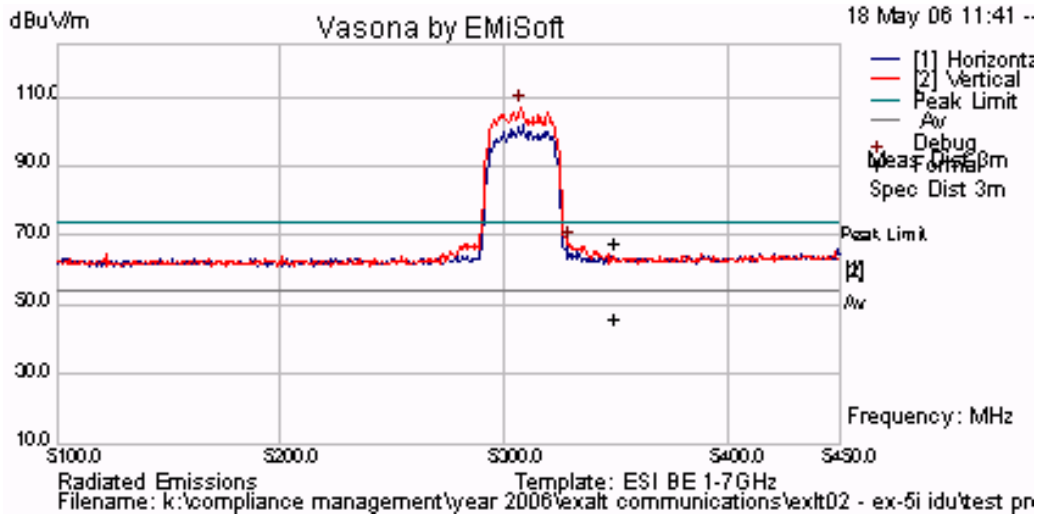
37.5 dBi Antenna 5,290 MHz 32 MHz Bandwidth QPSK

Peak Emission = 106.92 dBµV/m



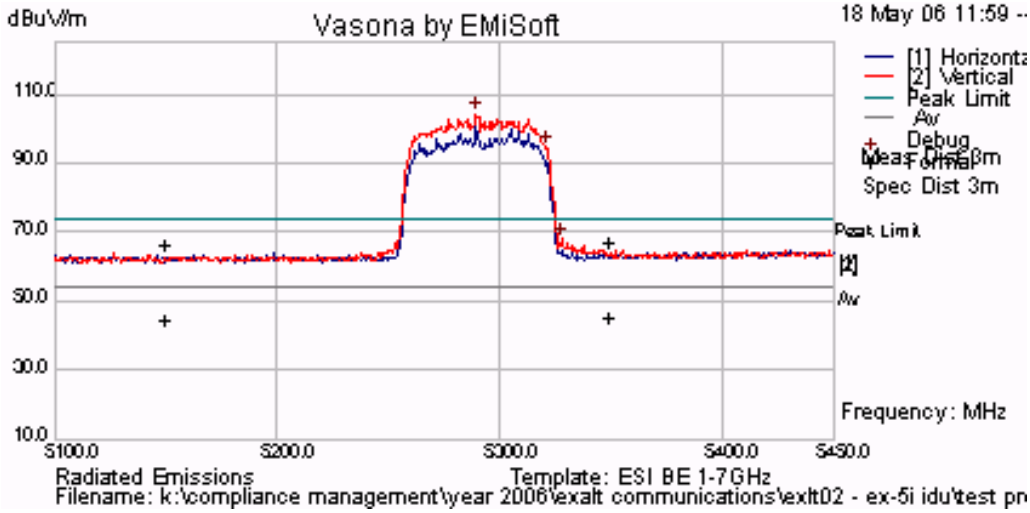
37.5 dBi Antenna 5,308 MHz 32 MHz Bandwidth QPSK

Peak Emission = 107.11 dBµV/m



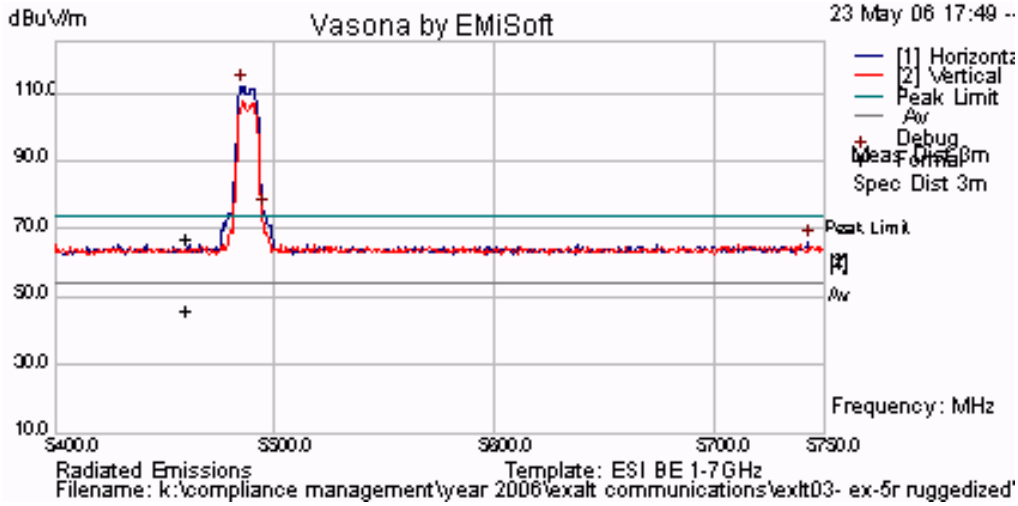
37.5 dBi Antenna 5,290 MHz 64 MHz Bandwidth QPSK

Peak Emission = 104.16 dBµV/m



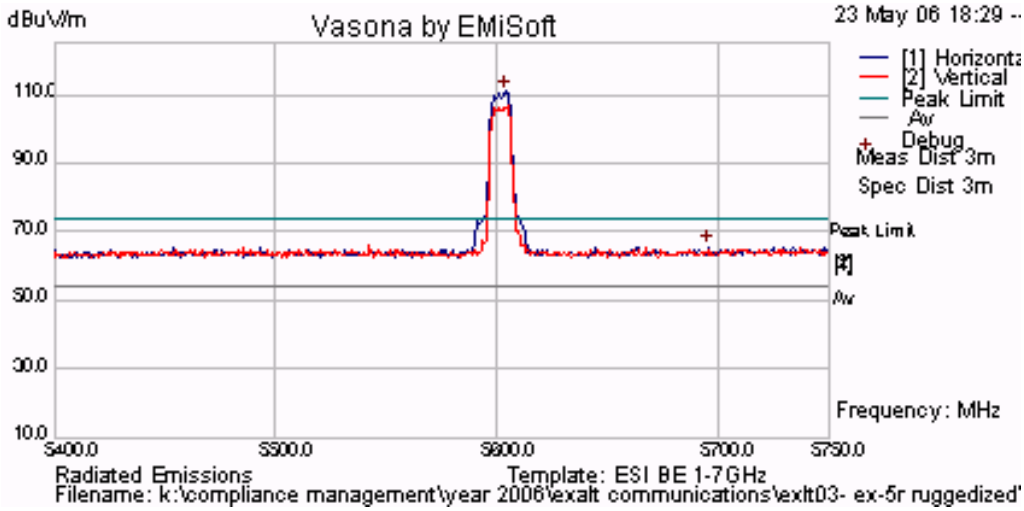
37.5 dBi Antenna 5,488 MHz 8 MHz Bandwidth QPSK

Peak Emission = 111.98 dBµV/m



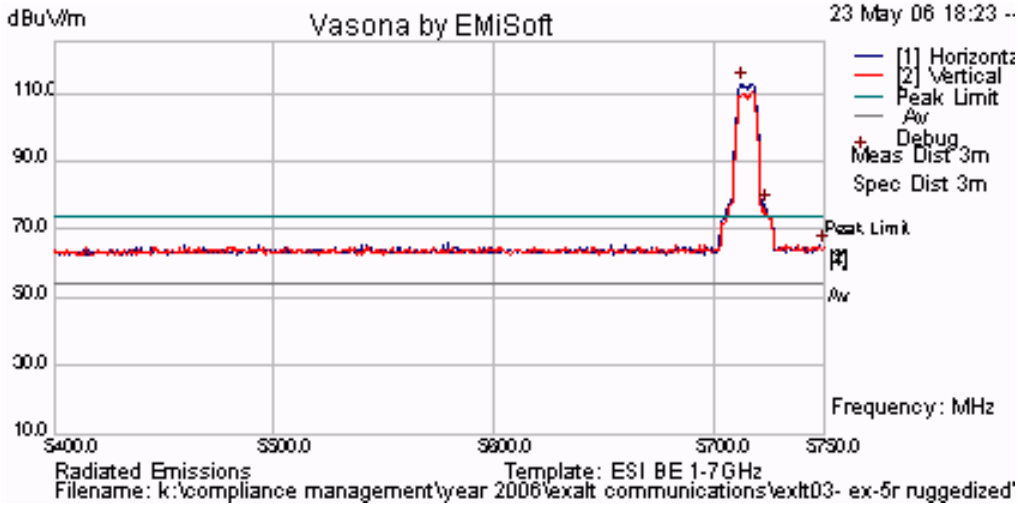
37.5 dBi Antenna 5,602 MHz 8 MHz Bandwidth QPSK

Peak Emission = 110.83 dBµV/m



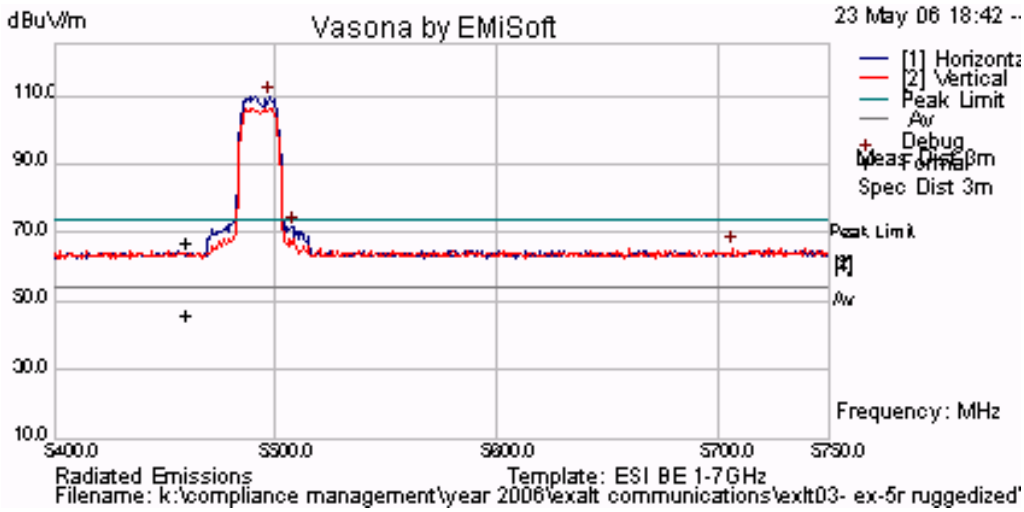
37.5 dBi Antenna 5,715 MHz 8 MHz Bandwidth QPSK

Peak Emission = 112.88 dBµV/m



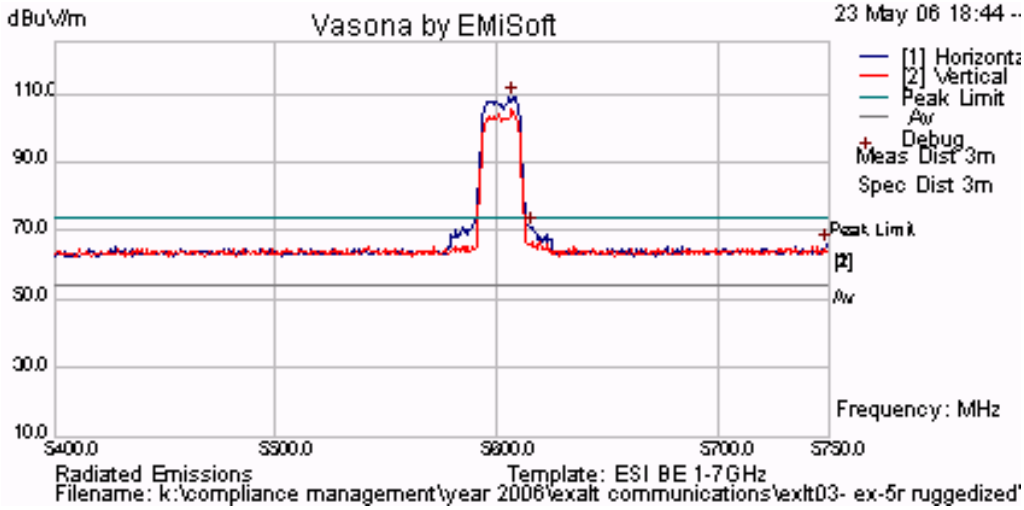
37.5 dBi Antenna 5,493 MHz 16 MHz Bandwidth QPSK

Peak Emission = 109.78 dBµV/m



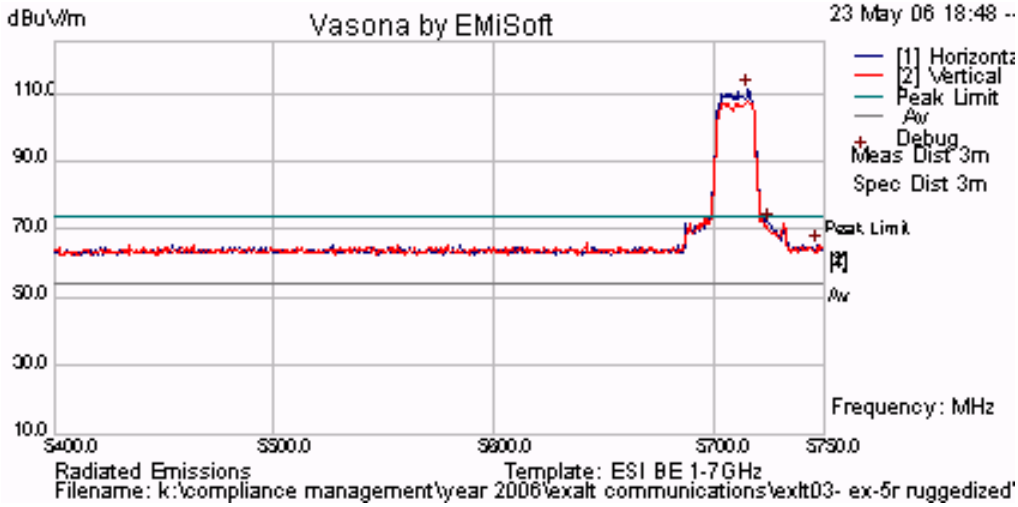
37.5 dBi Antenna 5,602 MHz 16 MHz Bandwidth QPSK

Peak Emission = 108.98 dBµV/m



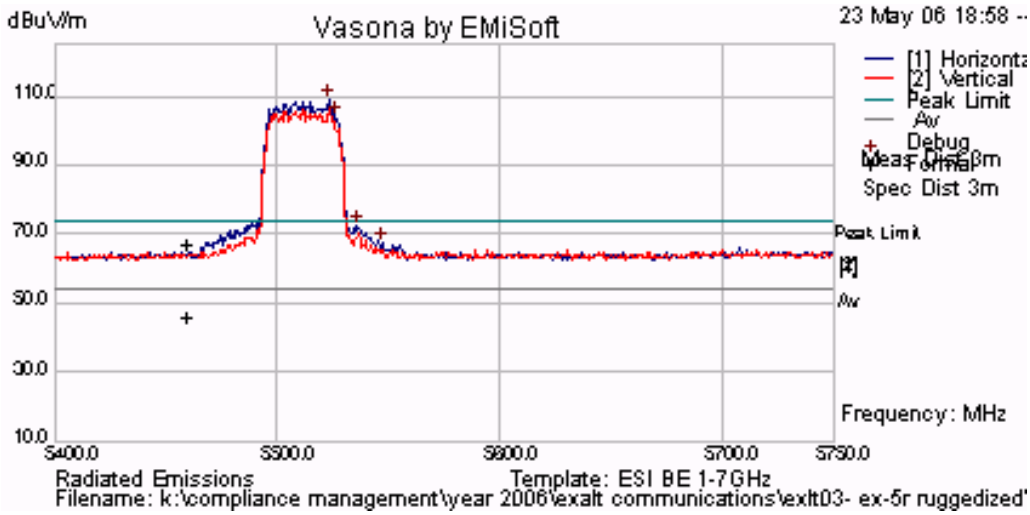
37.5 dBi Antenna 5,710 MHz 16 MHz Bandwidth QPSK

Peak Emission = 110.81 dBµV/m



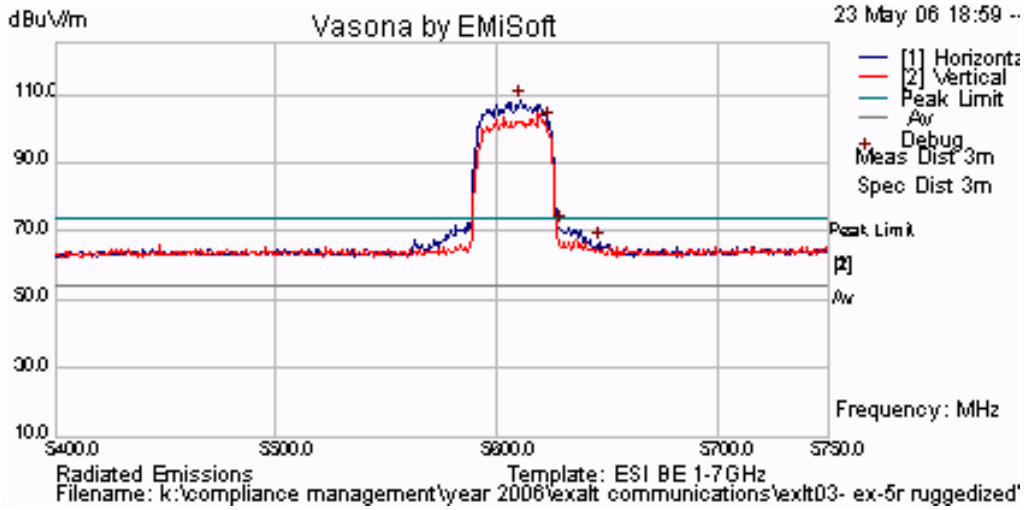
37.5 dBi Antenna 5,512 MHz 32 MHz Bandwidth QPSK

Peak Emission = 108.73 dBµV/m



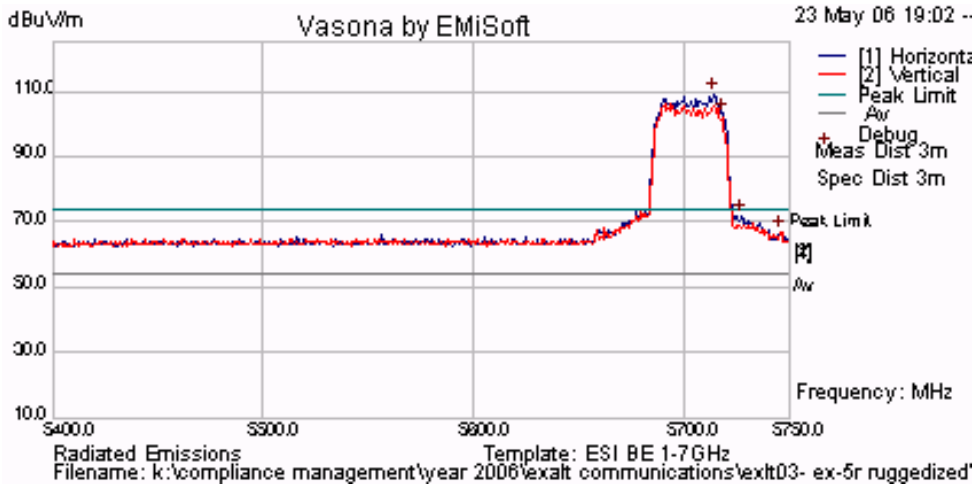
37.5 dBi Antenna 5,608 MHz 32 MHz Bandwidth QPSK

Peak Emission = 108.23 dBµV/m



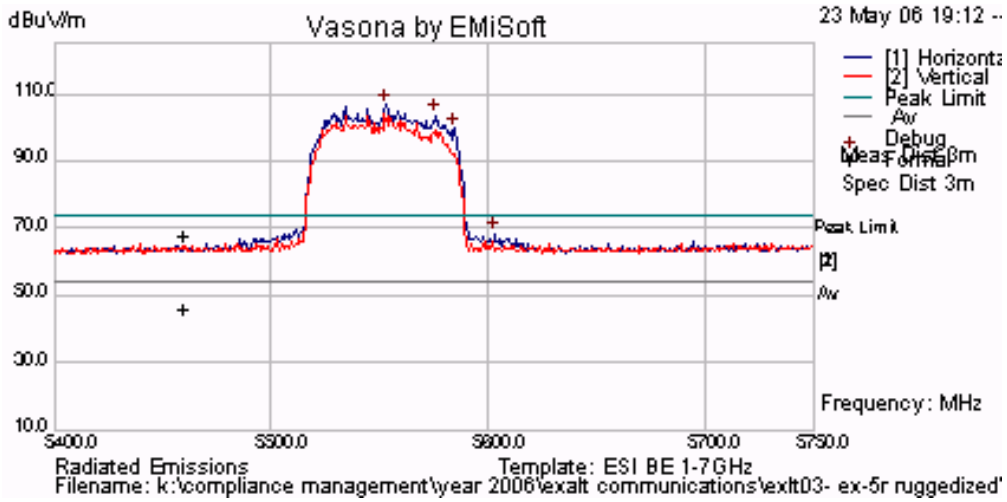
37.5 dBi Antenna 5,703 MHz 32 MHz Bandwidth QPSK

Peak Emission = 109.17 dBµV/m



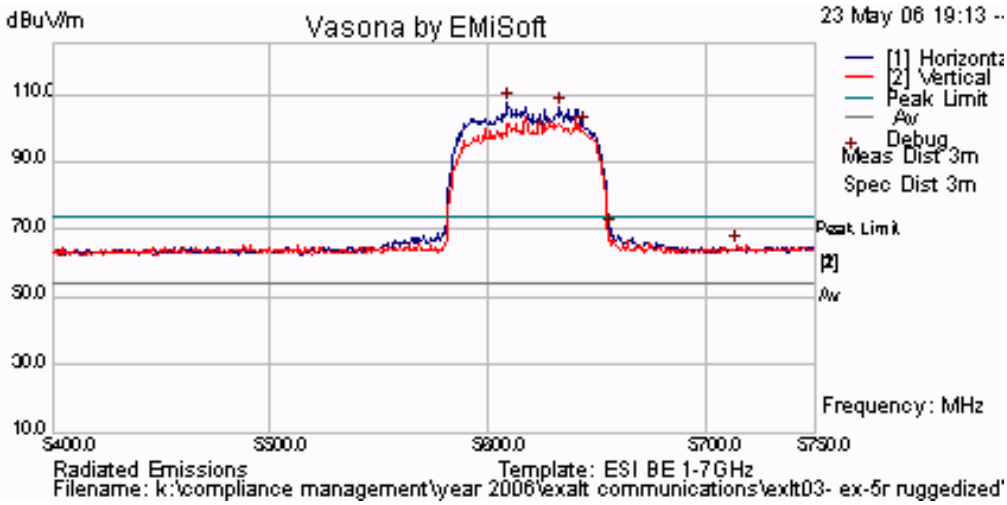
37.5 dBi Antenna 5,553 MHz 64 MHz Bandwidth QPSK

Peak Emission = 106.71 dBµV/m



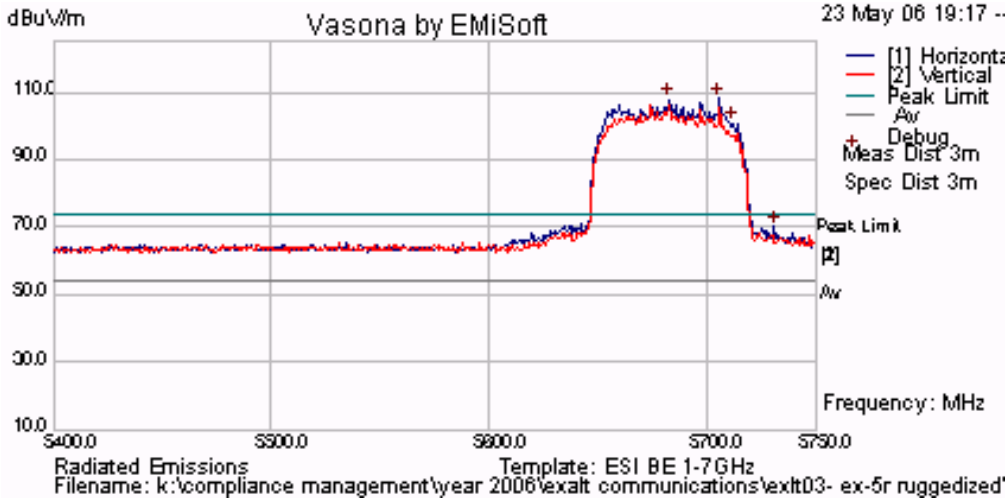
37.5 dBi Antenna 5,618 MHz 64 MHz Bandwidth QPSK

Peak Emission = 107.55 dBµV/m



37.5 dBi Antenna 5,683 MHz 64 MHz Bandwidth QPSK

Peak Emission = 108.16 dBµV/m



Specification

Limits

15.407 (b)(2). All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-210 §A9.3(2) For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

RSS-Gen §4.7 The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

5.1.7.3. Receiver Radiated Spurious Emissions (above 1 GHz)

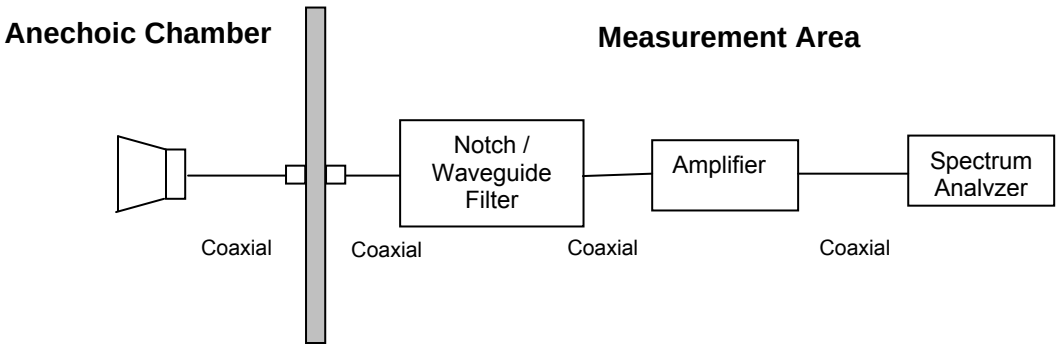
Industry Canada RSS-Gen §4.8, §6

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Receiver Radiated Spurious Emissions above 1 GHz

Ambient conditions.
Temperature: 17 to 23°C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

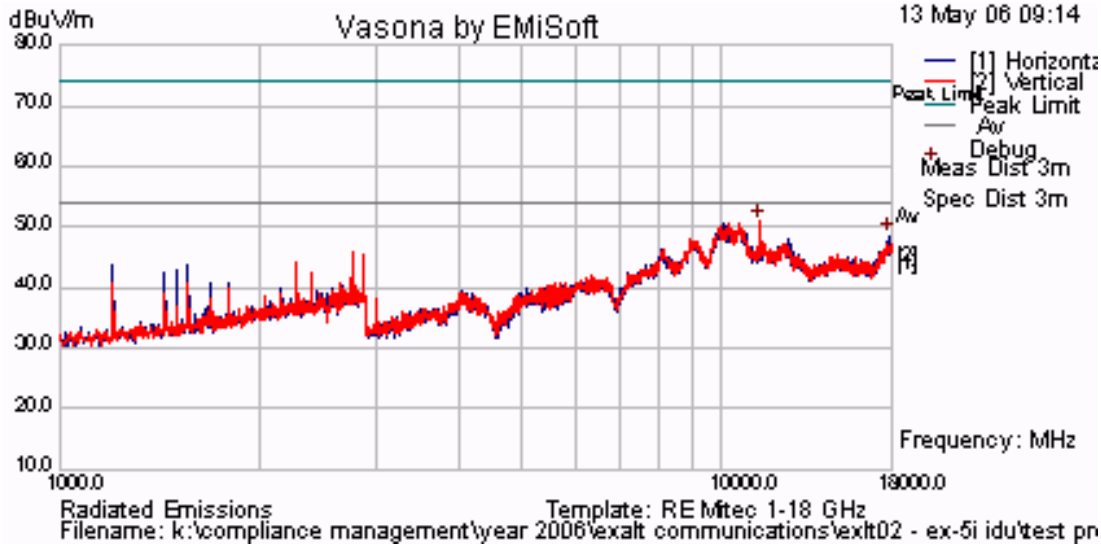
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,296 MHz 28 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBµV/m).

5,296 MHz Radiated Emissions for 28 dBi Antenna 8 MHz Bandwidth QPSK



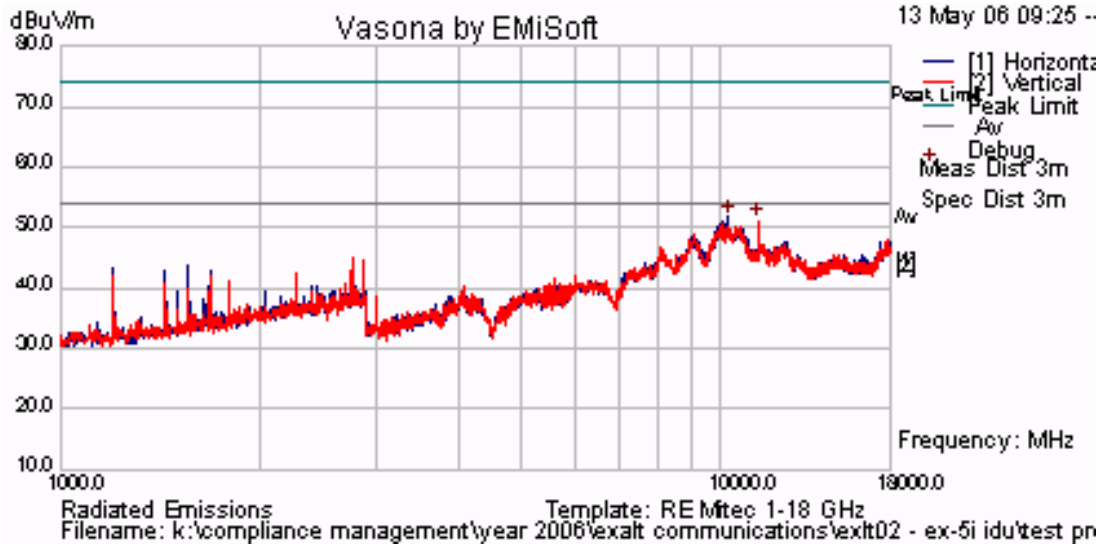
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,296 MHz 28 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,296 MHz Radiated Emissions for 28 dBi Antenna 16 MHz Bandwidth QPSK



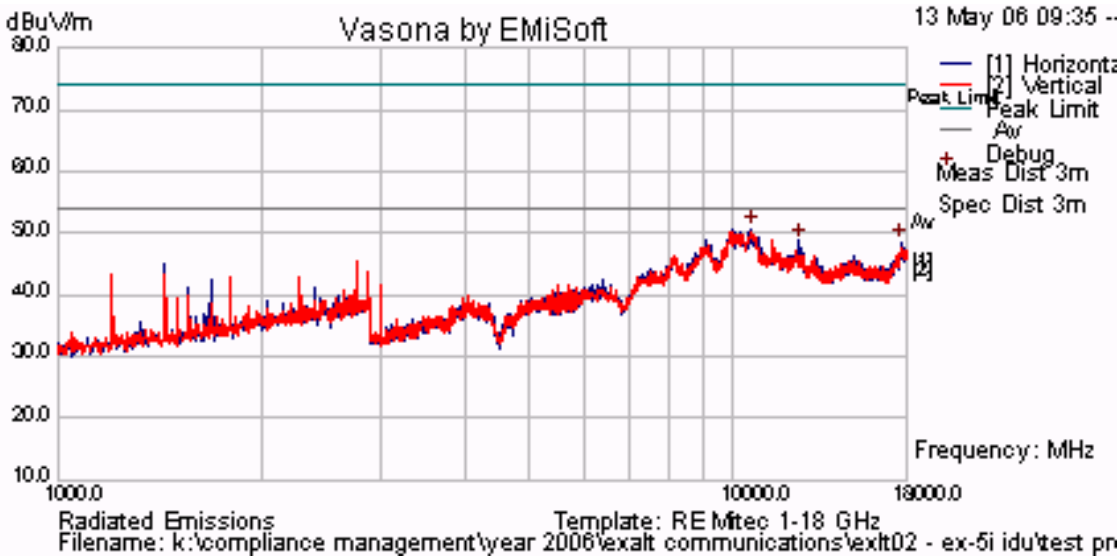
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,290 MHz 28 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,290 MHz Radiated Emissions for 28 dBi Antenna 32 MHz Bandwidth QPSK



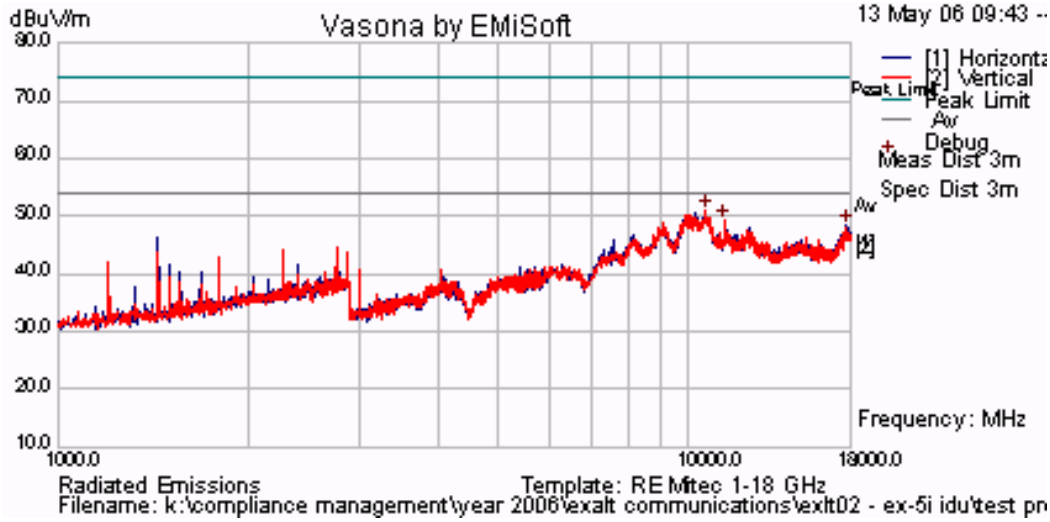
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,290 MHz 28 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBµV/m).

5,290 MHz Radiated Emissions for 28 dBi Antenna 64 MHz Bandwidth QPSK



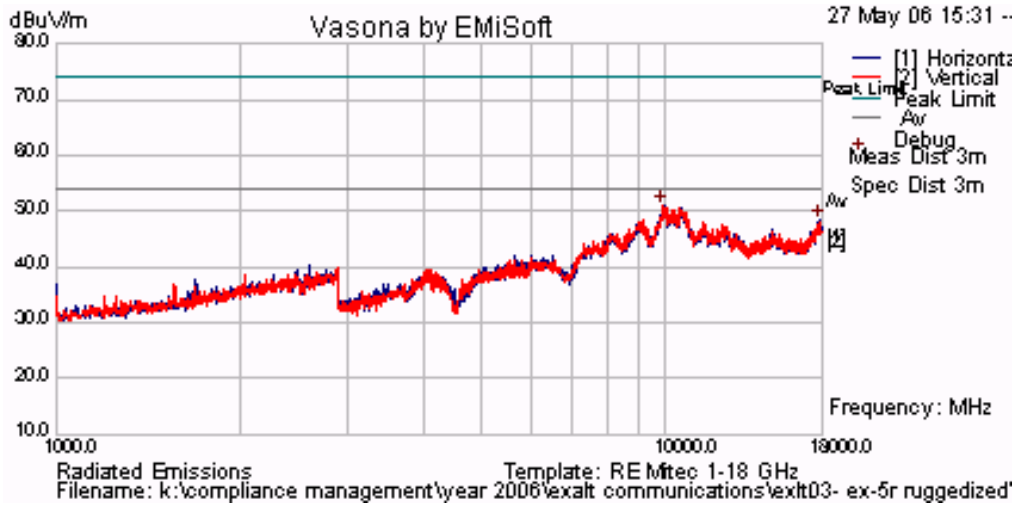
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,602 MHz 28 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,602 MHz Radiated Emissions for 28 dBi Antenna 8 MHz Bandwidth QPSK



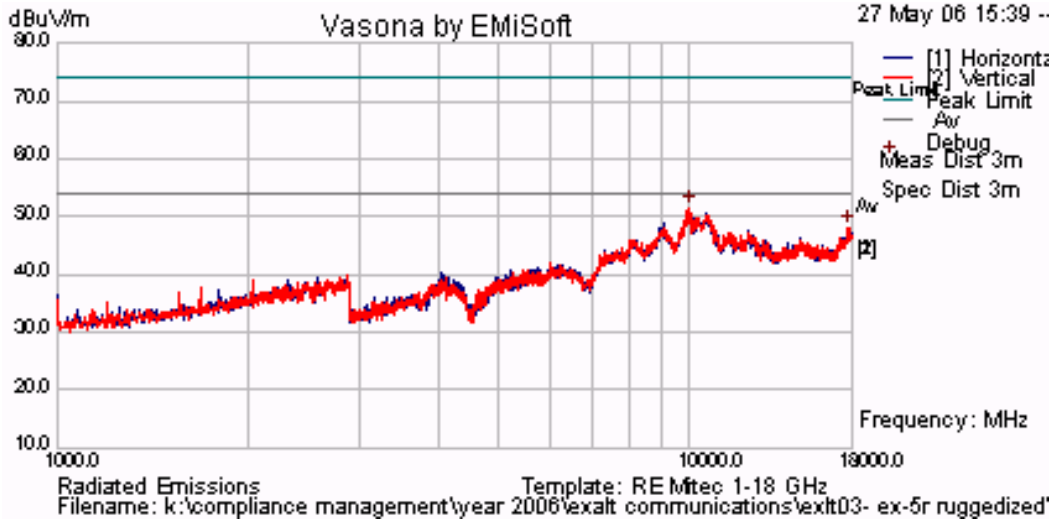
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,602 MHz 28 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,602 MHz Radiated Emissions for 28 dBi Antenna 16 MHz Bandwidth QPSK



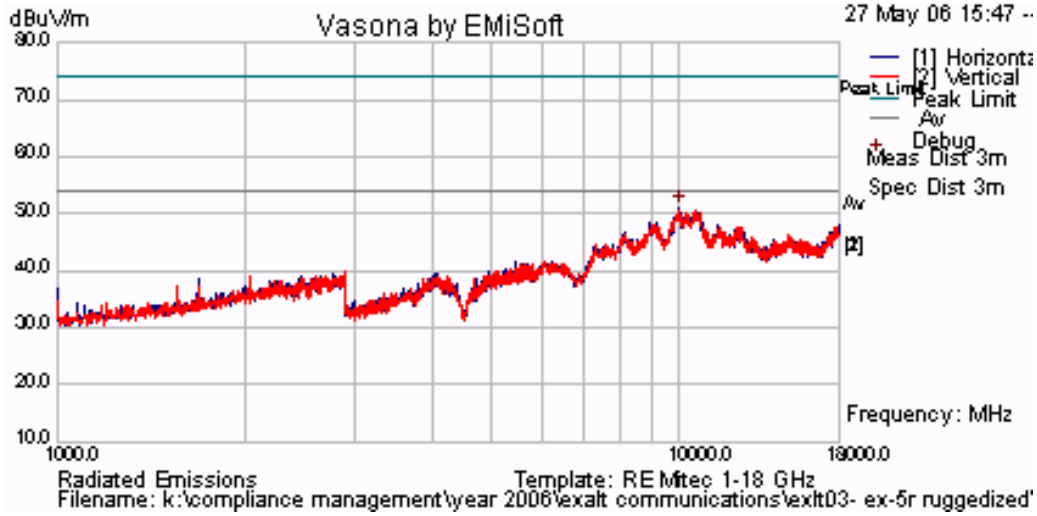
28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,608 MHz 28 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,608 MHz Radiated Emissions for 28 dBi Antenna 32 MHz Bandwidth QPSK

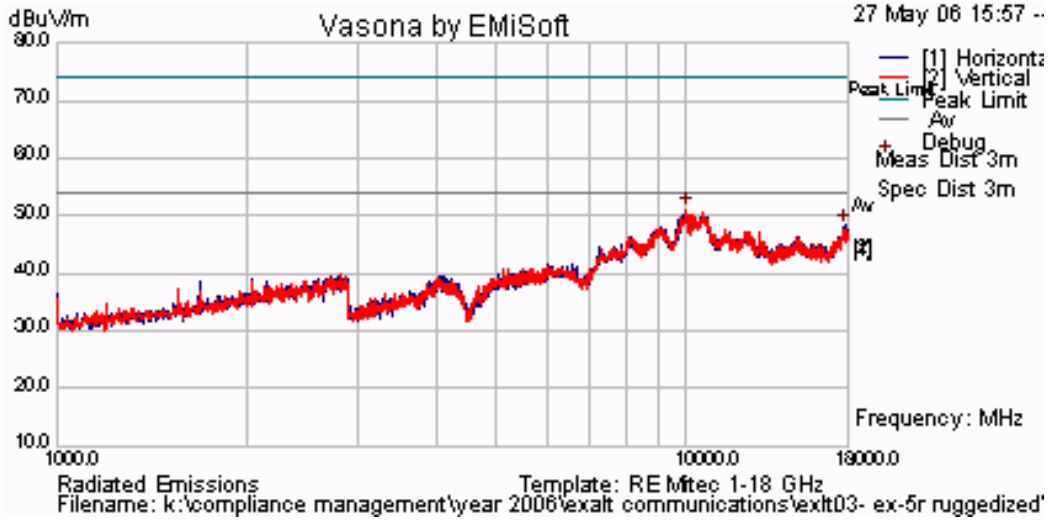


28 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,618 MHz 28 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

5,618 MHz Radiated Emissions for 28 dBi Antenna 64 MHz Bandwidth QPSK



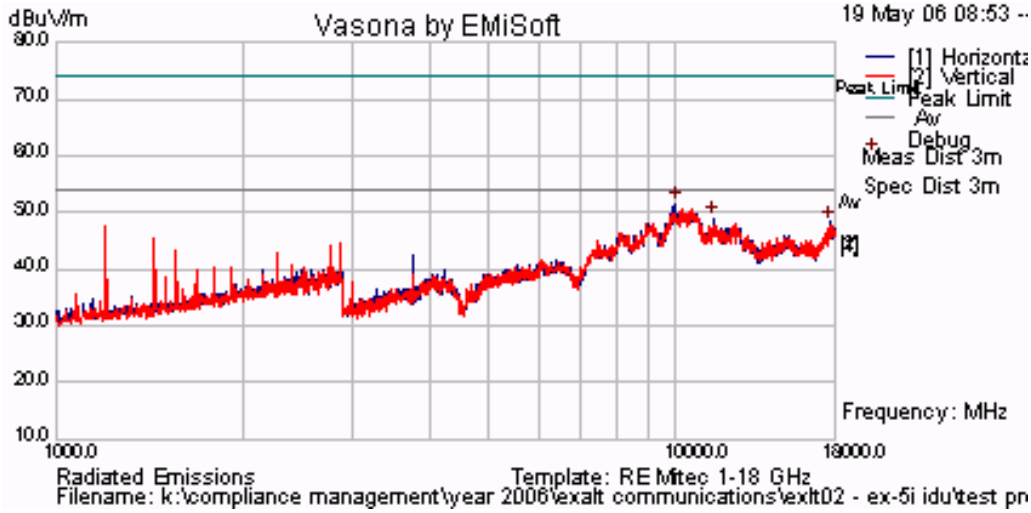
37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,296 MHz 37.5 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,296 MHz Radiated Emissions for 37.5 dBi Antenna 8 MHz Bandwidth QPSK



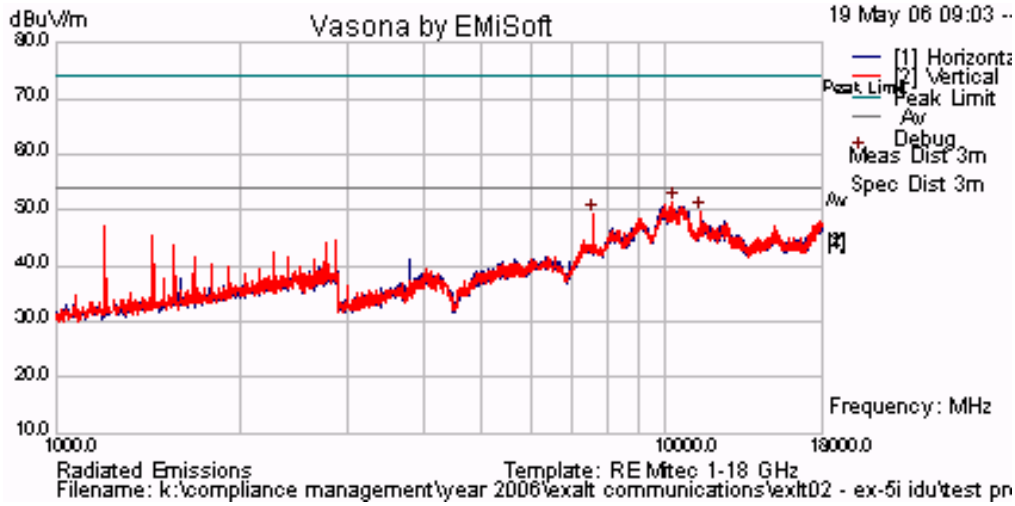
37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,296 MHz 37.5 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBµV/m).

5,296 MHz Radiated Emissions for 37.5 dBi Antenna 16 MHz Bandwidth QPSK



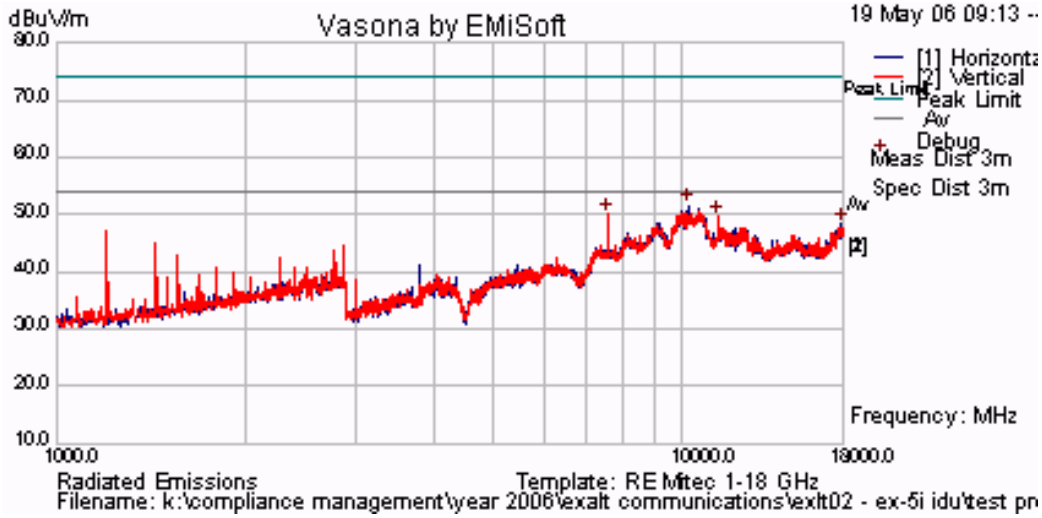
37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,290 MHz 37.5 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBµV/m).

5,290 MHz Radiated Emissions for 37.5 dBi Antenna 32 MHz Bandwidth QPSK



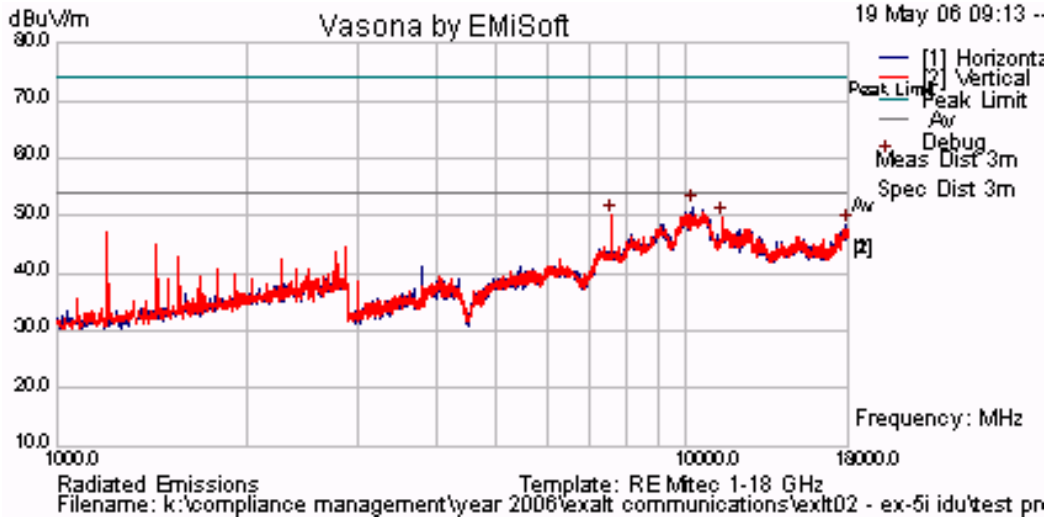
37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS – 5,290 MHz 37.5 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

No peak emissions were greater than the Average Limit (54 dBμV/m).

5,290 MHz Radiated Emissions for 37.5 dBi Antenna 64 MHz Bandwidth QPSK

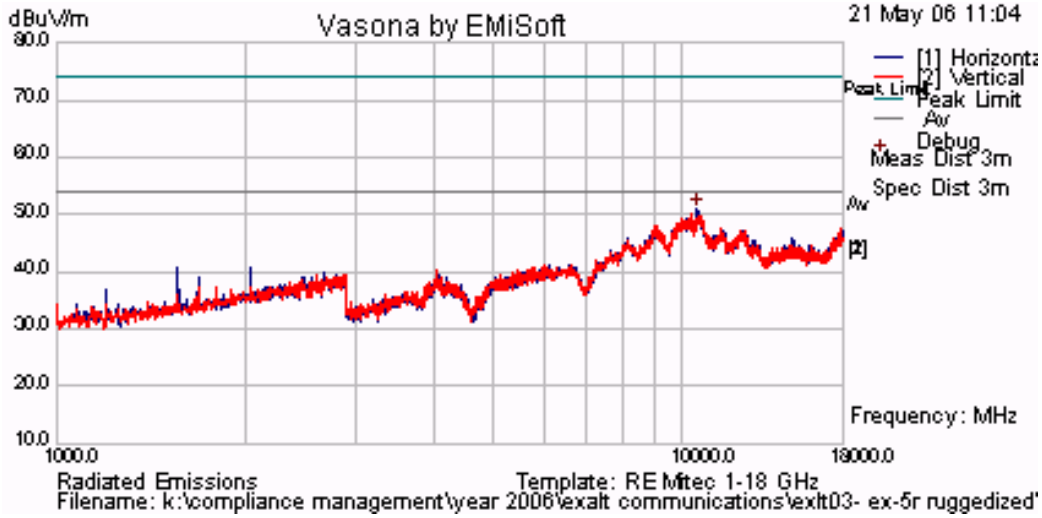


37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,602 MHz 37.5 dBi Antenna 8 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

5,602 MHz Radiated Emissions for 37.5 dBi Antenna 8 MHz Bandwidth QPSK

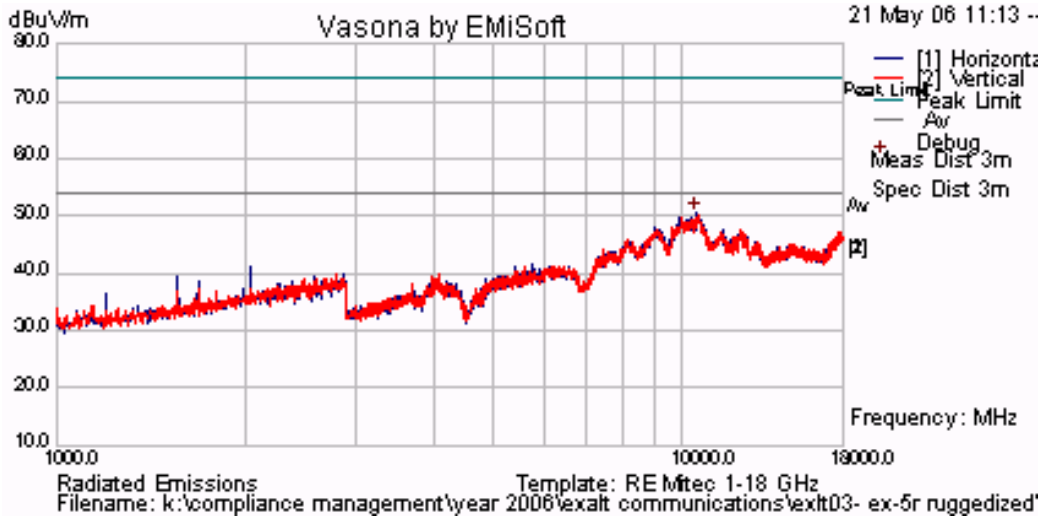


37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,602 MHz 37.5 dBi Antenna 16 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

5,602 MHz Radiated Emissions for 37.5 dBi Antenna 16 MHz Bandwidth QPSK

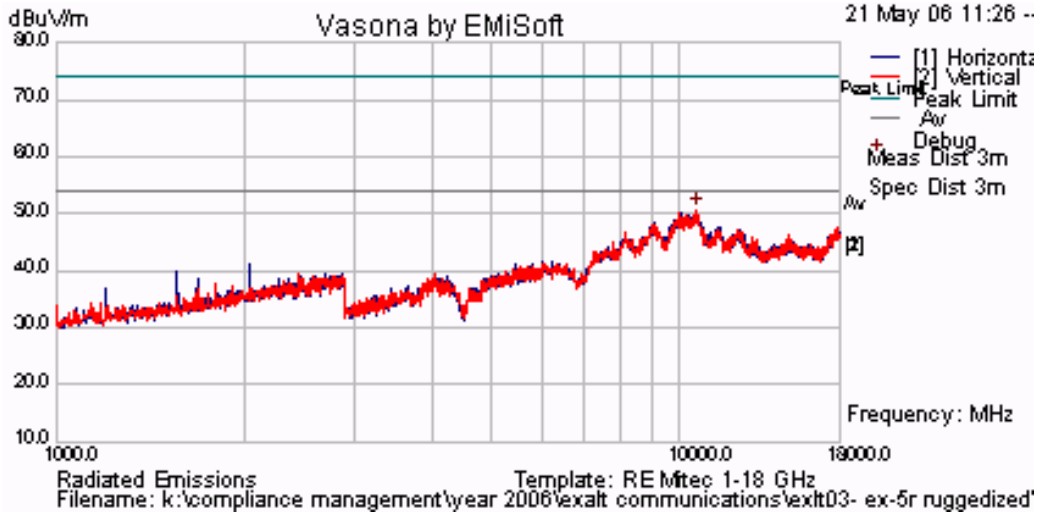


37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,608 MHz 37.5 dBi Antenna 32 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBµV/m)	Correction Factor (dB)	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

5,608 MHz Radiated Emissions for 37.5 dBi Antenna 32 MHz Bandwidth QPSK



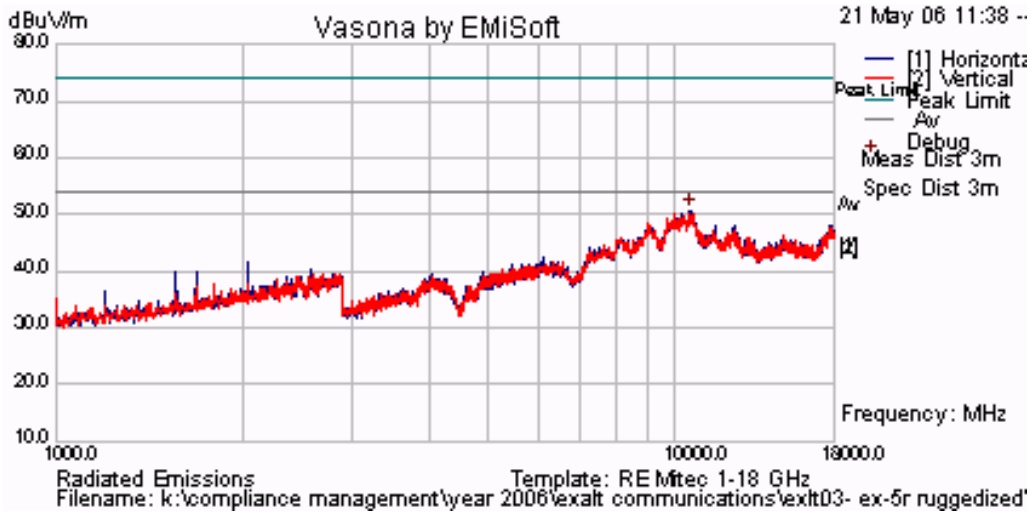
37.5 dBi Antenna - Receiver Radiated Spurious Emissions above 1 GHz

TABLE OF RESULTS –5,618 MHz 37.5 dBi Antenna 64 MHz Bandwidth QPSK

Freq. (MHz)	Pol. (H/V)	Raw Reading (dBμV/m)	Correction Factor (dB)	Corrected Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

As no peak emissions were greater than the Average Limit (54 dBμV/m) peak emissions are reported in the above matrix.

5,618 MHz Radiated Emissions for 37.5 dBi Antenna 64 MHz Bandwidth QPSK



Specification

Receiver Radiated Spurious Emissions

Industry Canada RSS-Gen §4.8,
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

RSS-Gen §6
The following receiver spurious emission limits shall be complied with;
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

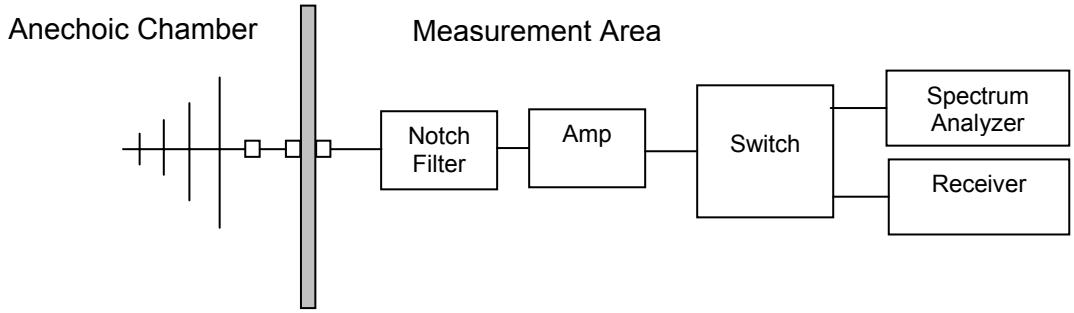
Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

5.1.7.4. Radiated Spurious Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.407(b)(6); §15.205(a); §15.209(a)
Industry Canada RSS-210 §2.2

Test Procedure
Testing 30M-1 GHz was subcontracted to the company identified in Section 3.9 Subcontracted Testing. Preliminary radiated emissions are measured in the anechoic chamber at a 10-meter distance on every azimuth in both horizontal and vertical polarity. The emissions are recorded with a spectrum analyzer in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

System operation was completed with five operational transmitters terminated in a 50Ω load at maximum power and one 2.4 GHz transmitter terminated in the 16.4 dBi Sector antenna.



Test Measurement Set up

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Measurement Results for Spurious Emissions (30 MHz – 1 GHz)

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

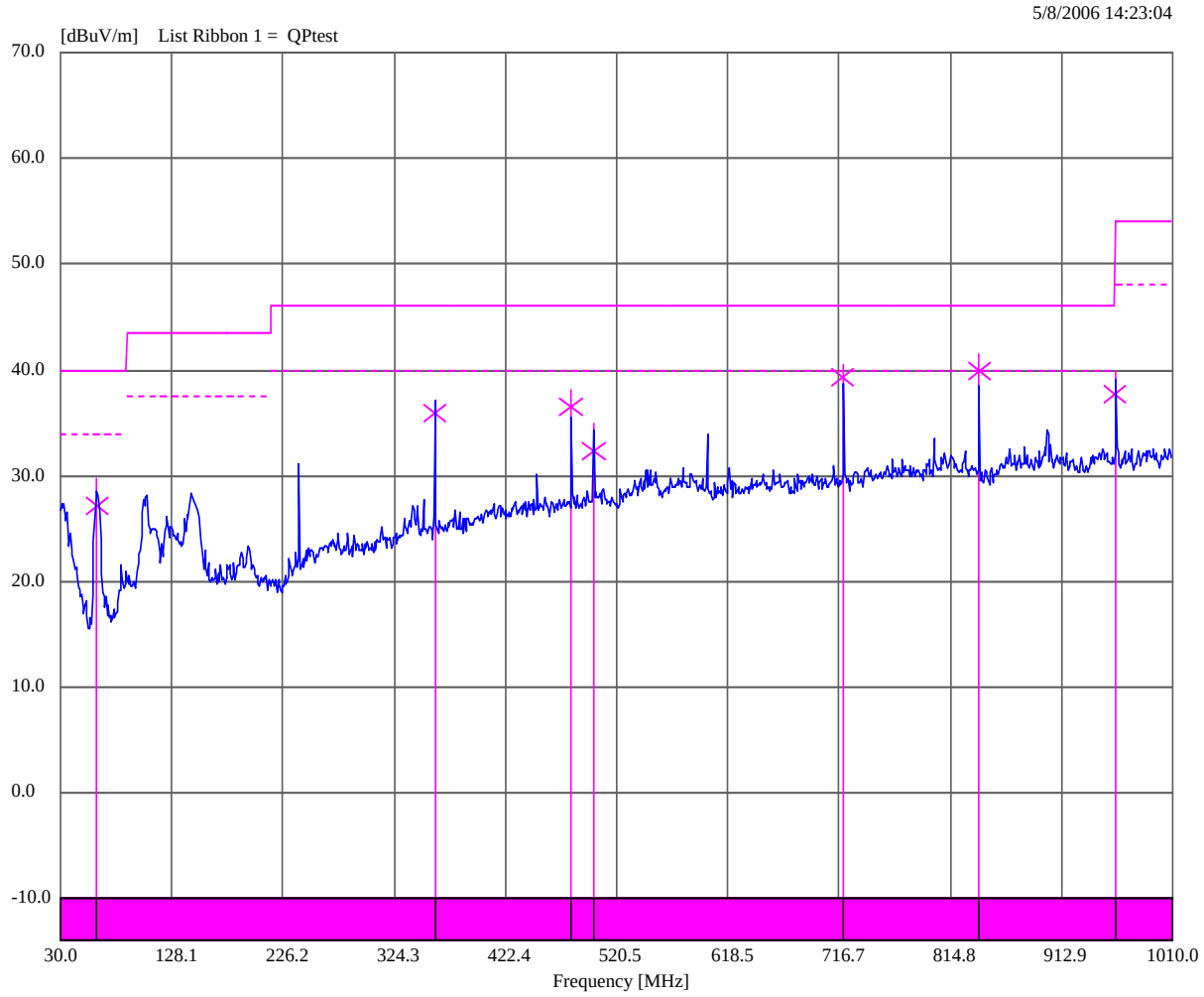
Radio parameters.

8 MHz BW
QPSK Modulation
Max. Power
EUT Antenna: 28 dBi Panel Antenna

TABLE OF RESULTS

Freq. (MHz)	Peak (dBuV/m)	QP (dBuV/m)	QP Lmt (dBuV/m)	QP Margin (dB)	Angle (deg)	Height (cm)	Polarity
62.348724	29.71	27.09	40.00	-12.91	348	196	Vert
359.990465	37.15	35.94	46.00	-10.06	11	396	Horz
479.992743	38.18	36.58	46.00	-9.42	4	300	Horz
499.982538	34.96	32.40	46.00	-13.60	338	332	Horz
720.007412	40.52	39.24	46.00	-6.76	86	294	Vert
840.004616	41.59	39.93	46.00	-6.07	129	200	Vert
960.011077	39.87	37.68	54.00	-16.32	41	200	Vert

Radiated Spurious Emissions 30 MHz to 1 GHz



Specification

Limits

§15.407(b)(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-210 §2.2 refers to Section 2.7 Table 2 below;-
.

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	**100**	**40.0**	**3**
88-216	**150**	**43.5**	**3**
216-960	**200**	**46.0**	**3**
Above 960	**500**	**54.0**	**3**

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per Sanmina work instruction	8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog

5.1.8. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

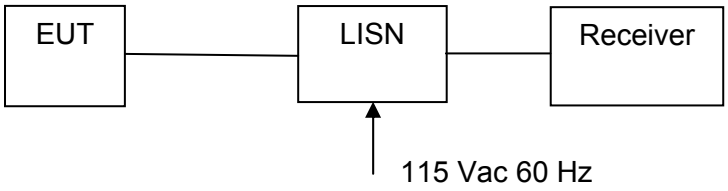
FCC, Part 15 Subpart C §15.407(b)(6)/15.207
Industry Canada RSS-Gen §7.2.2

Test Procedure

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

All six transmitters were operational and terminated in a 50Ω load.

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

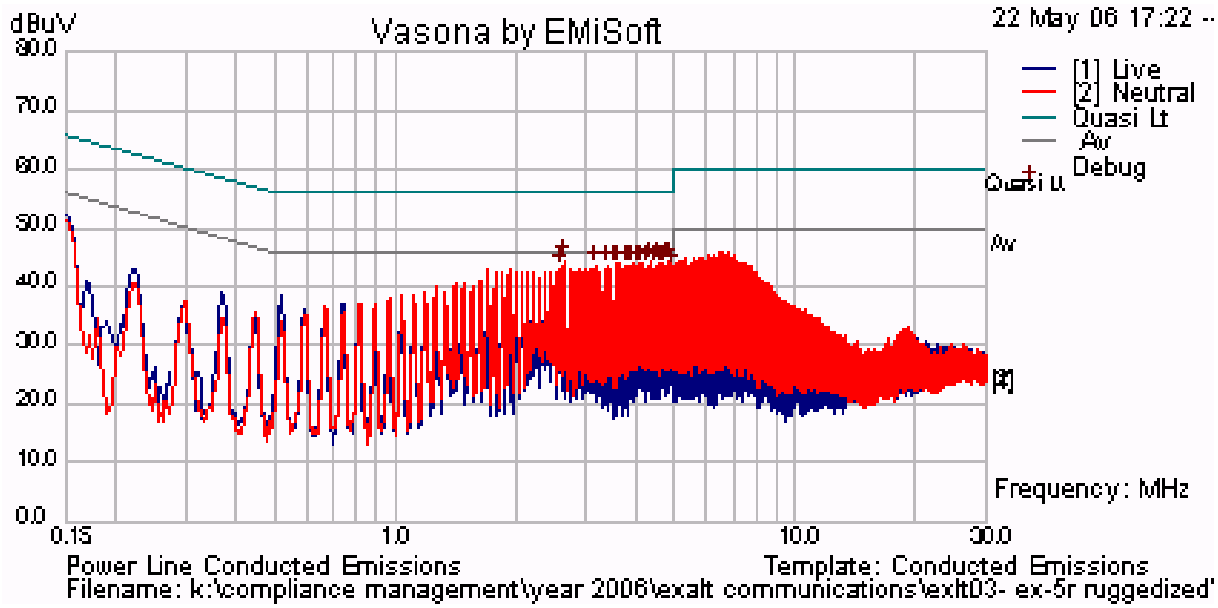
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Radio parameters.
Transmitter Port: Terminated in 50 Ohm load
Duty Cycle: 100%

TABLE OF RESULTS

Freq (MHz)	Line	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
2.672	Neutr	44.59	42.81	56	-13.19	40.34	46	-5.66
4.377	Neutr	44.21	41.75	56	-14.25	37.86	46	-8.14
4.820	Neutr	44.18	36.68	56	-19.32	32.69	46	-13.31
4.885	Neutr	44.14	21.16	56	-34.84	15.90	46	-30.10
4.603	Neutr	44.10	43.35	56	-12.65	40.27	46	-5.73
4.158	Neutr	43.80	43.29	56	-12.71	40.10	46	-5.90

AC Wireline Conducted Emissions (150 kHz – 30 MHz)



Specification

Limit

§15.407 (b)(6); Any U-NII devices using an AC power line are required to comply also with the limits set forth in Section 15.207.

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μΩ line impedance stabilization network (LISN), see §15.207 (a) matrix below. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

RSS-Gen §7.2.2
The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

§15.207 (a) and **RSS-Gen §7.2.2** Limit Matrix
The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0158, 0184, 0193, 0190, 0293, 0307