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Test Report: 2005 110815-FCC-C
Project number: 25-815-SAI

Applicant: Science Applications International Corporation
16701 W. Bernardo Rd.
San Diego, CA 92127

For The Radio Docimeter

Model: PDE5

FCC ID: LPRPDE5

In Accordance With: FCC Part 15 Subpart C, 15.247
FHSS System and Digitally Modulated
Radiators
902-928MHz, 2400 - 2483.5 MHz, 5725-
5850MHz

Date: 11-14-05

Total Number of Pages: 34

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed: Radio Docimeter Model PDE5

Specification: FCC Part 15 Subpart C, 15.247

Compliance Status: Complies

Exclusions: None

Non-compliances: None

Report Release History:

REVISION	DATE	COMMENTS
-	11-14-05	Prepared By: A. Laudani
-	11-14-05	Initial Release:

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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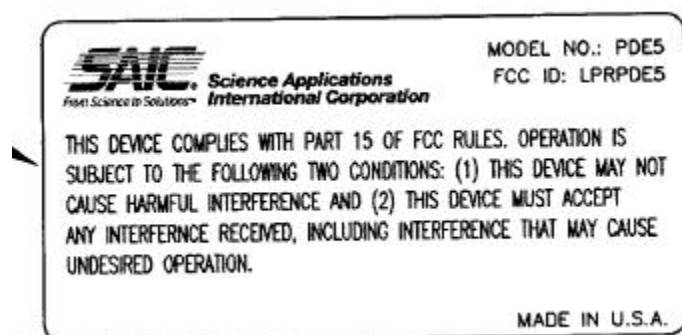
Section 1: Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

Serial Number: RE1522

Temporary label for test, see label exhibit for certification.



1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

The first samples were received on: September 22, 2005

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Radio Docimeter	SAIC PDE5 Serial #: RE1522	N/A
Base Station	SAIC Model # PDX-5 Serial #	Twin lead 9 Vdc from Power Supply
Power Supply		

1.3 Theory of Operation

The PDE5 is a Radio Docimeter. Its function is to measure radiation from the human body's extremities and when worn on the belt, transmit data to the base station. The base station connects to a computer and records the data. The EUT in hopping mode uses 25 (in the 910.5 to 917.7 MHz portion) of 83 hopping channels available in of the 902 to 928 MHz band. The test software available prevents the EUT from single channel operation on the lowest and highest channel in this range. The EUT was therefore exercised with the base station at low, mid and high frequencies in the 902 to 928 MHz band. These emissions should be representational for the 910.5 to 917.7 MHz range.

1.4 Technical Specifications of the EUT

Manufacturer:	SAIC	
Operating Frequency:	910.5-917.7 MHz	
Emission Designator	264KW7D	TRC-43
Peak Output Power:	21.0 dBm	
Modulation:	Digital	
Antenna Data:	ANT-916-CW-RCL 2.4 dBi	
Antenna Connector:	Reverse SMA	
Power Source:	Rechargeable battery	

1.5 Block Diagram of the EUT

See Block Diagram Exhibit.

Section 2: Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247

FHSS System and Digitally Modulated Radiators

902-928MHz, 2400 - 2483.5 MHz, 5725-5850MHz

2.2 Deviations From Laboratory Test Procedures

No deviations.

Measurements made in low, mid and high frequencies in the 902 to 928 MHz range presented as representational of emissions of the low and high frequencies of the 910 to 918 MHz range.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Asset Number	Description	Model Number	Serial Number	Last Cal	Cal Due
111	Antenna, LPA, EMCO	3146	1382	2/3/05	2/3/06
114	Antenna, Bicon, EMCO	3104	2997	11/30/04	11/30/05
835	Spectrum Analyzer, Rhode & Schwartz	RHDFSEK	829058/005	12/30/04	12/30/05
438	Quasi-Peak Adapter, HP	85650A	2521A00618	5/25/05	11/25/05
839	Spectrum Analyzer Display, HP	85662A	3014A18995	5/25/05	11/25/06
840	Spectrum Analyzer, HP	85680B	2416A00394	5/25/05	11/25/05
898	EMI Receiver, HP	8546A	3625A00348	5/16/05	5/16/06
564	High Pass Filter, Solar	7801-5.0	853130	1/6/05	1/6/06
395	LISN, Solar	9348-50-R-24-BNC	941718	12/22/04	12/22/05
681	Transient Limiter, HP	11947A	3107A02634	5/25/05	5/25/06
529	Antenna, DRWG, EMCO	3115	2505	4/13/05	4/13/06

Section 3: Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

The EUT uses the middle 10 MHz of the 902 to 928 MHz band. The client has bought the module and testing software from another company. The product will use hopping channels centered in the band.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C: Test Results

Part 15	Test Description	Result
15.207(a)	Powerline Conducted Emissions	PASS
15.209(a)	Radiated Emissions within Restricted Bands	PASS
15.247(a)(1)	Frequency hopping systems	PASS
15.247(a)(1)(i)	Frequency hopping systems operating in the 902-928 MHz band	PASS
15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725-5850 MHz band	NA
15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400-2483.5 MHz band	NA
15.247(a)(2)	Systems using digital modulation techniques	NA
15.247(b)(1)	Maximum peak output power of Frequency hopping systems operating in the 2400-2483.5 MHz band and 5725-5850 MHz band	NA
15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902-928 MHz band	PASS
15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands	NA
15.247(b)(4)	Maximum peak output power	PASS
15.247(c)(1)	Fixed point-to-point Operation with directional antenna gains greater than 6 dBi	NA
15.247(c)(2)	Transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams	NA
15.247(d)	Radiated Emissions Not in Restricted Bands	PASS
15.247(e)	Power Spectral Density for Digitally Modulated Devices	NA
15.247(f)	Time of Occupancy for Hybrid Systems	NA

NA = not applicable; Pass = complies with requirement(s)

Notes:

Appendix A: Test Results

15.207(a) Powerline Conducted Emissions

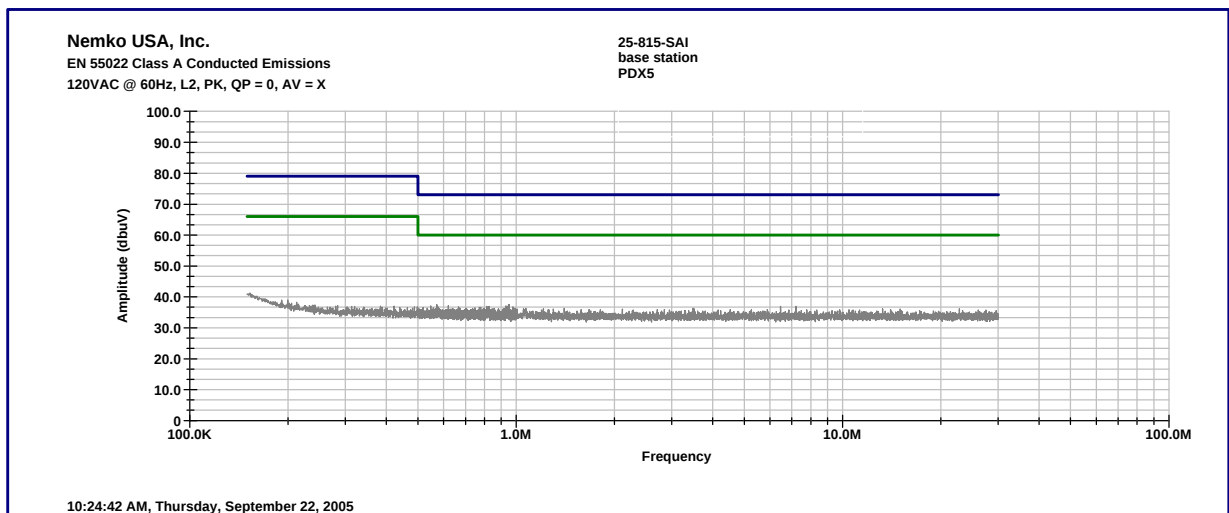
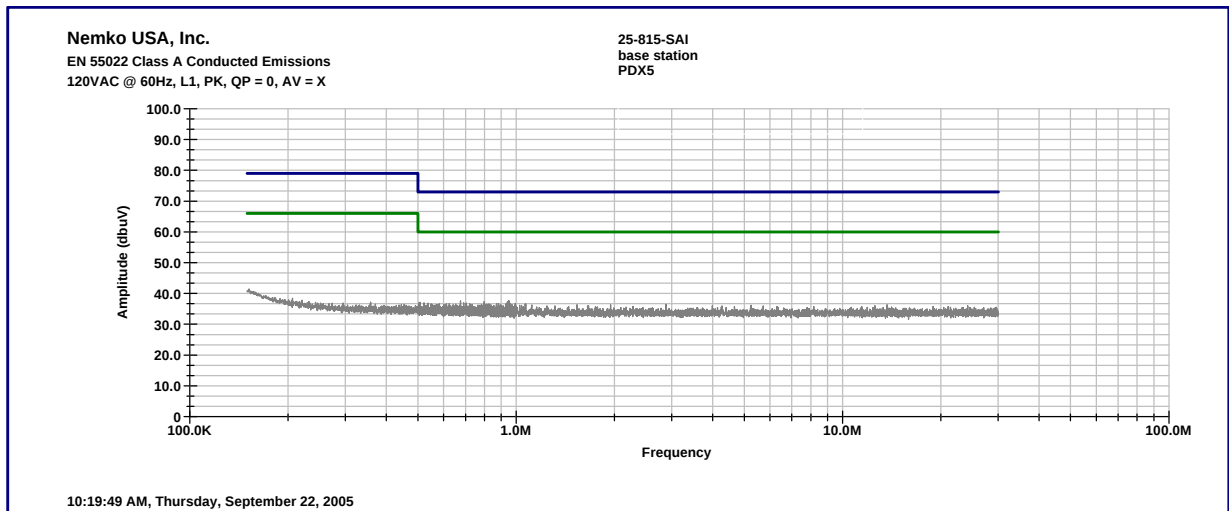
Frequency of Conducted limit (dBmV)		
Emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

Test Conditions:

Sample Number:	RE1522	Temperature:	72°F
Date:	9-22-05	Humidity:	51 %
Modification State:	Hopping Mode	Tester:	A. Laudani
		Laboratory:	SR1

Test Results: See Attached Plots.

Additional Observations:



15.209(a) Radiated Emissions within Restricted Bands

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:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400F (kHz)	300
0.490-1.705	24000F (kHz)	30
1.705-30.0	30	30
30-88	1001	3
88-216	1502	3
216-960	2003	3
Above 960	500	3

Test Conditions:

Sample Number:	RE1522	Temperature:	72°F
Date:	9-22-05	Humidity:	50 %
Modification State:	Hopping Mode	Tester:	A. Laudani
		Laboratory:	SOUTH OATS

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

These results apply to emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205.

The EUT was measured on three orthogonal axes. The worst case axis reported. The battery was freshly charged. RF power level did not change when the battery was replaced by a voltage source varying 15% from nominal voltage

Radiated Emissions 30 MHz to 900 MHz

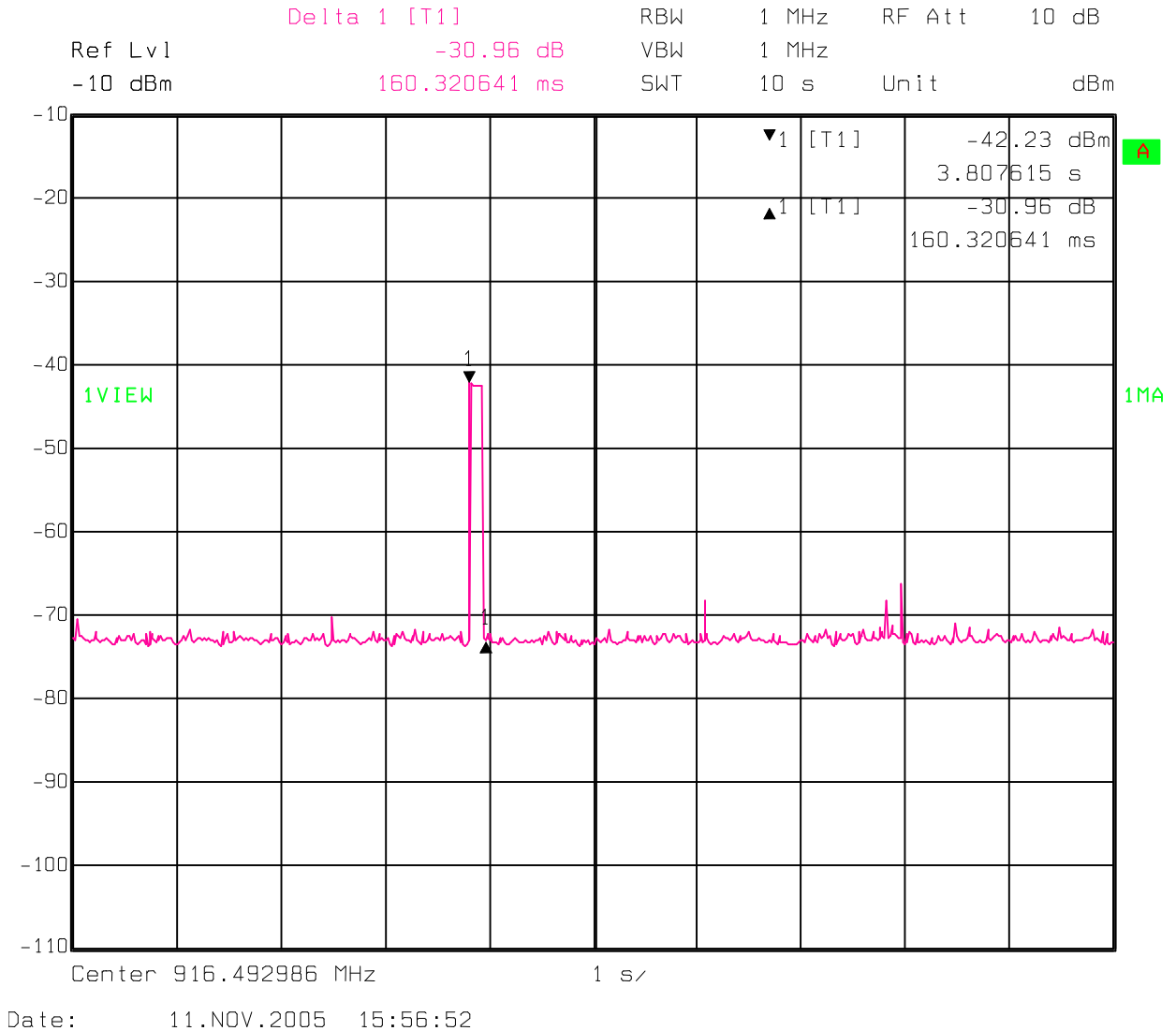
[illegible]

Radiated Emissions: 900 MHz to 9300 MHz

[illegible]

Duty Cycle: 160 ms/10 seconds x 25 channels = 0.4

Duty Cycle Factor: $20 * \log(0.4) = -8.0$ dB



15.247(a)(1) Frequency hopping systems

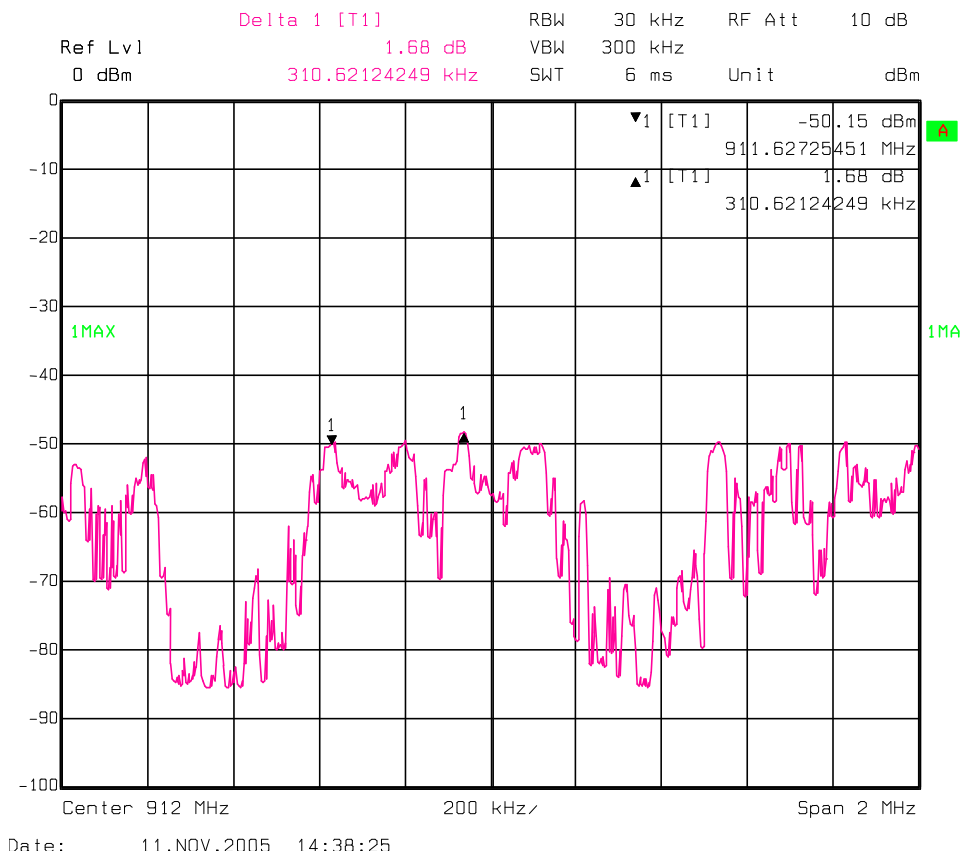
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. **The system shall hop to channel frequencies that are selected at the system-hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.**

Test Conditions:

Sample Number:	RE1522	Temperature:	72°F
Date:	9-22-05	Humidity:	50 %
Modification State:	Hopping Mode	Tester:	A. Laudani
		Laboratory:	Nemko

Test Results:

Channel Spacing: 310 kHz < 500 kHz



15.247(a)(1)(i) Frequency hopping systems operating in the 902-928 MHz band

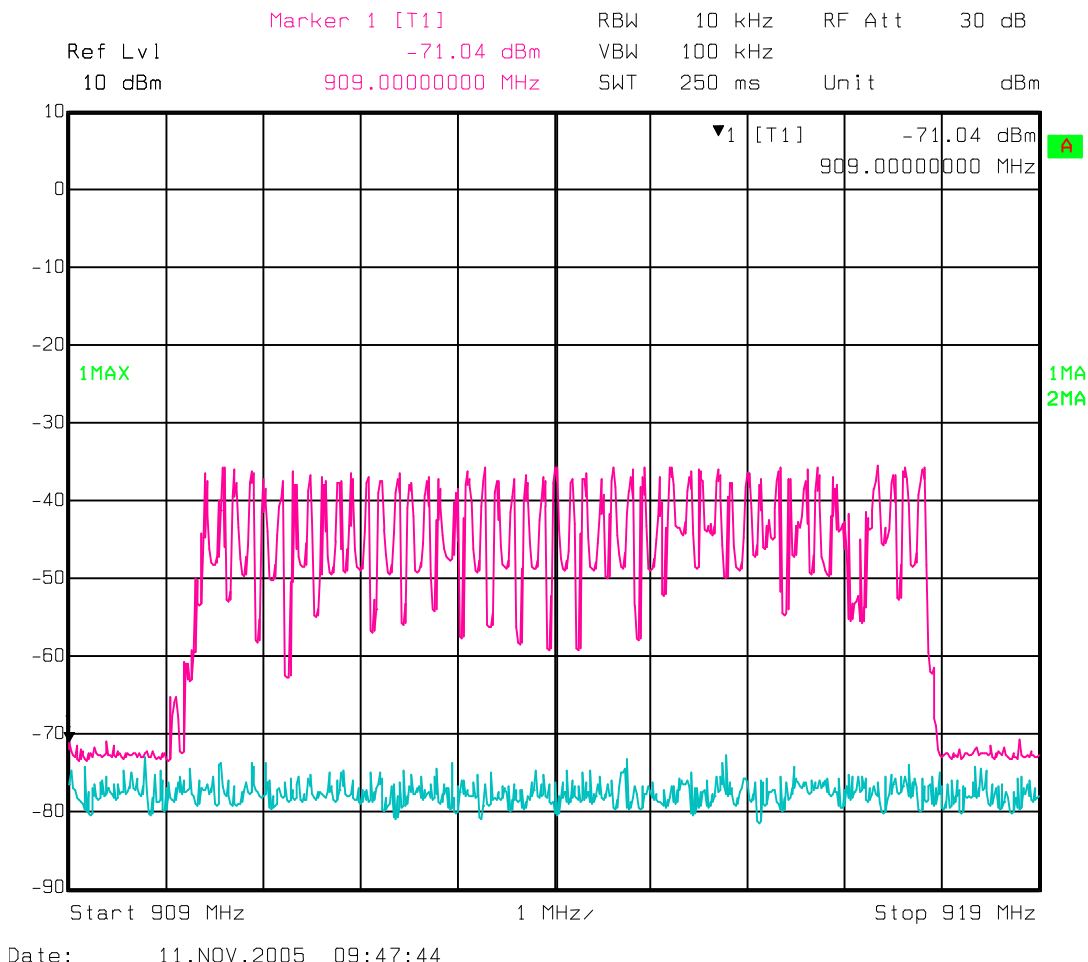
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Conditions:

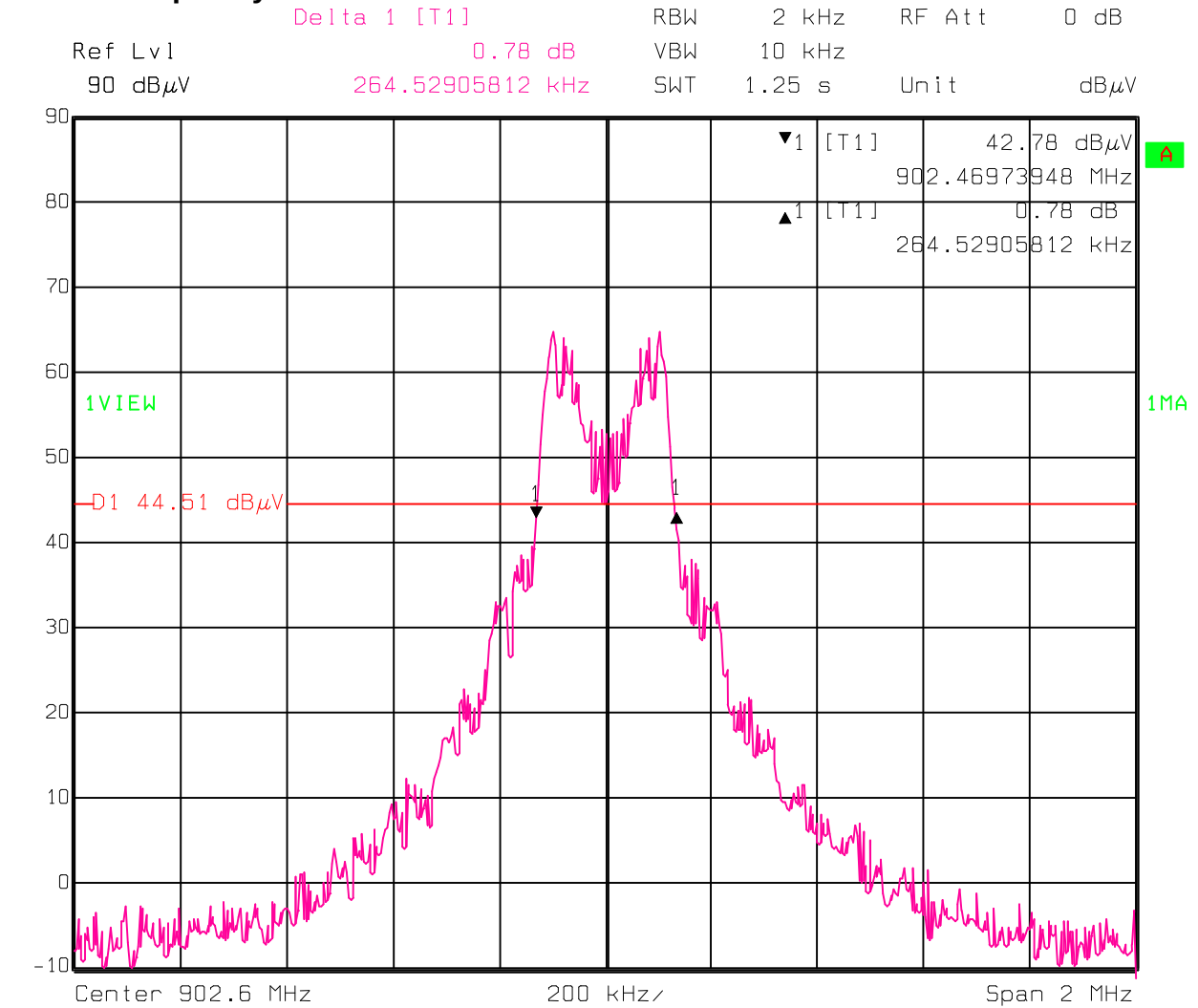
Sample Number:	RE1522	Temperature:	72°F
Date:	9-22-05	Humidity:	30.01 "Hg
Modification State:	Hopping Mode	Tester:	A. Laudani
		Laboratory:	

Test Results:

Number of Hopping Channels: 83 available in the 902 to 928 MHz Band
25 Active within the applied band 910 MHz to 918 MHz



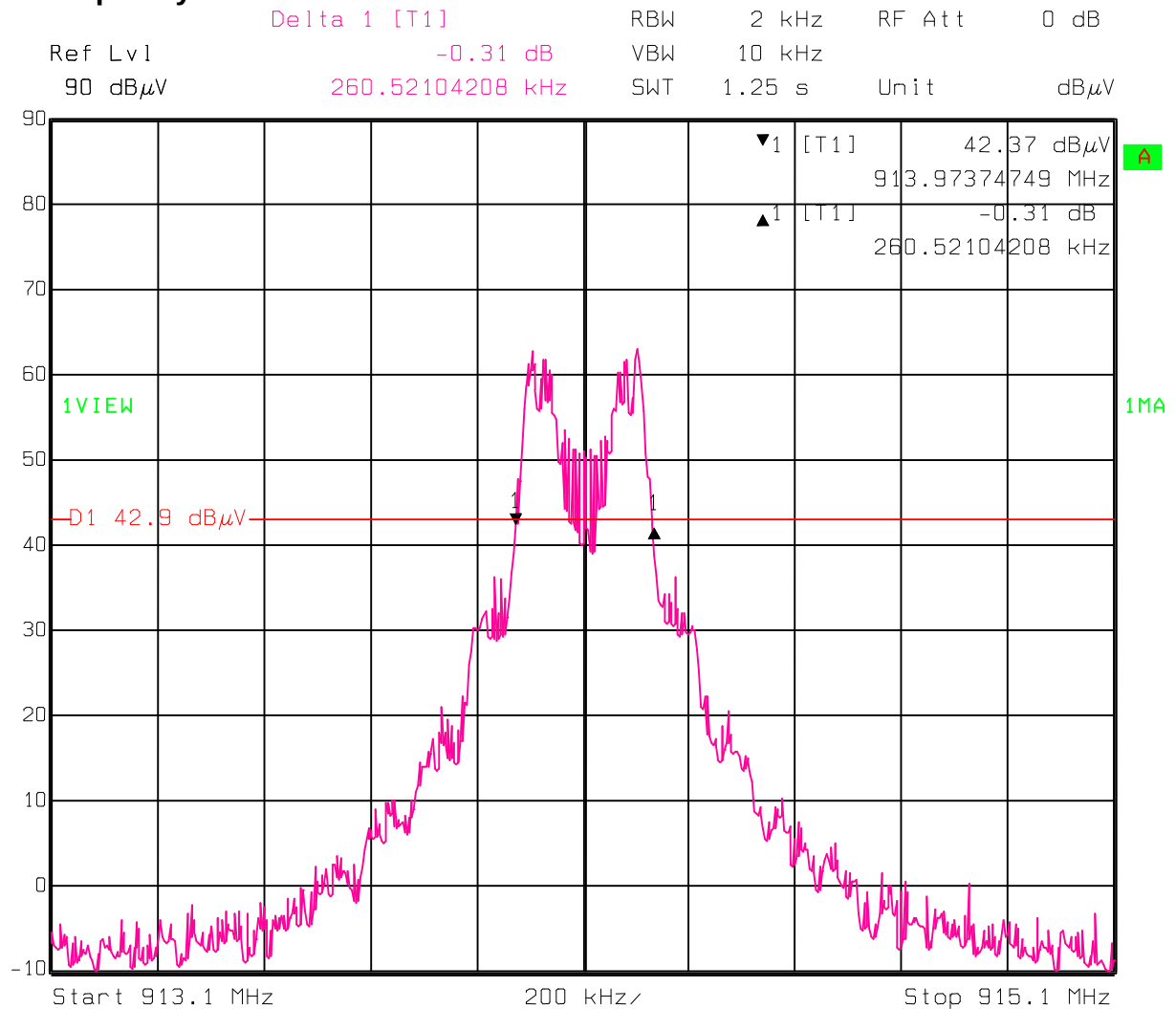
**20dB Bandwidth:
Lowest frequency**



Date: 27.OCT.2005 09:48:43

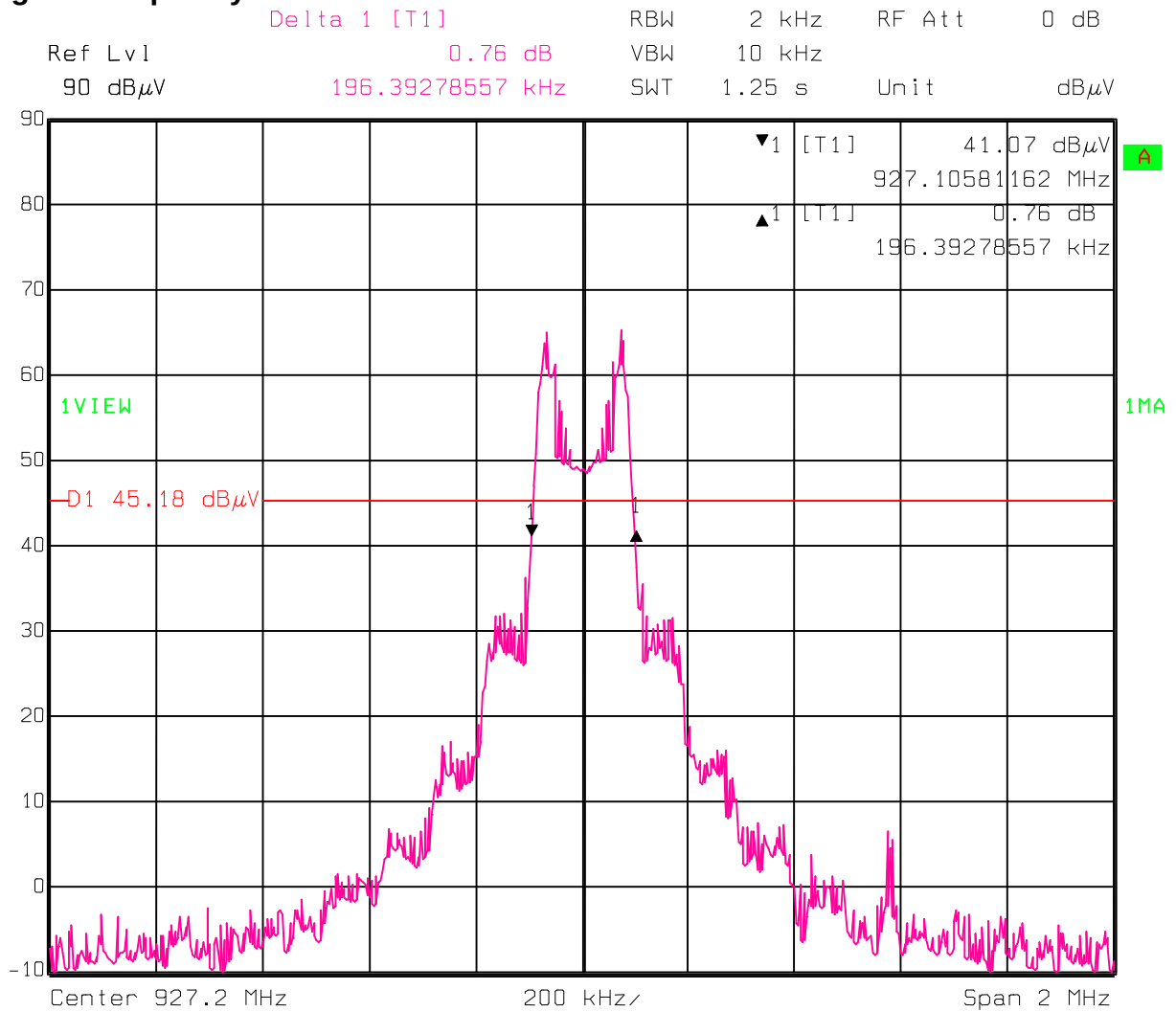
20dB Bandwidth:

Mid frequency



Date: 27.OCT.2005 09:41:02

**20dB Bandwidth:
highest frequency**



Date: 27.OCT.2005 09:44:20

15.247(b)(2) EIRP Peak Output Power

Maximum peak output power of Frequency hopping systems operating in the 902-928 MHz band ... 0.25 Watts for systems employing less than 50 hopping channels...

The battery was freshly charged. RF power level did not change when the battery was replaced by a voltage source varying 15% from nominal voltage

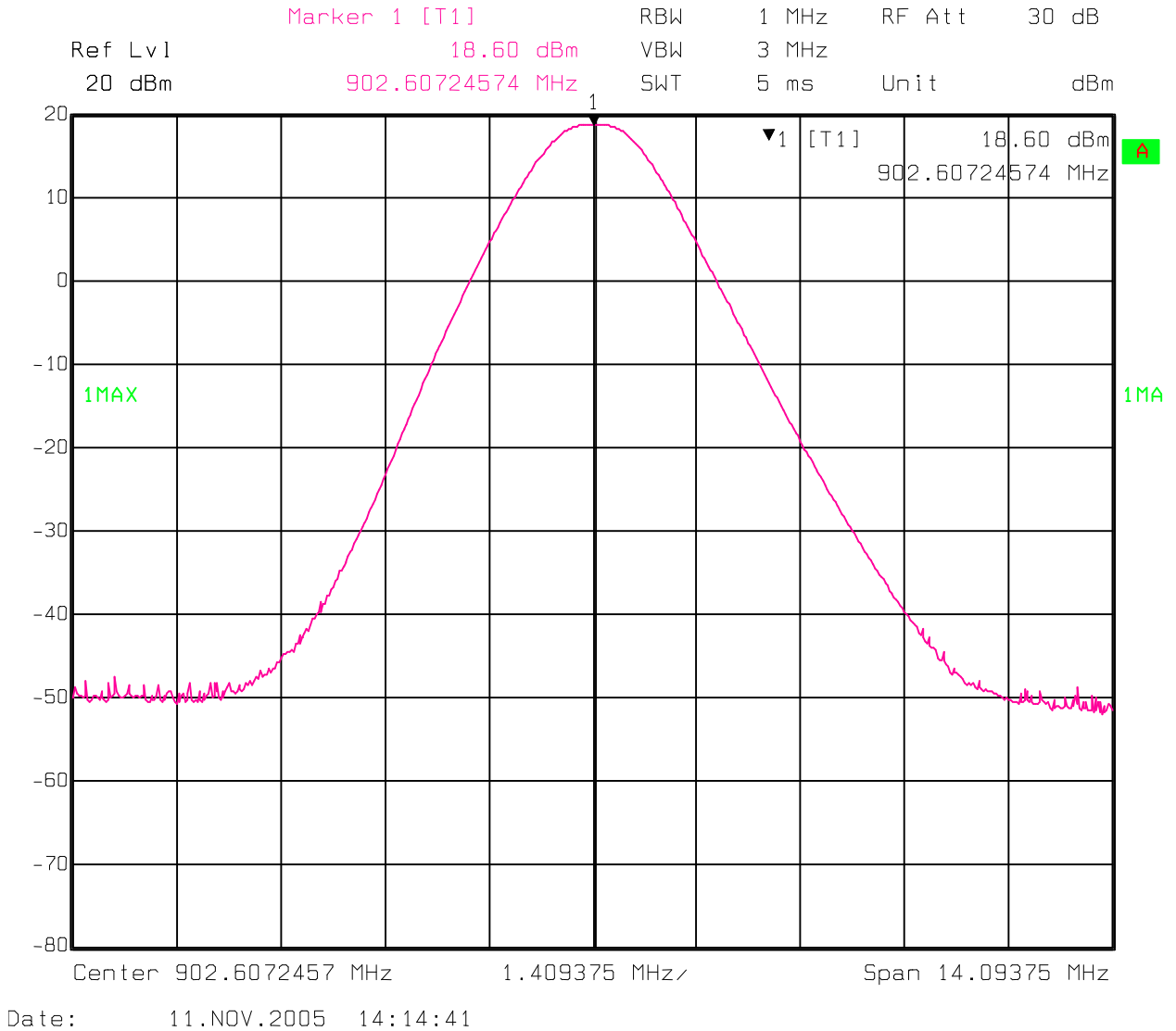
18.6 dBm + 2.4 dBi gain = 21.0 dBm
ANT-916-CW-RCL 2.4 dBi

$$10^{((\text{dBm}-30)/10)} = W$$

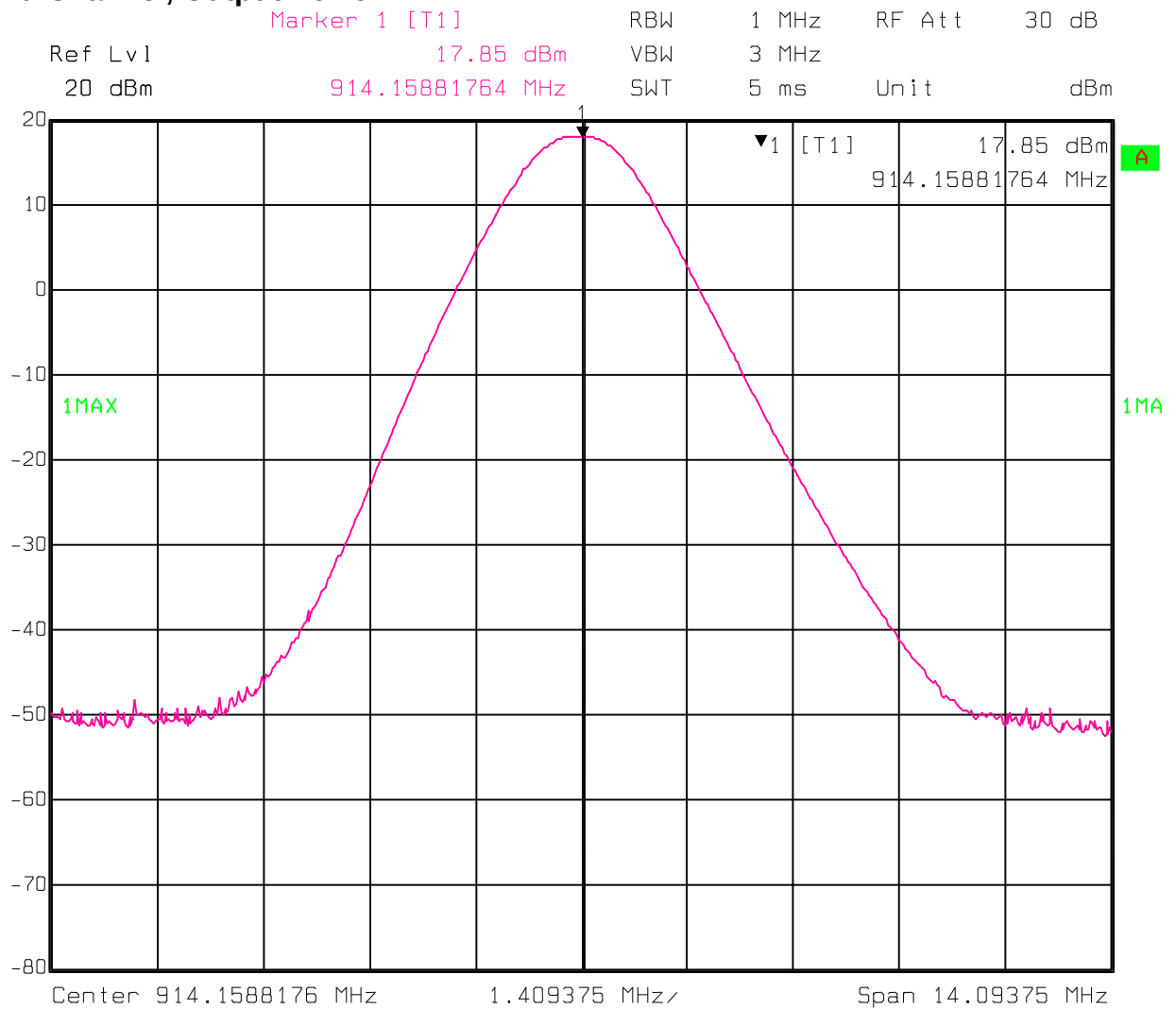
$$21.0 \text{ dBm} \Rightarrow 0.126 \text{ W}$$

See Plots...

Low Channel, Output Power

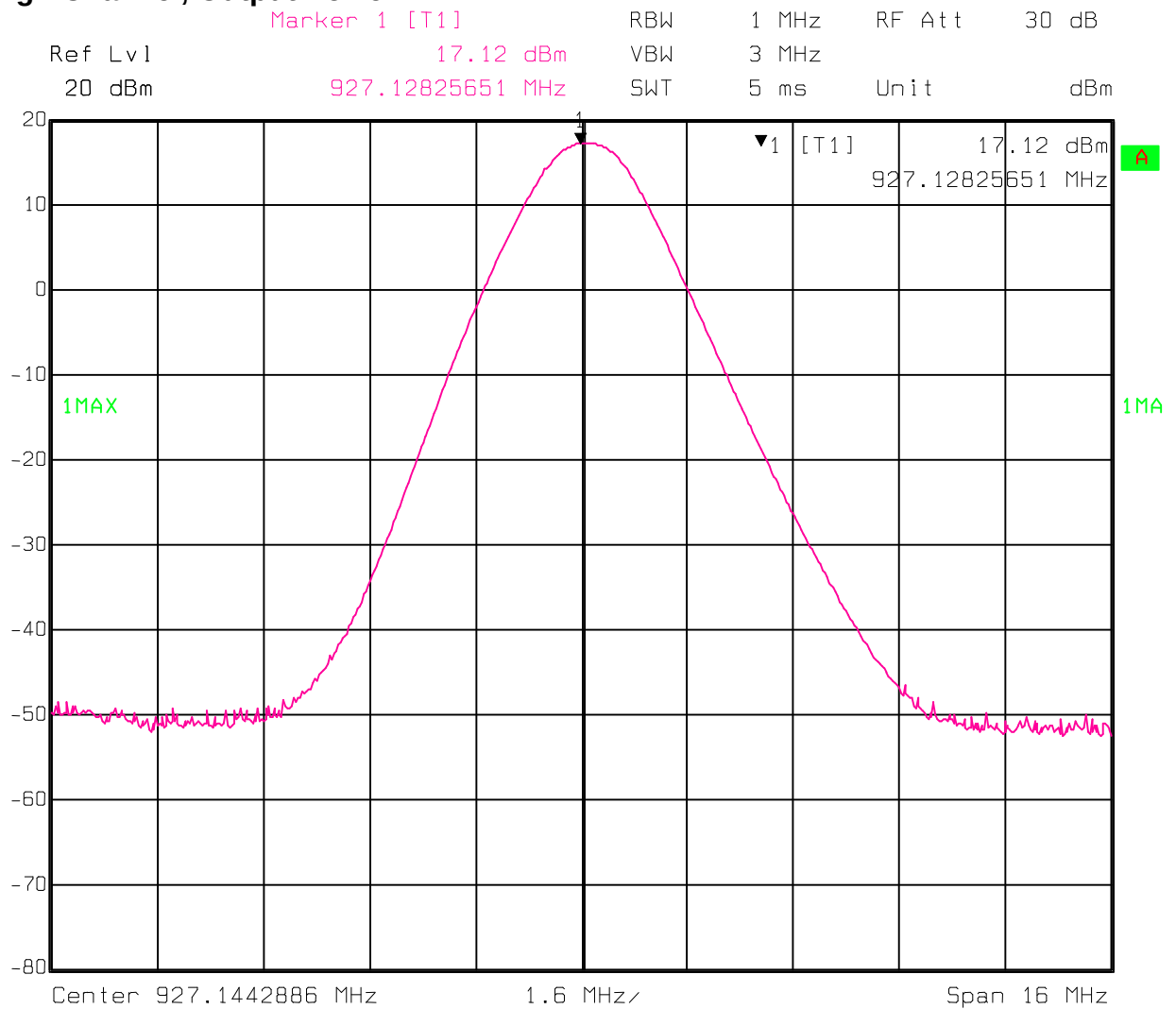


Mid Channel, Output Power



Date: 11.NOV.2005 14:17:08

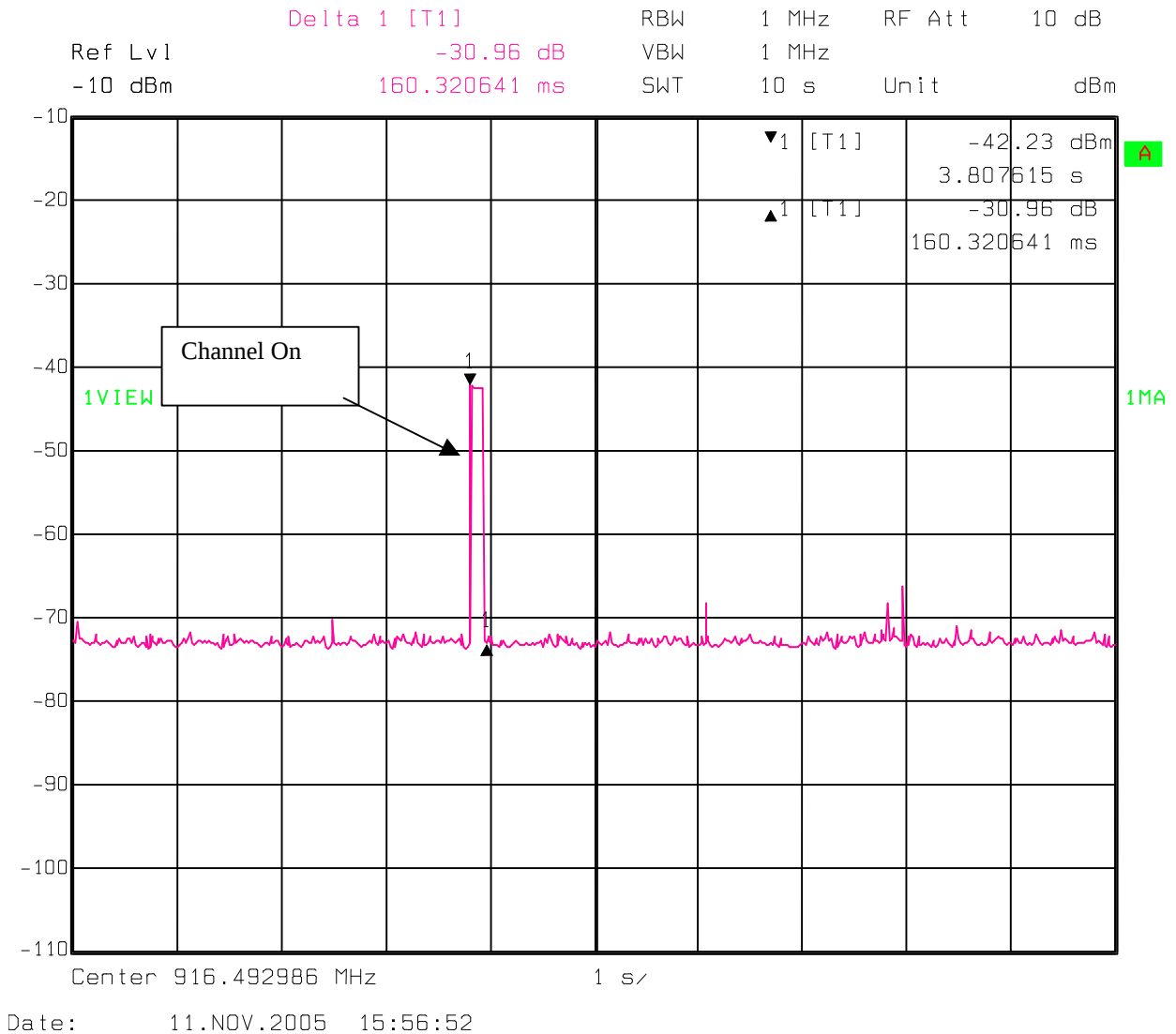
High Channel, Output Power



Date: 11.NOV.2005 14:27:21

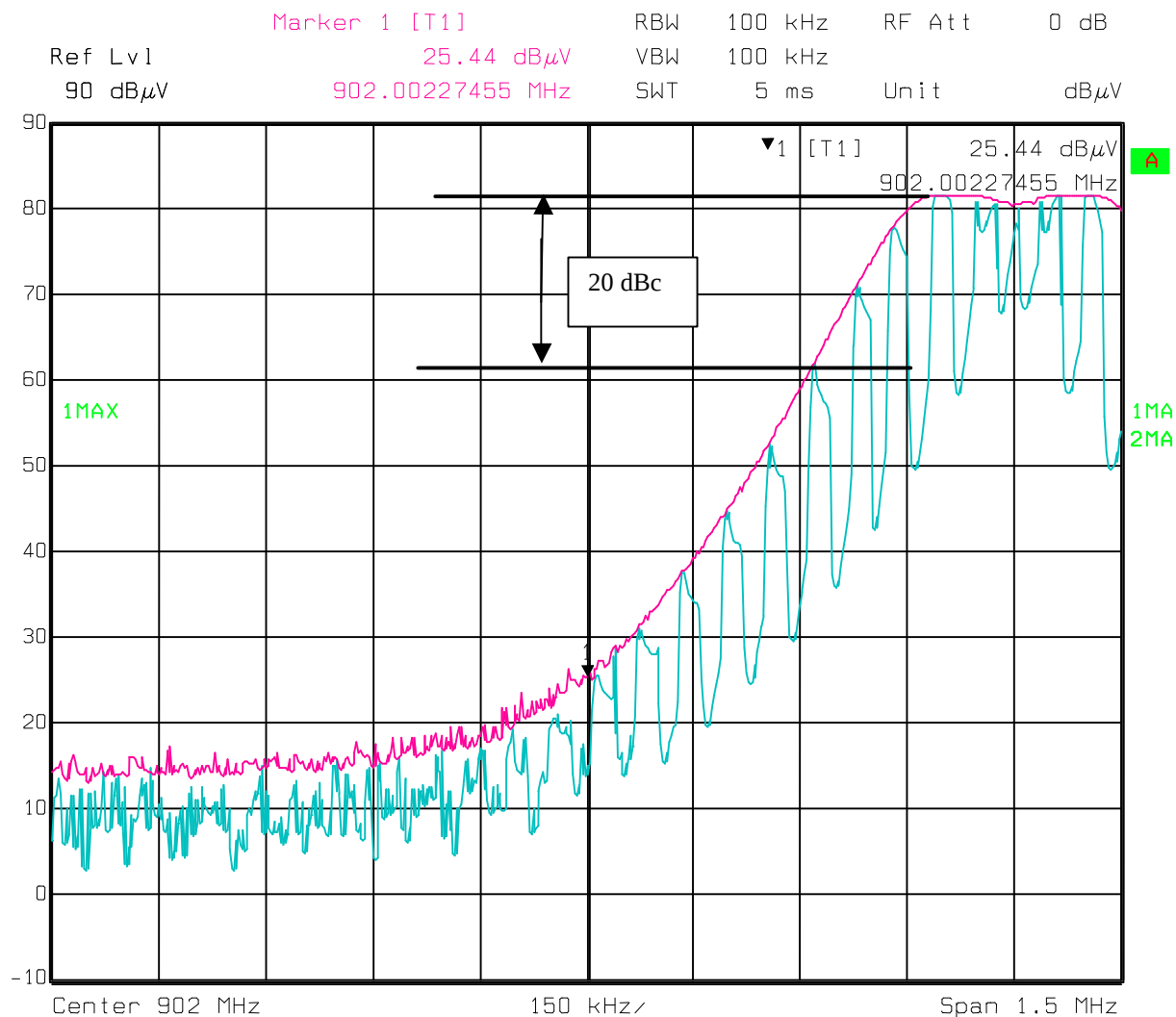
Time of Occupancy:

0.160 ms in 10 seconds x 25 channels = 0.4 second in 10 seconds.



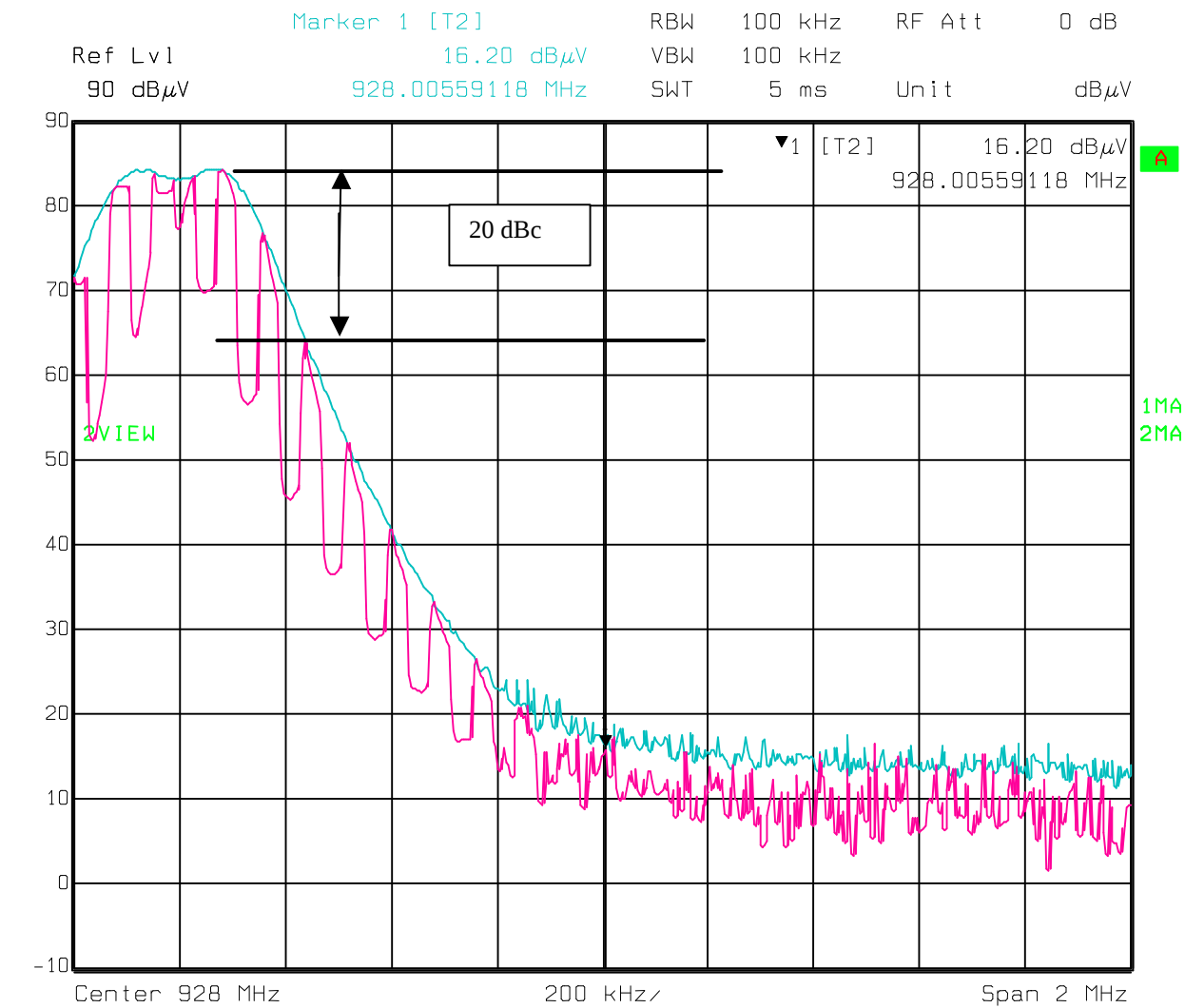
Lower Band Edge Hopping Off:

Lower band edge (902 MHz)



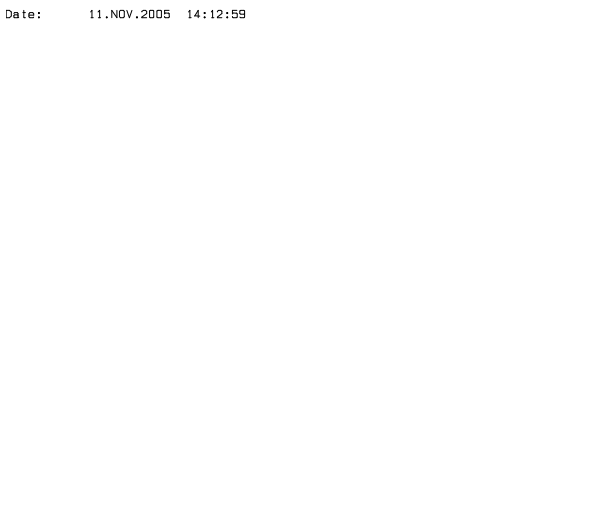
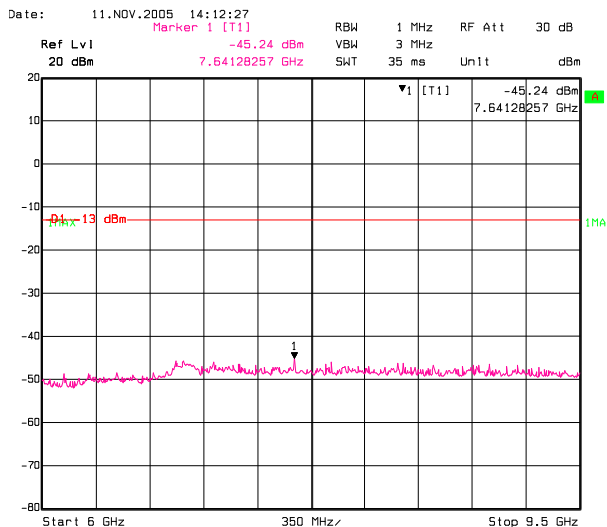
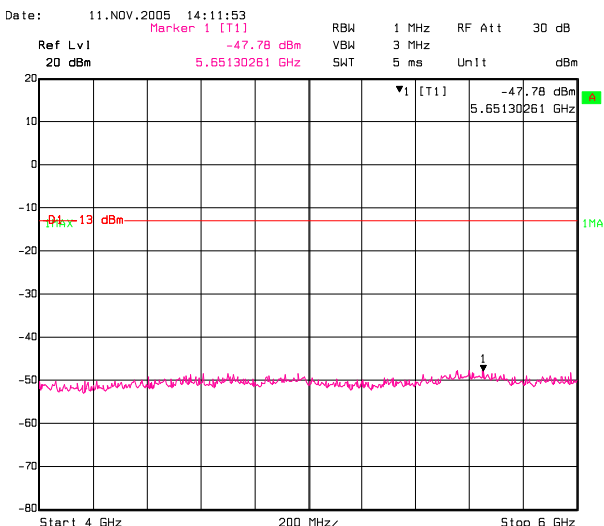
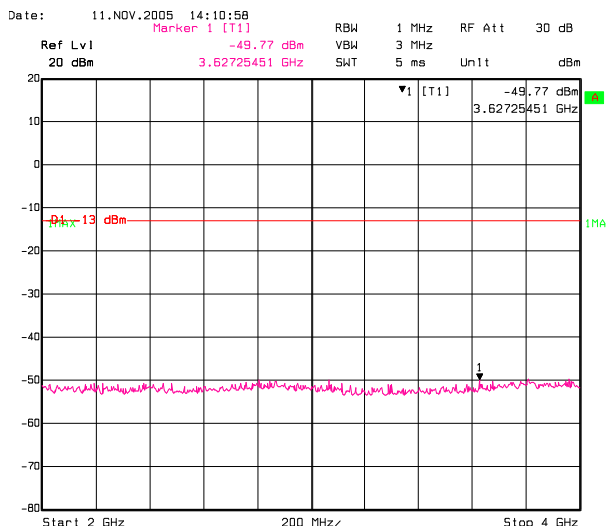
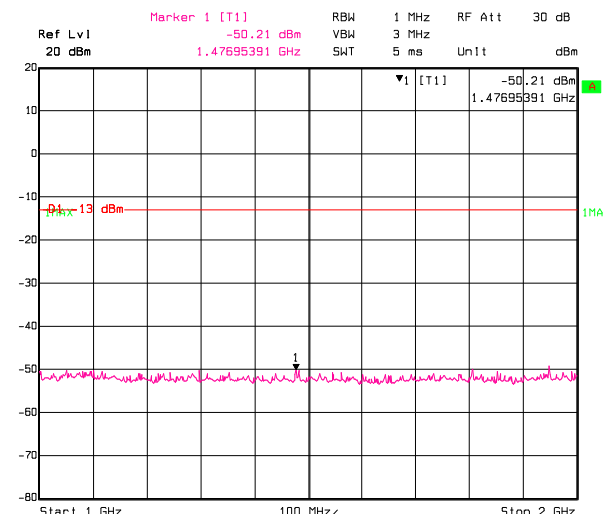
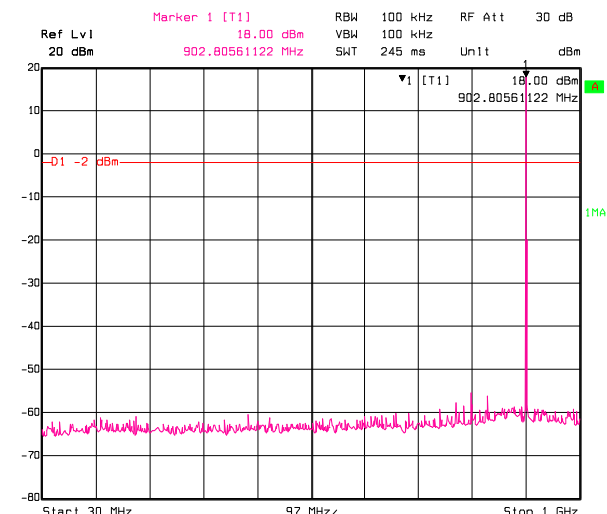
Date: 27.OCT.2005 09:04:03

**Upper Band Edge Hopping Off:
Upper band edge (928 MHz)**

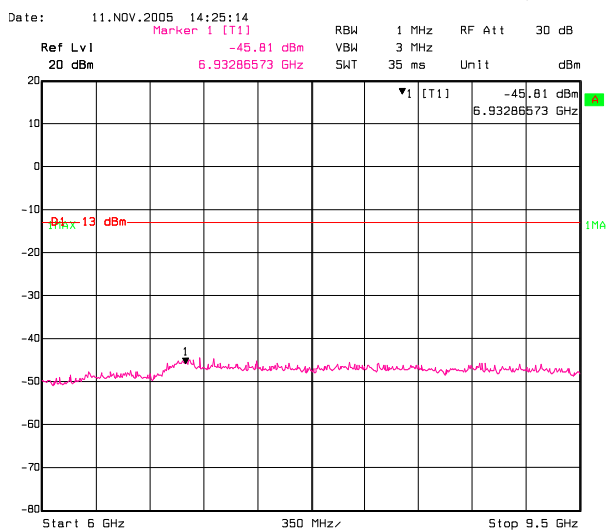
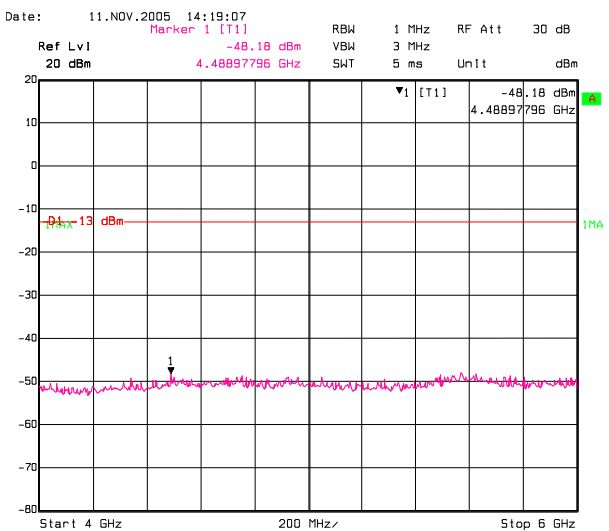
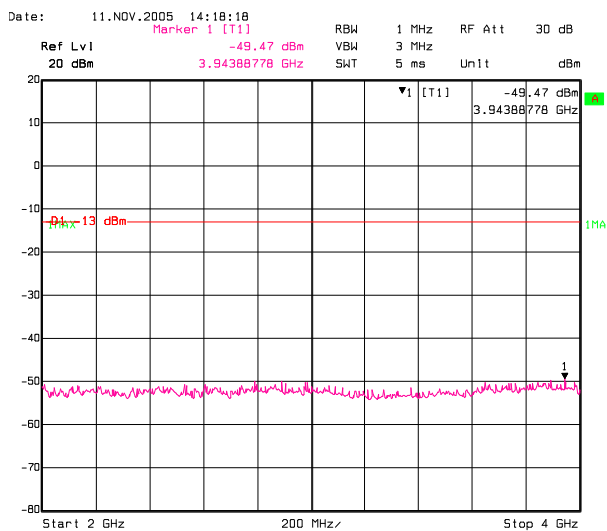
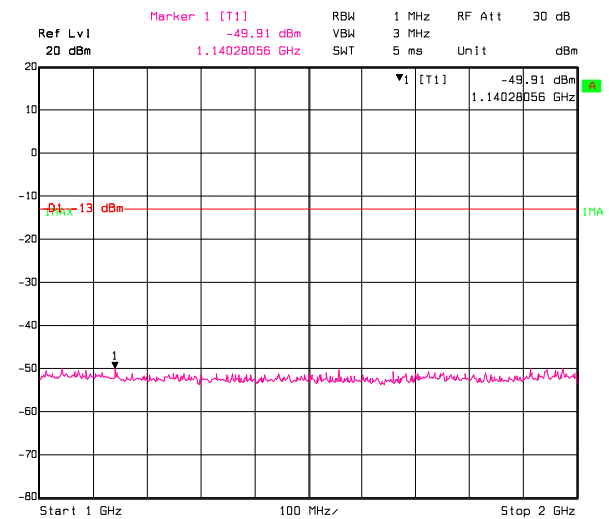
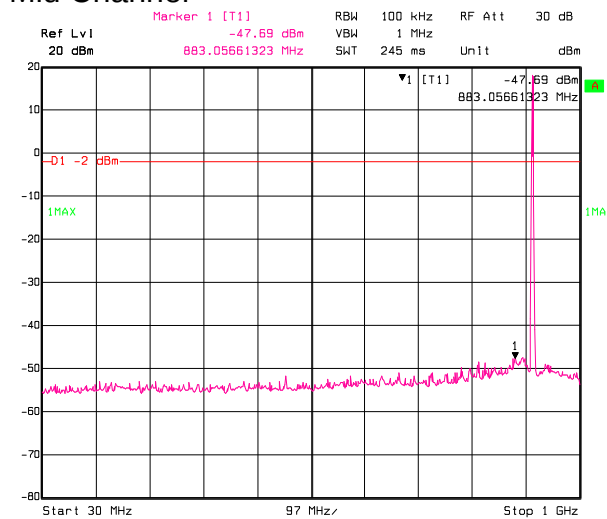


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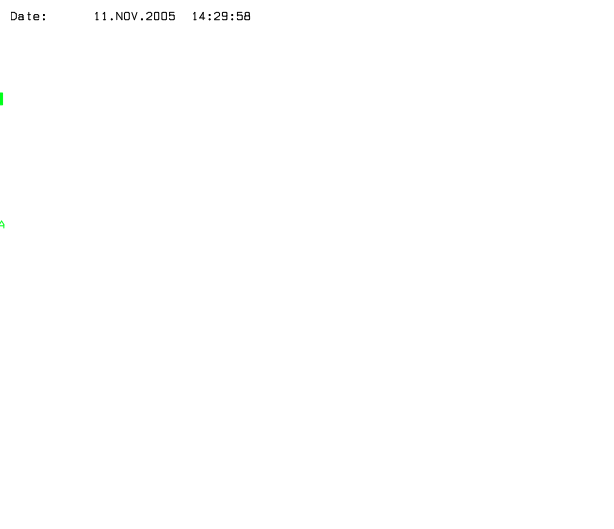
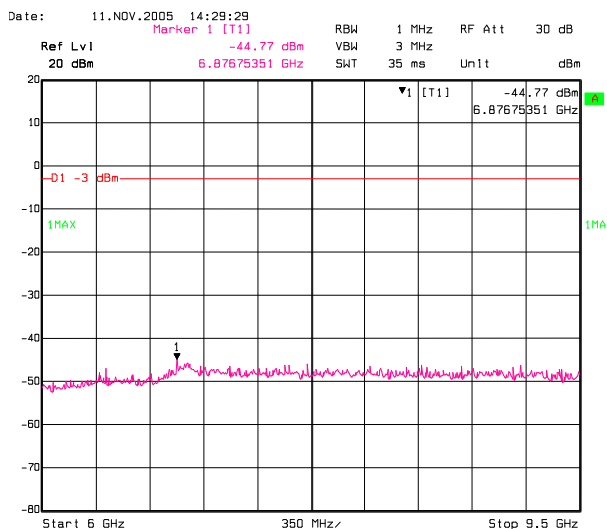
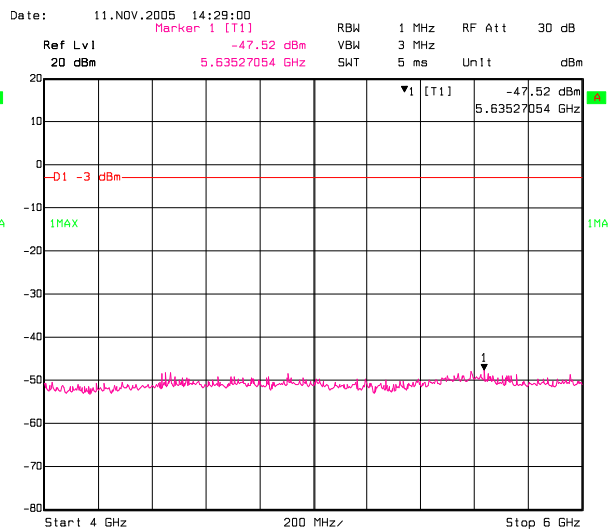
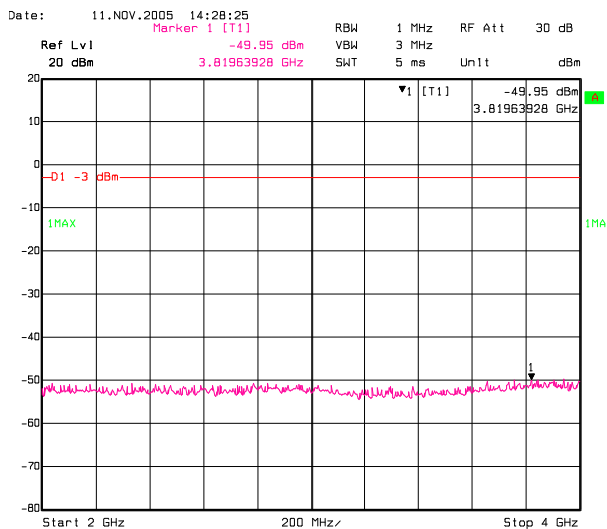
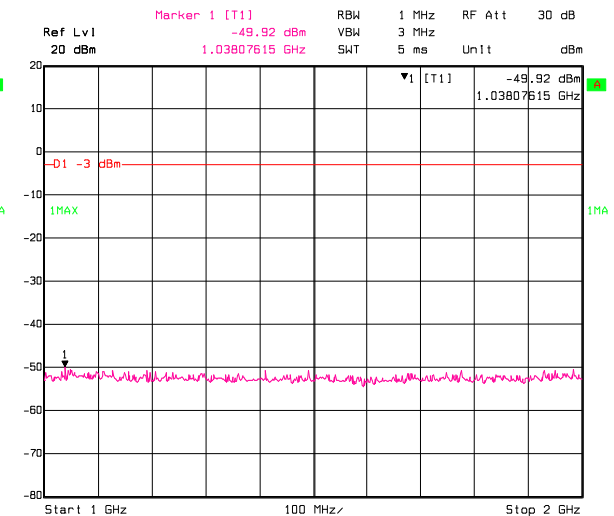
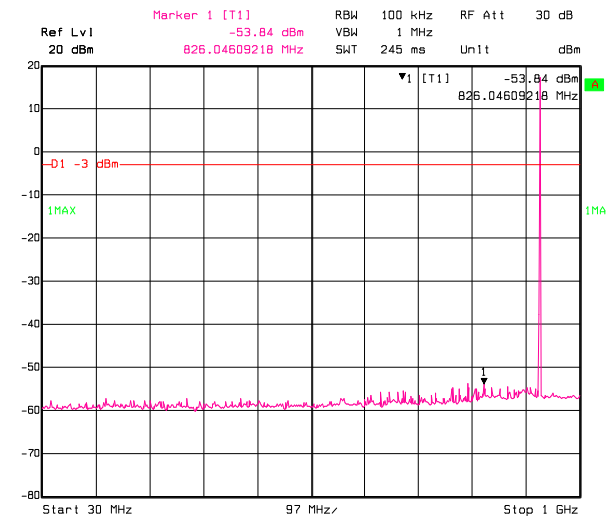
Conducted Emissions: Low Channel



Mid Channel

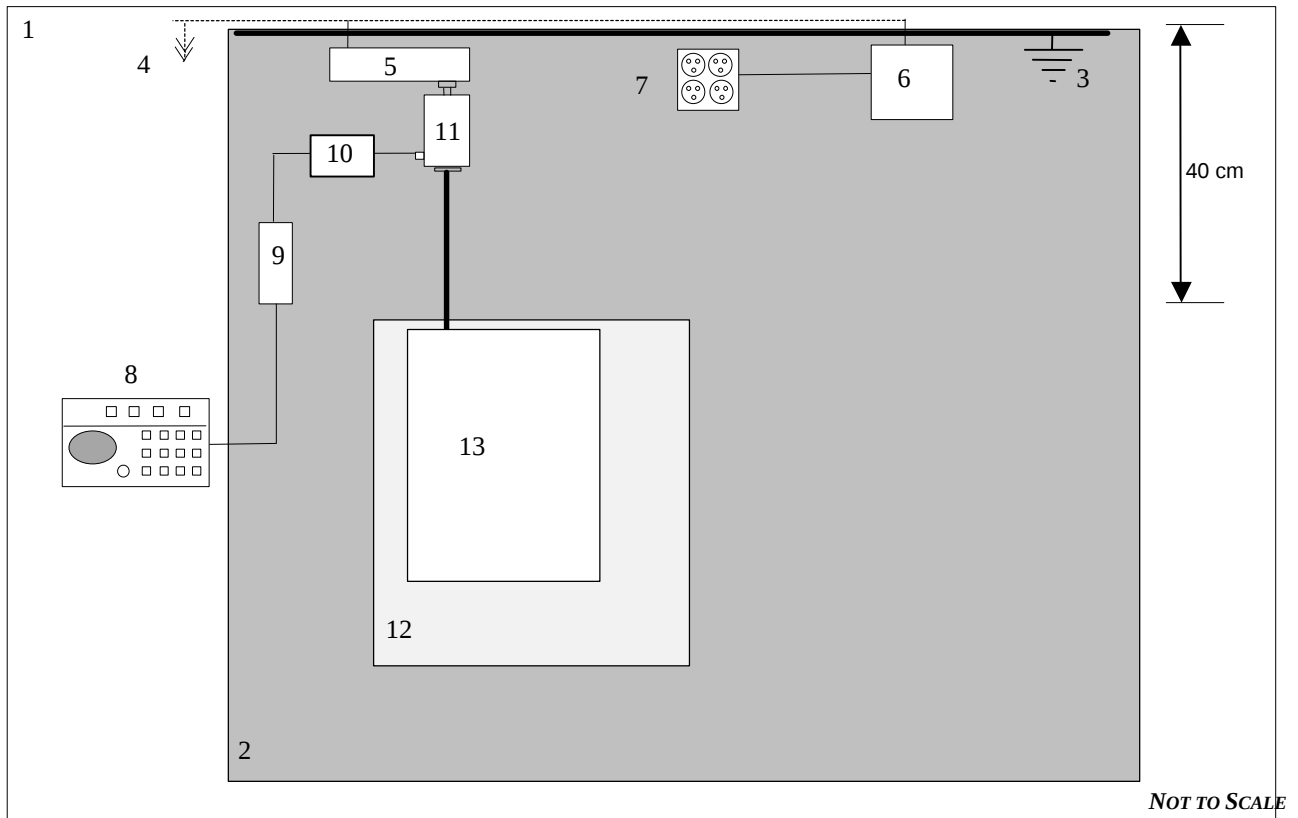


High Channel



Appendix B : Setup Photographs & Diagrams

Conducted Emissions Setup:



CONFIGURATION LEGEND

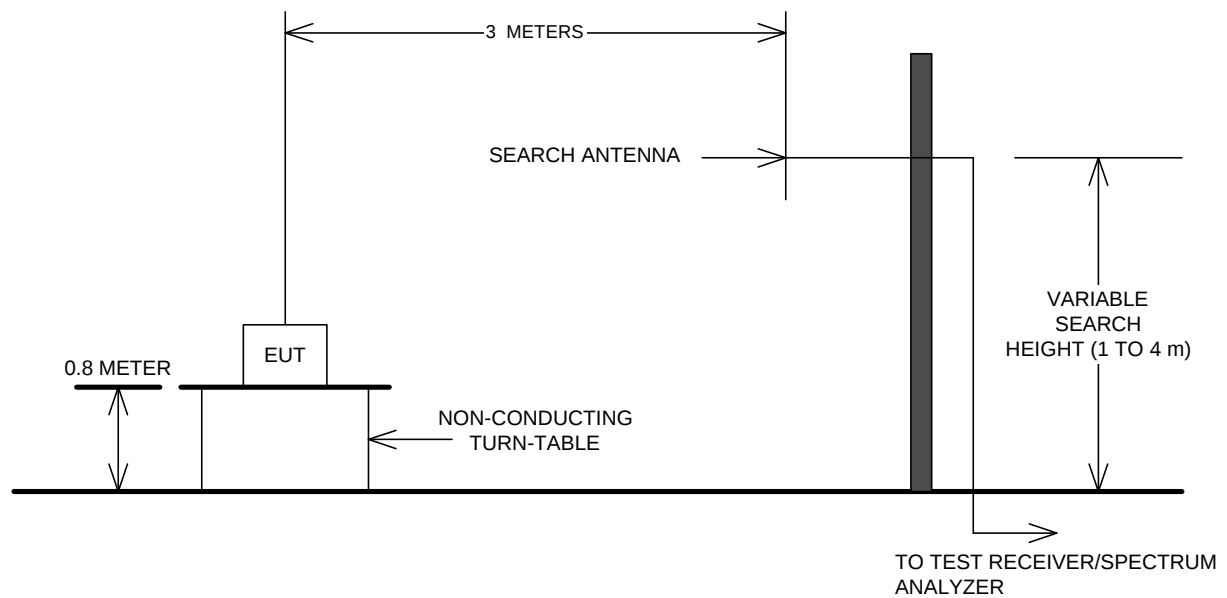
1. Test Laboratory (6 X 6 meters)
2. Ground Plane (15 square meters)
3. Vertical Conducting Wall (Grounded through Ground Plane via 10' ground rod)
4. AC Power for Devices
5. Power Line Filter, Lindgren, 120 dB, 30 amp
6. Artificial Mains Network (AMN) for peripheral devices
7. Power Distribution Box for peripheral devices
8. Spectrum Analyzer with Quasi-Peak Adapter
9. High Pass Filter
10. Coax input from EUT AMN to Spectrum Analyzer
11. AMN for EUT
12. EUT and Associated System

Spurious Emissions Setup:

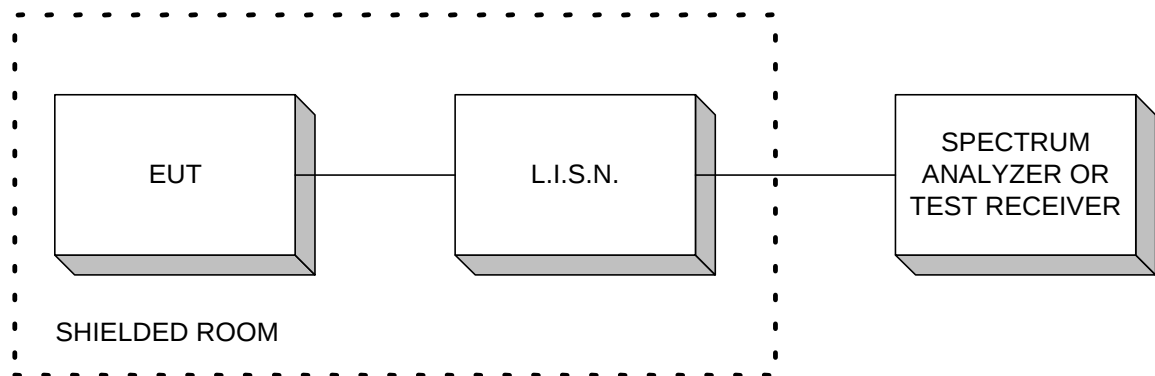


Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions



Conducted RF Emissions

Power level, bandwidth, conducted spurious

