



Project: 04CA24593
File: MC2181
Date: 12/08/2004
Model: MPR-2010
FCC ID: OGS MPR-2010AN

Test Report

On

Electromagnetic Compatibility Testing

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quality service for over 100 years**

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

Test Report Details

Tests Performed By:	Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, NY 11747
Tests Performed For:	Applied Wireless Identifications Group Inc. 382 Route 59 Section 292 Monsey , NY 10952
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Test Report Date:	12/08/2004
Product Type:	UHF RFID Reader
Model Number:	MPR-2010
Sample Serial Number:	Not Provided
Sample Tag Number:	0585774001
Sample Receive Date:	6/7/2004
EUT Category:	Radio Transmitter
Testing Start Date:	6/7/2004
Date Testing Complete:	11/12/2004

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, A2LA, or any agency of the US government.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
12/08/04	Add Spurious and Radiated tests	Joe Danisi	Bob DeLisi

1.0 G E N E R A L - Product Description

AWID's Sentinel-Sense MPR-2010 Ver. X.XXR is a long-range (12 to 15 feet) reader with RS-232 I/O interface general purpose digital I/O (GP I/O - one (1) input two (2) outputs) that works with most leading passive UHF passive tags. This reader comes with a unique combination of long read range, small size, and low power consumption. MPR-2010 has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. Its primary applications are asset management and tracking, and fleet management applications.

This Radio Frequency Identification (RFID) reader uses radio frequency to identify, locate and track pallets and/or items that carry the appropriate RFID transponders. MPR-2010 readers works in non-line-of-sight situations and in darkness, bright sun light, or through dirt, grime and smudges.

A typical RFID system consists of three components – a reader (interrogator), a transponder (card or tag), and a data processing controller. MPR-2010 has an internal micro-controller section, a transmitter section, a receiver section, and a circular polarized transmit/receive antenna. Passive transponders (tags or labels) consist of an antenna and an RFID ASIC (Application Specific Integrated Circuits). During operation, the transmitter sends out an electromagnetic wave to establish a zone of surveillance. When a transponder enters this zone, the electromagnetic energy from the reader begins to energize the IC in the transponder. Once the IC is energized, it goes through an initialization process and is ready to accept further commands. Upon receiving a command that query its identity, the RFID ASIC begins to broadcast its identity through a low-energy back-scattering processes, which selectively reflects or “back-scatters” the electromagnetic energy back to the interrogator. The receiving circuits in the reader sense and decode this “back-scattered” signal and determine the identity of the transponder.

Frequency Hopping and Modulation

The MPR-2010 utilizes the frequency hopping technique to satisfy the FCC requirements for spread spectrum operation. 50 frequency channels are selected in a pseudo random manner, with each dwell period at a nominal 300 milliseconds. These channels are separated by 0.5 MHz and extend from 902 to 928 MHz. To guarantee that the modulation bandwidth will be at least 20 dB between channels, the transmitter is switched off while hopping. The hopping frequencies are accurately controlled through the use of a fast PLL synthesizer, which can lock within 100 microseconds and utilizes a programmable hopping table, which provides the necessary pseudo-random control.

By making each dwell period identical and not allowing revisits until all channels are scanned, it is assured that each hopping channel is utilized equally on average.

Because the receiver utilizes homodyne demodulation, its carrier frequency is automatically identical to that of the transmitter and will hop in synchronism.

The receiver bandwidth is inherently designed to match the modulation bandwidth of the transponder and, since the MPR-2010 is multi-protocol, the receiver bandwidth is programmed to match the particular transponder used.

In order to avoid simultaneous occupancy of transmitting channels in a multi-transmitter environment, each frequency table is pseudo random and is in no way synchronous with any other (see Table 1). And, although there is always a possibility that 2 or more transmitters can transmit simultaneously in any instant, the probability of any substantial energy buildup is, practically zero.

Table 1: Hopping Table for MPR-2010 Reader

Index	Freq.	Index	Freq.
1	902.41	26	914.71
2	902.91	27	915.21
3	903.39	28	915.70
4	903.88	29	916.19
5	904.38	30	916.69
6	904.87	31	917.18
7	905.37	32	917.66
8	905.86	33	918.16
9	906.34	34	918.65
10	906.84	35	919.15
11	907.33	36	919.64
12	907.83	37	920.13
13	908.31	38	920.63
14	908.80	39	921.11
15	909.30	40	921.60
16	909.79	41	922.11
17	910.29	42	922.59
18	910.78	43	923.08
19	911.26	44	923.58
20	911.76	45	924.07
21	912.25	46	924.57
22	912.75	47	925.06
23	913.24	48	925.54
24	913.73	49	926.04
25	914.23	50	926.53

FUNCTIONAL DESCRIPTION

Theory of Operation:

A typical RFID system consists of three components- a reader (interrogator), a transponder (card or tag), and a data processing controller. MPR-2010 has an internal micro-controller section, a transmitter section, a receiver section, and a circular polarized transmitter/receive antenna. Passive transponder (tags or labels) consists of an antenna and an RFID ASIC (application Specific Integrated Circuits). During operation, the transmitter sends out an electromagnetic wave to establish a zone surveillance. When a transponder enters this zone, the electromagnetic energy from the reader begins to energize the IC in the transponder. Once the IC is energized, it goes through an initialization process and is ready to accept further commands. Upon receiving a command that query its identity, the RFID ASIC begins to broadcast its identity through a low-energy back- scattering processes, which selectively reflects or "back-scatters" the electromagnetic energy back to the interrogator. The receiving circuits in the reader sense and decode this "back-scattered" signal and determine the identity of the transponder.

Passive tags are "beam powered", which is the electromagnetic energy radiated by the transmitter section of the reader. Upon receiving a legitimated command, the tags will cause the matching of the tags antenna to vary from match to mismatch, thereby causing the tags to absorb the RF energy or to reflect the RF energy. This absorption or reflection sequence is commanded by the tags internal memory and this is how the tags internal data are "conveyed" to the reader. The reader in turn monitors the perturbation of the RF energy field, and thereby receives the varying degree of signal reflected from the tags.

The MPR-2010 is an RFID (Radio Frequency Identification) long-range Transceiver, operating at UHF (902-928 MHz), in a Frequency Hopping Mode. The unit has a self-contained antenna and operates directly on DC power. The dual data interface provides both Wiegand and RS-232 interfaces.

The antenna is a circularized integral part of the EUT and is self-contained within the enclosure.

Applications:

The MPR-2010 can be utilized in a number of applications in both security access and asset management. For example, the MPR-2010 may be used in parking garages and gate locations for both entry and identification.

DC Regulator:

This is a high efficiency Switching regulator whose output is a fixed 5 volts. The regulator can function with input voltages as high as 16 volts, but to provide stable and reliable operation, the input operating voltage range is limited from 5 to 12 volts at 5 watts maximum.

Synthesizer:

The synthesizer is a high speed, self-contained chip, which includes the Phase Lock Loop, VCO and interface controls. These are 50 frequencies, which are hopped as specified in Table 1.

Driver Amplifier and Power Amplifier:

These devices amplify the weak synthesizer output to a level in excess of 1 watt.

The Power Amplifier will operate in a near saturated condition for optimum efficiency and minimal noise.

Receiver Demodulator:

As the Power Amplifier output progresses toward the antenna, it passes through a Homodyne I/Q demodulator where it acts as a receiver local oscillator. Since a Homodyne receiver is used, there is no spurious local oscillator radiation.

Transmit Modulator:

The transmit Modulator is basically a high-speed non-reflective RF switch, which generates an appropriate modulation command for the purpose of activating the transponders.

Harmonic Filter:

This filter is designed to bring the radiated harmonics to a level below 500 microvolts / meter at a 3 meter distance. The peak output power to the antenna is + 30 dBm maximum.

Antenna:

The antenna is a Circular Polarized patch antenna and has a gain of 6.0 dBi.

Analog Receiver Channels:

The Analog Receiver's video bandwidth is designed to accommodate a number of known transponder types. The lower frequency cut-off is programmable in order to provide adequate receiver recovery after a series of modulation pulses.

Pre-Processors:

Each of the Pre-Processors time-samples and decodes the I and Q signals from the Receiver Demodulator. It includes a CRC check to insure the data is correct and re-transmits the correct data to the Main Processor, using TTL level RS-232 protocol.

The Main Processor:

The Main Processor generates the frequency hopping command to control the Synthesizer, generates the transmitter modulation command for tag activation and provides the interface, which transmits the data from the Pre-Processors to the user. It also accepts commands from the user to perform inter-active functions.

1.1 Device Configuration During Test

The MPR-2010 is configured for worst-case condition during the transmit mode testing. This was with 48V DC with modulation (AM). During the receive mode testing, all modulation and transmitting was turned off and the unit was tested at 48V DC worst-case condition.

1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Reader	AWID	MPR-2010	-
ACC	Laptop	Hyperdata	6133	-
ACC	Power Supply	Delta Electronics Inc	ADP-45GB Rev.P	-
ACC	Hub/Switch	AWID	P1-2000	-
ACC	Notch Filter	AWID	-50dB	902-928MHz

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

1.1.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	-	-	None
1	Mains	DC	> 3m	No	Ethernet is utilized to power the EUT
2	DC/ I/O	Ethernet	> 3m	No	Ethernet Cable UTP 24AWG Cat5E

*AC = AC Power Port

DC = DC Power Port

N/E = Non-Electrical

I/O = Signal Input or Output Port (Not Involved in Process Control)

PMC = Process Measurement and Control Port

1.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
902 - 928	Spread Spectrum	---	---

1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated						
1	48	0.3	1	DC	-	Power is received via the Ethernet cable

1.2 EUT Operation Modes:

Mode #	Description
1	Transmit Mode
2	Receive Mode

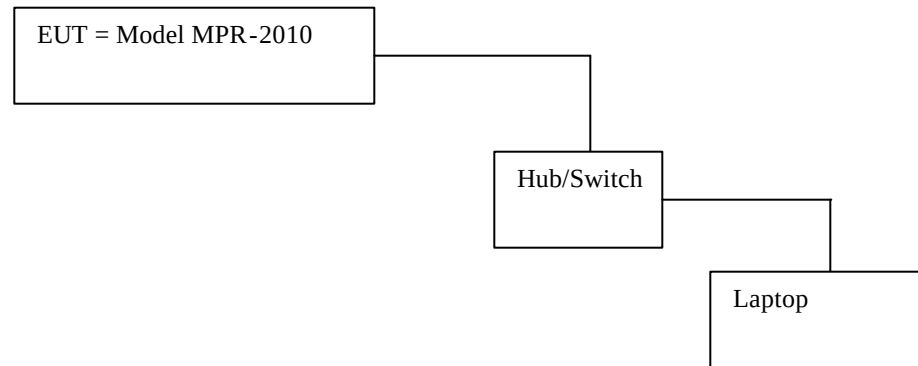
1.3 EUT Configuration Modes:

Mode #	Description
1	The MPR-2010 is configured for transmit mode testing. This was with 48V DC with modulation (AM). During the receive mode testing, all modulation and transmitting was turned off and the unit was tested at 48V DC. The manufacturer configured the laptop and the hub/switch to communicate with the EUT via a CAT5E cable.

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 Deviations from standard test methods.

Not Applicable

1.6 Field Strength Calculation

If a preamplifier was used during the Radiated Emissions testing, it is required that the amplifier gain be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. These considerations are automatically presented as a part of the print out. This modified specification limit is referred to as the "Actual Level" or simply the level, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

Level = Meter Reading + Gain/Loss + Transducer

Where

Meter Reading = Spectrum Analyzer Reading

Transducer – Antenna Factor

Gain/Loss = Cable Loss – Amplifier Gain (if any)

The Margin on the printout will be the actual margin level from the limit

For Example:

At 6835.407MHz we had a meter reading of 28.7 dB/uV, a Gain/Loss of –23.7 dB and a transducer factor of 36.9 dB.

Level = 28.7 = (-23.7) + 36.9

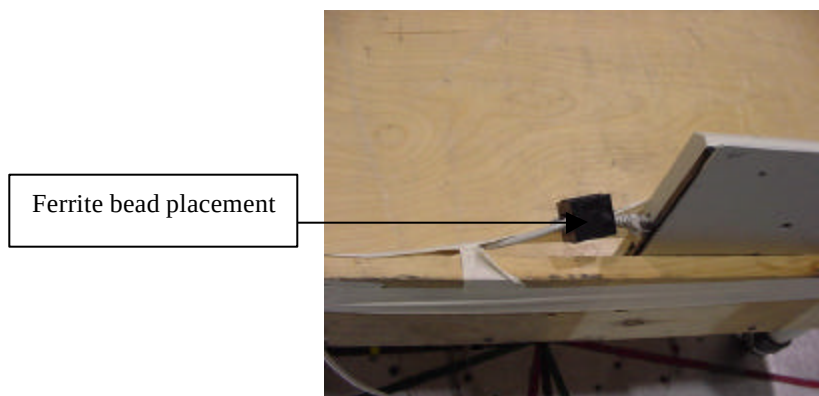
Level = 41.9 dBuV/m

This result is below the FCC Class B limit of 54 dBuV/m at 6835.407 MHz.

1.7 Device Modifications Necessary for Compliance

Yes, see below:

A ferrite bead was implemented with one turn on the CAT5E cable to comply with the Radiated Emissions limit. The manufacturer was Fair-Rite the P/N was 0443164151 or equivalent.



1.8 Test Summary

Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
Radiated Disturbance Emissions - 30 to 10000 MHz Electric Field	Y	-	2
FCC Part 15, Subpart C, Section 15.247			
Conducted Disturbance Spurious Emissions -	Y	-	1
FCC Part 15, Subpart C, Section 15.247			
Carrier Frequency Section 15.247 A1:	Y	-	1
Number of Hopping Frequencies Section 15.247 A (i)			
Time of Occupancy (Dwell Time)	Y	-	1
Occupied Bandwidth			
Peak Output Power Section 15.247(B)	Y	-	1
RF Exposure Compliance Requirements			
Band-edge Compliance of RF Conducted Emissions: Section 15.247 (C)	Y	-	1

Remarks:

- 1) No Modifications required for compliance.
- 2) Modifications required to comply as described in Section 1.6

2.0 Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The Applicant as being applicable to the Equipment Under Test determined the test list. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has met the technical requirements as defined under section 5.0.

Test Start Date: 7 June 2004
Test Completion Date: 12 November 2004



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3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is the manufacturer recommends one year or what whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

----- United States -----

FCC Part 15, Subpart B, 15.109 and Subpart C, 15.209 and Section 15.247 Code of Federal Regulations, Part 15, Subpart B and C, Radio Frequency Devices

Conducted Emissions Measurement summary:

Measurements	Results
Time of Occupancy	≈ 291ms
Spurious RF Antenna Port Conducted Emissions	> 20db
Occupied Bandwidth (20 dB BW)	37.41 KHz
Peak Output Power	28.02dBm
Carrier Frequency Separation	495KHz
Number of Hopping Frequencies	50
Band Edge Compliance (lower and Upper Band 902 MHz and 928 MHz)	> 20db

5.1.1 Spurious RF Conducted Emissions

Test Applicable

Procedure:

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz bandwidth. Spurious RF conducted emissions are measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer. The spectrum analyzer scans up to the 10th harmonic.

The following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.

RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	22.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	10 June 2004

1 fully configured sample was scanned over the following frequency range

Frequency range on each side of line	Measurement Point	Mode*	
		Power	Operation
30MHz to 10GHz	Antenna Port, Spurious Emission	<u>1</u>	<u>1</u>

*See Power Interface and EUT Operating Modes for details

ESI26

Rhode & Schwartz

EMI Receiver

Equipment No.: ME5B-081

Quasi Peak BW: 200Hz 9kHz to 150kHz
 RBW 10 KHz

Quasi Peak BW: 9kHz 150kHz to 30MHz
 RBW 100 KHz

Quasi Peak BW: 120 kHz
 RBW 1.0 MHz

Range: DC- 26.5GHz
 35710

Last Calibration Date: 28 August 2003

Oakton

Hygrometer/Temp
 Ranges

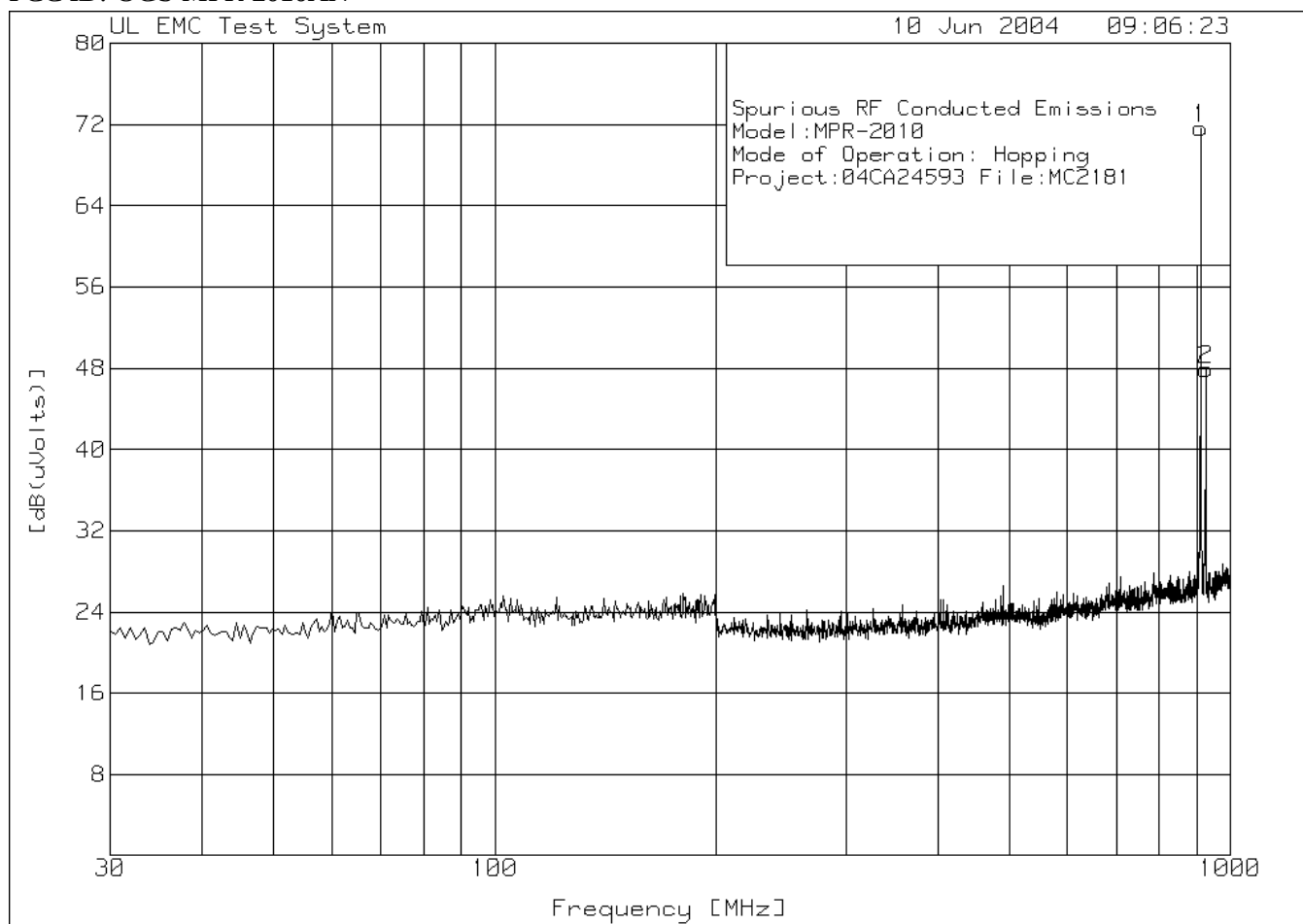
Calibration Due Date: 31 August 2004

Equipment No.: ME4-297

Temp: -30°C-50°C
 Humidity: 0% to 100%RH

Last Calibration Date: 02 June 2004

Calibration Due Date: 02 June 2005



File Number: MC2181

Issued: 12/08/2004

Project Number: 04CA24593

Model Number: MPR-2010

FCC ID: OGS MPR-2010AN

Spurious RF Conducted Emissions

Model:MPR-2010

Mode of Operation: Hopping

Project:04CA24593 File:MC2181

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit1	Limit 2
-----	----------------------------	------------------------------	-----------------------------	------------------------------	-----------------------	--------	---------

=====							
Range 1 30 - 1000MHz -----							
1	911.2013	71.65 pk	0	0		71.65	-
		Height:101	Horz	Margin [dB]			
2	925.7586	47.92 pk	0	0		-	47.92
		Height:101	Horz	Margin [dB]			

LIMIT 1: Fundamental Emissions

LIMIT 2: 20 dB down from fundamental

pk - Peak detector

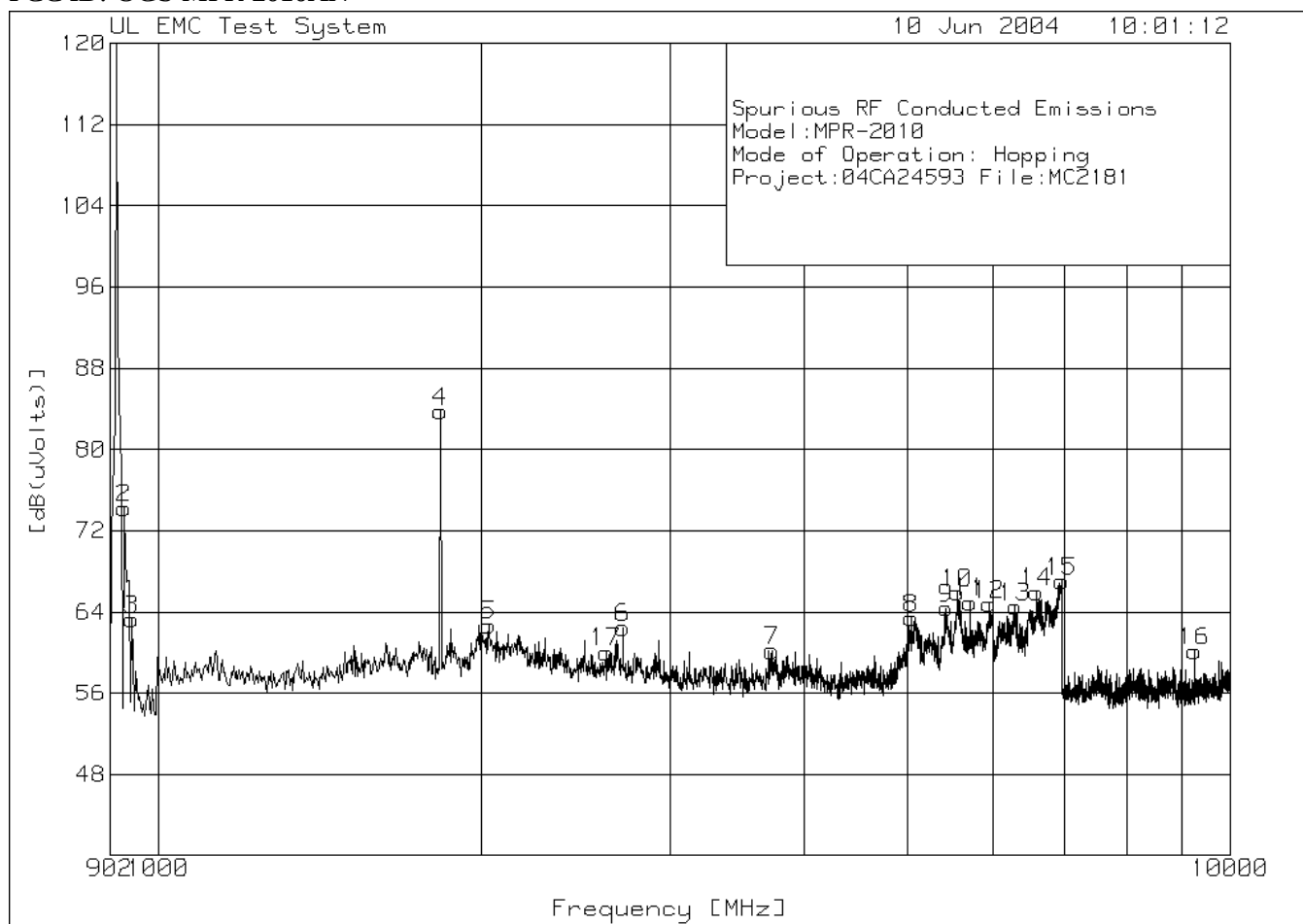
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



File Number: MC2181

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Model Number: MPR-2010

FCC ID: OGS MPR-2010AN

Spurious RF Conducted Emissions

Model:MPR-2010

Mode of Operation: Hopping

Project:04CA24593 File:MC2181

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit1	Limit 2
-----	----------------------	------------------------	-----------------------	------------------------	--------------------	--------	---------

Range 1 902 - 10000MHz -----							
1	914.1347	131.91 pk	0	0	131.91	-	
		Height:101	Horz	Margin [dB]			
2	929.3031	74.23 pk	0	0	-		74.23
		Height:101	Horz	Margin [dB]			-57.68
3	944.4715	63.28 pk	0	0	-		63.28
		Height:101	Horz	Margin [dB]			-68.63
4	1833.339	83.78 pk	0	0	-		83.78
		Height:101	Horz	Margin [dB]			-48.13
5	2033.562	62.69 pk	0	0	-		62.69
		Height:101	Horz	Margin [dB]			-69.22
6	2713.106	62.47 pk	0	0	-		62.47
		Height:101	Horz	Margin [dB]			-69.44
7	3735.455	60.19 pk	0	0	-		60.19
		Height:101	Horz	Margin [dB]			-71.72
8	5042.97	63.41 pk	0	0	-		63.41
		Height:101	Horz	Margin [dB]			-68.5
9	5431.281	64.38 pk	0	0	-		64.38
		Height:101	Horz	Margin [dB]			-67.53
10	5561.729	65.92 pk	0	0	-		65.92
		Height:101	Horz	Margin [dB]			-65.99
11	5716.447	64.93 pk	0	0	-		64.93
		Height:101	Horz	Margin [dB]			-66.98
12	5956.108	64.77 pk	0	0	-		64.77
		Height:101	Horz	Margin [dB]			-67.14
13	6298.913	64.52 pk	0	0	-		64.52
		Height:101	Horz	Margin [dB]			-67.39
14	6596.214	65.94 pk	0	0	-		65.94
		Height:101	Horz	Margin [dB]			-65.97
15	6957.221	67.04 pk	0	0	-		67.04
		Height:101	Horz	Margin [dB]			-64.87
16	9259.783	60.15 pk	0	0	-		60.15
		Height:101	Horz	Margin [dB]			-71.76
17	2616.028	60.04 pk	0	0	-		60.04
		Height:101	Horz	Margin [dB]			-71.87

LIMIT 1: Fundamental Emissions

LIMIT 2: 20 dB down from fundamental

pk - Peak detector

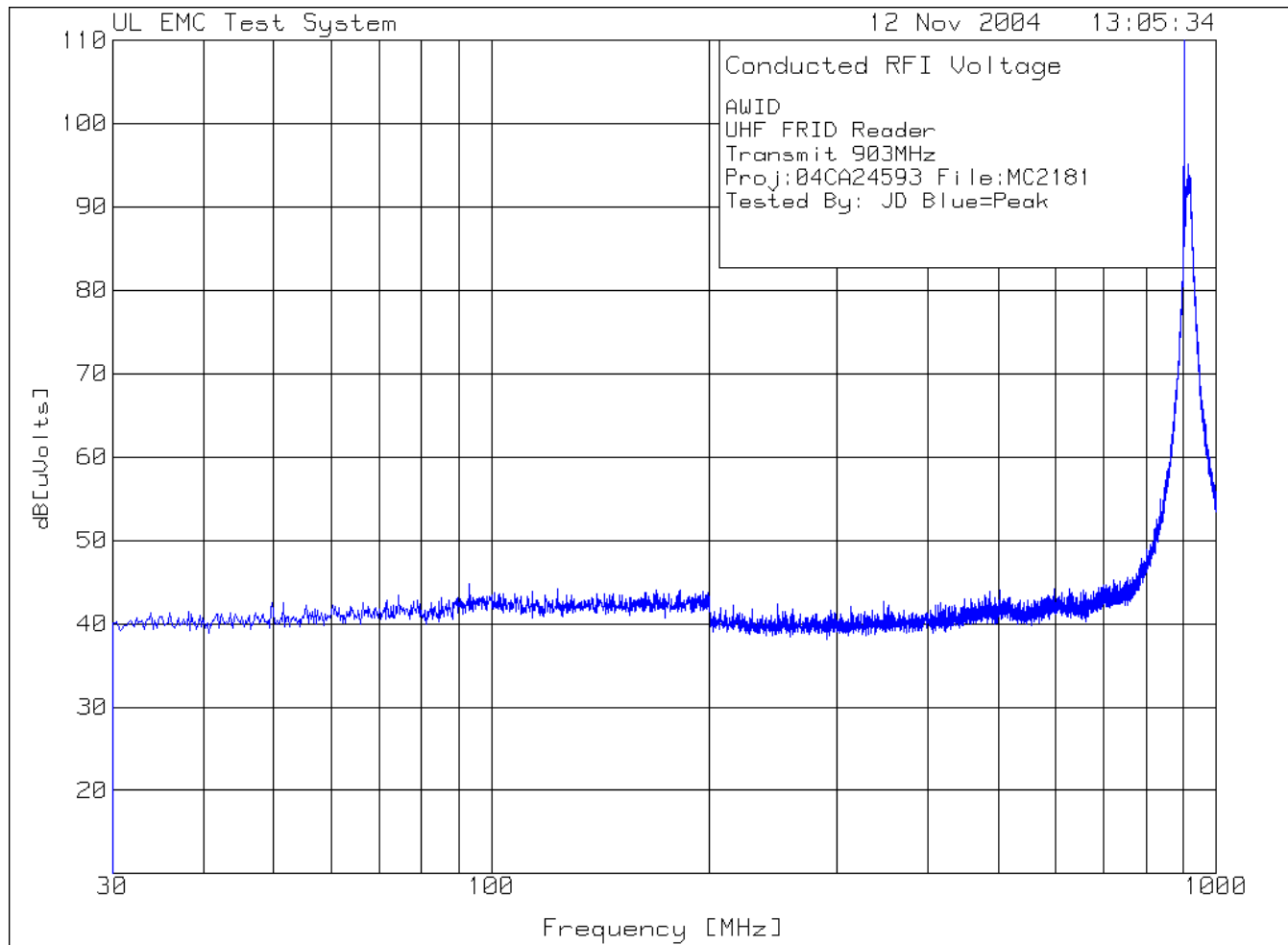
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



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AWID

UHF FRID Reader

Transmit 903MHz

Proj:04CA24593 File:MC2181

Tested By: JD Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	Limit:2
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------	---------

=====							
=====							
Range: 2 30 - 1000MHz -----							
1	902.3984	73.24 pk	41.7	20	134.94	134.94	-
				Margin [dB]			
2	915.7871	25.64 pk	49.5	20	95.14	-	95.14
				Margin [dB]			-39.8

LIMIT 1: Fundamental Emissions

LIMIT 2: 20 dB down from fundamental

pk - Peak detector

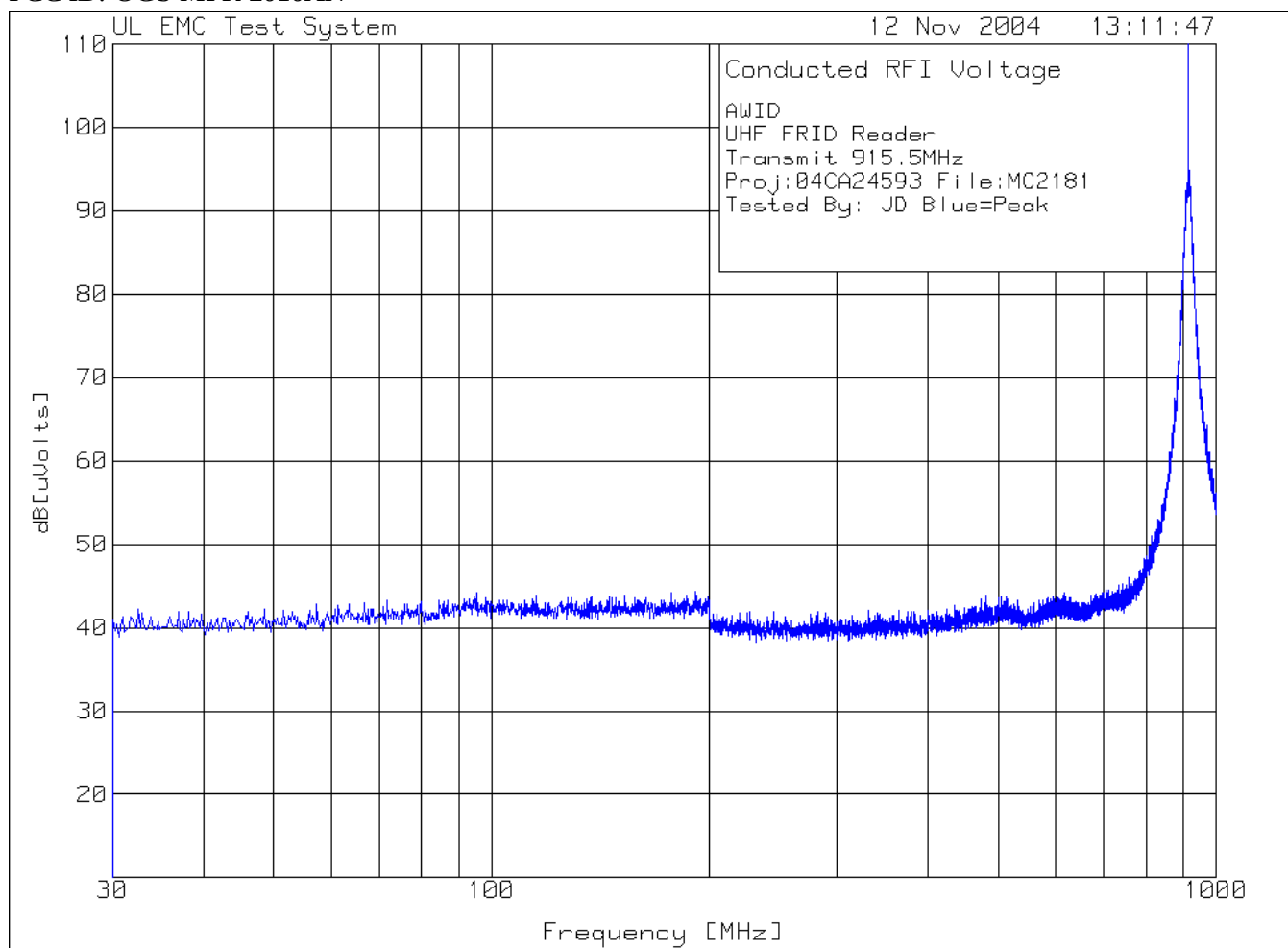
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result



File Number: MC2181
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AWID

UHF FRID Reader

Transmit 915.5MHz

Proj:04CA24593 File:MC2181

Tested By: JD Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	Limit 2
-----	----------------------	------------------------	-----------------------	------------------------	------------------	---------	---------

Range: 2 30 - 1000MHz -----							
1	915.5169	65.4 pk	49.4	20	134.8	134.8	-
				Margin [dB]			
2	910.16	24.02 pk	49	20	93.02	-	93.02
				Margin [dB]			-41.78
3	893.0846	24.29 pk	33	20	77.29	-	77.29
				Margin [dB]			-57.51
4	867.2774	24.91 pk	18.4	20	63.31	-	63.31
				Margin [dB]			-71.49
5	917.9215	25.23 pk	49.6	20	94.83	-	94.83
				Margin [dB]			-39.97
6	922.1904	25.14 pk	47.7	20	92.84	-	92.84
				Margin [dB]			-41.96
7	928.9818	25.03 pk	41	20	86.03	-	86.03
				Margin [dB]			-48.77
8	938.8777	24.87 pk	32.3	20	77.17	-	77.17
				Margin [dB]			-57.63
9	970.5061	27.08 pk	17.3	20	64.38	-	64.38
				Margin [dB]			-70.42

LIMIT 1: Fundamental Emissions

LIMIT 2: 20 dB down from fundamental

pk - Peak detector

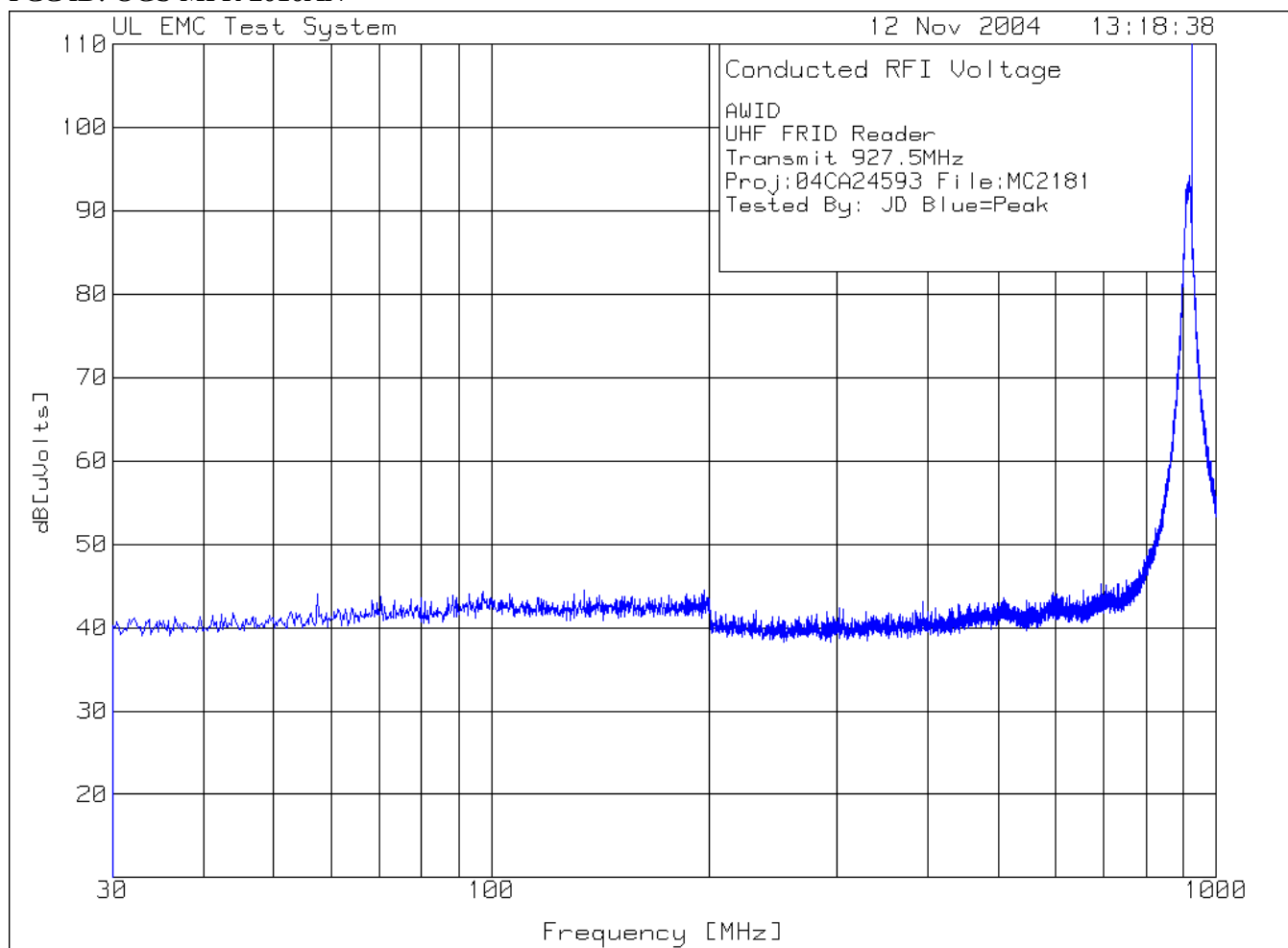
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result



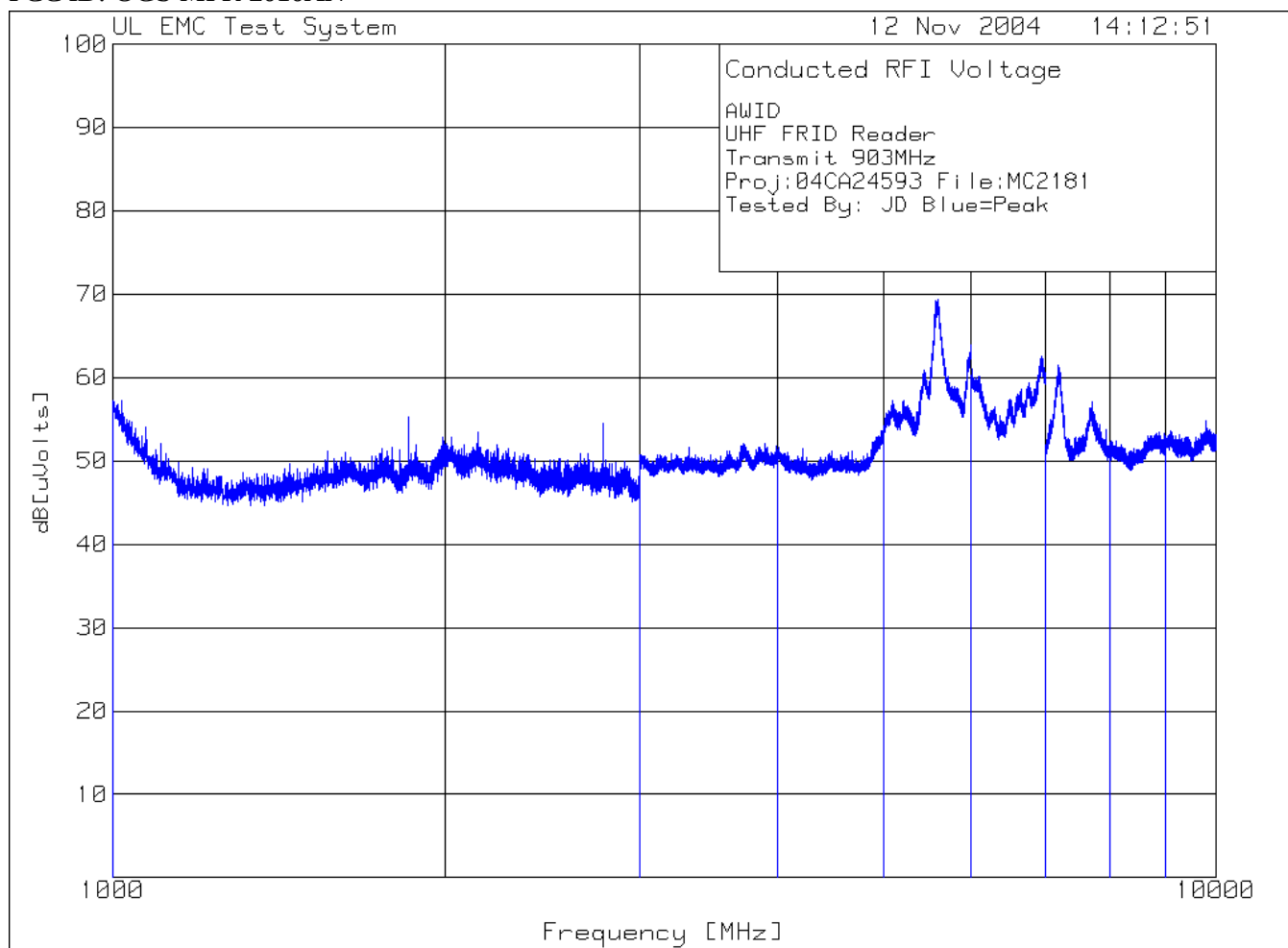
File Number: MC2181
 Project Number: 04CA24593
 Model Number: MPR-2010
 FCC ID: OGS MPR-2010AN
 AWID
 UHF FRID Reader
 Transmit 926.5MHz
 Proj:04CA24593 File:MC2181
 Tested By: JD Blue=Peak

Issued: 12/08/2004

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1	Limit: 2
=====							
Range: 2 30 - 1000MHz -----							
1	926.6533	70.26 pk	43.3	20	133.56	133.56	-
				Margin [dB]			
2	902.7865	24.81 pk	42.1	20	86.91	-	86.91
				Margin [dB]			-46.65
3	908.6077	24.81 pk	47.7	20	92.51	-	92.51
				Margin [dB]			-41.05
4	916.9514	24.48 pk	49.6	20	94.08	-	94.08
				Margin [dB]			-39.48
5	919.8619	24.44 pk	49.8	20	94.24	-	94.24
				Margin [dB]			-39.32
6	924.3248	25.04 pk	45.6	20	90.64	-	90.64
				Margin [dB]			-42.92
7	931.3102	24.4 pk	38.9	20	83.3	-	83.3
				Margin [dB]			-50.26
8	935.385	24.12 pk	35.4	20	79.52	-	79.52
				Margin [dB]			-54.04
9	941.4002	24.26 pk	30.5	20	74.76	-	74.76
				Margin [dB]			-58.8

LIMIT 1: Fundamental Emissions
 LIMIT 2: 20 dB down from fundamental

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection
 tm - Trace Math Result



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF FRID Reader

Transmit 903MHz

Proj:04CA24593 File:MC2181

Tested By: JD Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------

```
=====
Range: 2 1000 - 3000MHz -----
1 1019.505      28.57 pk      8.7      20      57.27      57.27
                        Margin [dB]
2 1853.213      34.6 pk      .6      20      55.2      55.2
                        Margin [dB]
3 2779.945      33.79 pk     .7      20      54.49      54.49
                        Margin [dB]
Range:4 5000 - 6000MHz -----
4 5559.28      38.56 pk     10.7      20      69.26      69.26
                        Height:100 Horz Margin [dB]
5 5988.494      35.21 pk      7.9      20      63.11      63.11
                        Height:100 Horz Margin [dB]
Range:5 6000 - 7000MHz -----
6 6959.98      38.9 pk      3.4      20      62.3      62.3
                        Height:100 Horz Margin [dB]
Range:6 7000 - 8000MHz -----
7 7197.099      27.76 pk     13.8      20      61.56      61.56
                        Height:100 Horz Margin [dB]
8 7709.355      28.82 pk      8.2      20      57.02      57.02
                        Height:100 Horz Margin [dB]
```

LIMIT 1: > 20 dB down from fundamental

pk - Peak detector

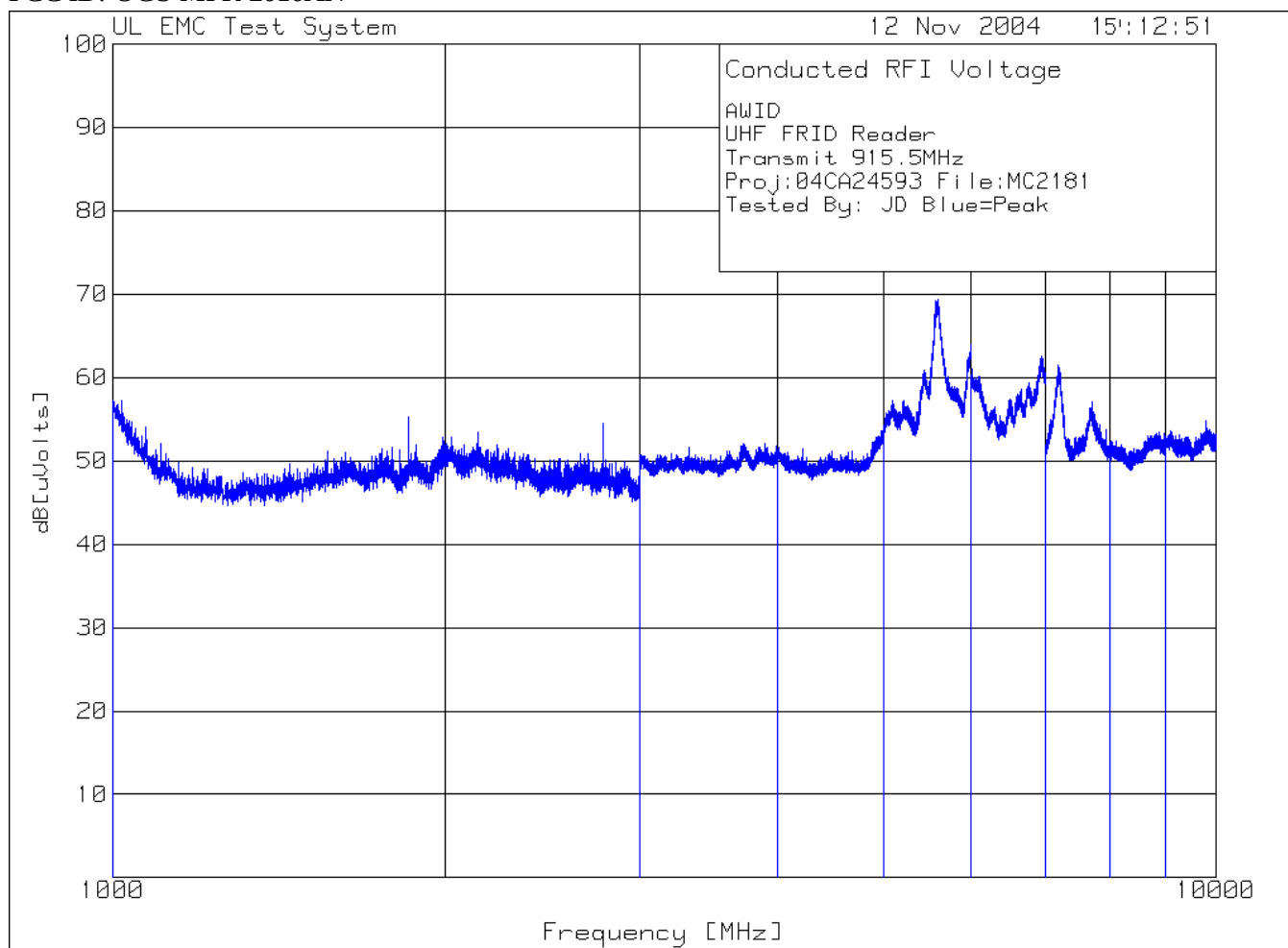
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF FRID Reader

Transmit 915.5MHz

Proj:04CA24593 File:MC2181

Tested By: JD Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------

```
=====
Range: 2 1000 - 3000MHz -----
1  1019.505      28.57 pk      8.7      20      57.27      57.27
                        Margin [dB]
2  1853.213      34.6 pk      .6      20      55.2      55.2
                        Margin [dB]
3  2779.945      33.79 pk     .7      20      54.49      54.49
                        Margin [dB]
Range:4 5000 - 6000MHz -----
4  5559.28       38.56 pk     10.7      20      69.26      69.26
                        Height:100 Horz Margin [dB]
5  5988.494       35.21 pk      7.9      20      63.11      63.11
                        Height:100 Horz Margin [dB]
Range:5 6000 - 7000MHz -----
6  6959.98       38.9 pk      3.4      20      62.3      62.3
                        Height:100 Horz Margin [dB]
Range:6 7000 - 8000MHz -----
7  7197.099       27.76 pk     13.8      20      61.56      61.56
                        Height:100 Horz Margin [dB]
8  7709.355       28.82 pk      8.2      20      57.02      57.02
                        Height:100 Horz Margin [dB]
```

LIMIT 1: > 20 dB down from fundamental

pk - Peak detector

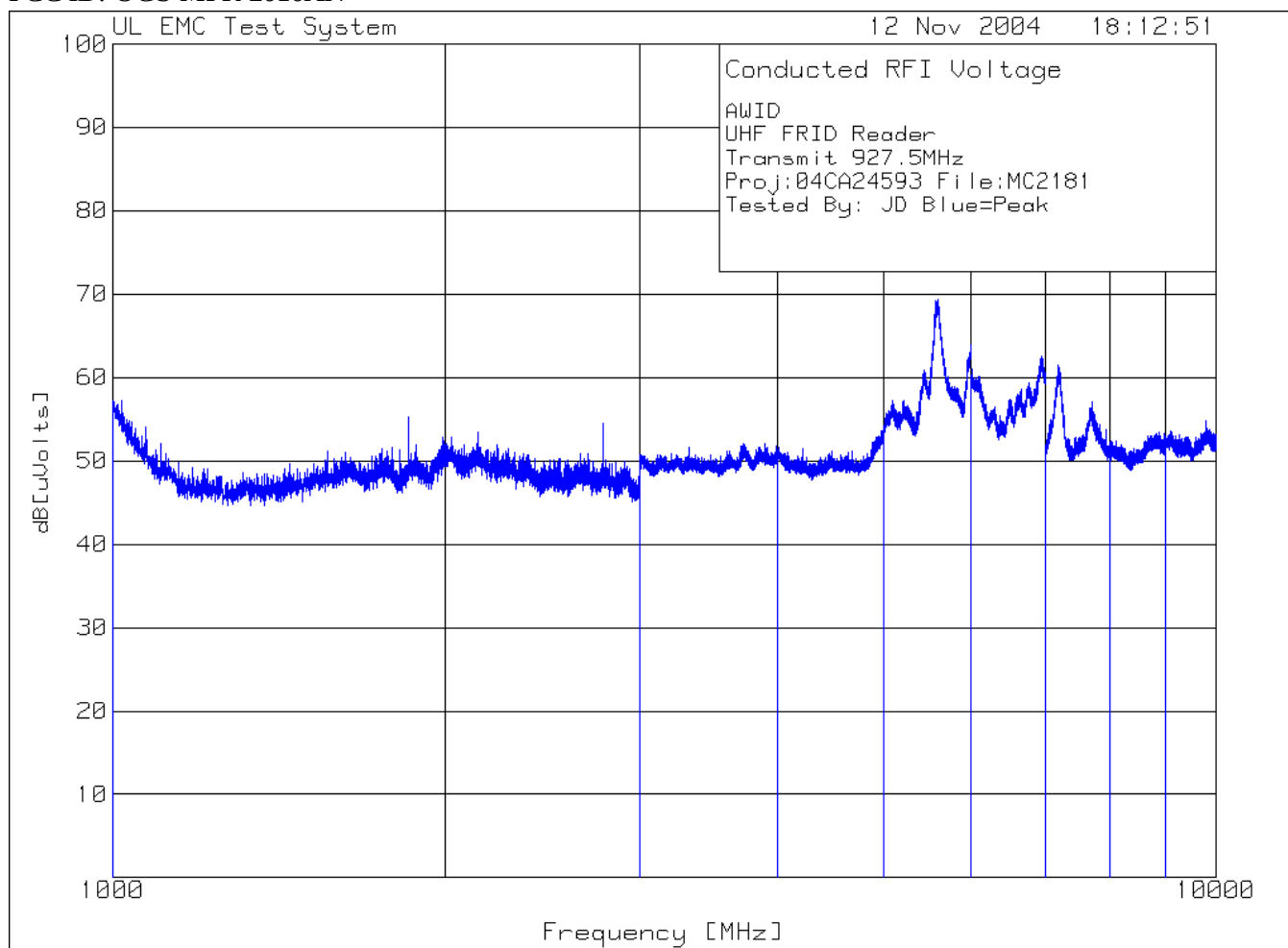
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF FRID Reader

Transmit 927.5MHz

Proj:04CA24593 File:MC2181

Tested By: JD Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit:1
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------	---------

```
=====
Range: 2 1000 - 3000MHz -----
1  1019.505      28.57 pk      8.7      20      57.27      57.27
                        Margin [dB]
2  1853.213      34.6 pk      .6      20      55.2      55.2
                        Margin [dB]
3  2779.945      33.79 pk     .7      20      54.49      54.49
                        Margin [dB]
Range:4 5000 - 6000MHz -----
4  5559.28      38.56 pk     10.7      20      69.26      69.26
                        Height:100 Horz Margin [dB]
5  5988.494      35.21 pk      7.9      20      63.11      63.11
                        Height:100 Horz Margin [dB]
Range:5 6000 - 7000MHz -----
6  6959.98      38.9 pk      3.4      20      62.3      62.3
                        Height:100 Horz Margin [dB]
Range:6 7000 - 8000MHz -----
7  7197.099      27.76 pk     13.8      20      61.56      61.56
                        Height:100 Horz Margin [dB]
8  7709.355      28.82 pk      8.2      20      57.02      57.02
                        Height:100 Horz Margin [dB]
```

LIMIT 1: > 20 dB down from fundamental

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

5.1.2 Occupied Bandwidth; Section 15.247

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	22.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	9 June 2004

1 fully configured sample was scanned over the following frequency range

Frequency range on each side of line	Measurement Point	Mode*	
		Power	Operation
902-928	Antenna Port	<u>1</u>	<u>1</u>

*See Power Interface and EUT Operating Modes for details

E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range: 900-950MHz 35710	Last Calibration Date: 22 January 2004 Oakton	Calibration Due Date: 22 January 2005 Hygrometer/Temp Ranges	Equipment No.: ME4-297 Temp: -30°C-50°C Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004	Calibration Due Date: 02 June 2005	

Procedure:

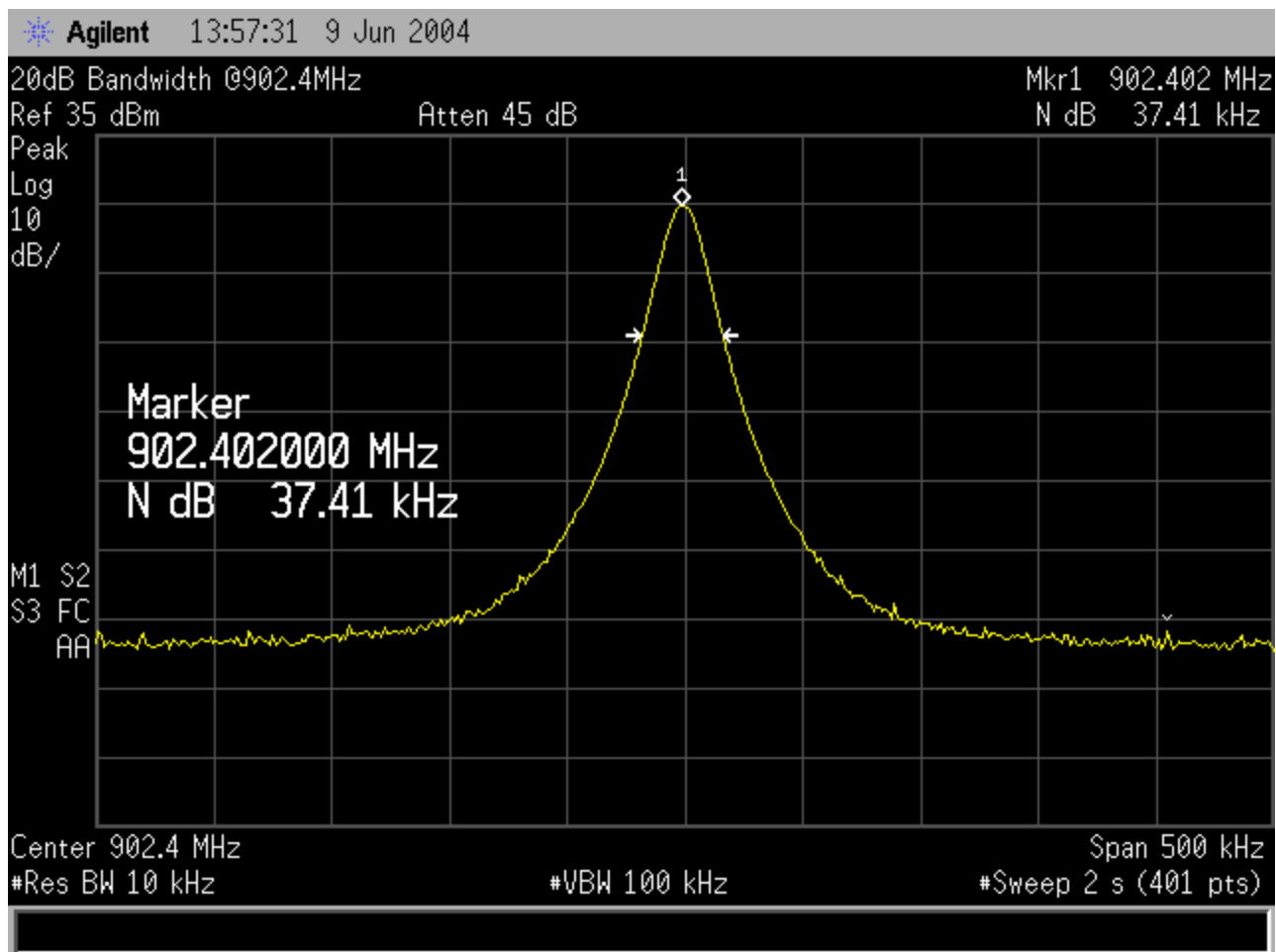
(1) Frequency hopping systems shall have hopping channel frequencies separated by a minimum of 25 KHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

Occupied bandwidth was measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer. The measurement was made with the spectrum analyzer's resolution bandwidth set to (RBW) = 100 kHz. The VBW > RBW. The frequency differences of two frequencies that are 20 dB from the peak of the fundamental are recorded. The difference of these two frequencies gives the 20 dB occupied bandwidth.

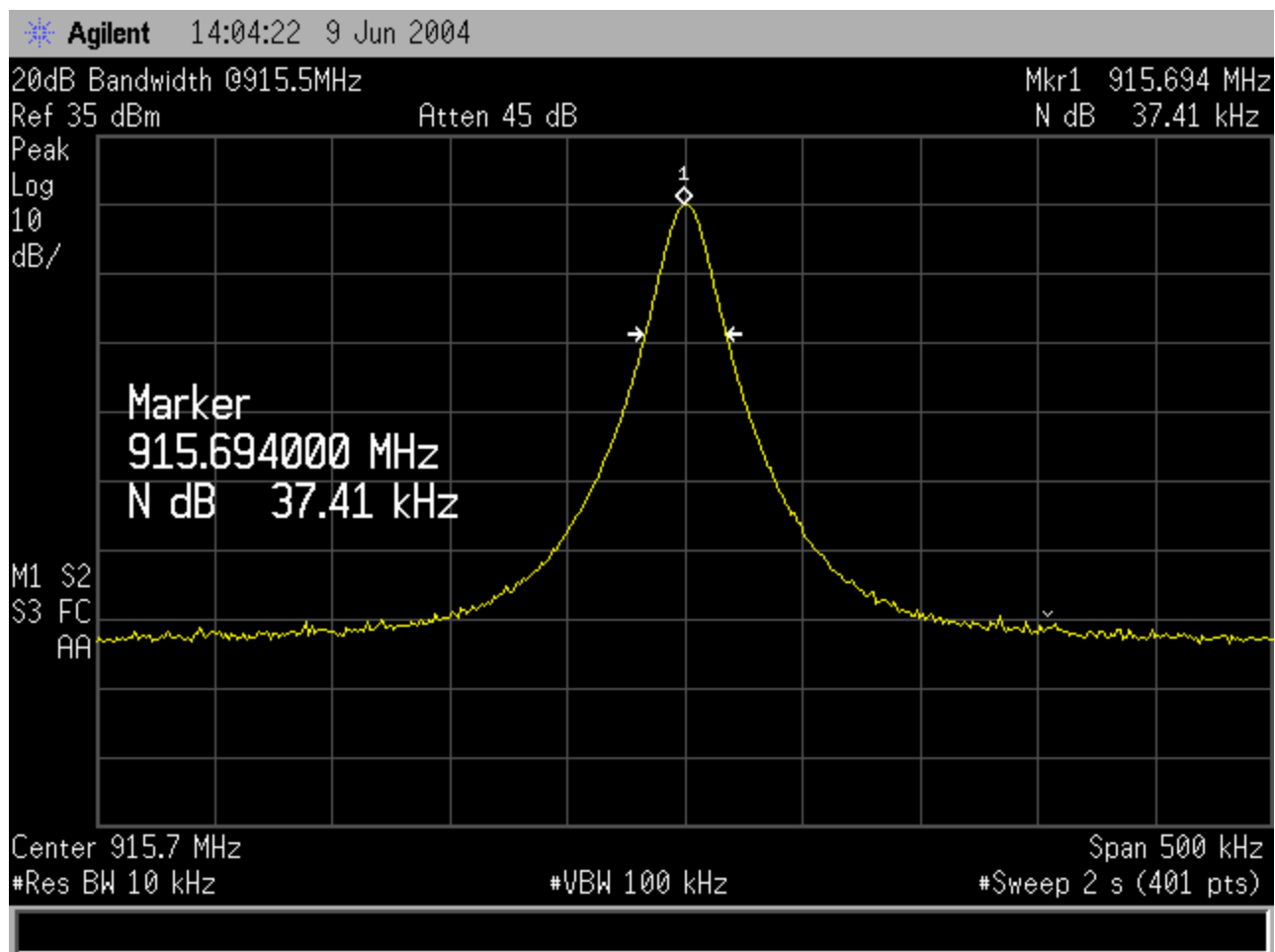
Test Data

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	902.4	0.03741
Mid	915.694	0.03741
High	926.525	0.03741

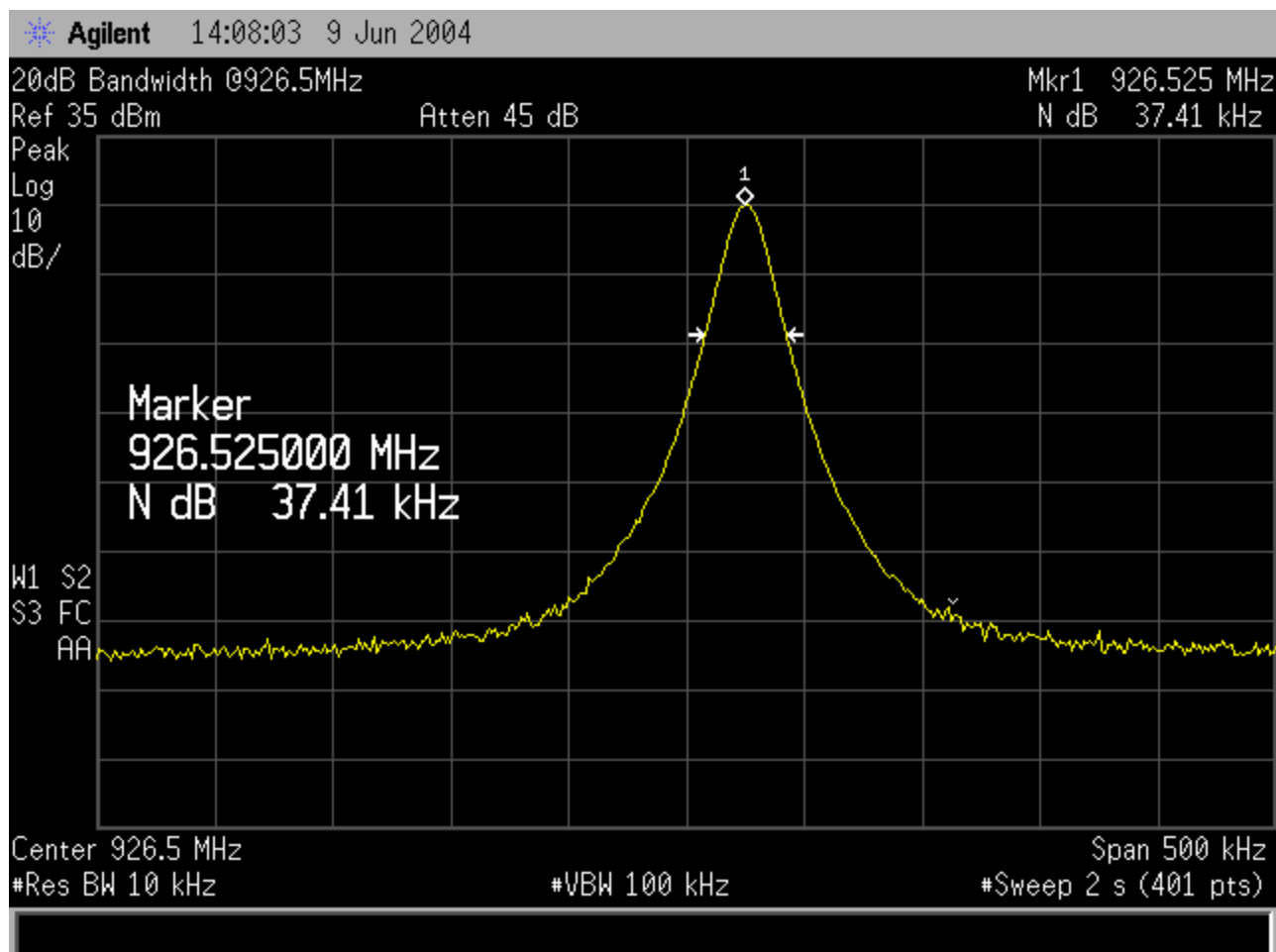
The values in the above table represent the minimum channel separation.



Bandwidth 902.402MHz



Bandwidth 915.694MHz



Bandwidth 926.525MHz

5.1.3 Peak Output Power; Section 15.247 (c)

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	22.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	9 June 2004

E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range: 902-928 35710	Last Calibration Date: 22 January 2004 Oakton	Calibration Due Date: 22 January 2005 Hygrometer/Temp Ranges	Equipment No.: ME4-297 Temp: -30°C-50°C Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004	Calibration Due Date: 02 June 2005	

UL Procedure

The maximum peak output power of the intentional radiator shall not exceed 1 Watt. Peak output power was measured with a direct connection between the antenna port of the transmitter and the spectrum analyzer.

Sweep = auto
Detector function = peak
Trace = max hold

Allowed the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

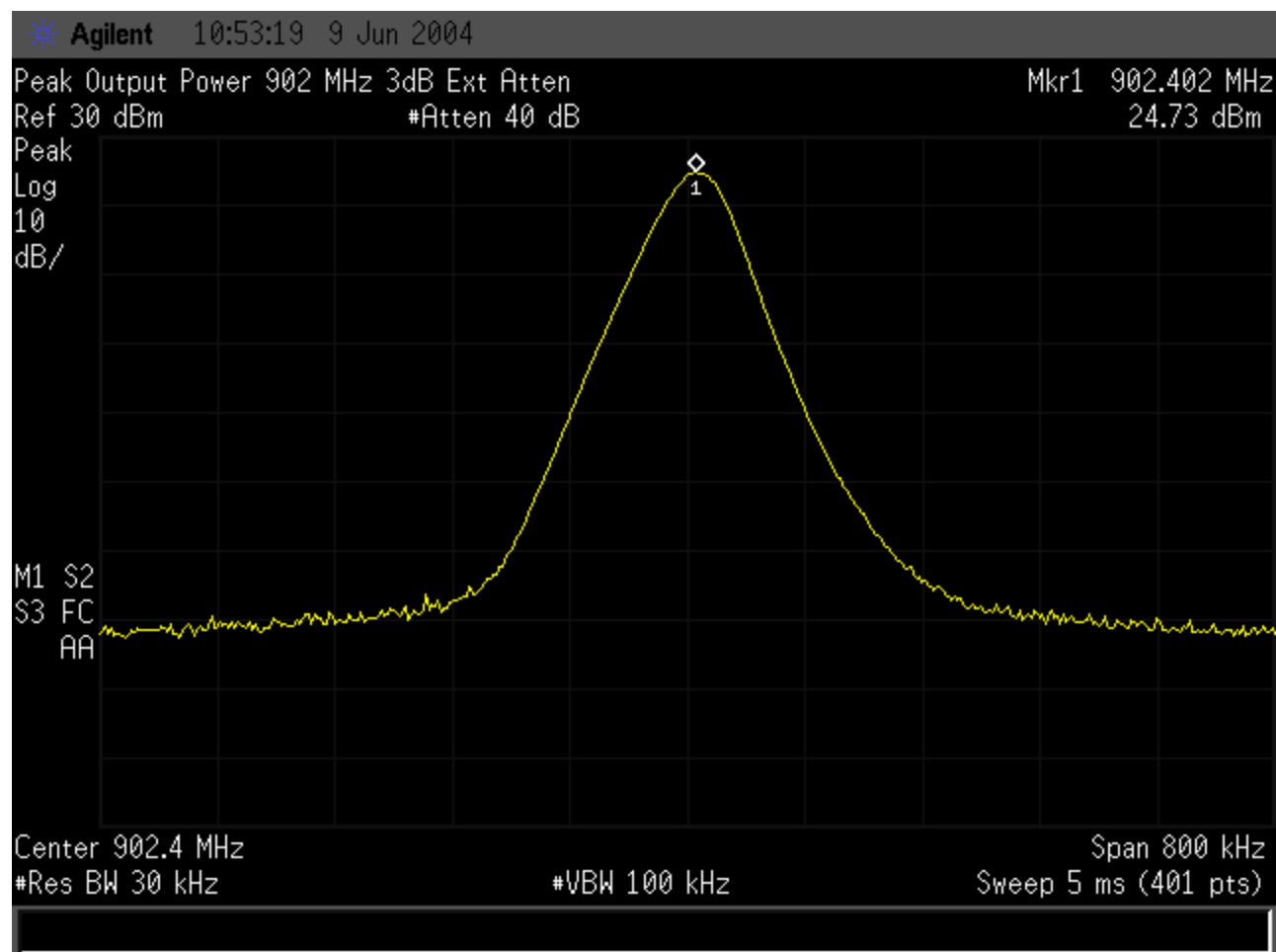
External 3dB attenuation was utilized and added to the measurements depicted on the plots below.

Test Data

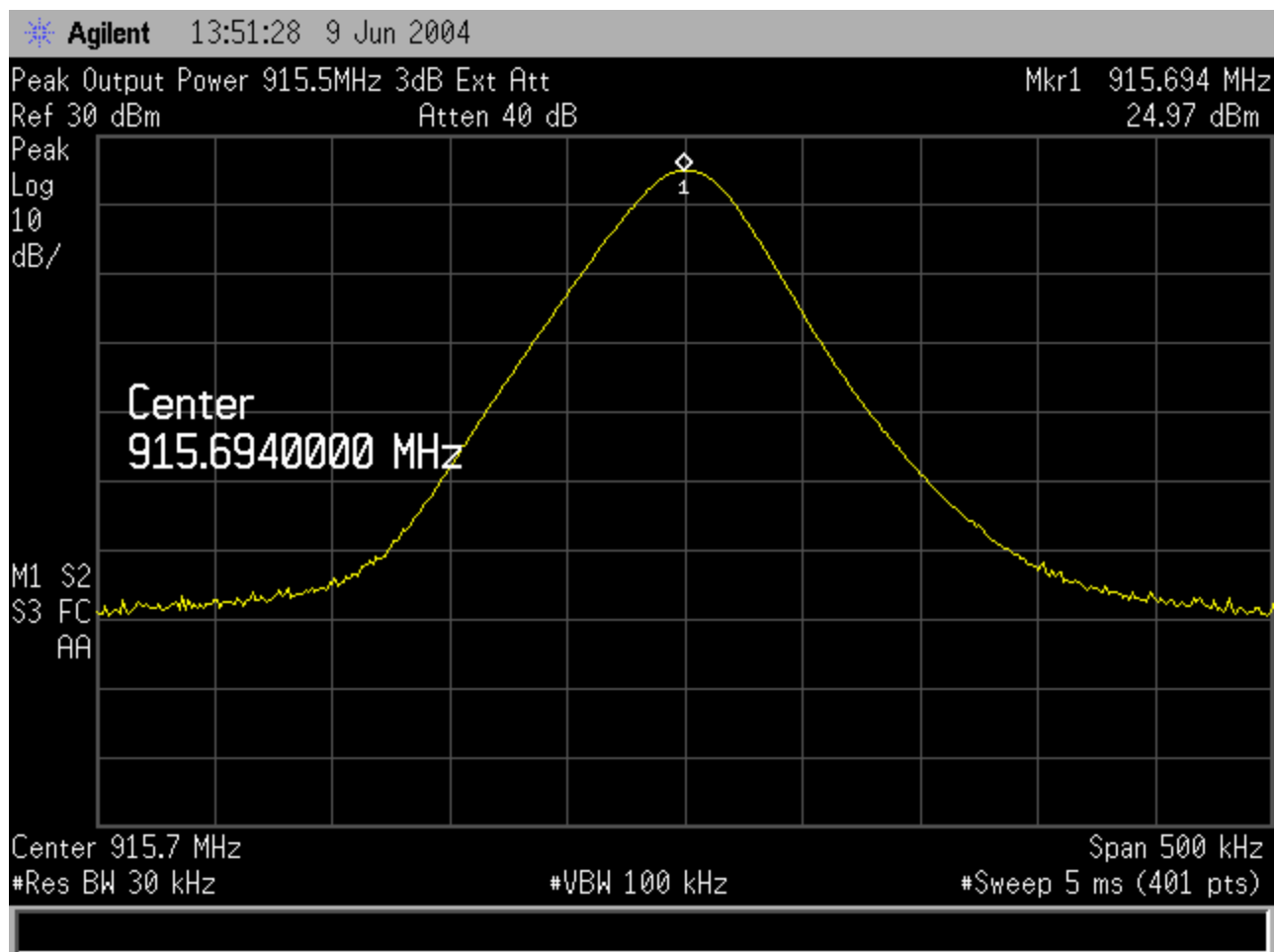
Channel	Frequency (MHz)	Measured Output power (dBm)	External Attenuator	Output Power (dBm)	Output Power (Watt)	Limit (Watt)
Low	902.4	24.73	3dB	27.73	0.6	1
Mid	915.694	24.97	3dB	27.97	0.63	1
High	926.526	25.02	3dB	28.02	0.64	1

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Issued: 12/08/2004



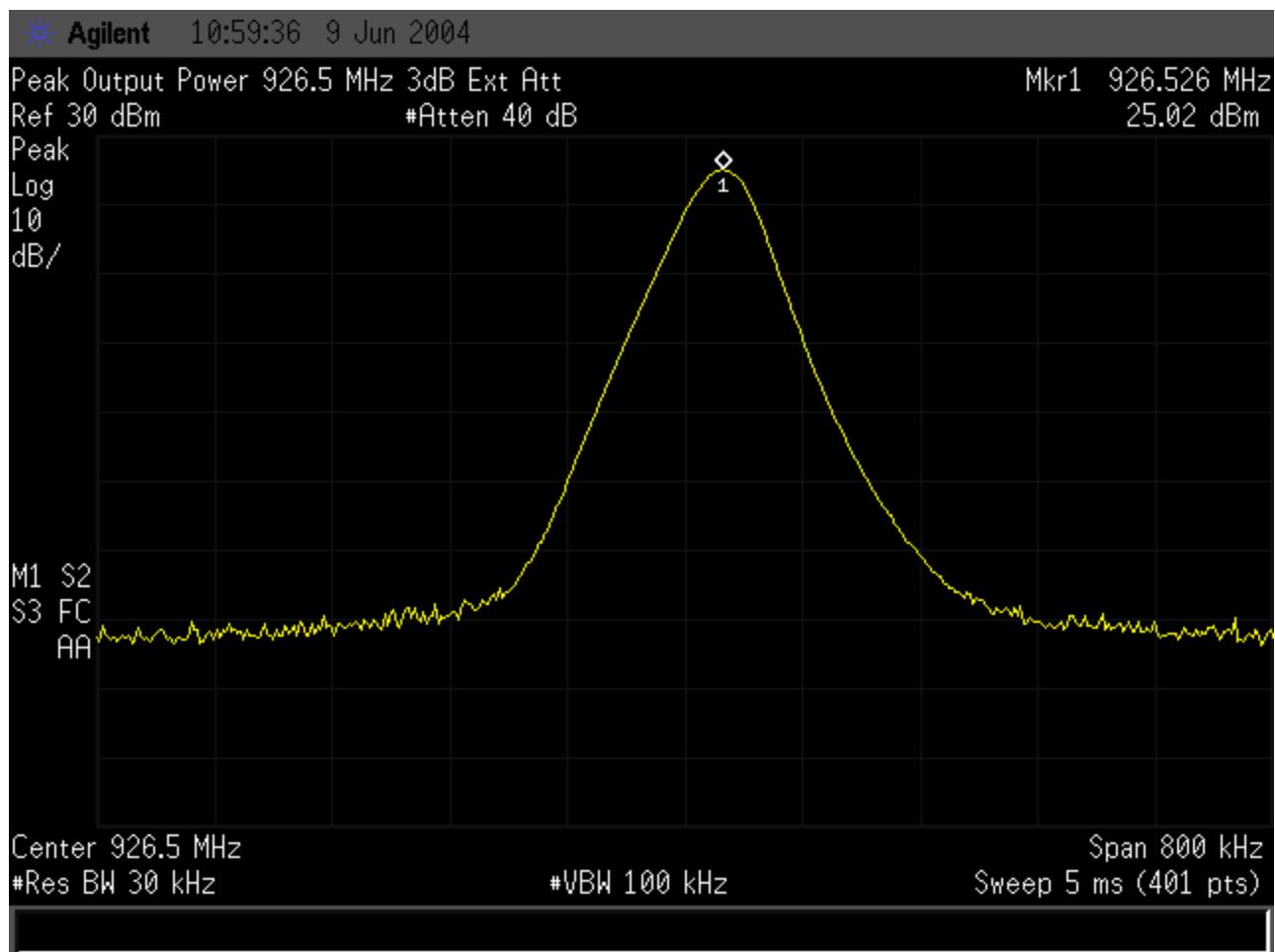
Peak Output Power 902.402MHz



Peak Output Power 915.694MHz

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004



Peak Output Power 926.526MHz

5.1.4 Procedure RF Exposure Compliance Requirements

Spread spectrum transmitters operating under Section 15.247 are categorically excluded from routine environmental evaluation for demonstrating RF exposure compliance with respect to MPE and/or SAR limits. These devices are not exempted from compliance. As indicated in Section 15.247(b)(4), these transmitters are required to operate in a manner that ensures that exposure to the public (users and nearby persons) does not exceed the Commission's RF exposure guidelines (see Sections 1.1307, 2.1091 and 2.1093). Unless a device operates at substantially low output power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s), in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed: (1) calculations that estimate the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits (defined for free-space), (2) antenna installation and device operating instructions for installers (professional and/or unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirements, (3) any caution statements and/or warning labels that are necessary in order for a device to comply with the exposure limits, and (4) any other RF exposure related issues that may affect MPE compliance.

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

Installation/Operation Manual Requirements

Submit a copy of the information/instructions that will be included in the installation/operation manual pertaining to: (a) correct peak output power settings required for compliant operation for every antenna proposed for use with the EUT, (b) point-to-point operational requirements and responsibilities, (c) any RF exposure compliance requirements.

MPE Estimate for MPR-2010 Transceiver

Example only:

Table 1 of CFR 1.1310 states MPE for Uncontrolled Exposure is $f/1500 \text{ mW/cm}^2$ in the 300-1500 MHz range.

$$\begin{aligned} F &= 902 \text{ MHz minimum} \\ \text{MPE} &= f/1500 \text{ mW/cm}^2 \\ &= 902/1500 \text{ mW/cm}^2 \\ &= 0.601 \text{ mW/cm}^2 \\ &= 6.01 \text{ W/m}^2 \end{aligned}$$

In order to calculate the range at which the power density is 0.601 mW/cm^2 . The following Equation is used:

$$P_d = (P_t * G_t) / (4P_i * R^2) \text{ where: } P_t = \text{transmitted power (640mw)}$$
$$G_t = \text{gain of transmitting antenna (6.0dBi)}$$
$$P_i = 3.14$$
$$R = \text{distance from the antenna}$$

Solving for R:

$$\begin{aligned} R^2 &= (P_t * G_t) / (4P_i * P_d) \\ R &= [(P_t * G_t) / (4P_i * P_d)]^{0.5} \\ &= [(0.64 * 6.0) / (4 * 3.14 * 6.01)]^{0.5} \\ &= [(3.84) / (75.4856)]^{0.5} \\ &= [0.0508706]^{0.5} \\ &= 0.226 \text{ meters} \\ &= 8.88 \text{ inches} \end{aligned}$$

The Range at which the power density of the MPR -2010 transceiver is 0.6 mW/cm^2 is 8.88 inches (22.6cm). This information will be placed in MPR-2010 operation Manual

5.1.5 Number of Hopping Frequencies

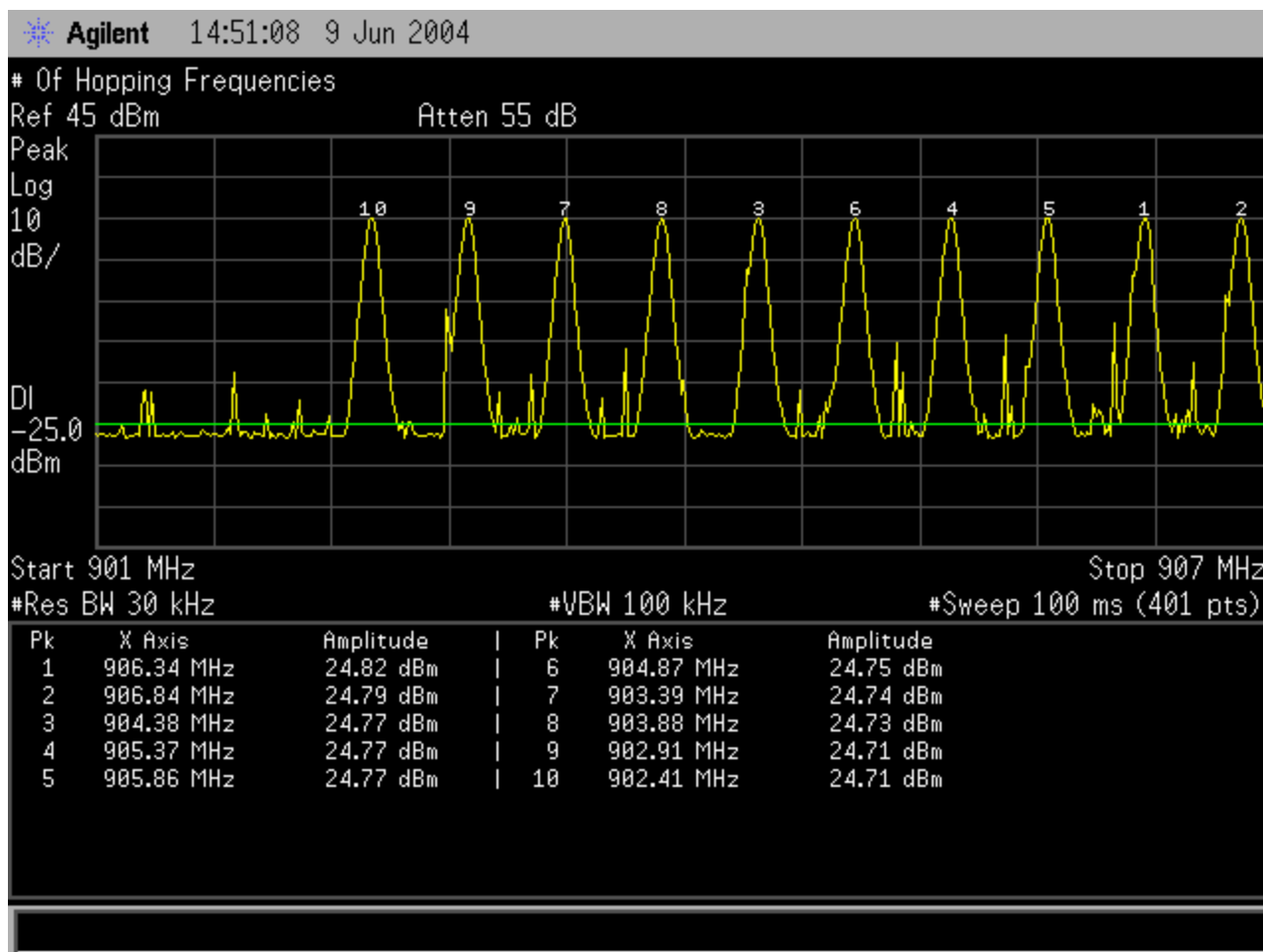
The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	23.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	9 June 2004

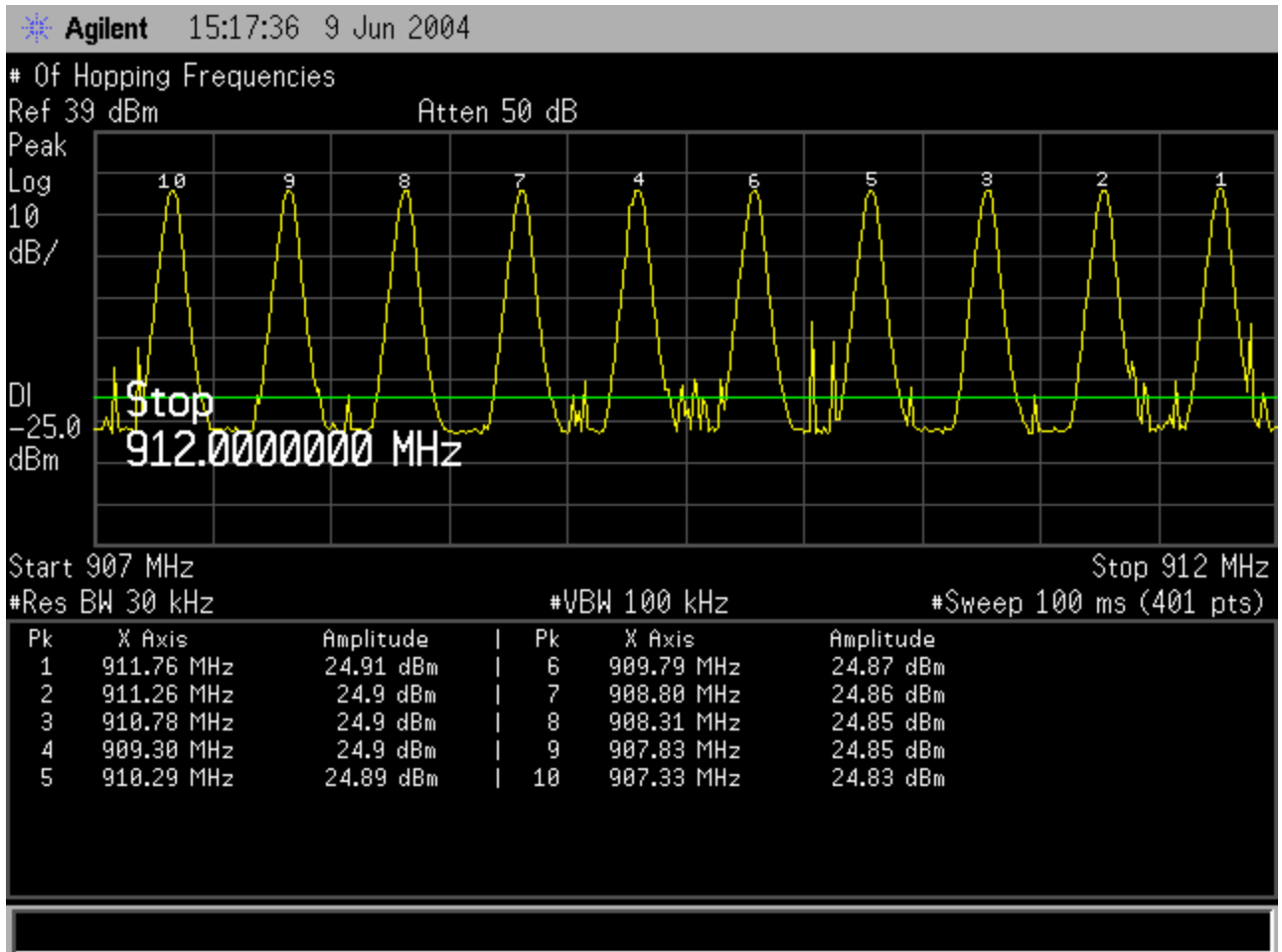
E7402A	Agilent	EMI Spectrum Analyzer	Equipment No.: ME5B-123
	Technologies		
Range: 902-928	Last Calibration Date: 22 January 2004	Calibration Due Date: 22 January 2005	
35710	Oakton	Hygrometer/Temp	Equipment No.: ME4-297
		Ranges	Temp: -30°C-50°C
			Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004	Calibration Due Date: 02 June 2005	

The EUT must have its hopping function enabled. Span = the frequency band of operation, Sweep = auto, Detector function = peak, Trace = max hold Allow the trace to stabilize.

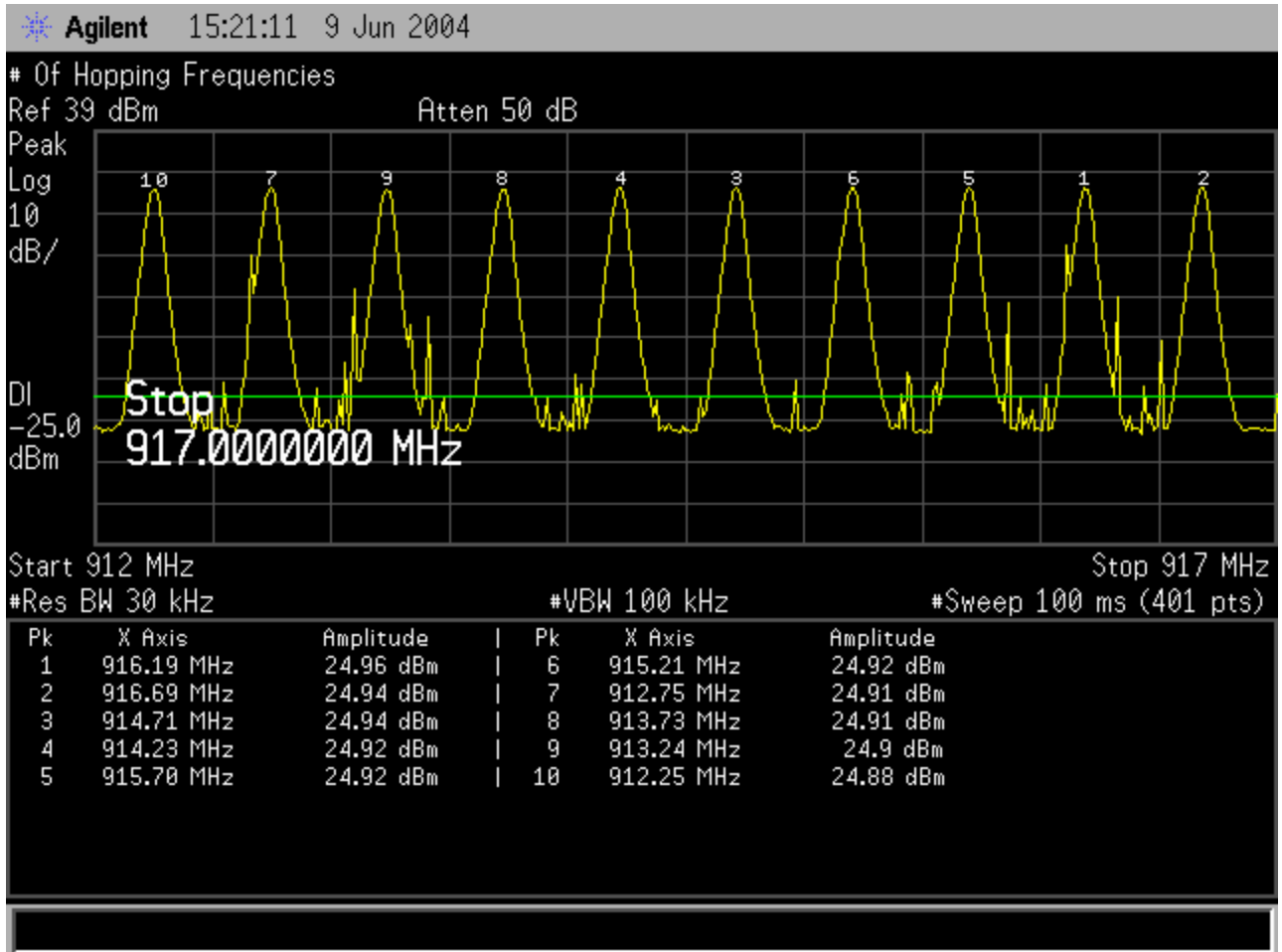
The EUT operates on 50 equally spaced hopping frequencies, which meets the channel separation values determined from the 20 dB BW in section 5.1.2 of this report.



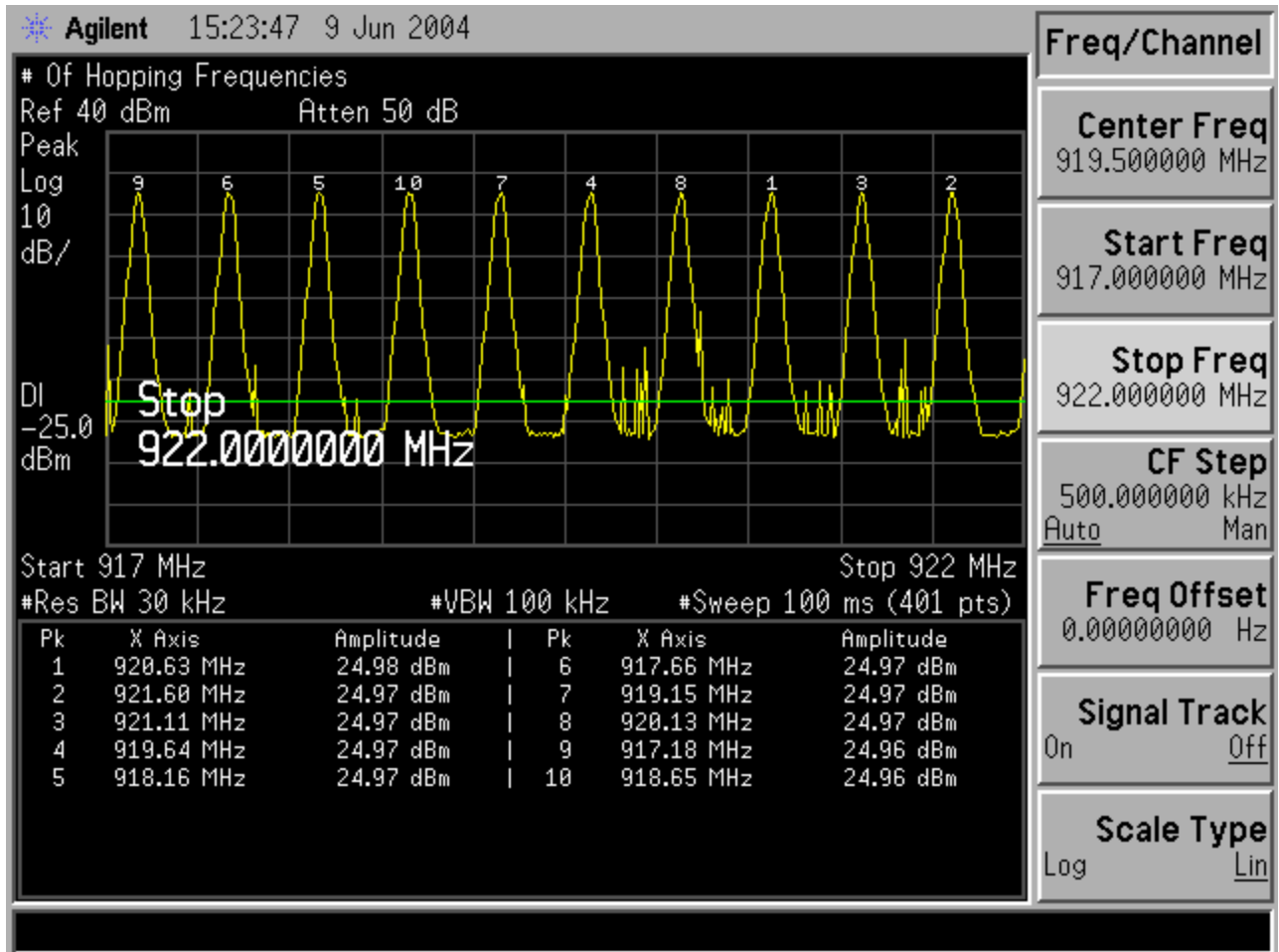
Number of Hopping Frequencies 901-907MHz



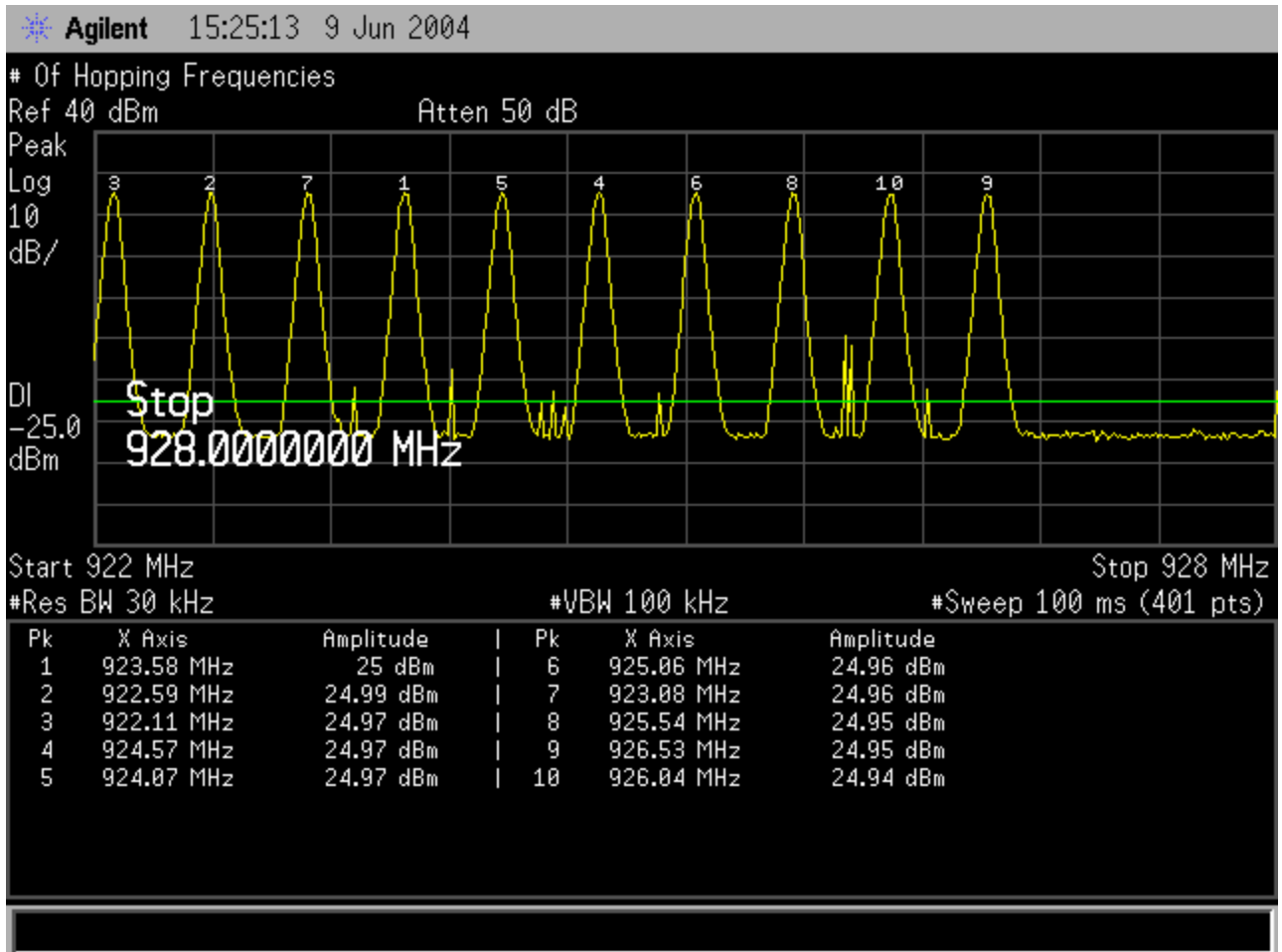
Number of Hopping Frequencies 907 - 912MHz



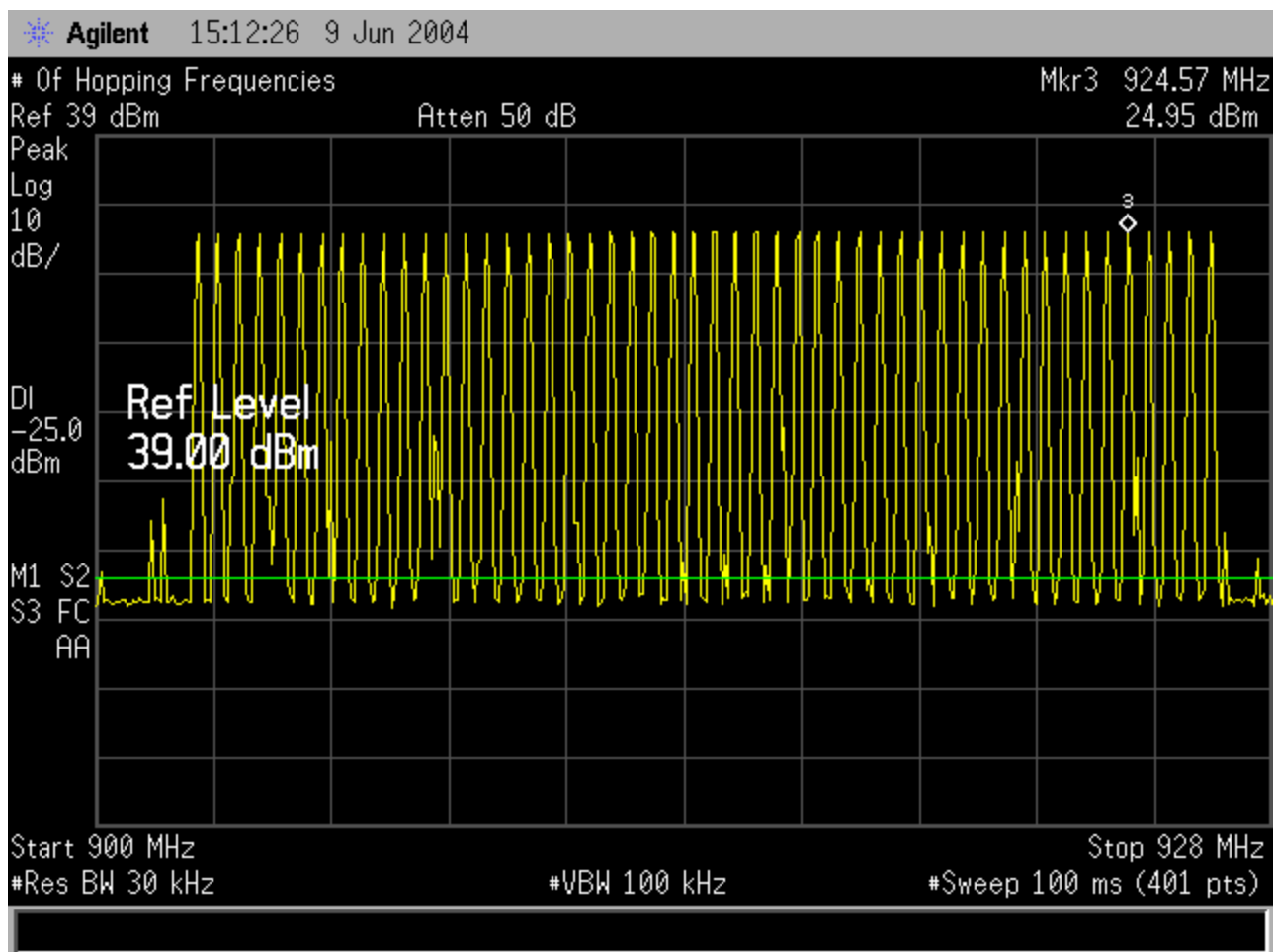
Number of Hopping Frequencies 912 - 917MHz



Number of Hopping Frequencies 917 - 922MHz



Number of Hopping Frequencies 922 - 928MHz



Complete Number of Hopping Frequencies

5.1.6 Carrier Frequency Separation

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	23.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	9 June 2004

E7402A	Agilent	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range: 150K-30M	Technologies	Last Calibration Date: 22 January 2004	Calibration Due Date: 22 January 2005
35710	Oakton	Hygrometer/Temp	Equipment No.: ME4-297
		Ranges	Temp: -30°C-50°C
			Humidity: 0% to 100%RH
		Last Calibration Date: 02 June 2004	Calibration Due Date: 02 June 2005

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

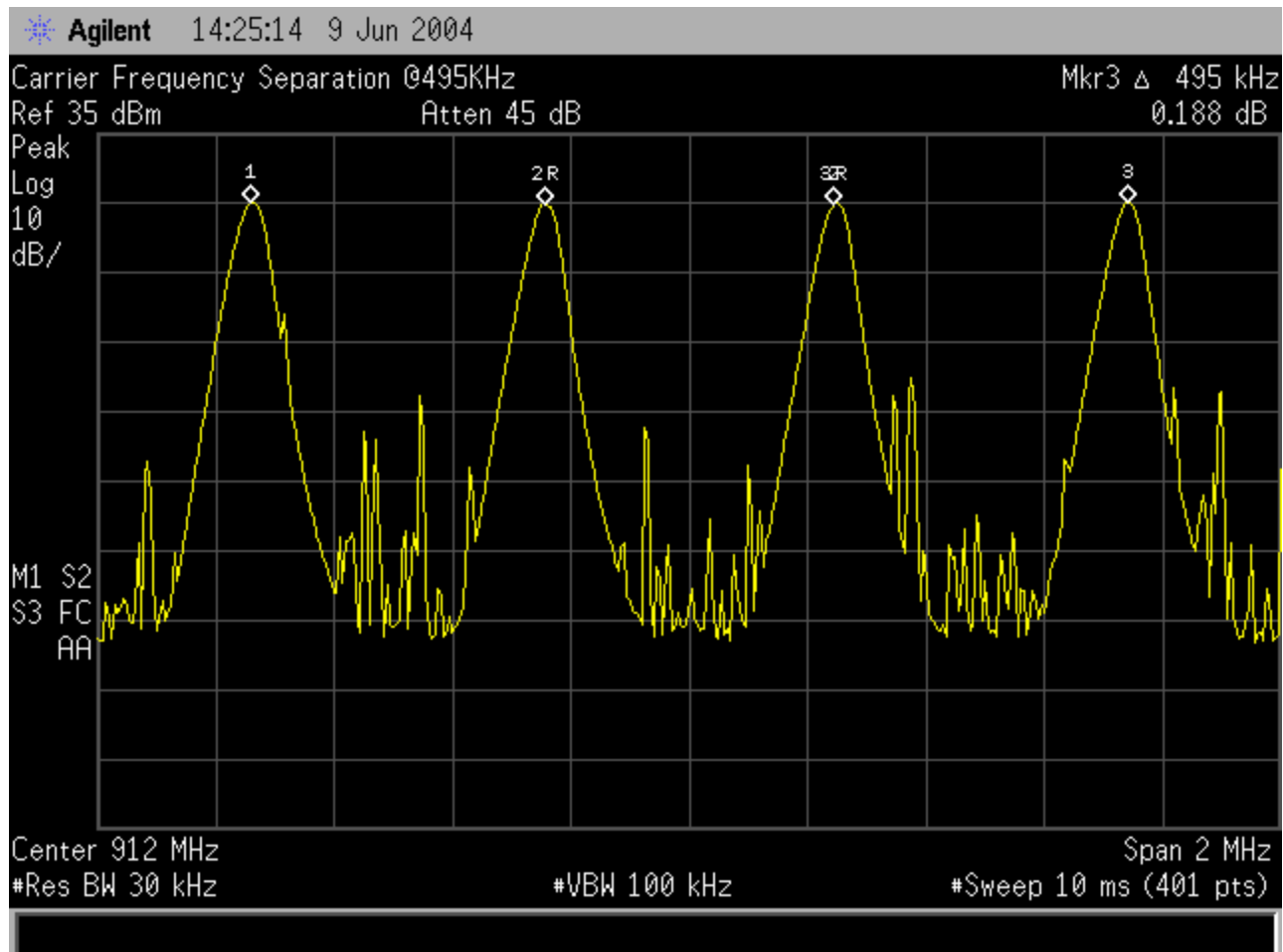
Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. The marker-delta function was utilized to determine the separation between the peaks of the adjacent channels.

The measurement between hopping channels was 495 KHz. The channel separation is greater than the values determined from the 20 dB BW in section 5.1.2 of this report.



Carrier Frequency Separation = 495KHz

5.1.7 Time of Occupancy (Dwell Time)

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	22.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	10 June 2004

1 fully configured sample was scanned over the following frequency range

Frequency range on each side of line	Measurement Point	Mode*	
		Power	Operation
902-928MHz	Antenna Port	<u>1</u>	<u>1</u>

*See Power Interface and EUT Operating Modes for details

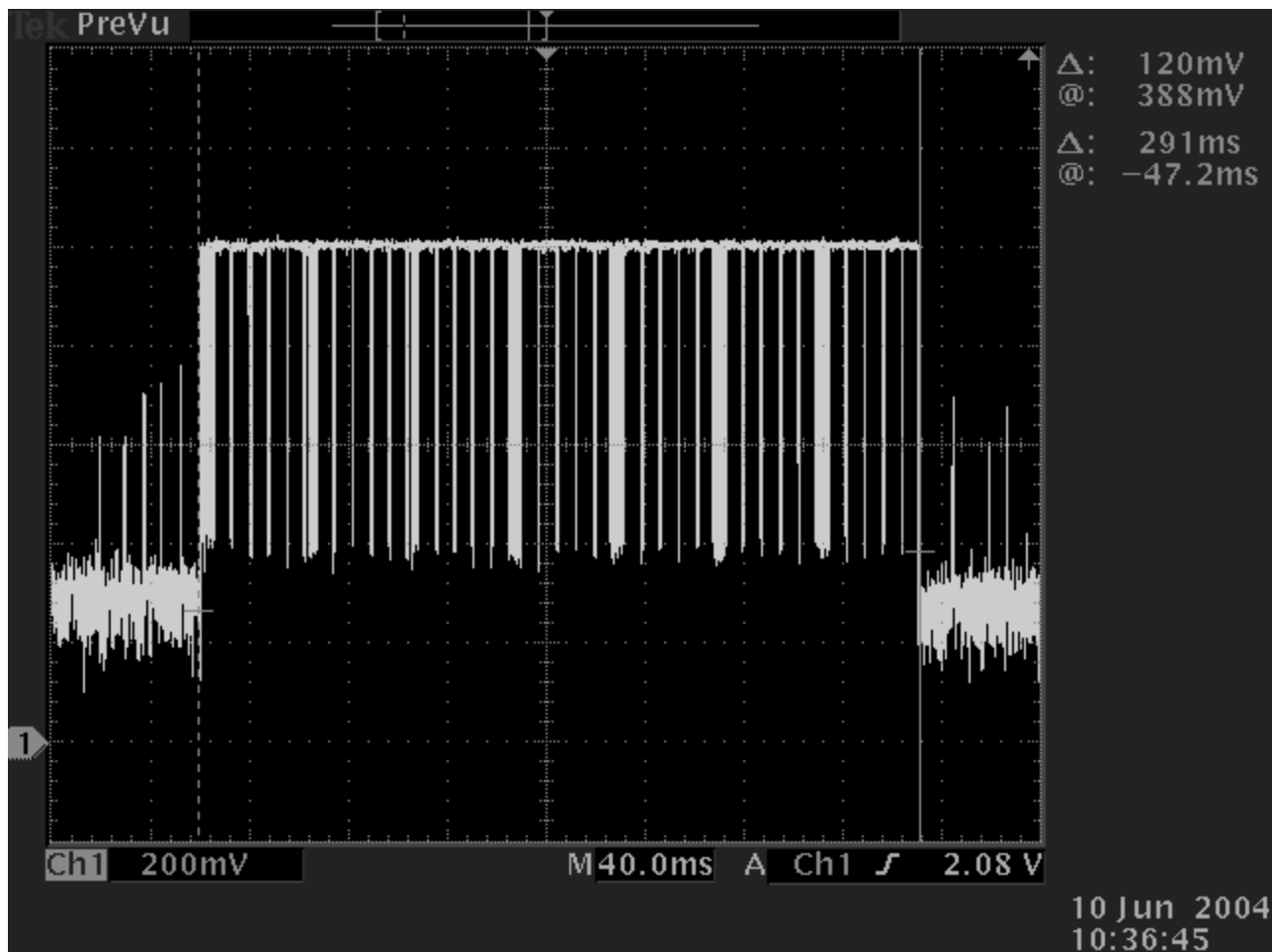
ES126	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz
			RBW 10 KHz
			Quasi Peak BW: 9kHz
			RBW 100 KHz
			Quasi Peak BW: 120 kHz
			RBW 1.0 MHz
Range: DC- 26.5GHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004
TDS-3052	Tektronix	Oscilloscope	Equipment No.: ME5B-129
Range: 902-928 MHz	Last Calibration Date: 16 September 2003		Calibration Due Date: 16 September 2004
35710	Oakton	Hygrometer/Temp Ranges	Equipment No.: ME4-297
			Temp: -30°C-50°C
			Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004		Calibration Due Date: 02 June 2005

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel, RBW = 1 MHz, VBW ≥ RBW, Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak
Trace = max hold

To determine the dwell time the marker-delta function was utilized. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. An oscilloscope was used with a spectrum analyzer.

If the 20 db bandwidth of the hopping channels 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. The measured time of occupancy was approximately 291ms.



Time of Occupancy Dwell Time » 291ms

5.1.8 Band-edge Compliance of RF Conducted Emissions

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	22.5°C
Humidity:	53 %RH
Pressure:	1011mbar
Date test performed:	9 June 2004

E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range: 900-950MHz 35710	Last Calibration Date: 22 January 2004 Oakton	Calibration Due Date: 22 January 2005 Hygrometer/Temp Ranges	Equipment No.: ME4-297 Temp: -30°C-50°C Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004		Calibration Due Date: 02 June 2005

Use the following spectrum analyzer settings:

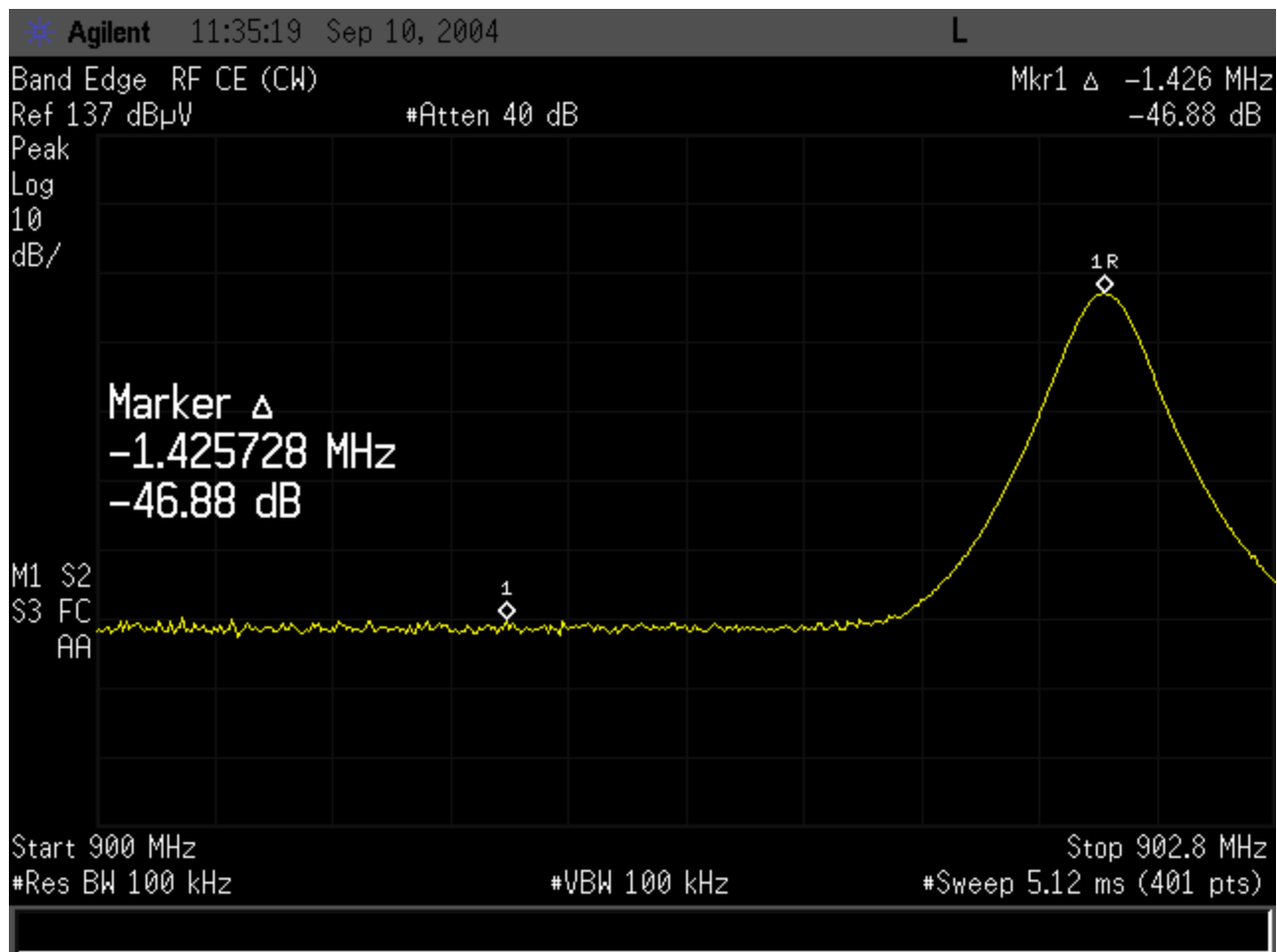
Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation

RBW 100KHz, Sweep = auto, Detector function = peak, and Trace = max hold

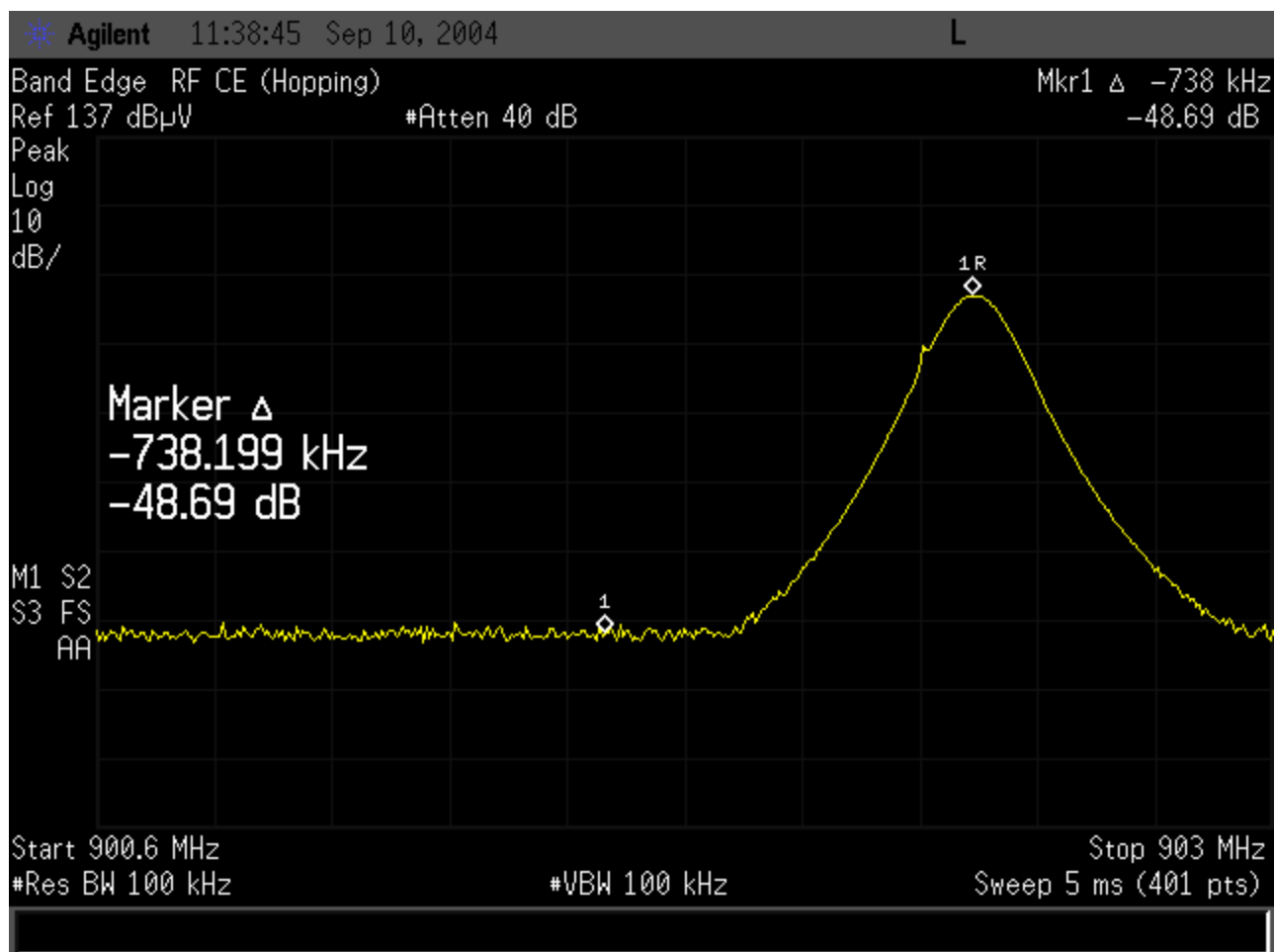
Allow the trace to stabilize. Set the marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is greater than that at the band-edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

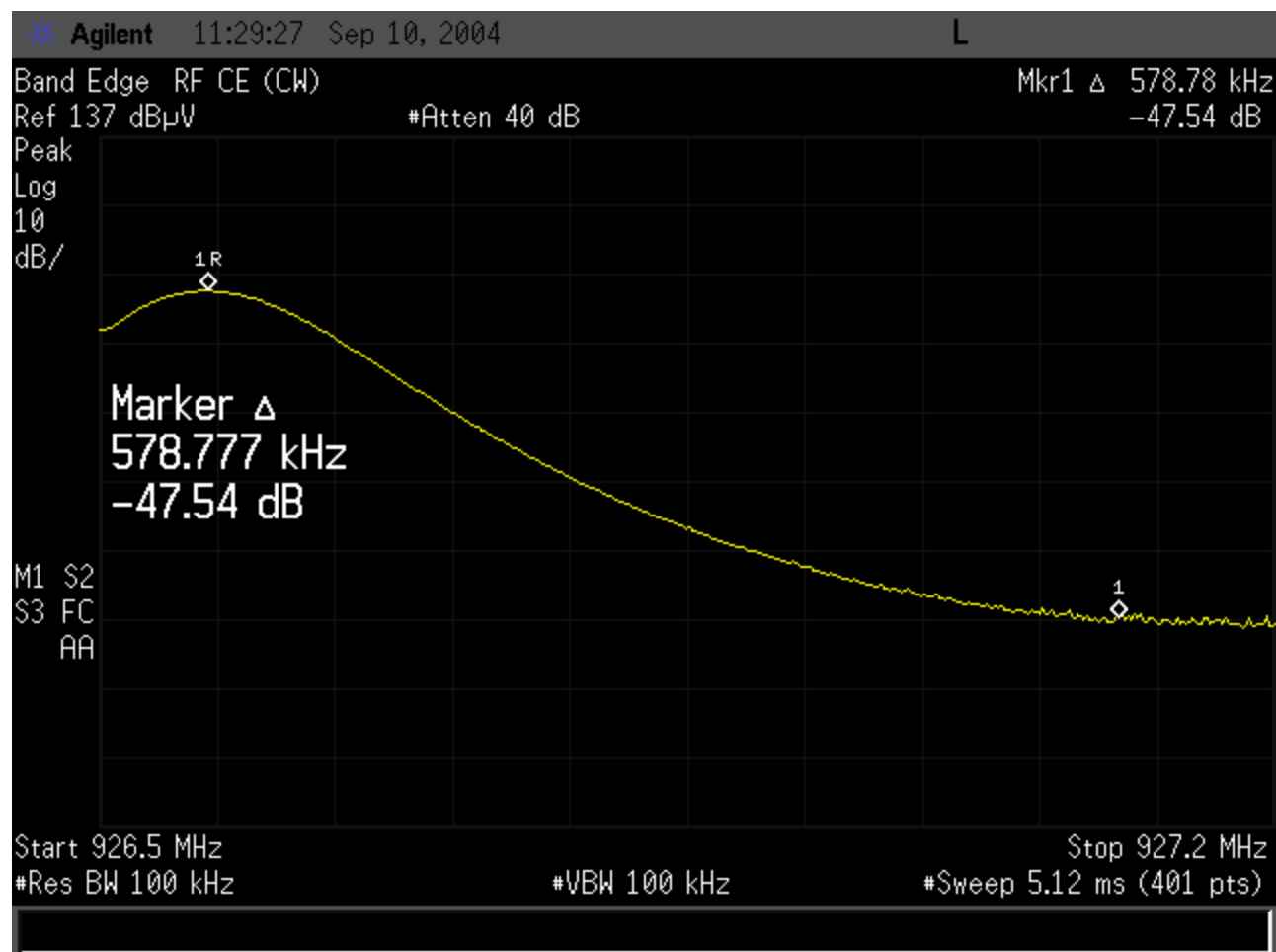
In any 100 KHz bandwidths outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator spurious emissions shall be at least 20db below that of the band edge of the spectrum.



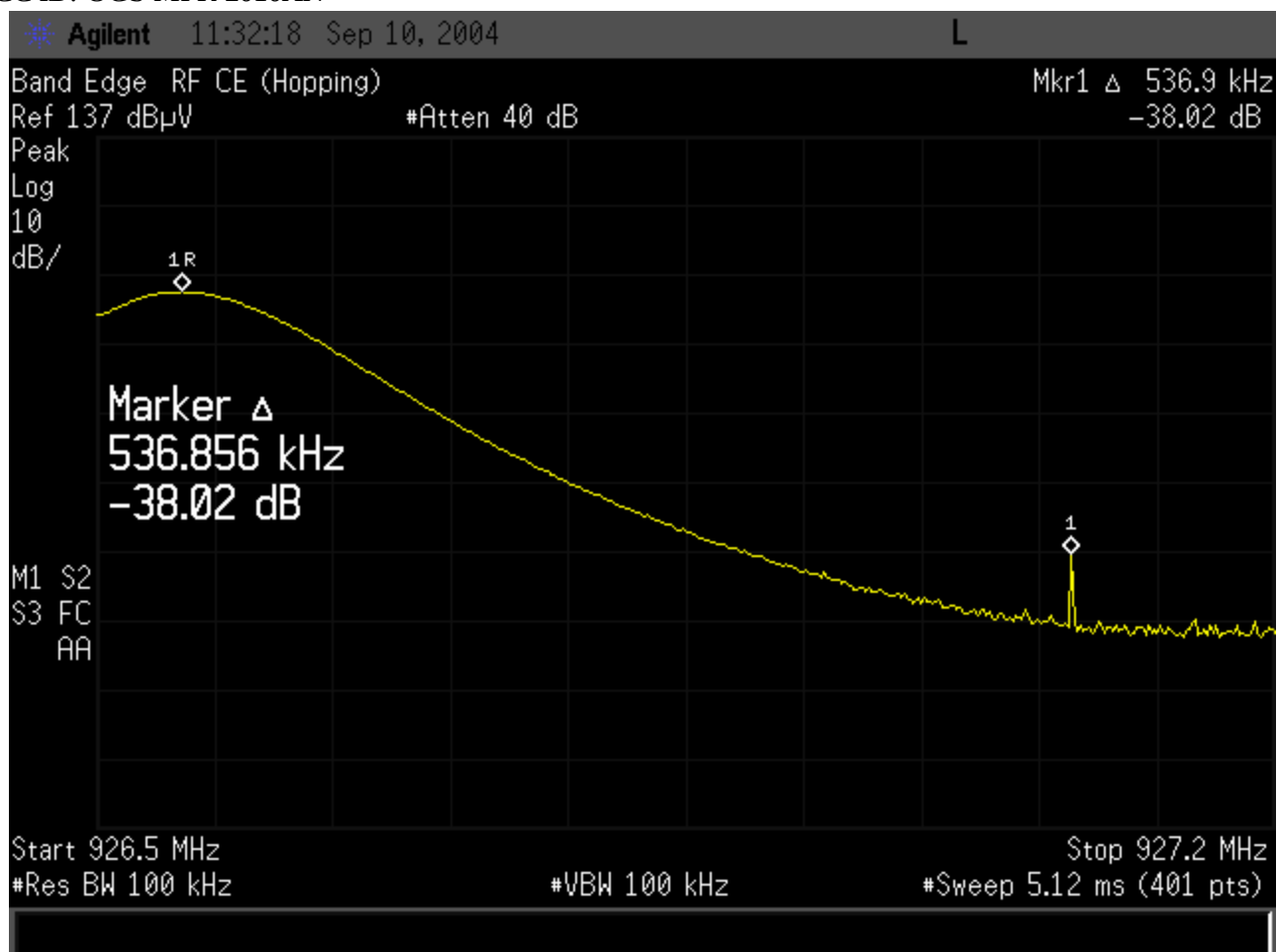
Band Edge Compliance for CE 900 – 902.5MHz



Band Edge Compliance for CE 900.4 – 902.6MHz



Band Edge Compliance for CE 926.4 – 930MHz



Band Edge Compliance for CE 926.4 – 930MHz

5.1.9 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

Test Applicable

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Results

The system met the requirements for radiated emissions. Data Pages follow.

Temperature:	23.0 °C	Mode*	
Humidity:	55%RH	Power	Operation
Pressure:	990mbar	<u>1</u>	<u>1, 2</u>

1 fully configured sample was scanned over the following frequency range:

Electric fields:	30MHz - 1GHz	(3 meter measurement distance)
	1GHz - 10GHz	(3 meter measurement distance)

Spurious Radiated Emissions:

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

All spurious emissions above 1GHz are 20dB down from the fundamental. All spurious emissions were measured and recorded in the tables below. The spurious emissions were checked in accordance to the limits of 15.209 and met the limits.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

Test equipment used for radiated emissions

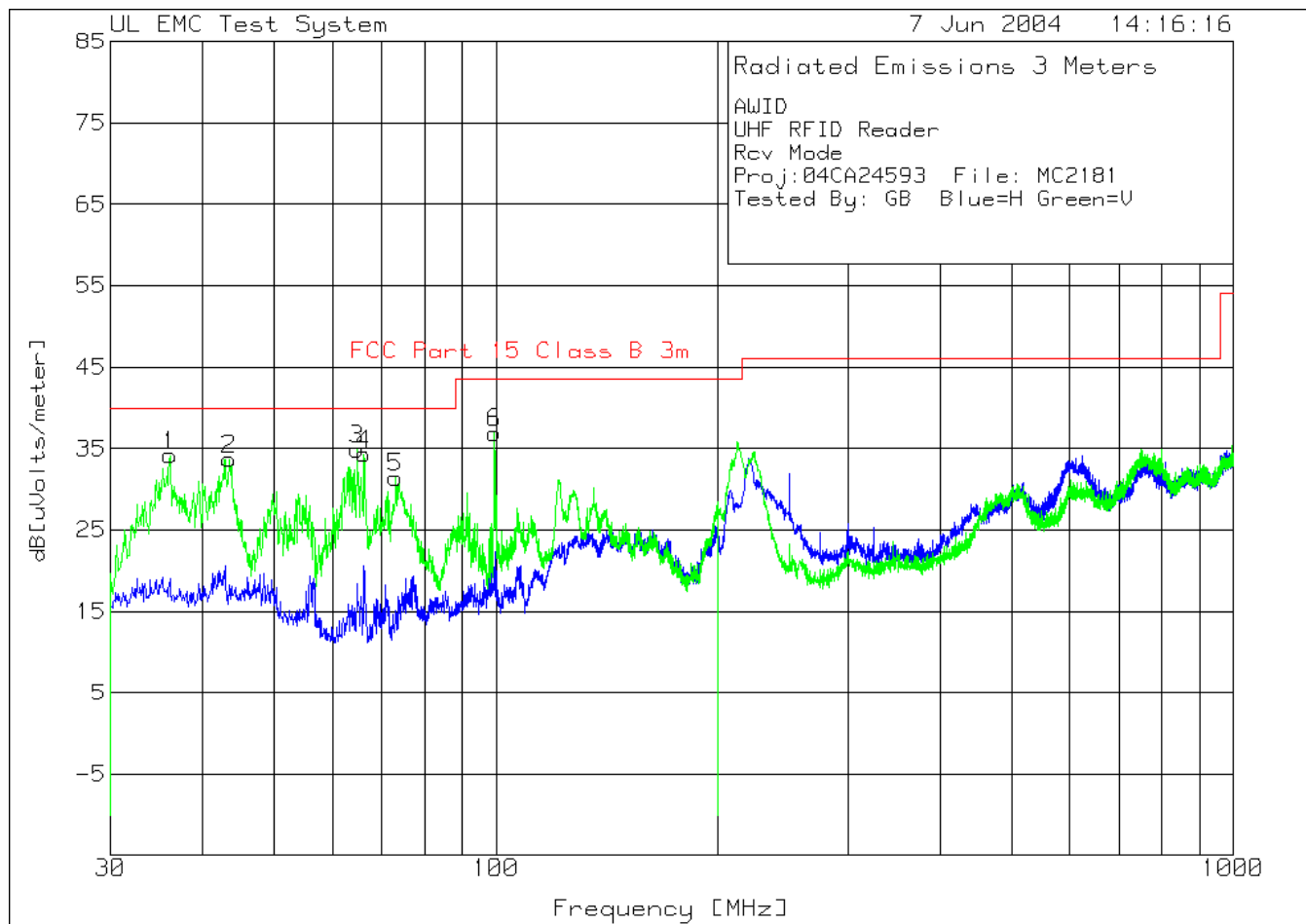
ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz
			RBW 10 KHz
			Quasi Peak BW: 9kHz
			RBW 100 KHz
			Quasi Peak BW: 120 kHz
			RBW 1.0 MHz
Range: 30-1000MHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

Test equipment used for radiated emissions above 1GHz

ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Resolution BW: 1MHz
			Video BW: 1MHz
Range: 1-10GHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

Test Accessories for Radiated Emissions

94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
Range: 30-200MHz	Last Calibration Date: 02 December 2003		Calibration Due Date: 02 December 2004
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
Range: 200-1000MHz	Last Calibration Date: 04 December 2003		Calibration Due Date: 04 December 2004
RGA-180	EMCO	Horn Antenna	Equipment No.: ME5-565
Range: 1-10GHz	Last Calibration Date: 24 June 2003		Calibration Due Date: 24 June 2004
8449B	Hewlett Packard	1-26GHz Pre-Amp	Equipment No.: ME5-914
Range: 1-10GHz	Last Calibration Date: 21 January 2004		Calibration Due Date: 21 January 2005
35710	Oakton	Hygrometer/Temp	Equipment No.: ME4-297
		Ranges	Temp: -30°C-50°C
			Humidity: 0% to 100%RH
	Last Calibration Date: 02 June 2004		Calibration Due Date: 02 June 2005



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Rcv Mode

Proj:04CA24593 File: MC2181

Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

=====						
Vertical 30 - 200MHz -----						
1	36.1231	19.55 pk	.9	13.7	34.15	40
	Azimuth:343	Height:100	Vert	Margin [dB]		-5.85
2	43.4793	19.88 pk	.9	12.9	33.68	40
	Azimuth:201	Height:100	Vert	Margin [dB]		-6.32
3	64.7826	28.07 pk	1.1	5.7	34.87	40
	Azimuth:201	Height:100	Vert	Margin [dB]		-5.13
4	66.2283	27.71 pk	1.1	5.5	34.31	40
	Azimuth:122	Height:100	Vert	Margin [dB]		-5.69
5	73.1168	24.21 pk	1.2	6	31.41	40
	Azimuth:358	Height:100	Vert	Margin [dB]		-8.59
6	99.5652	24.83 pk	1.4	10.7	36.93	43.5
	Azimuth:281	Height:199	Vert	Margin [dB]		-6.57

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID
UHF RFID Reader
Rcv Mode
Proj:04CA24593 File: MC2181
Tested By: GB Blue=H Green=V
Test Meter Gain/Loss Transducer Level Limit:1
Frequency Reading Factor Factor dB[uVolts/meter]
[MHz] [dB(uV)] [dB] [dB]

```
=====
Vertical 30 - 200MHz
36.12      18.04 qp      .9      13.7      32.64  40
Azimuth: 152 Height:104 Vert      Margin [dB]: -7.36

64.7927    25.44 qp      1.1      5.7      32.24  40
Azimuth: 67 Height:100 Vert      Margin [dB]: -7.76

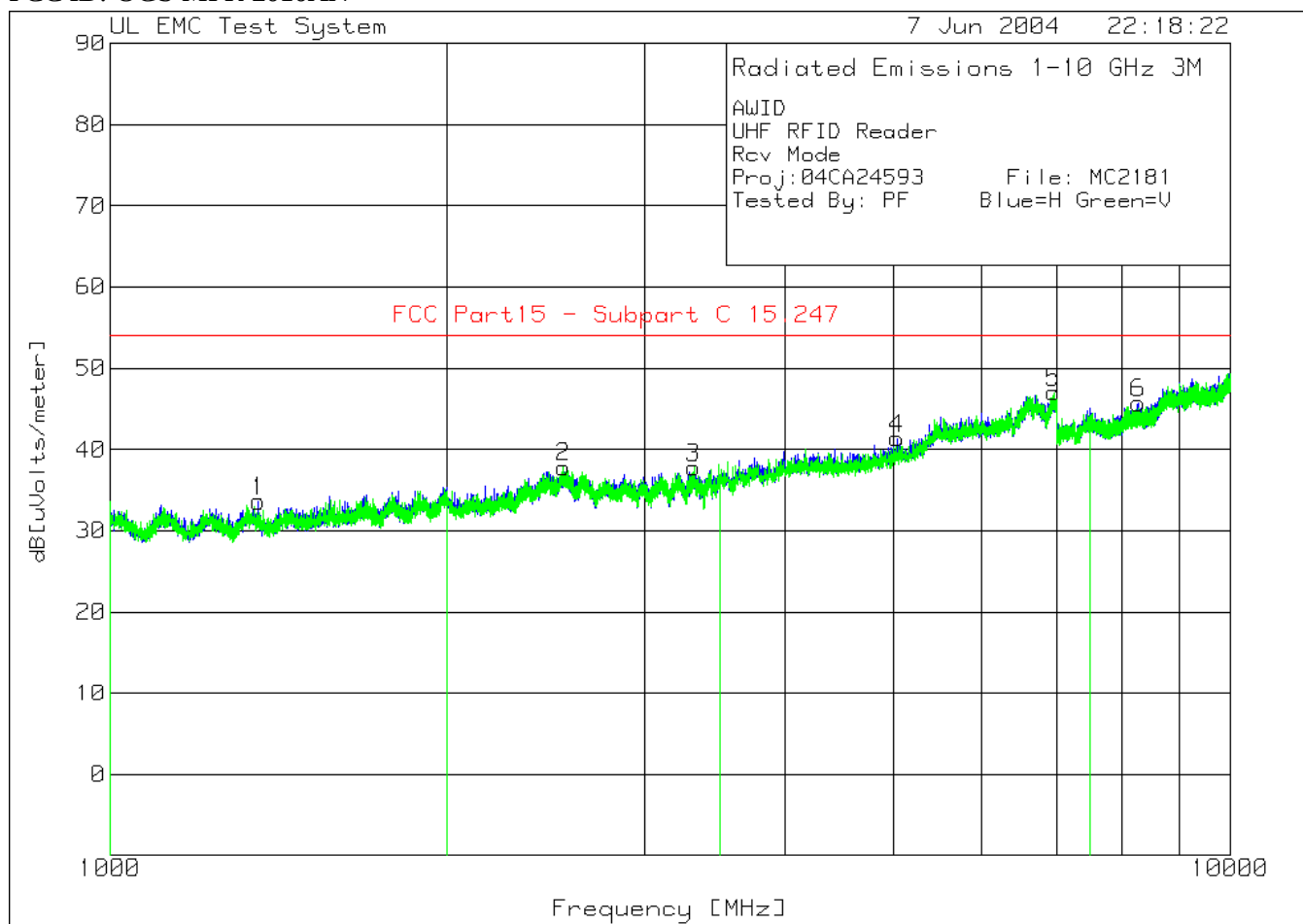
66.2925    24.99 qp      1.1      5.5      31.59  40
Azimuth: 126 Height:112 Vert      Margin [dB]: -8.41
```

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector
avem - EMI Average detector

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Rcv Mode

Proj:04CA24593

File: MC2181

Tested By: PF

Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

=====						
Horizontal 1000 - 2000MHz -----						
1	1356.785	38.44 pk	-31	26.2	33.64	54
	Azimuth:143	Height:101	Horz	Margin [dB]		-20.36

Horizontal 3500 - 7500MHz -----						
4	5037.846	29.57 pk	-23.4	35.2	41.37	54
	Azimuth:200	Height:199	Horz	Margin [dB]		-12.63

Horizontal 7500 - 10000MHz -----						
6	8278.593	26.94 pk	-19	37.8	45.74	54
	Azimuth:149	Height:199	Horz	Margin [dB]		-8.26

Vertical 2000 - 3500MHz -----						
2	2538.68	33.83 pk	-26.7	30.7	37.83	54
	Azimuth:93	Height:199	Vert	Margin [dB]		-16.17
3	3318.94	32.08 pk	-26.6	32.3	37.78	54
	Azimuth:267	Height:199	Vert	Margin [dB]		-16.22

Vertical 3500 - 7500MHz -----						
5	6953.151	31.13 pk	-21.3	37.2	47.03	54
	Azimuth:8	Height:199	Vert	Margin [dB]		-6.97

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

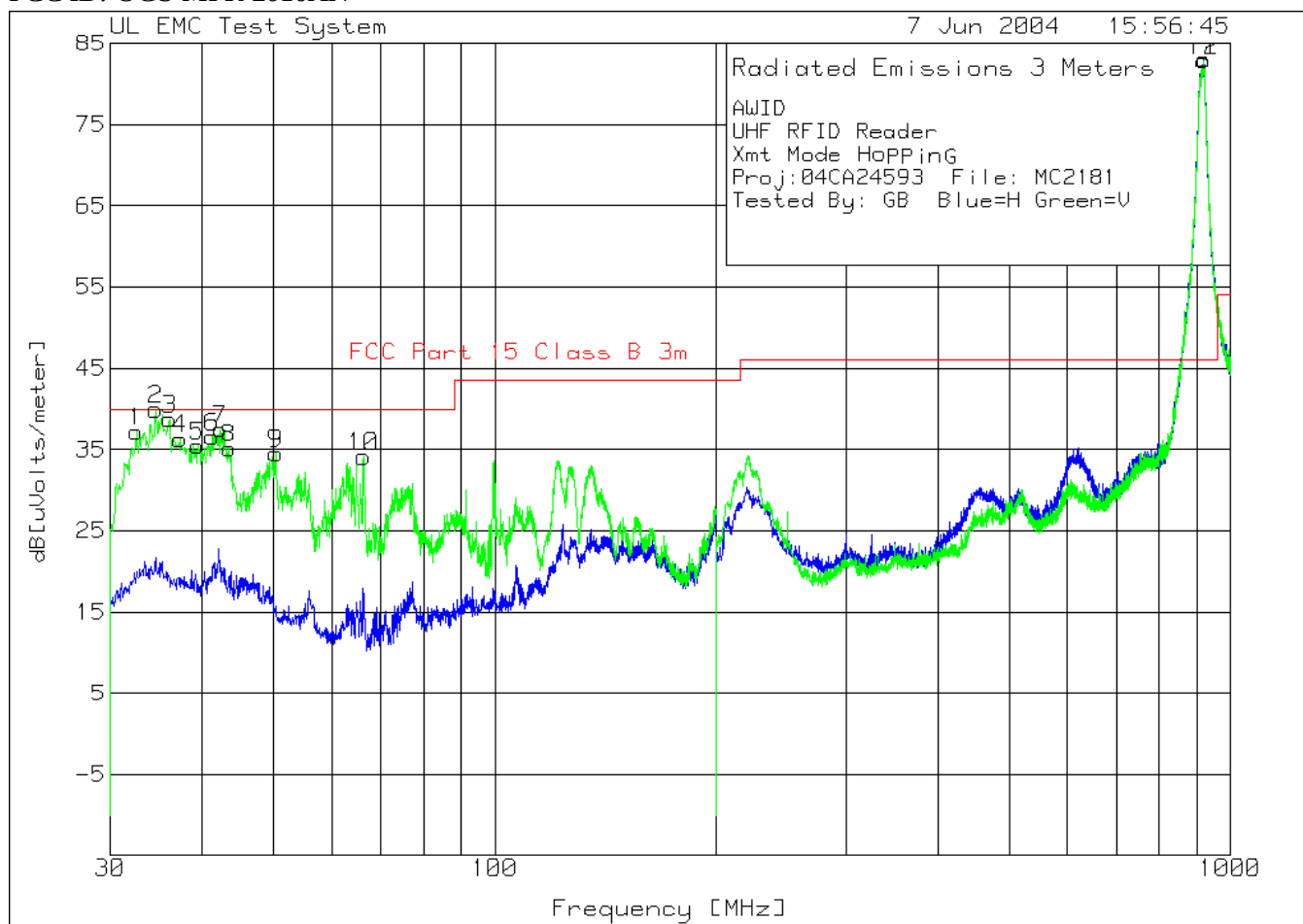
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode Hopping

Proj:04CA24593 File: MC2181

Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Vertical 30 - 200MHz						
32.6741	19.82 qp	.8	13.9	34.52	40	
Azimuth: 239	Height:104	Vert	Margin	[dB]:	-5.48	
34.6501	23.74 qp	.9	13.9	38.54	40	
Azimuth: 149	Height:103	Vert	Margin	[dB]:	-1.46	
36.0486	20.89 qp	.9	13.7	35.49	40	
Azimuth: 180	Height:101	Vert	Margin	[dB]:	-4.51	
37.2405	19.67 qp	.9	13.8	34.37	40	
Azimuth: 172	Height:101	Vert	Margin	[dB]:	-5.63	
39.4611	17.99 qp	.9	13.5	32.39	40	
Azimuth: 144	Height:106	Vert	Margin	[dB]:	-7.61	
41.4271	21.32 qp	.9	13.3	35.52	40	
Azimuth: 191	Height:104	Vert	Margin	[dB]:	-4.48	
42.3968	22.55 qp	1	13.2	36.75	40	
Azimuth: 182	Height:101	Vert	Margin	[dB]:	-3.25	
43.5914	18.94 qp	1	12.9	32.84	40	
Azimuth: 134	Height:104	Vert	Margin	[dB]:	-7.16	
50.1282	18.5 qp	1	11.4	30.9	40	
Azimuth: 202	Height:104	Vert	Margin	[dB]:	-9.1	
66.2436	20.21 qp	1.1	5.5	26.81	40	
Azimuth: 116	Height:107	Vert	Margin	[dB]:	-13.19	
Horizontal 200 - 1000MHz						

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

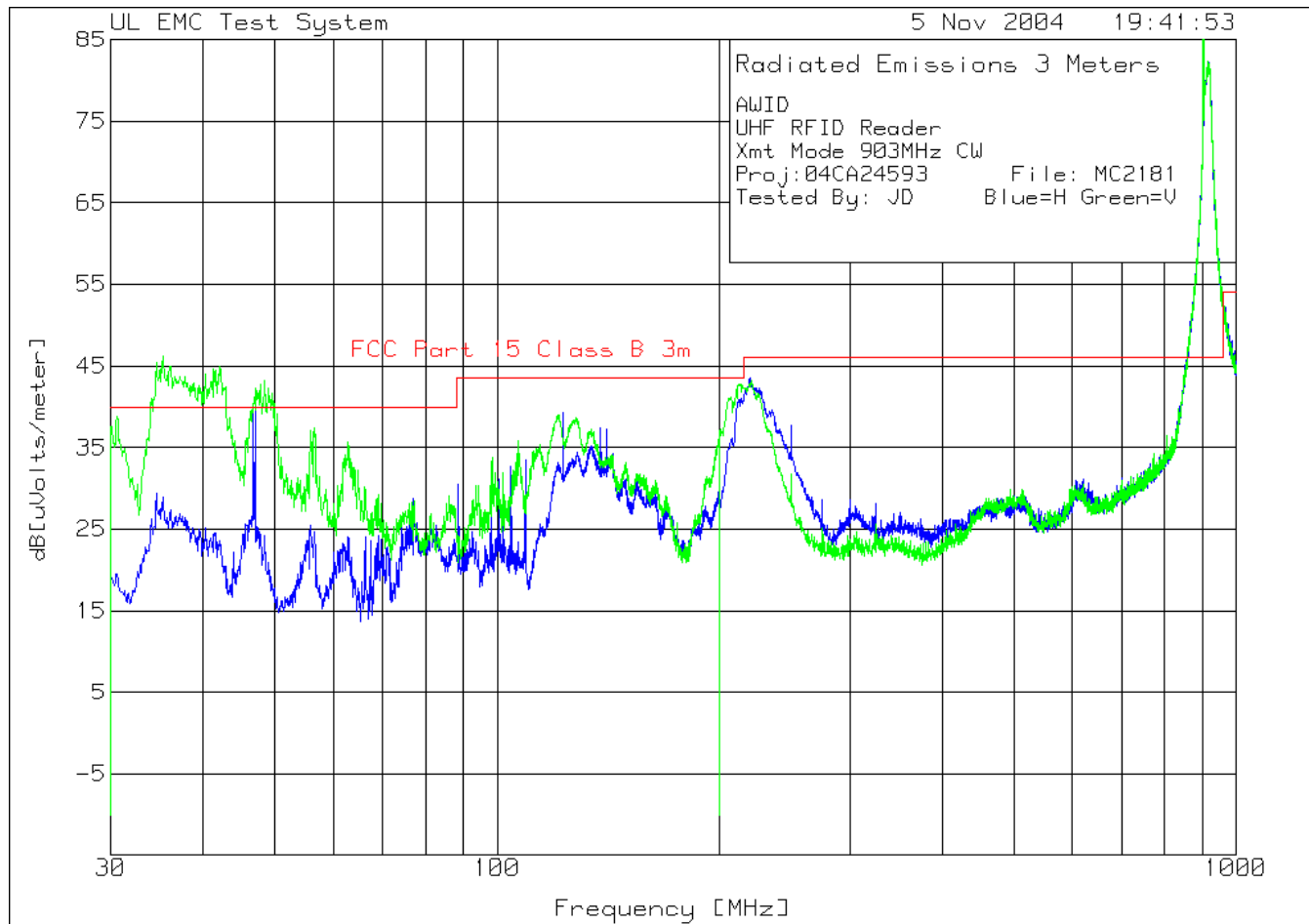
av - Average detector

avlg - Average log detector

avem - EMI Average detector

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 903MHz CW

Proj:04CA24593 File: MC2181

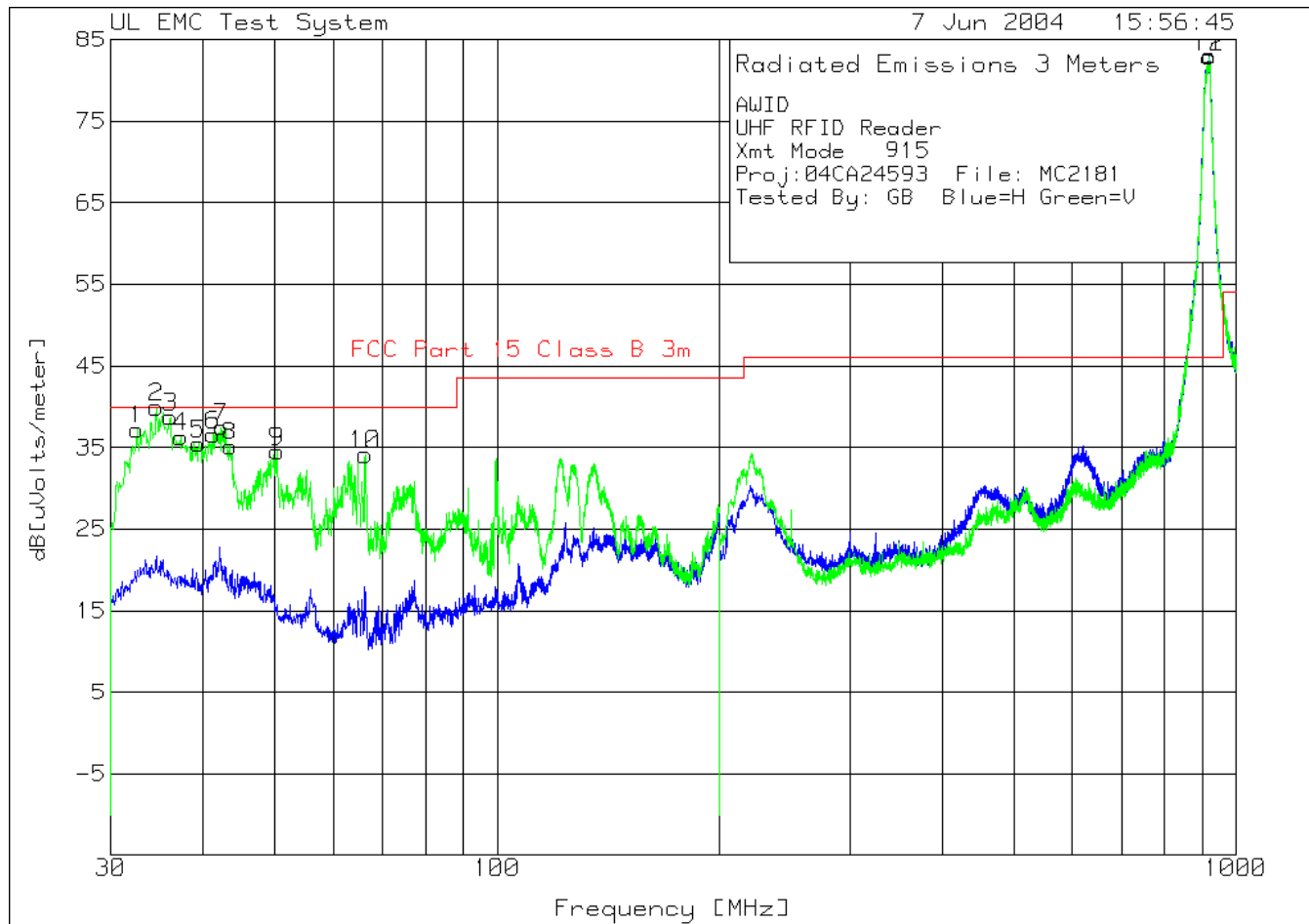
Tested By: JD Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1
Frequency	Reading	Factor	Factor	dB[uVolts/meter]	
[MHz]	[dB(uV)]	[dB]	[dB]		

=====					
Horizontal 30 - 200MHz					
46.9073	13.74 qp	1	12.3	27.04	40
Azimuth: 0	Height:234	Horz	Margin	[dB]:	-12.96
122.7259	19.41 qp	1.7	10.8	31.91	43.5
Azimuth: 22	Height:265	Horz	Margin	[dB]:	-11.59
Vertical 30 - 200MHz					
30.6785	22.81 qp	.8	13.8	37.41	40
Azimuth: 194	Height:104	Vert	Margin	[dB]:	-2.59
56.779	23.89 qp	1.1	9.1	34.09	40
Azimuth: 11	Height:108	Vert	Margin	[dB]:	-5.91
62.7752	27.11 qp	1.1	6.4	34.61	40
Azimuth: 3	Height:105	Vert	Margin	[dB]:	-5.39
121.1535	26.49 qp	1.6	10.5	38.59	43.5
Azimuth: 341	Height:102	Vert	Margin	[dB]:	-4.91
127.714	24.45 qp	1.7	12	38.15	43.5
Azimuth: 293	Height:105	Vert	Margin	[dB]:	-5.35
49.0298	20.83 qp	1	11.7	33.53	40
Azimuth: 287	Height:104	Vert	Margin	[dB]:	-6.47
35.3427	21.21 qp	.9	13.9	36.01	40
Azimuth: 112	Height:100	Vert	Margin	[dB]:	-3.99
42.0841	24.78 qp	1	13.3	39.08	40
Azimuth: 69	Height:101	Vert	Margin	[dB]:	-.92
Horizontal 200 - 1000MHz					
220.2415	29.39 qp	2.2	11.7	43.29	46
Azimuth: 7	Height:146	Horz	Margin	[dB]:	-2.71
Vertical 200 - 1000MHz					
221.519	28.58 qp	2.2	11.7	42.48	46
Azimuth: 333	Height:102	Vert	Margin	[dB]:	-3.52
Horizontal 200 - 1000MHz					
960	9.68 qp	4.6	23.9	38.18	46
Azimuth: 0	Height:230	Horz	Margin	[dB]:	-7.82
Vertical 200 - 1000MHz					
960	9.59 qp	4.6	23.9	38.09	46
Azimuth: 2	Height:130	Vert	Margin	[dB]:	-7.91

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector
ave - Average detector



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 915MHz

Proj:04CA24593 File: MC2181

Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

=====

Vertical 30 - 200MHz

32.6741	19.82 qp	.8	13.9	34.52	40
Azimuth: 239	Height:104	Vert	Margin	[dB]:	-5.48
34.6501	23.74 qp	.9	13.9	38.54	40
Azimuth: 149	Height:103	Vert	Margin	[dB]:	-1.46
36.0486	20.89 qp	.9	13.7	35.49	40
Azimuth: 180	Height:101	Vert	Margin	[dB]:	-4.51
37.2405	19.67 qp	.9	13.8	34.37	40
Azimuth: 172	Height:101	Vert	Margin	[dB]:	-5.63
39.4611	17.99 qp	.9	13.5	32.39	40
Azimuth: 144	Height:106	Vert	Margin	[dB]:	-7.61
41.4271	21.32 qp	.9	13.3	35.52	40
Azimuth: 191	Height:104	Vert	Margin	[dB]:	-4.48
42.3968	22.55 qp	1	13.2	36.75	40
Azimuth: 182	Height:101	Vert	Margin	[dB]:	-3.25
43.5914	18.94 qp	1	12.9	32.84	40
Azimuth: 134	Height:104	Vert	Margin	[dB]:	-7.16
50.1282	18.5 qp	1	11.4	30.9	40
Azimuth: 202	Height:104	Vert	Margin	[dB]:	-9.1
66.2436	20.21 qp	1.1	5.5	26.81	40
Azimuth: 116	Height:107	Vert	Margin	[dB]:	-13.19

Horizontal 200 - 1000MHz

902	11.86 qp	4.4	23.6	39.86	46
Azimuth: 3	Height:246	Horz	Margin	[dB]:	-6.14
960	10.01 qp	4.6	23.9	38.51	46
Azimuth: 3	Height:228	Horz	Margin	[dB]:	-7.49

Vertical 200 - 1000MHz

902	11.28 qp	4.4	23.6	39.28	46
Azimuth: 21	Height:148	Vert	Margin	[dB]:	-6.72
960	9.96 qp	4.6	23.9	38.46	46
Azimuth: 0	Height:137	Vert	Margin	[dB]:	-7.54

LIMIT 1: FCC Part 15 Class B 3m

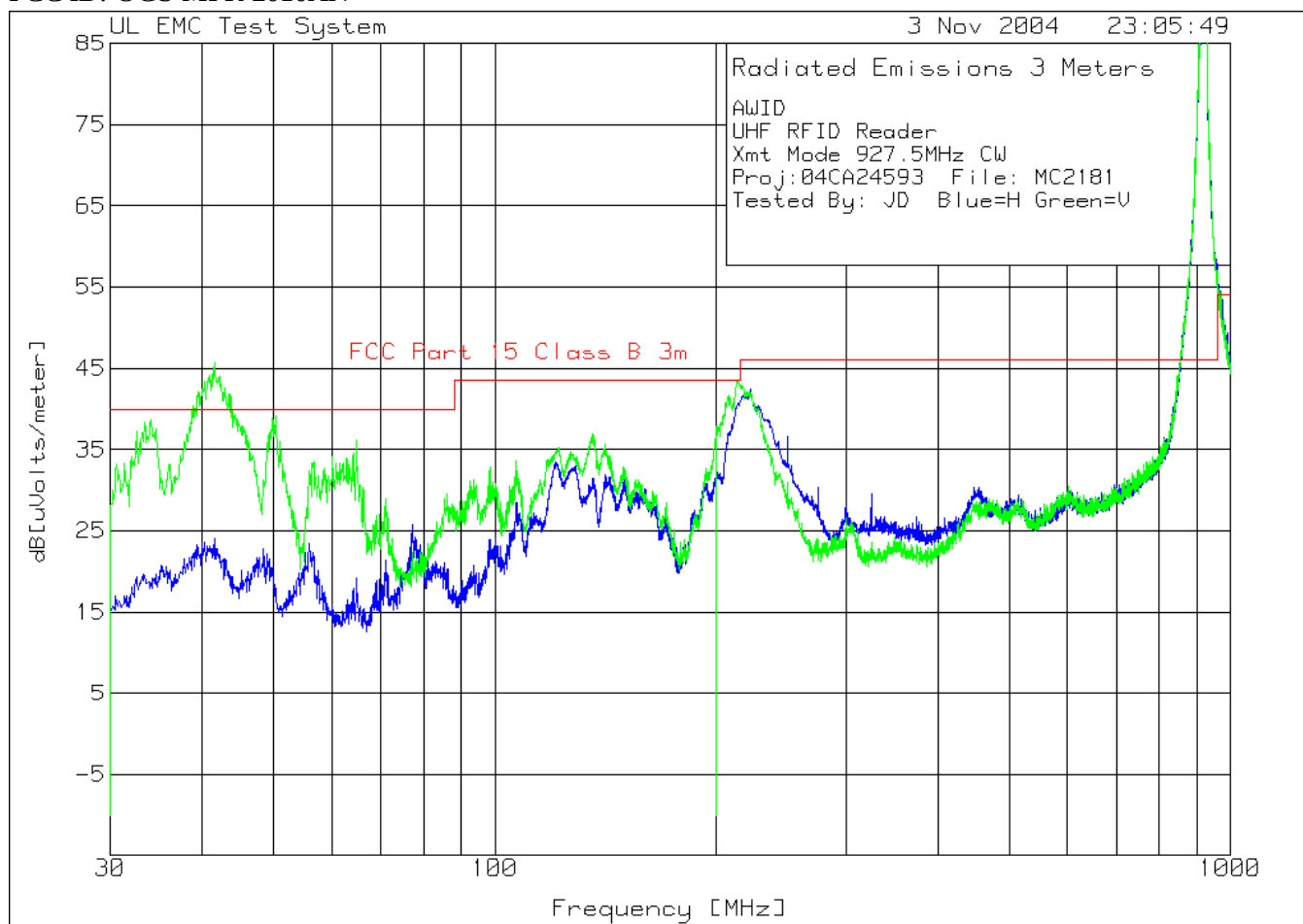
pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

avem - EMI Average detector



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 927.5MHz CW

Proj:04CA24593 File: MC2181

Tested By: JD Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
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=====

Vertical 30 - 200MHz

32.6047	13.53 qp	.8	13.9	28.23	40
Azimuth: 292	Height:108	Vert	Margin	[dB]:	-11.77
34.0048	21.17 qp	.9	13.8	35.87	40
Azimuth: 47	Height:105	Vert	Margin	[dB]:	-4.13
43.705	22.51 qp	1	12.9	36.41	40
Azimuth: 70	Height:110	Vert	Margin	[dB]:	-3.59
49.8464	26.39 qp	1	11.5	38.89	40
Azimuth: 197	Height:104	Vert	Margin	[dB]:	-1.11
56.7728	24.29 qp	1.1	9.1	34.49	40
Azimuth: 189	Height:104	Vert	Margin	[dB]:	-5.51
63.4124	21.31 qp	1.1	6.3	28.71	40
Azimuth: 206	Height:105	Vert	Margin	[dB]:	-11.29
60.1488	16.3 qp	1.1	7.5	24.9	40
Azimuth: 299	Height:102	Vert	Margin	[dB]:	-15.1

Horizontal 200 - 1000MHz

221.1483	29.05 qp	2.2	11.7	42.95	46
Azimuth: 359	Height:146	Horz	Margin	[dB]:	-3.05
Vertical 200 - 1000MHz					
215.1523	18.9 qp	2.2	12	32.89	43.5
Azimuth: 326	Height:101	Vert	Margin	[dB]:	-10.61

Horizontal 200 - 1000MHz

960	10.24 qp	4.6	23.9	38.74	46
Azimuth: 6	Height:227	Horz	Margin	[dB]:	-7.26
915	11.93 qp	4.4	23.5	39.83	46
Azimuth: 357	Height:242	Horz	Margin	[dB]:	-6.17
902	10.32 qp	4.4	23.6	38.32	46
Azimuth: 360	Height:244	Horz	Margin	[dB]:	-7.68

Vertical 200 - 1000MHz

960	10.46 qp	4.6	23.9	38.96	46
Azimuth: 0	Height:131	Vert	Margin	[dB]:	-7.04
915	11.97 qp	4.4	23.5	39.87	46
Azimuth: 353	Height:139	Vert	Margin	[dB]:	-6.13
902	10.28 qp	4.4	23.6	38.28	46
Azimuth: 355	Height:141	Vert	Margin	[dB]:	-7.72

LIMIT 1: FCC Part 15 Class B 3m

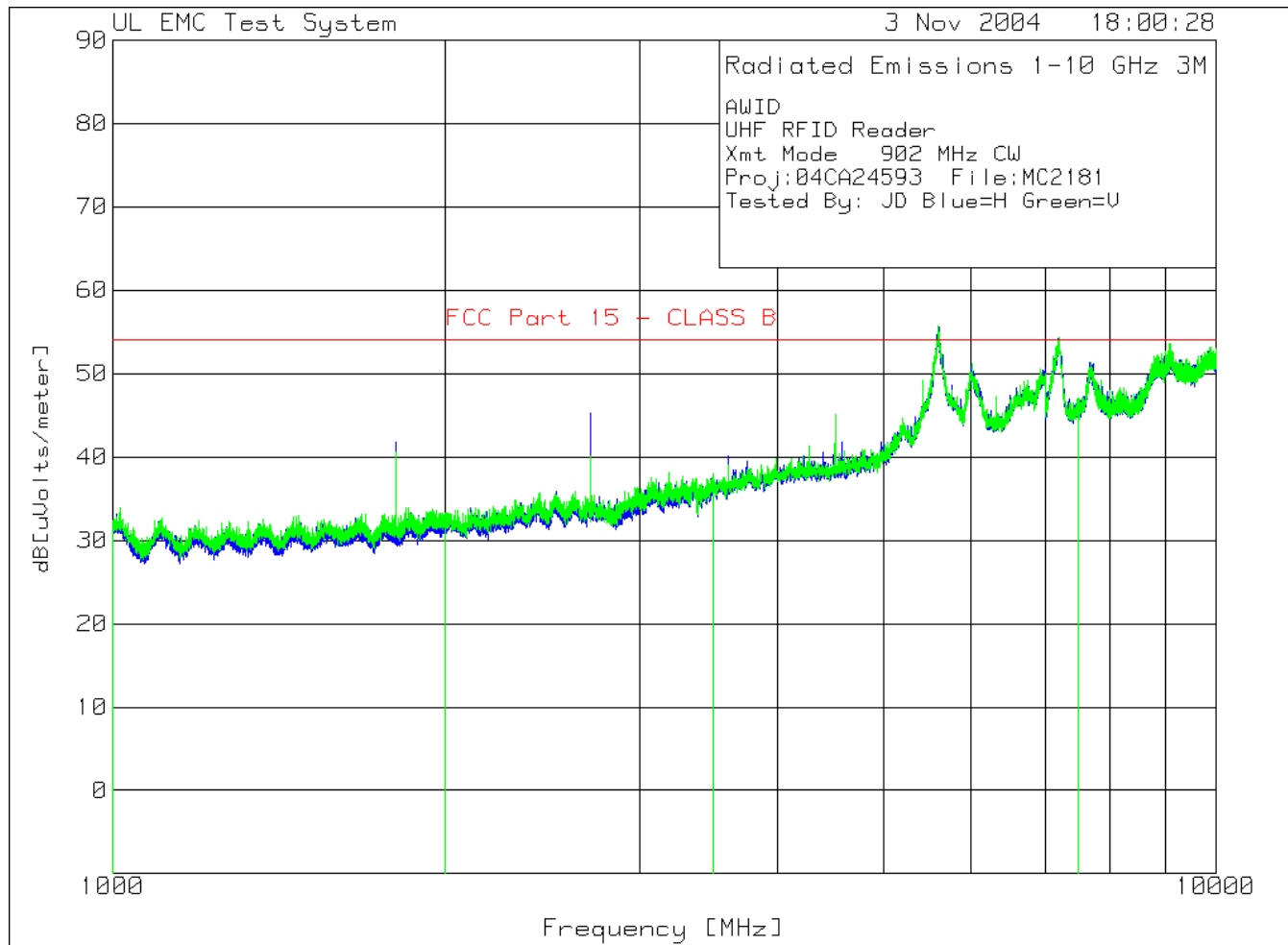
pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

ave - Average detector



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 902 MHz CW

Proj:04CA24593 File:MC2181

Tested By: JD Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

=====

Horizontal 1000 - 2000MHz

1805.7247	46.69 ave	-30.1	28	44.59	54
Azimuth: 7	Height:152	Horz	Margin	[dB]:	-9.41

Horizontal 2000 - 3500MHz

2708.7691	46.67 ave	-27.9	31	49.77	54
Azimuth: 68	Height:102	Horz	Margin	[dB]:	-4.23

Horizontal 3500 - 7500MHz

4514.3934	37.96 ave	-23	33.7	48.66	54
Azimuth: 77	Height:103	Horz	Margin	[dB]:	-5.34

5610.037	27.32 ave	-9.5	36.3	54.12	54
Azimuth: 292	Height:103	Horz	Margin	[dB]:	-.12

6012.838	27.58 ave	-14	36.8	50.38	54
Azimuth: 185	Height:111	Horz	Margin	[dB]:	-3.62

997	31.22 ave	-17.1	37.3	51.42	54
Azimuth: 284	Height:166	Horz	Margin	[dB]:	-2.58

7209.237	21.7 ave	-9.1	37.6	50.2	54
Azimuth: 33	Height:137	Horz	Margin	[dB]:	-3.8

Vertical 7500 - 10000MHz

7702.567	21.71 ave	-11.5	37.9	48.11	54
Azimuth: 166	Height:100	Vert	Margin	[dB]:	-5.89

8868.789	22.42 ave	-13.6	39.4	48.22	54
Azimuth: 188	Height:124	Vert	Margin	[dB]:	-5.78

9055.518	22.02 ave	-12.9	39.9	49.02	54
Azimuth: 0	Height:172	Vert	Margin	[dB]:	-4.98

9891.63	23.05 ave	-12.4	39.2	49.85	54
Azimuth: 209	Height:165	Vert	Margin	[dB]:	-4.15

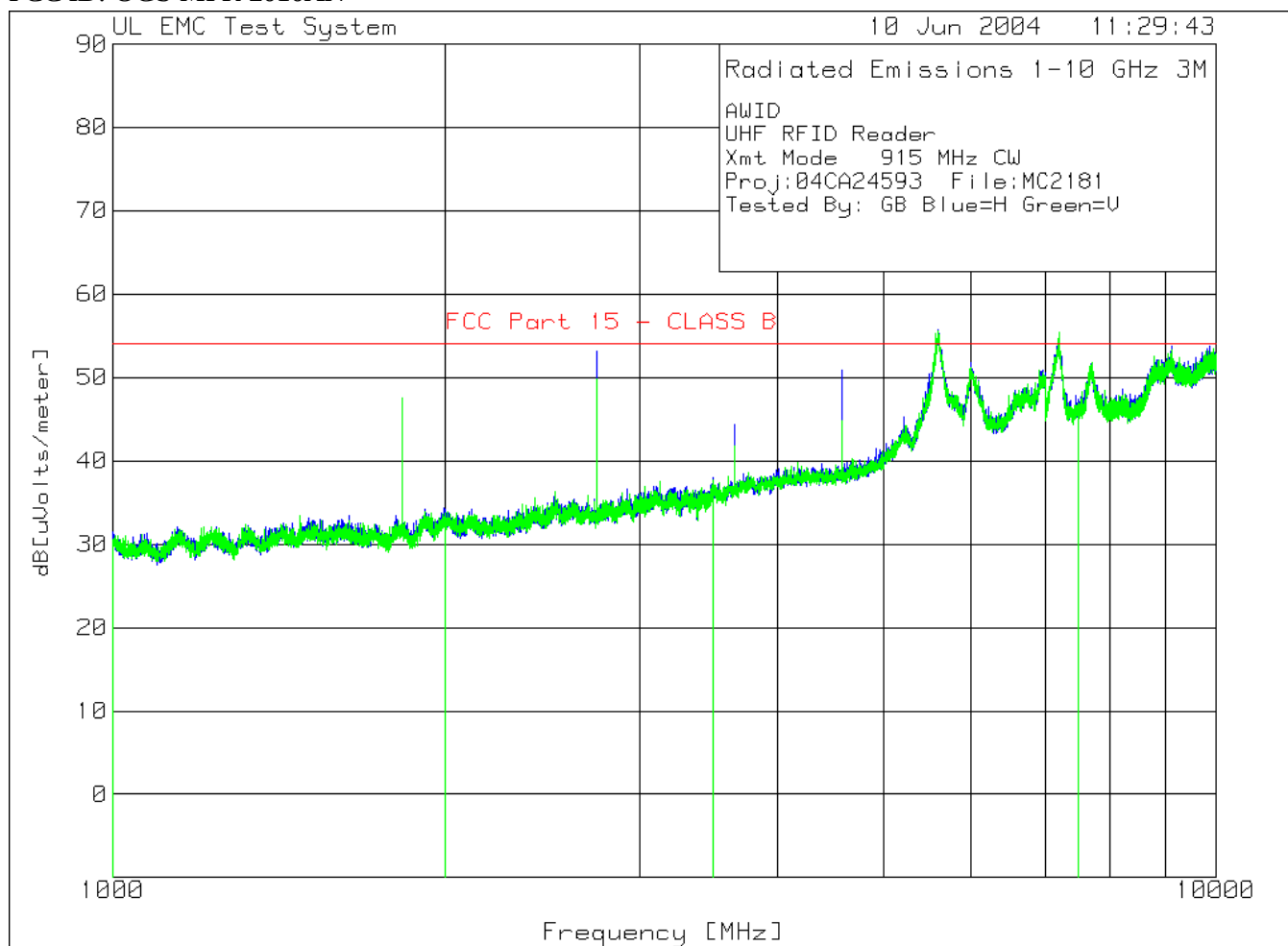
LIMIT 1: FCC Part 15 - CLASS B

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

ave - Average detector



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 915 MHz CW

Proj:04CA24593 File:MC2181

Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

Horizontal 1000 - 2000MHz

1828.2606	34.52 ave	-30.1	28.1	32.52	54
Azimuth: 340	Height:136	Horz	Margin [dB]:	-21.48	
1828.2966	35.51 ave	-30.1	28.1	33.51	54
Azimuth: 340	Height:136	Horz	Margin [dB]:	-20.49	
2745.749	23.61 ave	-27.8	31	26.81	54
Azimuth: 13	Height:104	Horz	Margin [dB]:	-27.19	

Horizontal 3500 - 7500MHz

3656.9138	36.23 ave	-24.8	33.3	44.73	54
Azimuth: 71	Height:113	Horz	Margin [dB]:	-9.27	
3660	22.3 ave	-24.8	33.3	30.8	54
Azimuth: 191	Height:101	Horz	Margin [dB]:	-23.2	
4571.0301	41.74 ave	-22.8	33.9	52.84	54
Azimuth: 44	Height:136	Horz	Margin [dB]:	-1.16	
5599.367	27.97 ave	-14.1	36.8	50.67	54
Azimuth: 15	Height:170	Horz	Margin [dB]:	-3.33	

Horizontal 7500 - 10000MHz

9871.62	23.07 ave	-12.4	39.1	49.77	54
Azimuth: 173	Height:102	Horz	Margin [dB]:	-4.23	

Vertical 1000 - 2000MHz

1828.3044	42.36 ave	-30.1	28.1	40.36	54
Azimuth: 349	Height:101	Vert	Margin [dB]:	-13.64	

Vertical 2000 - 3500MHz

2742.6653	47.66 ave	-27.8	31	50.86	54
Azimuth: 34	Height:109	Vert	Margin [dB]:	-3.14	

Vertical 3500 - 7500MHz

3656.9339	34.06 ave	-24.8	33.3	42.56	54
Azimuth: 326	Height:107	Vert	Margin [dB]:	-11.44	
4571.0301	31.54 ave	-22.8	33.9	42.64	54
Azimuth: 4	Height:108	Vert	Margin [dB]:	-11.36	
7202.568	21.73 ave	-8.6	37.6	50.73	54
Azimuth: 192	Height:101	Vert	Margin [dB]:	-3.27	

Vertical 7500 - 10000MHz

9101.367	21.71 ave	-12.2	39.8	49.31	54
Azimuth: 348	Height:102	Vert	Margin [dB]:	-4.69	

LIMIT 1: FCC Part 15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

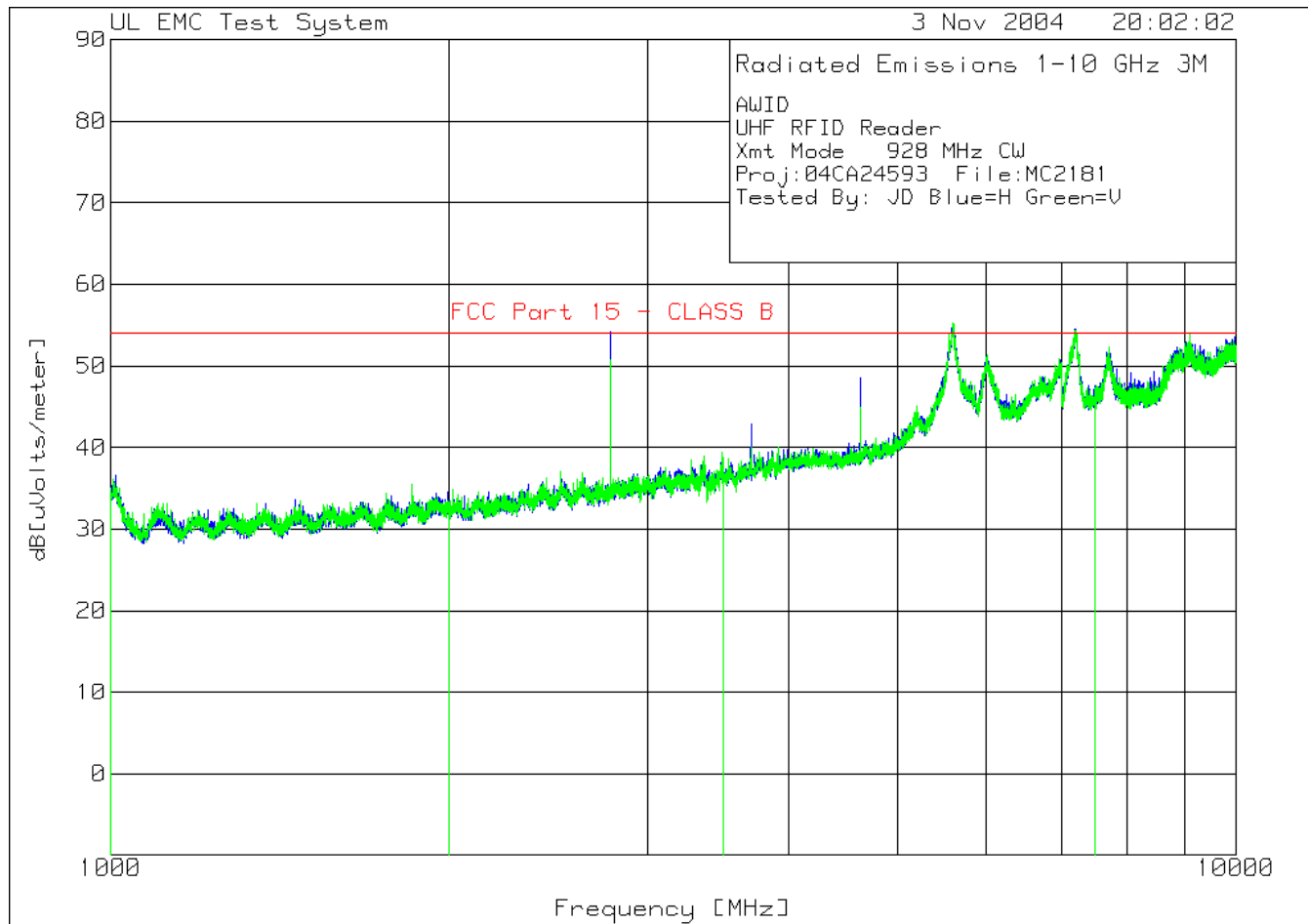
av - Average detector

avlg - Average log detector

ave - Average detector

File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 928 MHz CW

Proj:04CA24593 File:MC2181

Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
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Horizontal 1000 - 2000MHz

1828.2606	34.52 ave	-30.1	28.1	32.52	54
Azimuth: 340	Height:136	Horz	Margin [dB]:		-21.48
1828.2966	35.51 ave	-30.1	28.1	33.51	54
Azimuth: 340	Height:136	Horz	Margin [dB]:		-20.49
2745.749	23.61 ave	-27.8	31	26.81	54
Azimuth: 13	Height:104	Horz	Margin [dB]:		-27.19

Horizontal 3500 - 7500MHz

3656.9138	36.23 ave	-24.8	33.3	44.73	54
Azimuth: 71	Height:113	Horz	Margin [dB]:		-9.27
3660	22.3 ave	-24.8	33.3	30.8	54
Azimuth: 191	Height:101	Horz	Margin [dB]:		-23.2
4571.0301	41.74 ave	-22.8	33.9	52.84	54
Azimuth: 44	Height:136	Horz	Margin [dB]:		-1.16
5599.367	27.97 ave	-14.1	36.8	50.67	54
Azimuth: 15	Height:170	Horz	Margin [dB]:		-3.33

Horizontal 7500 - 10000MHz

9871.62	23.07 ave	-12.4	39.1	49.77	54
Azimuth: 173	Height:102	Horz	Margin [dB]:		-4.23

Vertical 1000 - 2000MHz

1828.3044	42.36 ave	-30.1	28.1	40.36	54
Azimuth: 349	Height:101	Vert	Margin [dB]:		-13.64

Vertical 2000 - 3500MHz

2742.6653	47.66 ave	-27.8	31	50.86	54
Azimuth: 34	Height:109	Vert	Margin [dB]:		-3.14

Vertical 3500 - 7500MHz

3656.9339	34.06 ave	-24.8	33.3	42.56	54
Azimuth: 326	Height:107	Vert	Margin [dB]:		-11.44
4571.0301	31.54 ave	-22.8	33.9	42.64	54
Azimuth: 4	Height:108	Vert	Margin [dB]:		-11.36
7202.568	21.73 ave	-8.6	37.6	50.73	54
Azimuth: 192	Height:101	Vert	Margin [dB]:		-3.27

Vertical 7500 - 10000MHz

9101.367	21.71 ave	-12.2	39.8	49.31	54
Azimuth: 348	Height:102	Vert	Margin [dB]:		-4.69

LIMIT 1: FCC Part 15 - CLASS B

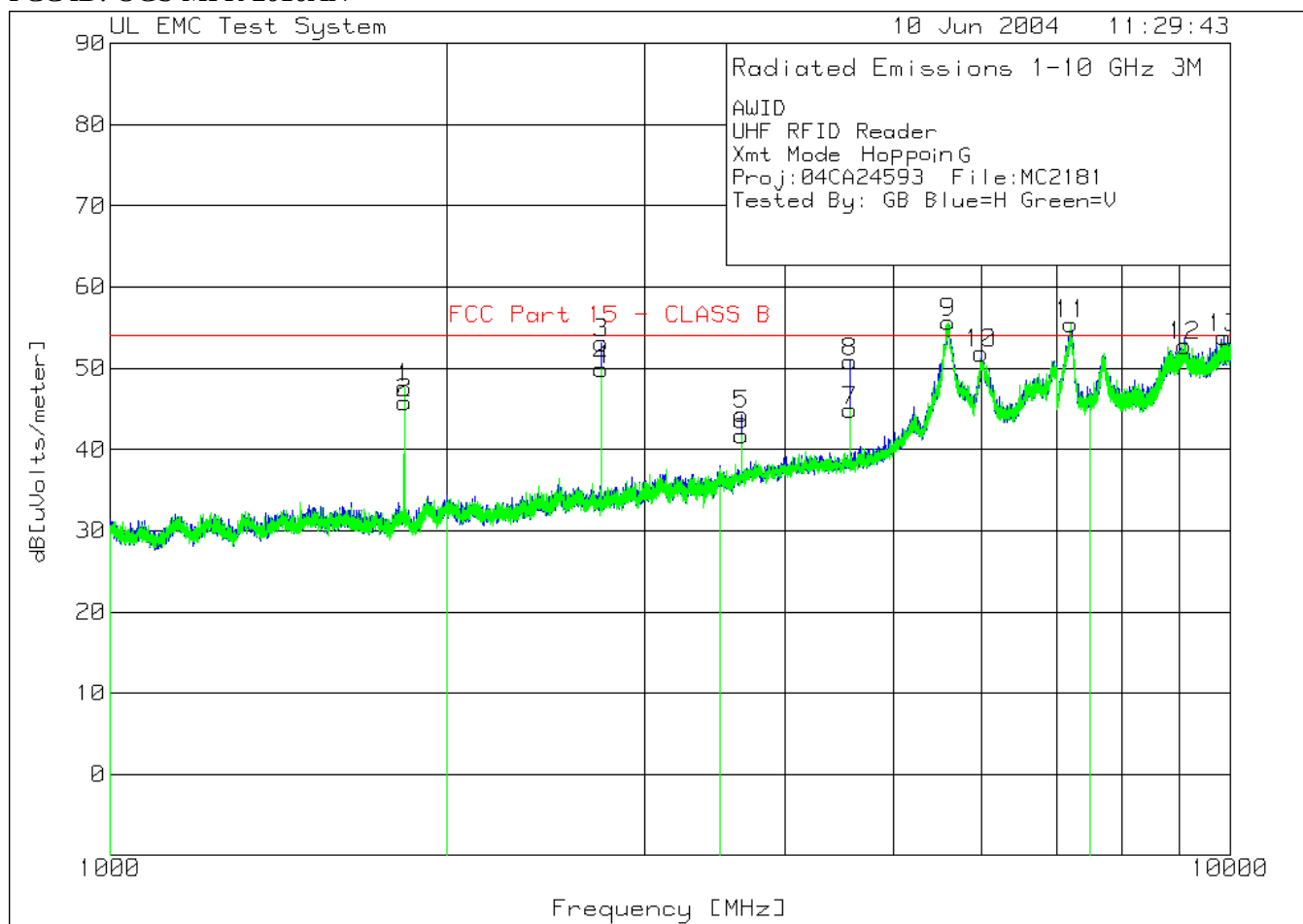
pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

ave - Average detector



File Number: MC2181
Project Number: 04CA24593
Model Number: MPR-2010
FCC ID: OGS MPR-2010AN

Issued: 12/08/2004

AWID

UHF RFID Reader

Xmt Mode 902 MHz CW

Proj:04CA24593 File:MC2181

Tested By: JD Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
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Horizontal 1000 - 2000MHz

1805.7247	46.69 ave	-30.1	28	44.59	54
Azimuth: 7	Height:152	Horz	Margin	[dB]:	-9.41

Horizontal 2000 - 3500MHz

2708.7691	46.67 ave	-27.9	31	49.77	54
Azimuth: 68	Height:102	Horz	Margin	[dB]:	-4.23

Horizontal 3500 - 7500MHz

4514.3934	37.96 ave	-23	33.7	48.66	54
Azimuth: 77	Height:103	Horz	Margin	[dB]:	-5.34

5610.037	27.32 ave	-9.5	36.3	54.12	54
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Azimuth: 292	Height:103	Horz	Margin	[dB]:	-.12
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6012.838	27.58 ave	-14	36.8	50.38	54
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Azimuth: 185	Height:111	Horz	Margin	[dB]:	-3.62
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6997	31.22 ave	-17.1	37.3	51.42	54
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Azimuth: 284	Height:166	Horz	Margin	[dB]:	-2.58
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7209.237	21.7 ave	-9.1	37.6	50.2	54
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Azimuth: 33	Height:137	Horz	Margin	[dB]:	-3.8
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Vertical 7500 - 10000MHz

7702.567	21.71 ave	-11.5	37.9	48.11	54
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Azimuth: 166	Height:100	Vert	Margin	[dB]:	-5.89
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8868.789	22.42 ave	-13.6	39.4	48.22	54
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Azimuth: 188	Height:124	Vert	Margin	[dB]:	-5.78
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9055.518	22.02 ave	-12.9	39.9	49.02	54
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Azimuth: 0	Height:172	Vert	Margin	[dB]:	-4.98
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9891.63	23.05 ave	-12.4	39.2	49.85	54
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Azimuth: 209	Height:165	Vert	Margin	[dB]:	-4.15
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LIMIT 1: FCC Part 15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

ave - Average detector

Below are measured Average Harmonics emissions of the intentional radiator low, mid and high band Average Detector.

902MHz

Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.805	Vertical	-0.53	24.9	24.37	54
2.7075	Vertical	3.67	25.44	29.11	54
3.610	Vertical	7.8	17.47	25.27	54
4.5725	Vertical	17.2	18.56	35.76	54
5.415	Vertical	19.1	17.99	37.09	54
6.3175	Vertical	18.8	20.38	39.18	54
7.220	Vertical	20.3	28.61	48.91	54
8.1225	Vertical	19.9	30.77	50.67	54
9.025	Vertical	23.2	28.64	51.84	54
10	Vertical	23.8	29.23	53.03	54

902MHz

Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.805	Horizontal	-0.53	24.9	24.37	54
2.7075	Horizontal	3.67	29.63	33.3	54
3.610	Horizontal	7.8	18.26	26.06	54
4.5725	Horizontal	17.2	20.61	37.81	54
5.415	Horizontal	19.1	19.17	38.27	54
6.3175	Horizontal	18.8	20.51	39.31	54
7.220	Horizontal	20.3	28.85	49.15	54
8.1225	Horizontal	19.9	29.05	48.95	54
9.025	Horizontal	23.2	28.45	51.65	54
10	Horizontal	23.8	28.84	52.64	54

915MHz

Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.830	Vertical	-0.53	23.8	22.96	54
2.745	Vertical	3.67	26.27	29.94	54
3.660	Vertical	7.8	18.89	26.69	54
4.575	Vertical	17.2	20.51	37.71	54
5.490	Vertical	19.1	16.82	35.92	54
6.405	Vertical	18.8	18.95	37.75	54
7.320	Vertical	20.3	28.64	48.94	54
8.235	Vertical	19.9	29.48	49.38	54
9.150	Vertical	23.2	30.29	53.49	54
10.065	Vertical	23.8	29.01	52.81	54

915MHz

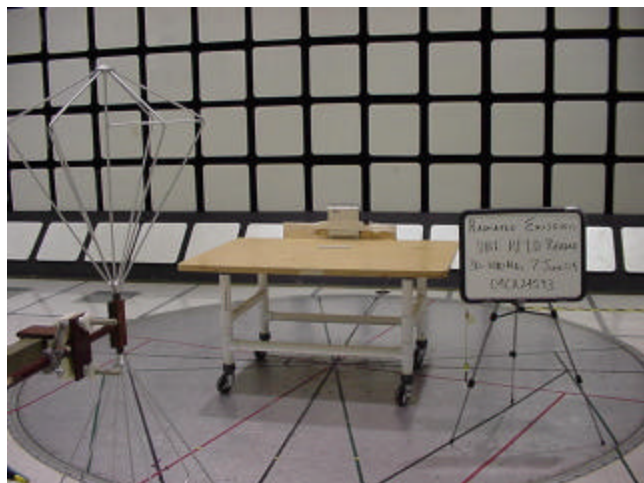
Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.830	Horizontal	-0.53	23.49	24.02	54
2.745	Horizontal	3.67	28.93	32.6	54
3.660	Horizontal	7.8	19.20	27	54
4.575	Horizontal	17.2	24.33	41.53	54
5.490	Horizontal	19.1	19.05	38.15	54
6.405	Horizontal	18.8	18.97	37.77	54
7.320	Horizontal	20.3	27.85	48.15	54
8.235	Horizontal	19.9	28.23	48.13	54
9.150	Horizontal	23.2	28.12	51.32	54
10.065	Horizontal	23.8	29.73	53.53	54

926 . 5MHz

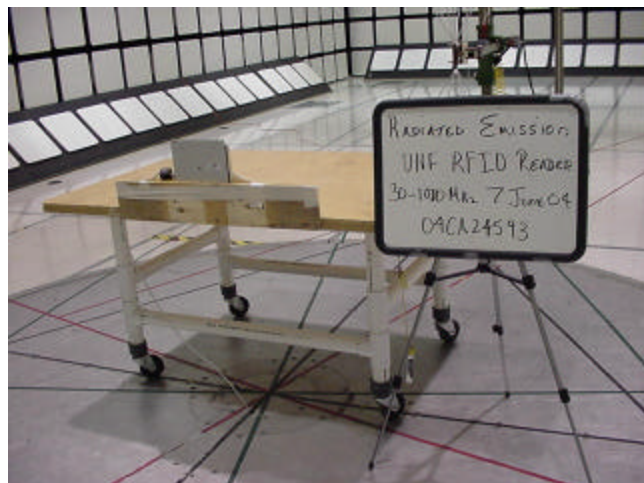
Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.853	Vertical	-0.53	22.63	22.1	54
2.7795	Vertical	3.67	23.59	27.26	54
3.706	Vertical	7.8	19.77	27.57	54
4.6325	Vertical	17.2	20.86	38.06	54
5.559	Vertical	19.1	18.45	37.55	54
6.4855	Vertical	18.8	20.36	39.16	54
7.412	Vertical	20.3	27.81	48.11	54
8.3385	Vertical	19.9	29.73	49.63	54
9.265	Vertical	23.2	28.09	51.29	54
10.1915	Vertical	23.8	28.62	52.42	54

926 . 5MHz

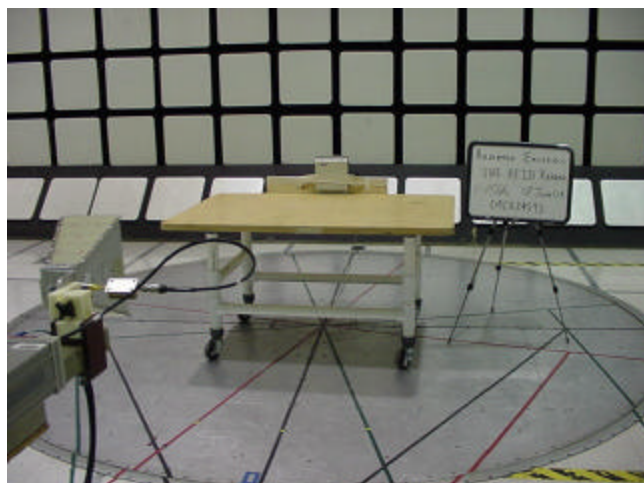
Frequency (GHz)	Antenna Polarity	Transducer factor and Gain/Loss factors	Meter/dBuV	Meter/dBuV/M	Limit
1.853	Horizontal	-0.53	21.44	20.91	54
2.7795	Horizontal	3.67	25.47	29.14	54
3.706	Horizontal	7.8	19.3	27.1	54
4.6325	Horizontal	17.2	24.79	41.99	54
5.559	Horizontal	19.1	20.84	39.94	54
6.4855	Horizontal	18.8	18.05	36.85	54
7.412	Horizontal	20.3	28.46	48.76	54
8.3385	Horizontal	19.9	27.85	47.75	54
9.265	Horizontal	23.2	28.76	51.96	54
10.1915	Horizontal	23.8	29.19	52.99	54



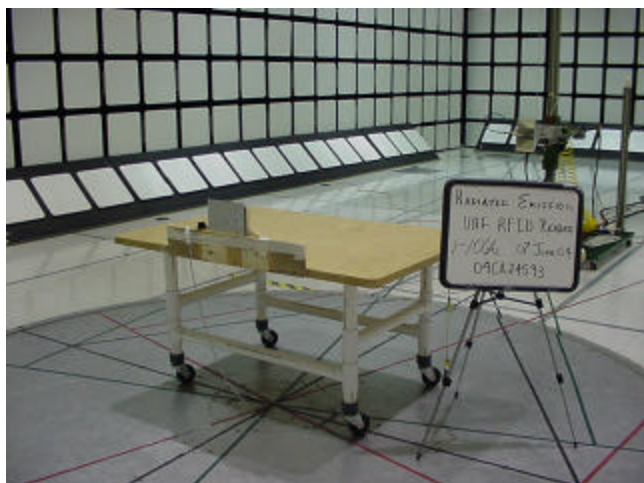
Front – 30-1000MHz



Rear – 30-1000MHz



Front – 1-10GHz



Rear - 1-10GHz

Radiated Emissions Test Set-Up

Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The specific scope includes IEC/CISPR 22:1997, Amendment 1:1995, Amendment 2:1997, EN 55022:1998, AS/NZS 1044, CNS 13438:1997, ANSI C63.4, FCC Method - 47 CFR Part 15, FCC Method - 47 CFR Part 68, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, AS/NZS 1044, CNS 13783-1, CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, and IEC 61000-4-11 testing.



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated September 24, 1997 (Ref. No. 91040).



Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.



ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6. U.S. Identifier Number: US0113