



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 15.407 CERTIFICATION & INDUSTRY CANADA CERTIFICATION

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FCC ID:	LDK102045	GRANTEE FRN NUMBER:	0004968939
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2002109
MODEL(S):	AIR-RM20A-A-K9	RTL QUOTE NUMBER:	QRTL02-462
DATE OF TEST REPORT:	May 15, 2002		
FCC Classification:	NII-Unlicensed National Information Infrastructure TX		
FCC Rule Part(s):	Part 15 subpart E Part 15.407: Operation within the bands 5.15–5.35 GHz and 5.725–5.825 GHz		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Freq. Tolerance	Emission Designator
5180-5250	0.025	N/A	N/A
5250-5320	0.037	N/A	N/A

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15 and Industry Canada RSS-210.

Signature: 

Date: May 15, 2002

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 15.401, 15.403, 15.405, and 15.407: Unlicensed National Information Infrastructure Devices that are in operation within the bands 5.15–5.35 GHz

IC RSS-210 Section 6.2.2(q1): Unlicensed National Information Infrastructure Devices that are in operation within the bands of 5.15–5.35 GHz

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is a new application. The Digital Interface and Receiver were investigated and found compliant. A DoC report can be provided upon request. The IF, LO and up to the 2nd LO were investigated.

2 EQUIPMENT INFORMATION

2.1 APPLICANT AND EQUIPMENT INFORMATION

Test Lab:		Applicant Information:	
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170		Phone: 703-689-0368 Fax: 703-689-2056 Web Site: www.rheintech.com	CISCO Systems, Inc. 3875 Embassy Parkway Suite 350 Akron, OH 44333
		Contact: Jim Nicholson Phone: 330-664-7362 Fax: 330-664-7301	
FCC ID:	LDK102045	GRANTEE FRN NUMBER:	0004968939
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2002109
MODEL(S):	AIR-RM20A-A-K9	RTL QUOTE NUMBER:	QRTL02-462
DATE OF TEST REPORT:	May 15, 2002		
FCC Classification:	NII-Unlicensed National Information Infrastructure TX		
FCC Rule Part(s):	Part 15 subpart E Part 15.407: Operation within the bands 5.15–5.35 GHz and 5.725–5.825 GHz		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Freq. Tolerance	Emission Designator
5180-5250	0.025	N/A	N/A
5250-5320	0.037	N/A	N/A

2.2 JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. Channel 36 at 5180 MHz, Channel 52 at 5260 MHz and channel 64 at 5320 MHz were tested and investigated from 9 kHz to 53.5 GHz. Data for all three channels is presented in this report.

The OFDM system provides a wireless LAN with data payload communication capabilities of 6, 9, 12, 18, 24, 36, 48 and 54 Mbit/s. The support of transmitting and receiving at data rates of 6, 12, and 24 Mbit/s is mandatory. The system uses 52 subcarriers that are modulated using binary or quadrature phase shift keying (BPSK/QPSK), 16-quadrature amplitude modulation (QAM), or 64-QAM. Forward error correction coding (convolution coding) uses a coding rate of 1/2, 2/3, and 3/4.

The EUT contains four integral antennas, in order to complete the configuration required, the transmitter was tested in a notebook computer. The unit contains 4 antennas, two dipoles and two patches, one antenna of each type transmits and receives, and the other is used to receive. The dipoles and patch antennas can not be used at the same time and need to be switched manually. Applying any one of the 8 data rates and 4 modulation schemes did not change the EUT's envelope. As a result, the highest data rate and QAM 64 modulation scheme was used for final measurements. The EUT was installed in a PCMCIA extender card, the extender was installed in the laptop's PCMCIA slot. The extender card was powered from a regulated 5.0 volt external power supply in order to maintain a constant operating voltage per the manufacturer's specification.

2.3 EXERCISING THE EUT

The EUT's exercise software was configured to continuously transmit binary data at 54 Mbit/s using 64 QAM modulation during all testing. The carrier was checked to verify that the information was being transmitted.

2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
U-NII	CISCO	AIR-RM20A-A-K9	VEN06152784	LDK102045	N/A	14401
EXTENDER	CATALYST	PC EXTEND 140A	N/A	N/A	N/A	14057

TABLE 2-2: ANTENNA UNDER TEST

PART	MANUFACTURER	MODEL	GAIN dBi	CABLE TYPE	CABLE LENGTH	RTL BAR CODE
	CISCO	PATCH	6 dBi	Integral antenna		
	CISCO	DIPOLE	6 dBi	Integral antenna		

TABLE 2-3: EXTERNAL COMPONENTS IN TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
LAPTOP	TOSHIBA	SATELLITE	9015765CU	DOC	N/A	013988
POWER SUPPLY	ALINCO	DM 340V	N/A	DOC	N/A	901023

2.5 CONFIGURATION OF TESTED SYSTEM

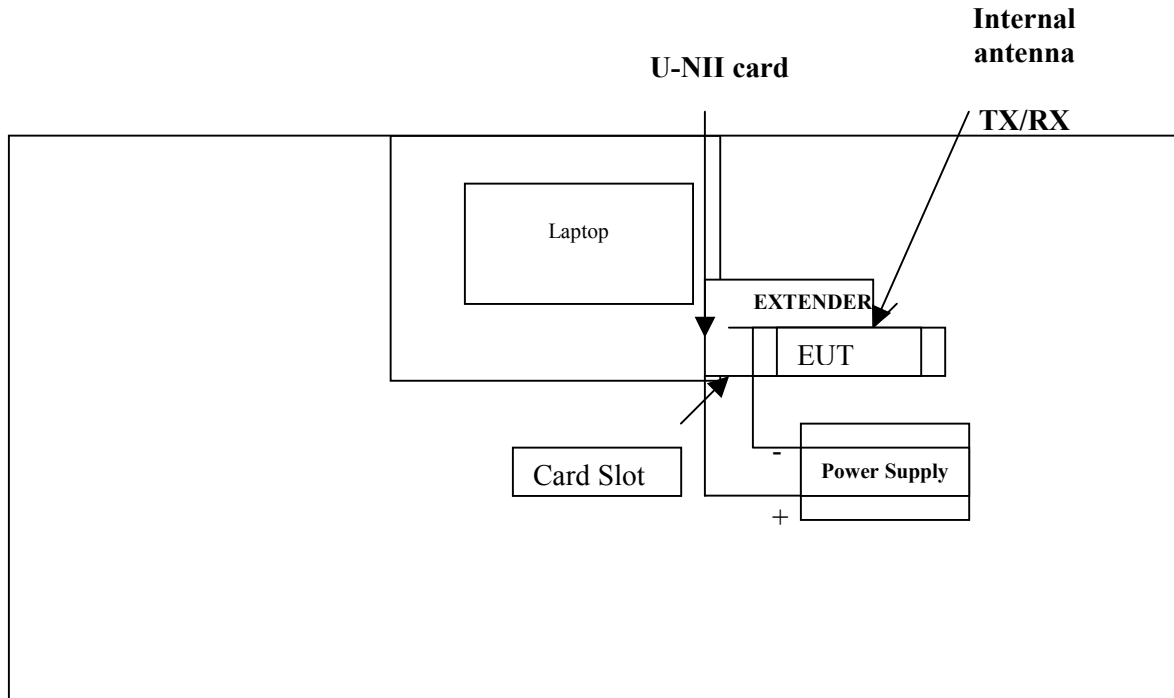


FIGURE 2-1: WORST CASE CONFIGURATION OF EQUIPMENT UNDER TEST

3 CONDUCTED POWER OUTPUT - §15.407(A) 1

3.1 CONDUCTED POWER OUTPUT TEST PROCEDURE

The power output per FCC 15.407(a)1 was measured on the EUT using the channel band power measurement function on the HP8564E Spectrum Analyzer. The following settings were used since the emission bandwidth (EBW) is larger than the spectrum analyzer resolution bandwidth; the emission bandwidth is the 99.75% bandwidth measurement. The resolution bandwidth (RBW) was set to 1 MHz, the video bandwidth (VBW) was set to $VBW = EBW/2^{**}30 = 103.5\text{KHz}$. The VBW was set to 300KHz. Peak detector with no averaging and the max hold function were used. The Spectrum Analyzer display was set in the linear mode. The EIRP measurement was performed as a radiated test using the substitution method on the outdoor test range. The spectrum analyzer setting for the EIRP radiated measurements were the following: Sweep time = auto; RBW = 1 MHz; VBW = 300KHz; Spectrum analyzer display mode = Lin mode.

3.2 CONDUCTED POWER OUTPUT TEST DATA

TABLE 3-1: CONDUCTED POWER OUTPUT TEST DATA

CHANNEL	EIRP (dBm)* Dipole antenna	EIRP (dBm)* Patch antenna	POWER CONDUCTED OUTPUT (dBm)
36	19.6	18.7	14.1
52	19.5	18.7	14.7
64	19.0	18.2	15.7

*Measurement accuracy is +/- 0.5 dB

TEST PERSONNEL:

RACHID SEHB		5/06/2002
TEST ENGINEER	SIGNATURE	DATE OF TEST

3.3 TEST EQUIPMENT USED FOR TESTING

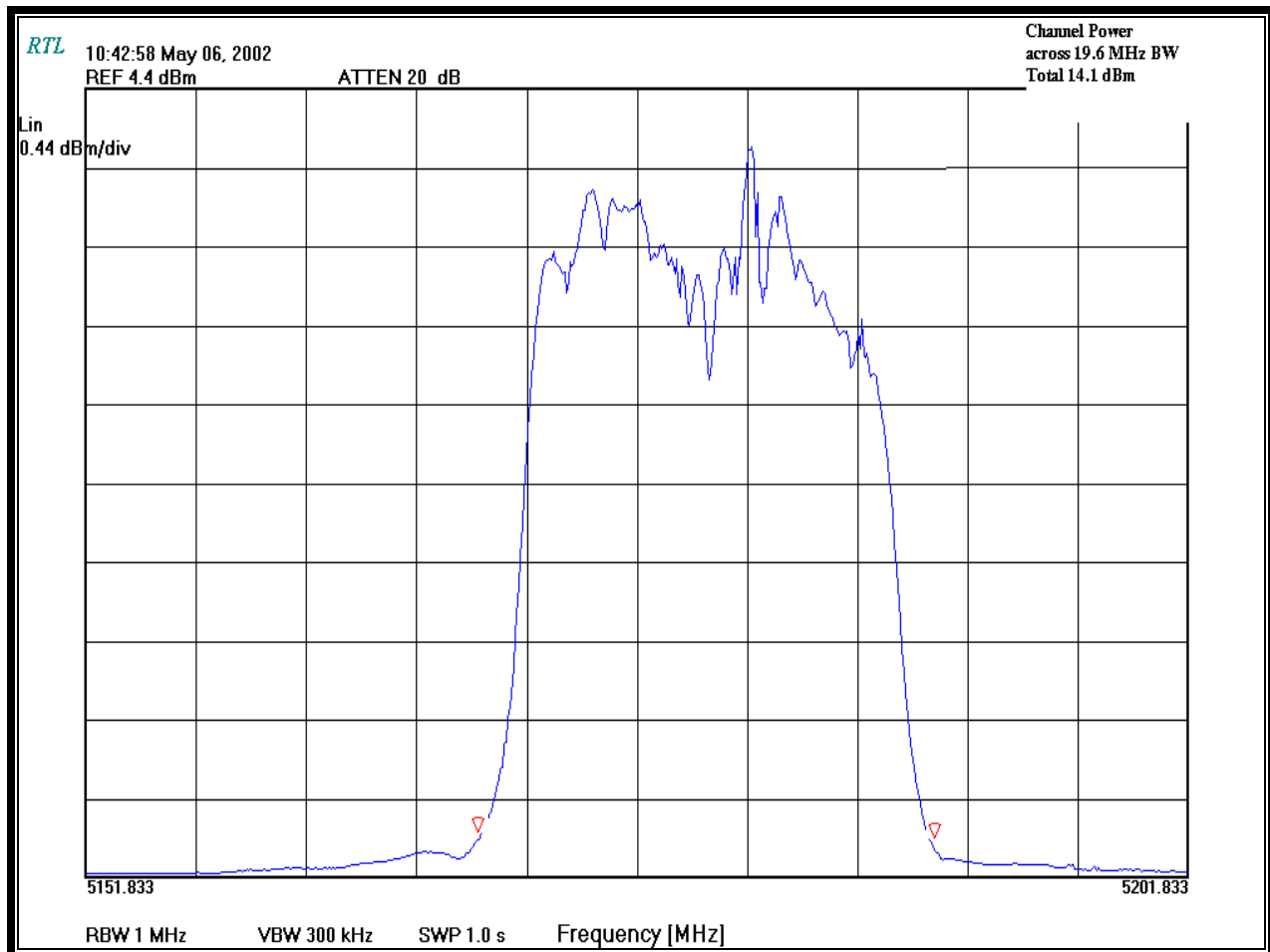
TABLE 3-2: TEST EQUIPMENT USED FOR TESTING CONDUCTED AND RADIATED EIRP OUTPUT POWER

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8564E	Spectrum Analyzer (30Hz – 40 GHz)	3138A07771
900772	EMCO	3161-03	Horn ANTENNA (2-4 GHz)	900772
900814	Electro-Metrics	RGA-60	Double Ridges Guide Antenna (1-18 GHz)	2310
900928	HP	83752A	Synthesized sweeper 0.01 – 20GHz	3610A00866

3.4 CONDUCTED POWER OUTPUT PLOTS

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 300 KHz
SPAN: 50 MHz
SCALE: LINEAR

PLOT 3-1: CONDUCTED POWER OUTPUT CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/06/2002

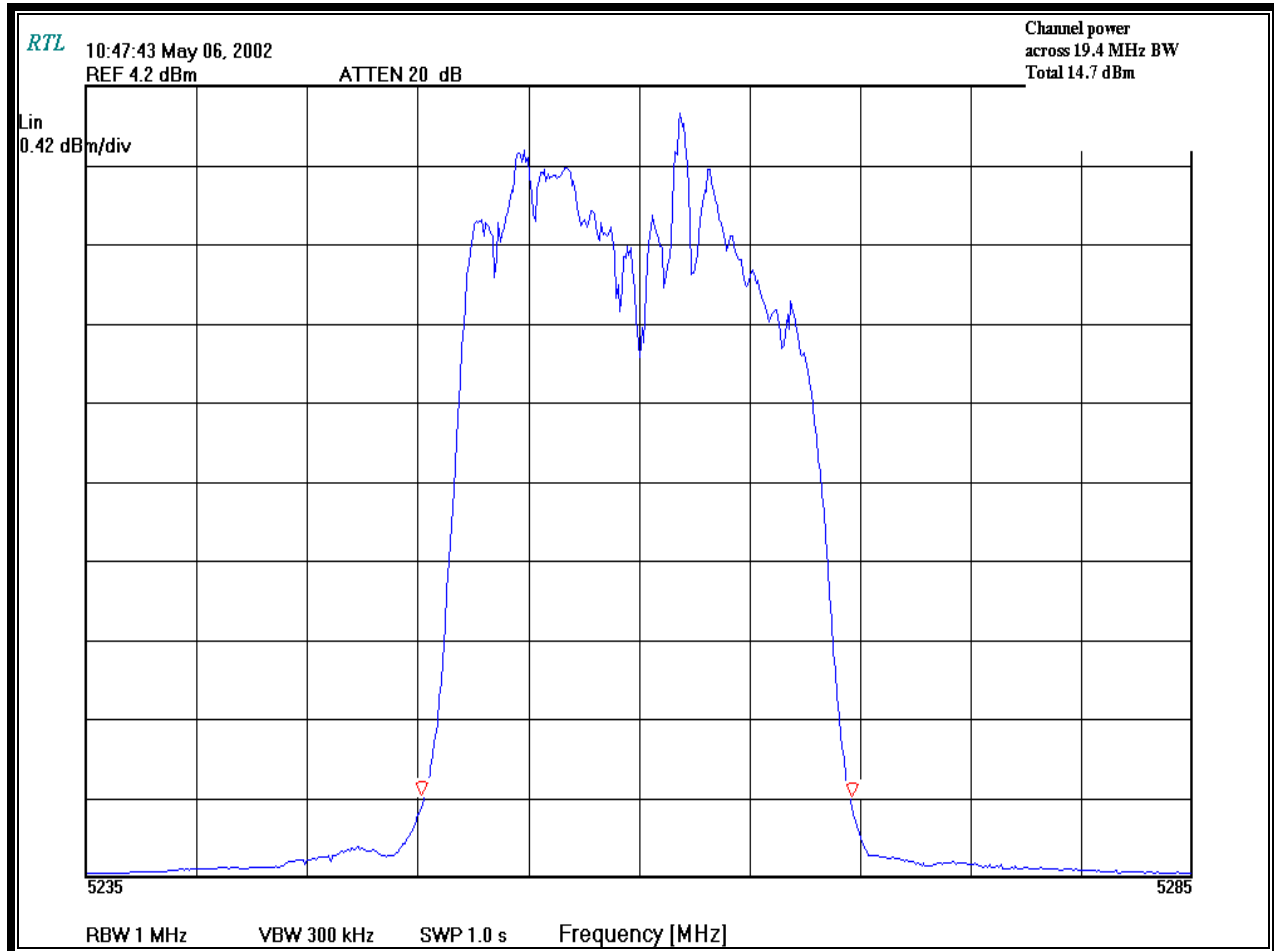
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 300 KHz
SPAN: 50 MHz
SCALE: LINEAR

PLOT 3-2: CONDUCTED POWER OUTPUT CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/06/2002

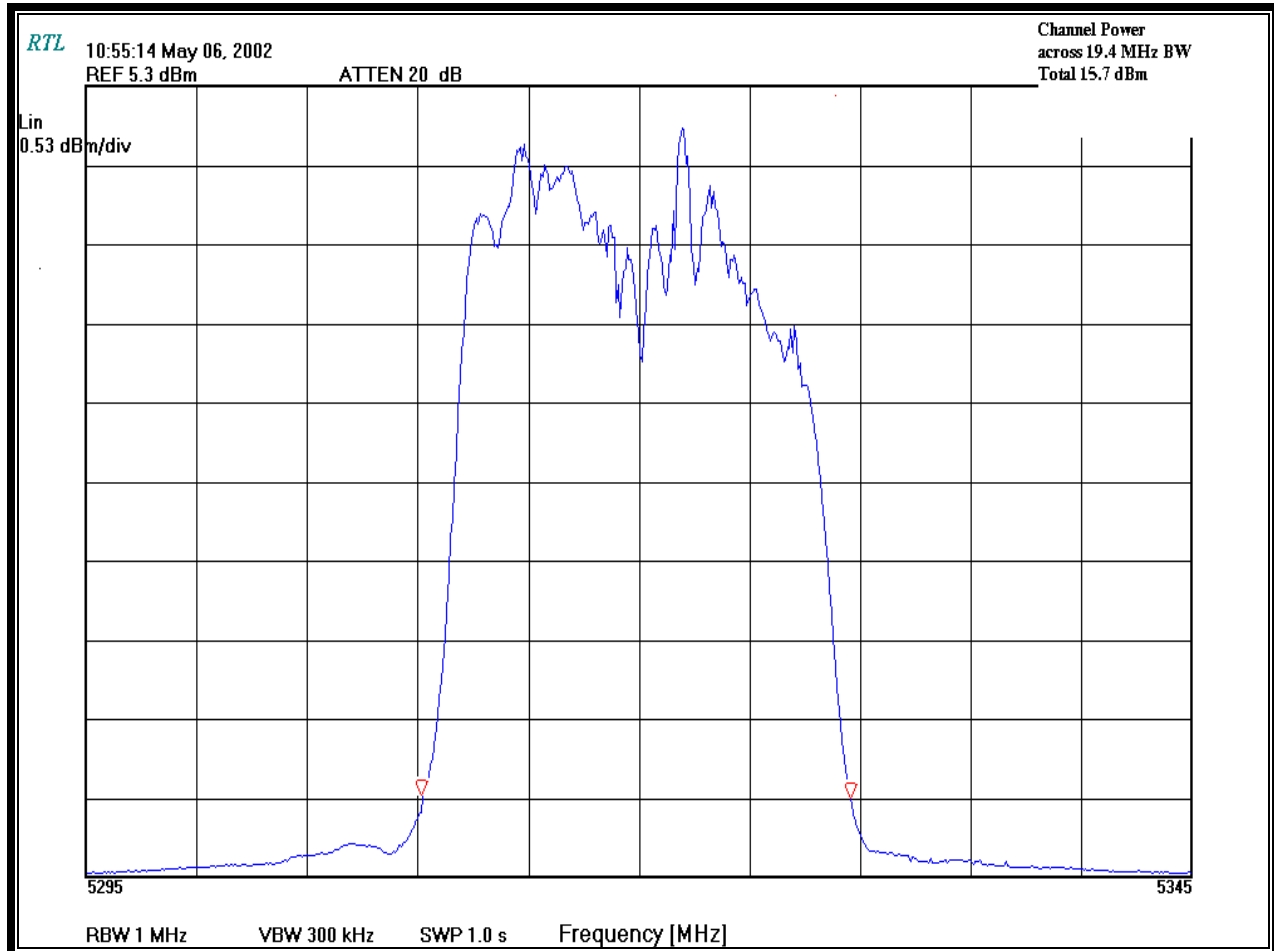
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 300 KHz
SPAN: 50 MHz
SCALE: LINEAR

PLOT 3-3: CONDUCTED POWER OUTPUT CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/06/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

4 MODULATED BANDWIDTH - §15.407(A) 1

4.1 MODULATED BANDWIDTH TEST PROCEDURE

The minimum 26 dB bandwidth per FCC 15.407 (a)1 was measured using a 50 ohm spectrum analyzer. The carrier was adjusted on the analyzer so that it was displayed entirely on the Spectrum Analyzer. The sweep time was set to AUTO; the view function was used instead of the max hold function in peak detector mode. The resolution bandwidth was set to 1% of the emission bandwidth at 300 kHz, and the video bandwidth was set at 1MHz. The minimum 26 dB modulated bandwidth was measured using the spectrum analyzer delta marker set 26 dB down from the peak of the carrier. The table below contains the bandwidth measurement results.

4.2 MODULATED BANDWIDTH TEST DATA

TABLE 4-1: MINIMUM 26 dB MODULATED BANDWIDTHS

CHANNEL	26 dB BANDWIDTH (MHz)
36	19.6
52	19.4
64	19.4

TEST PERSONNEL:

RACHID SEHB		5/07/2002
TEST ENGINEER	SIGNATURE	DATE OF TEST

4.3 TEST EQUIPMENT USED FOR TESTING

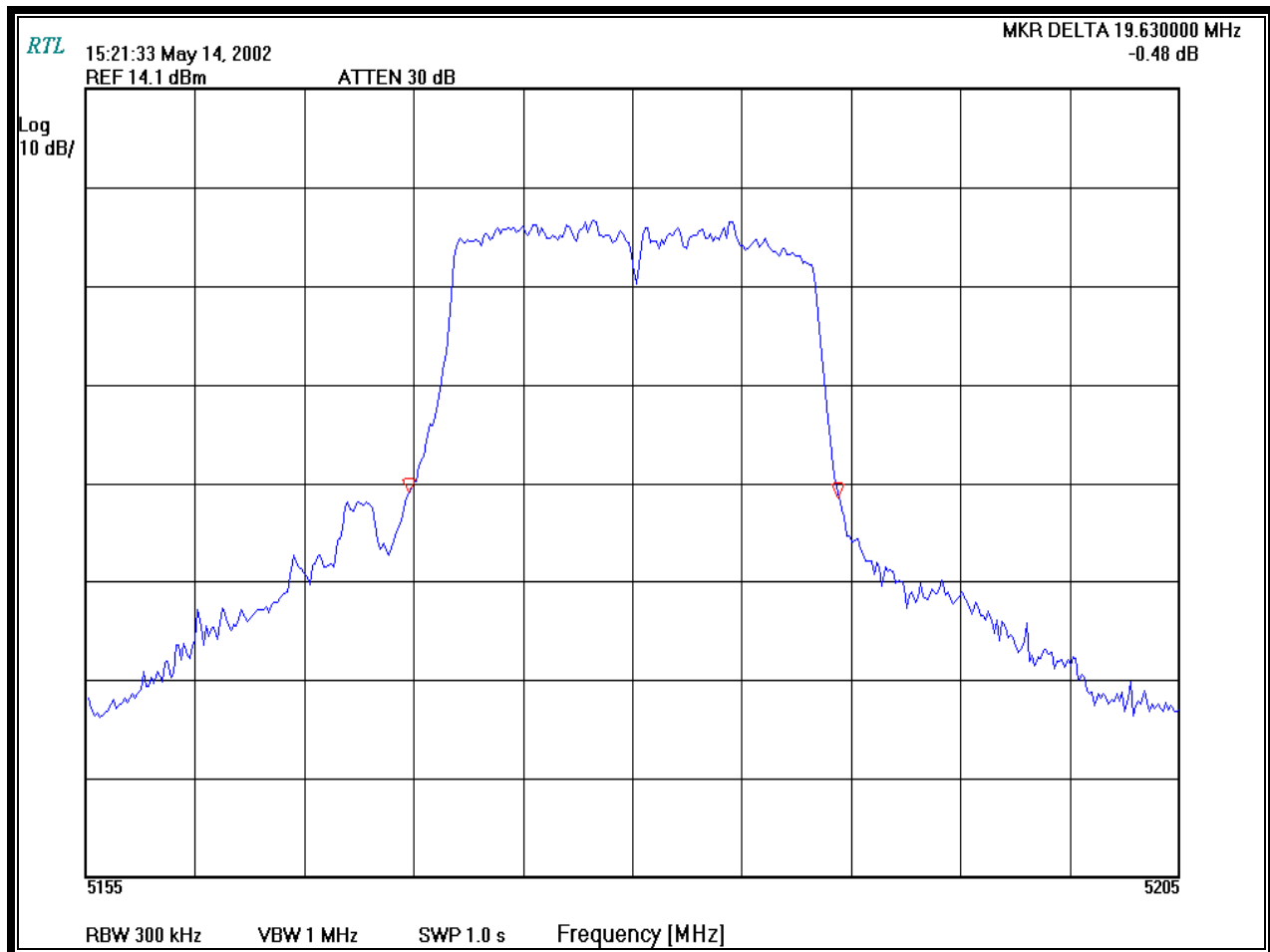
TABLE 4-2: TEST EQUIPMENT USED FOR TESTING (MODULATED BANDWIDTH)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901215	HP	8596EM	Spectrum Analyzer (9kHz – 12.8 GHz)	3826A00144

4.4 MODULATED BANDWIDTH PLOTS

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 300KHz
VIDEO BANDWIDTH: 1MHz
SPAN: 50 MHz

PLOT 4-1: MODULATED BANDWIDTH CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/14/2002

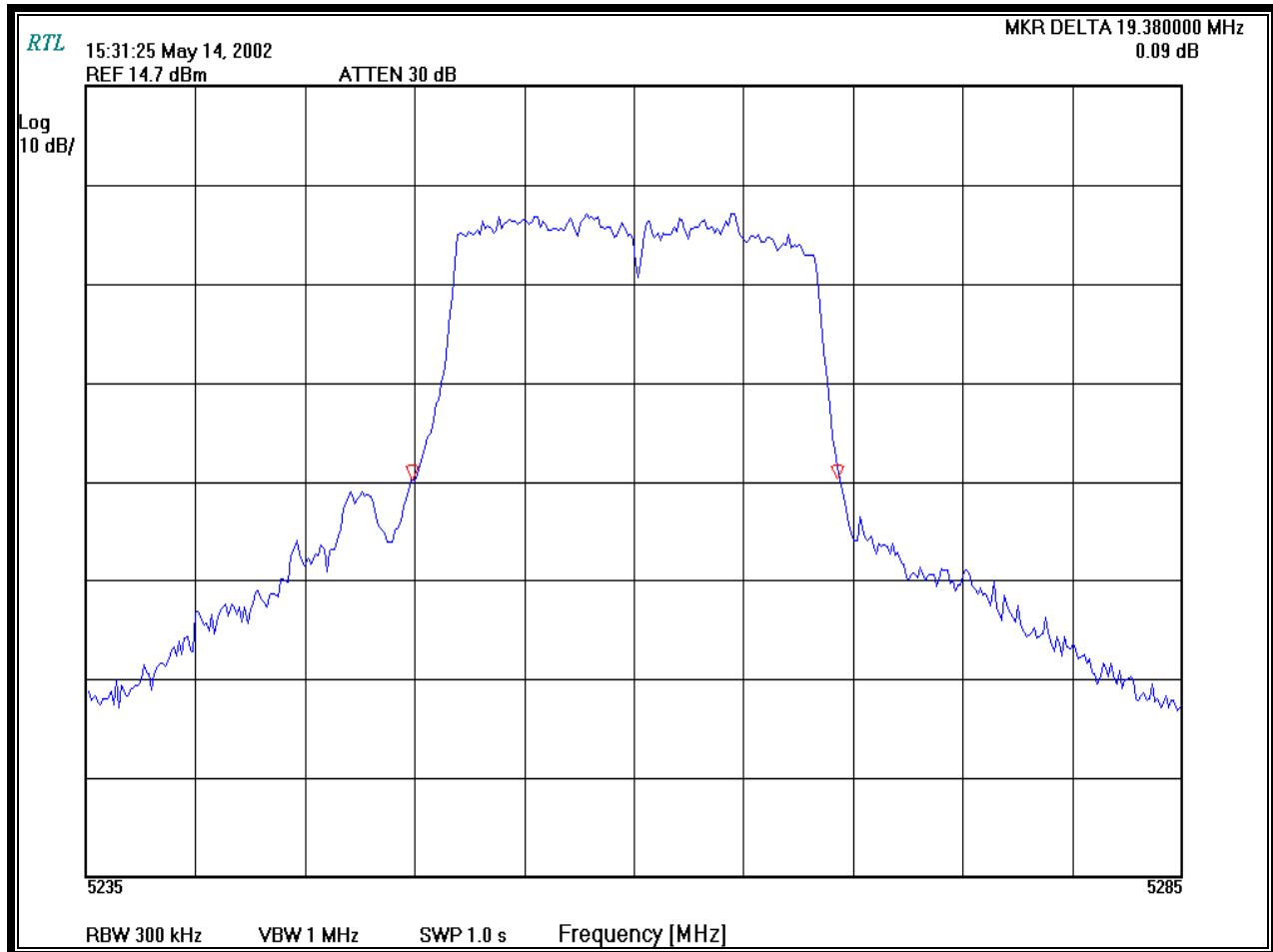
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 300KHz
VIDEO BANDWIDTH: 1MHz
SPAN: 50 MHz

PLOT 4-2: MODULATED BANDWIDTH CHANNEL 52



TEST PERSONNEL:

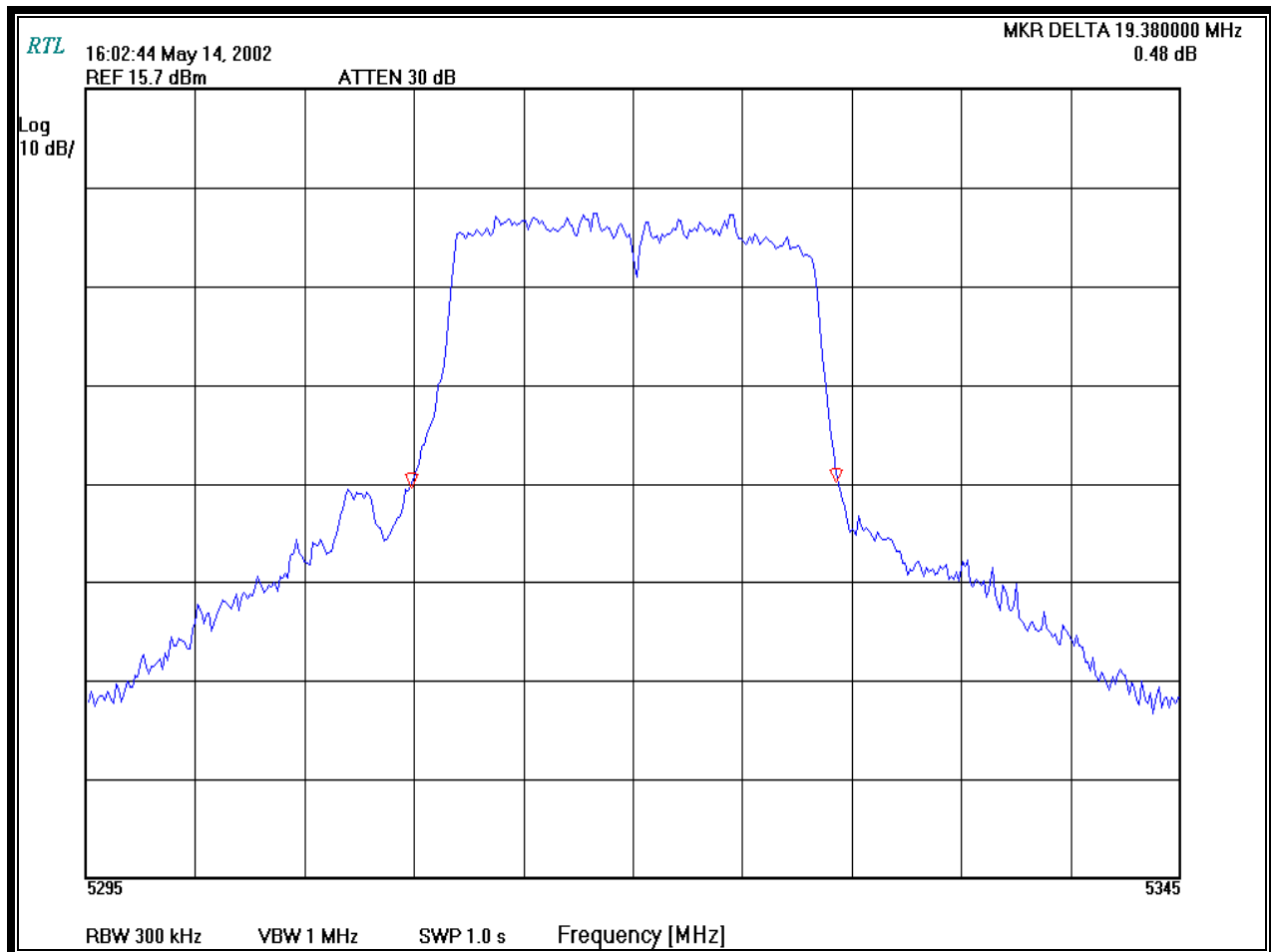
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/14/2002
DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 300 KHz
VIDEO BANDWIDTH: 1MHz
SPAN: 50 MHz

PLOT 4-3: MODULATED BANDWIDTH CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/14/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

5 PEAK POWER SPECTRAL DENSITY - §15.407(A) 1 & 2

5.1 PEAK POWER SPECTRAL DENSITY TEST PROCEDURE

The Peak Power spectral density (PPSD) per FCC 15.407(a)1 and 2 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set at 3MHz. The spectral lines were resolved for the modulated carriers at 32 = 5180 MHz, 52 = 5260 MHz and 64 = 5320 MHz respectively with 100% duty cycle. The Spectrum Analyzer peak and max hold functions were enabled with power averaging set for 100 sweeps. The PPSD is the highest level found across the entire emission carrier in any 100 power sweeps of averaging. The measured levels are well below the + 4dBm/MHz limit for the 5.15 - 5.25GHz band and + 11dBm/MHz for the 5.25 – 5.35GHz band. The PPSD table and plots are listed below.

5.2 TEST EQUIPMENT USED FOR TESTING

TABLE 5-1: TEST EQUIPMENT USED FOR TESTING (POWER SPECTRAL DENSITY)

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
901020	HP	8564E	Spectrum Analyzer (30Hz – 40 GHz)	3943A01719

5.3 POWER SPECTRAL DENSITY TEST DATA

TABLE 5-2: POWER SPECTRAL DENSITY

CHANNEL	POWER SPECTRAL DENSITY
36	-4.5
52	-4.6
64	-3.8

TEST PERSONNEL:

RACHID SEHB



5/07/2002

TEST ENGINEER

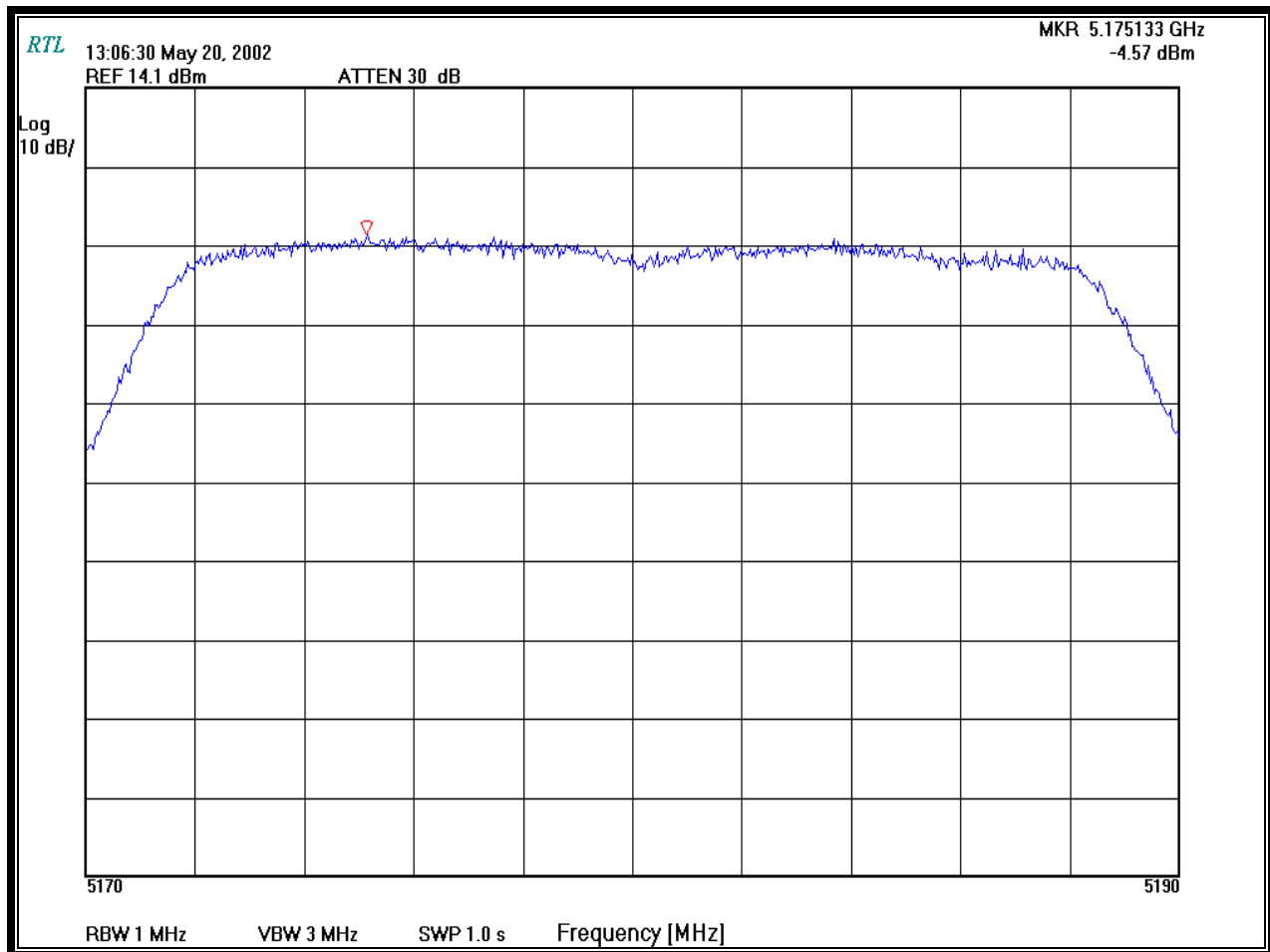
SIGNATURE

DATE OF TEST

5.4 POWER SPECTRAL DENSITY PLOTS

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 3MHz
SPAN: 20 MHz
MEASUREMENT METHOD: SPECTRUM ANALYZER POWER AVERAGE

PLOT 5-1: POWER SPECTRAL DENSITY: CHANNEL 36



TEST PERSONNEL:

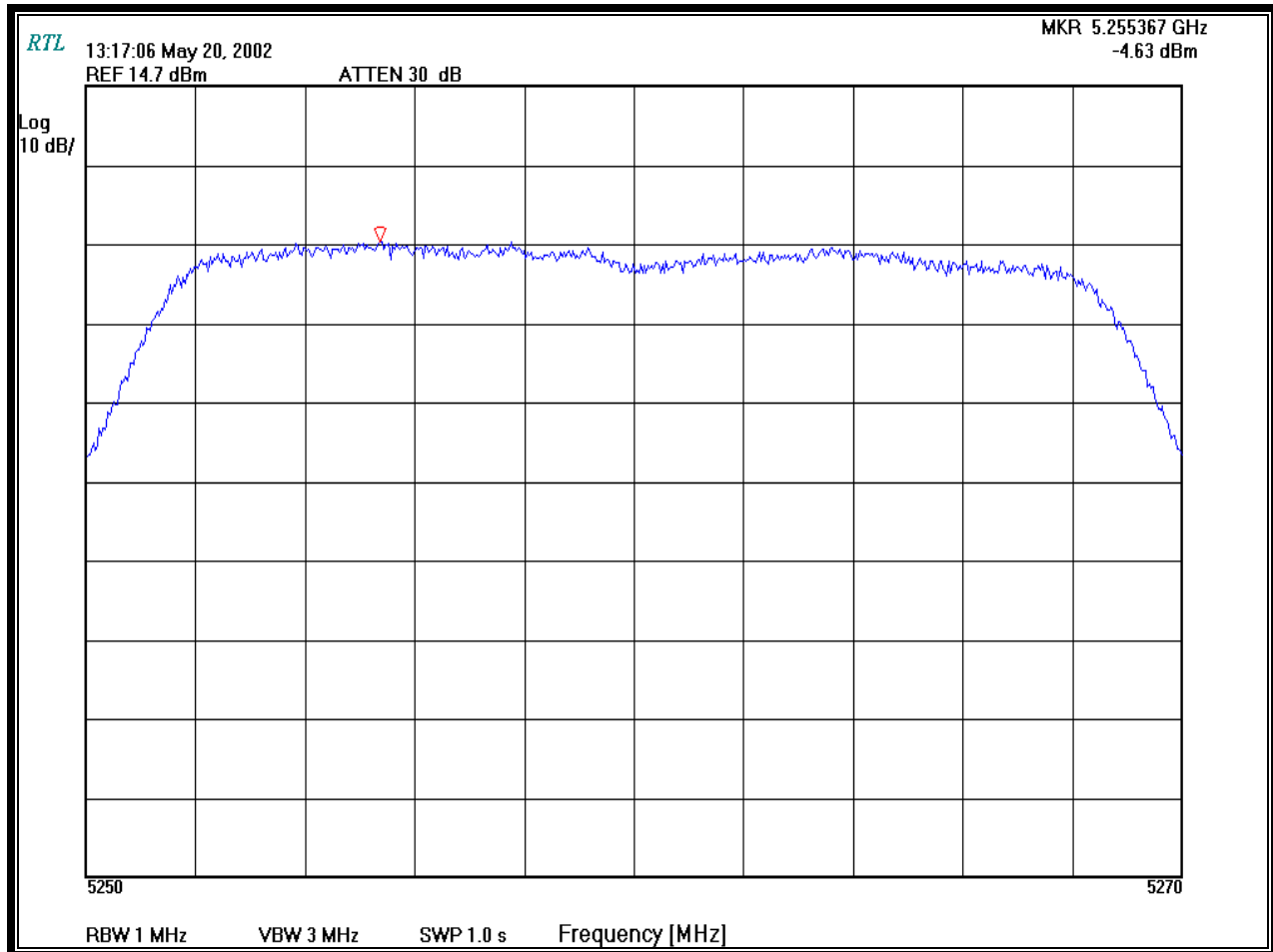
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/20/2002
DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 3MHz
SPAN: 20 MHz
MEASUREMENT METHOD: SPECTRUM ANALYZER POWER AVERAGE

PLOT 5-2: POWER SPECTRAL DENSITY: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/20/2002

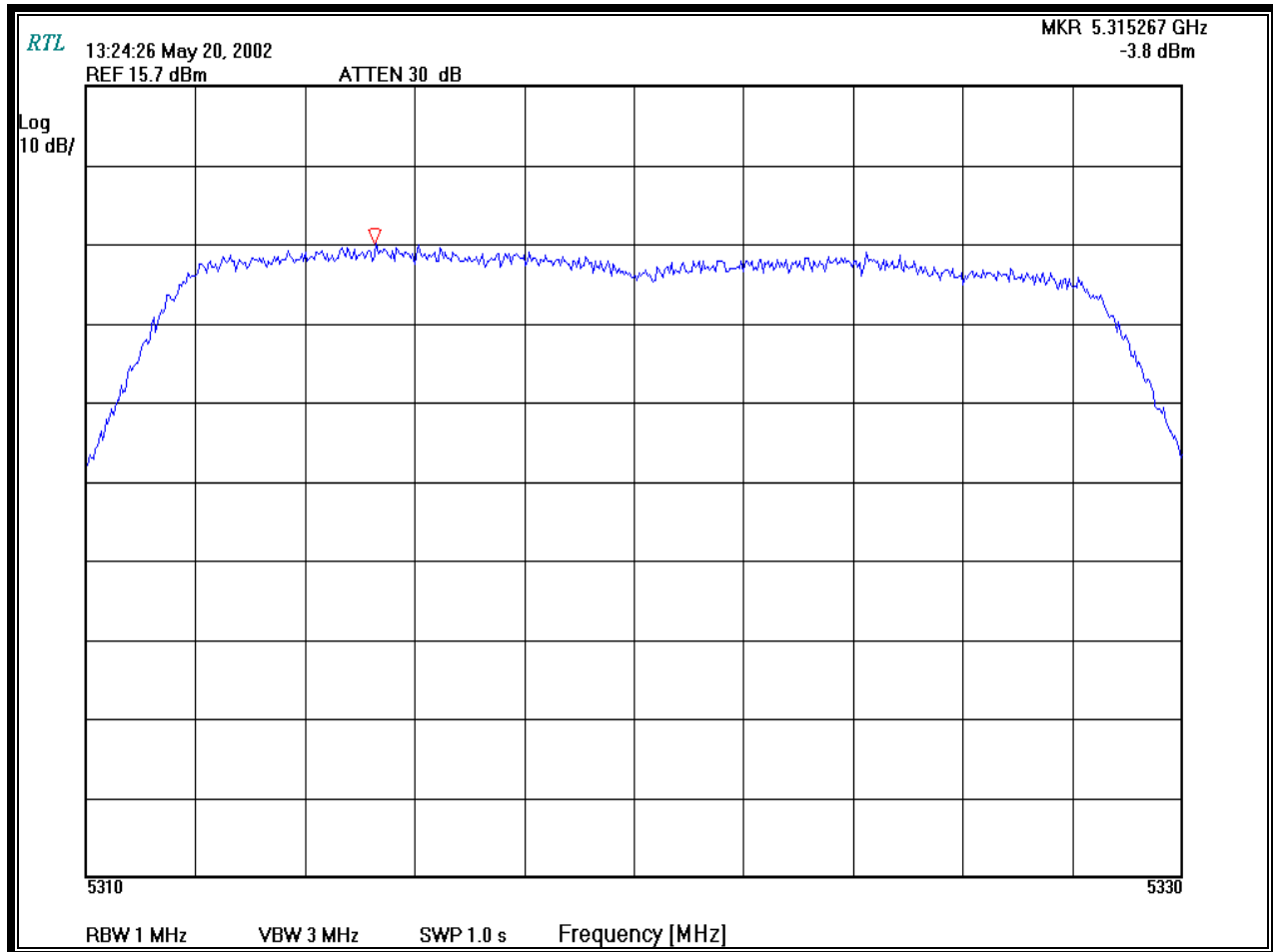
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH 1MHz
VIDEO BANDWIDTH: 3MHz
SPAN 20 MHz
MEASUREMENT METHOD SPECTRUM ANALYZER POWER AVERAGE

PLOT 5-3: POWER SPECTRAL DENSITY: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/20/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

6 PEAK EXCURSION MEASUREMENT - §15.247(A) 6

6.1 PEAK EXCURSION TEST PROCEDURE

The Power spectral density per FCC 15.407(a)6 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set at 30kHz, and the second trace was the resolution bandwidth set at 1MHz, the video bandwidth set at 1MHz. The spectral lines were resolved for the modulated carriers at 5180 MHz, 5260 MHz and 5320 MHz respectively. These levels are well below the +13dB limit. See power Peak excursion table and plots.

6.2 PEAK EXCURSION TEST DATA

TABLE 6-1: PEAK EXCURSION MEASUREMENT TABLE

CHANNEL	PEAK EXCURSION MEASUREMENT (dB)
36	8.5
52	8.8
64	8.0

TEST PERSONNEL:

RACHID SEHB



5/07/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

6.3 TEST EQUIPMENT USED FOR TESTING PEAK EXCURSION

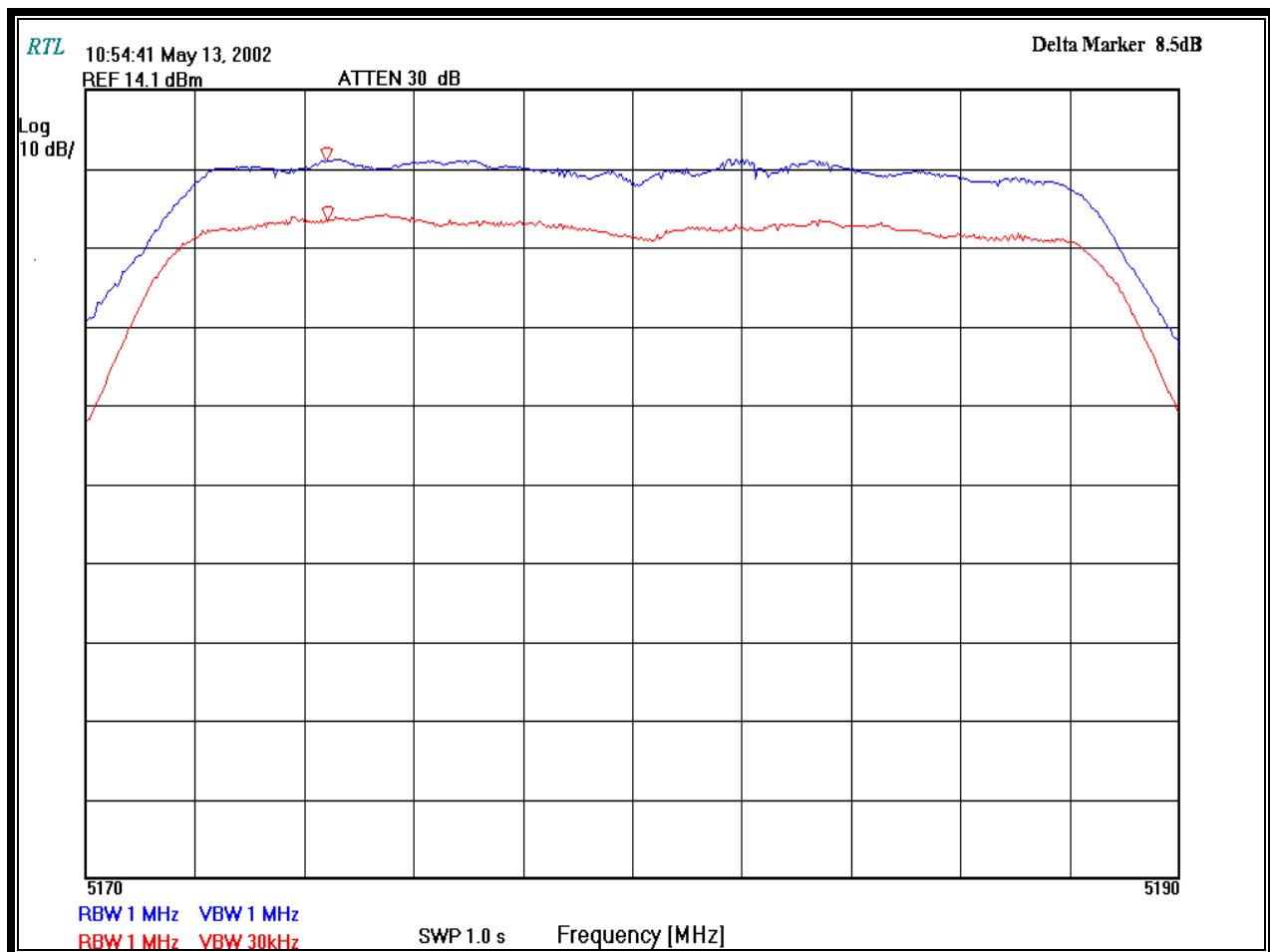
TABLE 6-2: TEST EQUIPMENT USED FOR TESTING PEAK EXCURSION MEASUREMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
901020	HP	8564E	Spectrum Analyzer (30Hz – 40 GHz)	3943A01719

6.4 PEAK EXCURSION PLOTS

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz/1MHz
VIDEO BANDWIDTH: 1MHz/30KHz
SPAN: 20 MHz
MEASUREMENT METHOD: SPECTRUM ANALYZER DUAL TRACE MODE

PLOT 6-1: PEAK EXCURSION: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

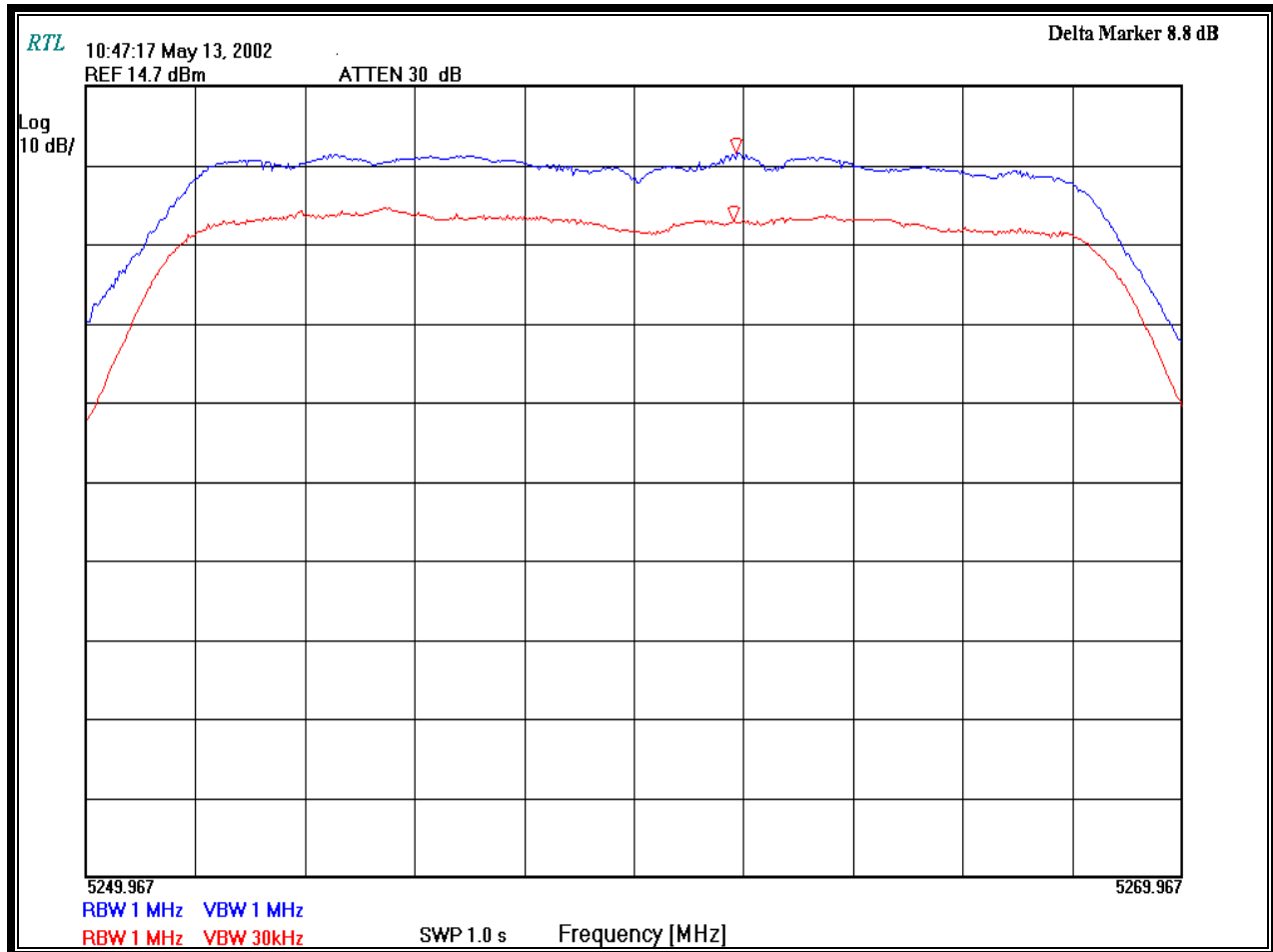
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz/1MHz
VIDEO BANDWIDTH: 1MHz/30KHz
SPAN: 20 MHz
MEASUREMENT METHOD: SPECTRUM ANALYZER DUAL TRACE MODE

PLOT 6-2: PEAK EXCURSION: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

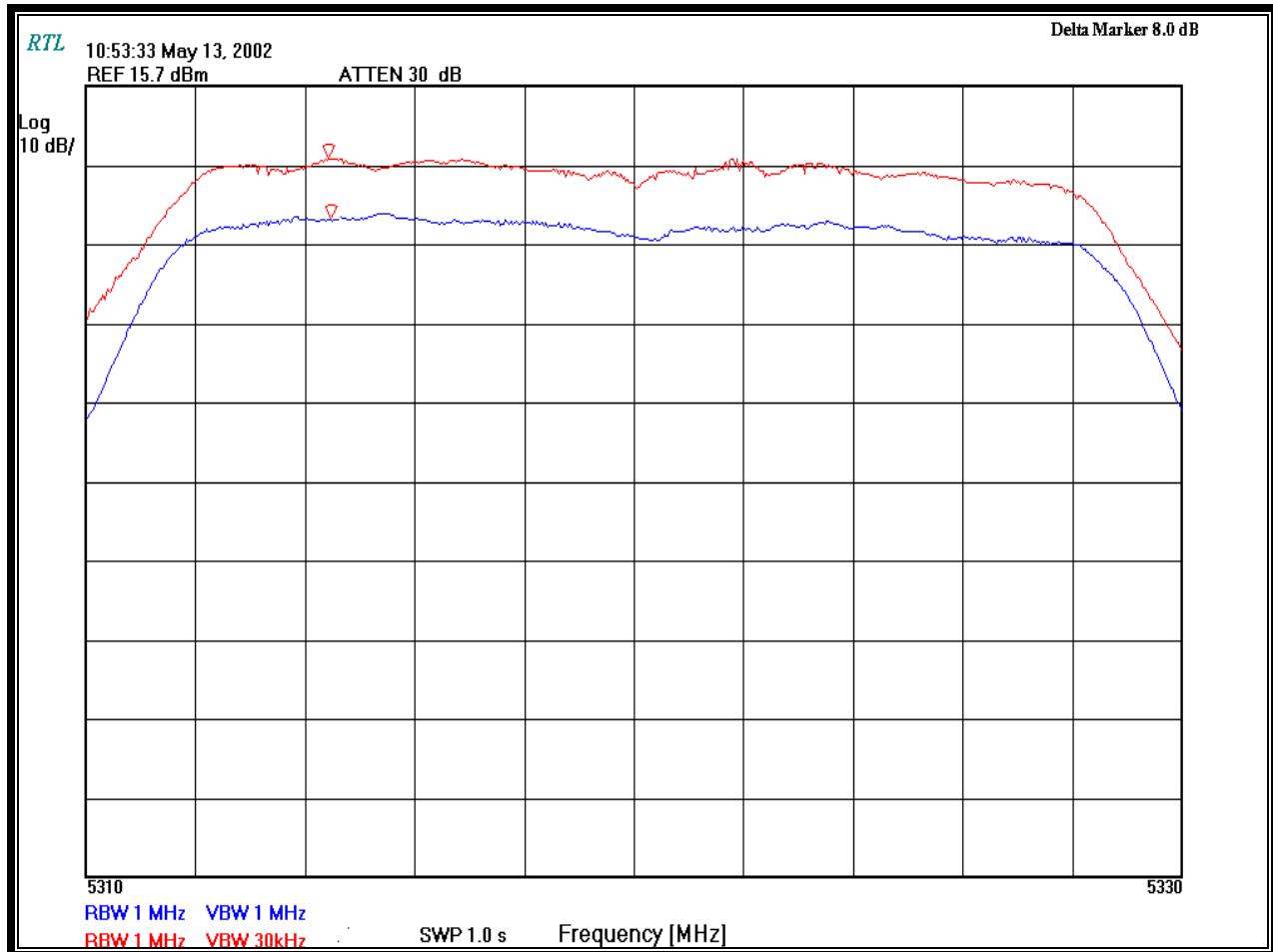
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz/1MHz
VIDEO BANDWIDTH: 1MHz/30KHz
SPAN: 20 MHz
MEASUREMENT METHOD: SPECTRUM ANALYZER DUAL TRACE MODE

PLOT 6-3: PEAK EXCURSION: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

7 COMPLIANCE WITH THE RESTRICTED BAND EDGE - §15.205

7.1 RESTRICTED BAND EDGE TEST PROCEDURE

Compliance with the restricted band edges was performed using the absolute measurement. The final data derived below were from radiated measurements only. The data taken in this report represents the worst-case mode at 54 Mbit/s and a 64 QAM modulation. All other data rates as well as modulation schemes were investigated and found to be compliant.

7.2 COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA

TABLE 7-1: COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA DIPOLE

CHANNEL	FREQUENCY MHz	METHOD	FIELD STRENGTH LEVEL (dBμV)	CORRECTED LEVEL (dBμV/m)	FCC LIMIT (dBμV/m)	FCC MARGIN (dB)
36	5150.00	Absolute measurement	36.9	50.9	54.0	-3.1
64	5350.00	Absolute measurement	34.7	48.7	54.0	-5.3

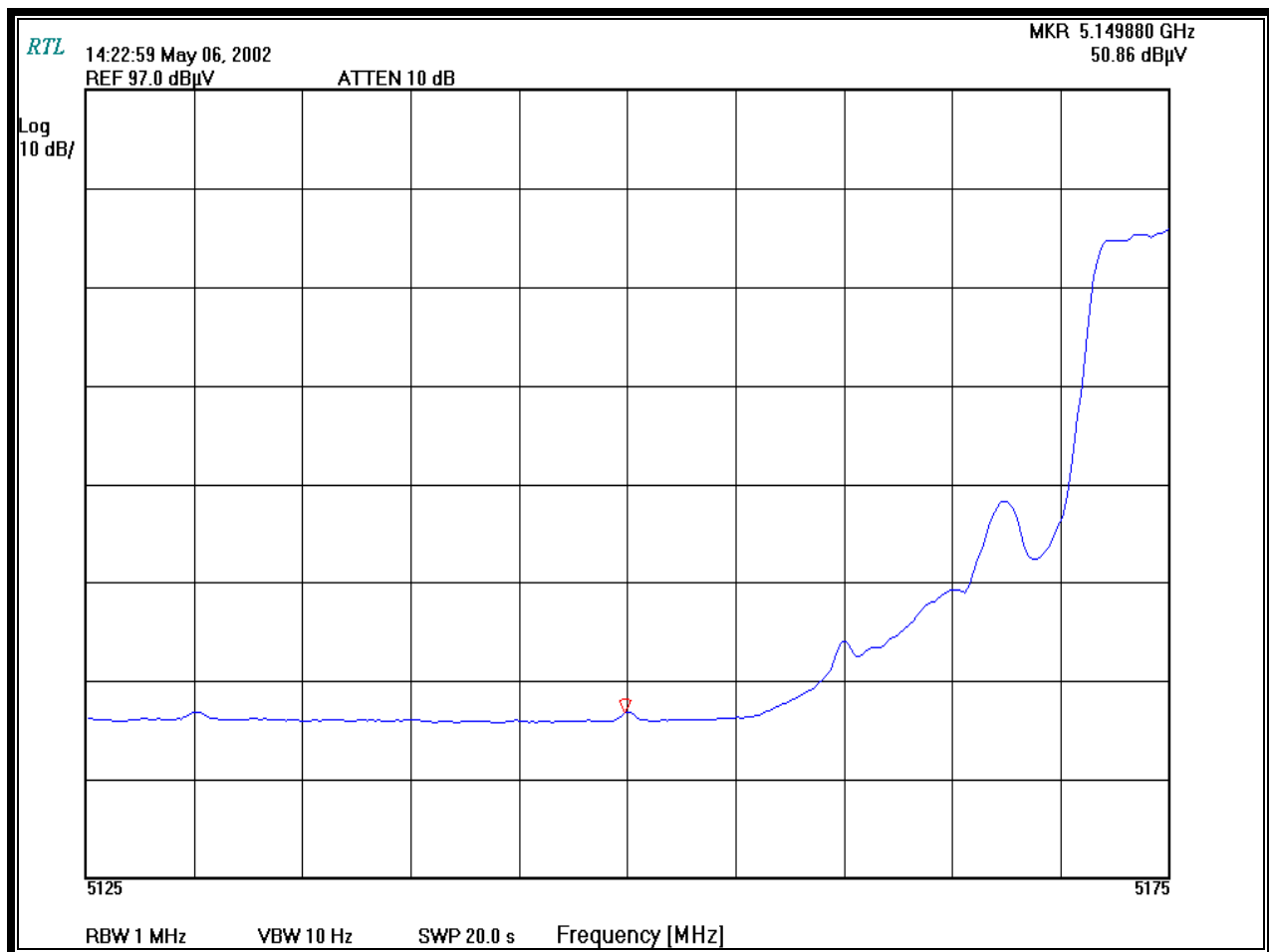
TABLE 7-2: COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA PATCH

CHANNEL	FREQUENCY MHz	METHOD	FIELD STRENGTH LEVEL (dBμV)	CORRECTED LEVEL (dBμV/m)	FCC LIMIT (dBμV/m)	FCC MARGIN (dB)
36	5150.00	Absolute measurement	39.1	53.1	54.0	-0.9
64	5350.00	Absolute measurement	35.9	49.9	54.0	-4.1

7.3 RESTRICTED BAND EDGE PLOTS

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 10Hz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: DIPOLE
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-1: LOWER BAND EDGE: AVERAGE MEASUREMENT CHANNEL 36 (DIPOLE)



TEST PERSONNEL:

RACHID SEHB

5/06/2002

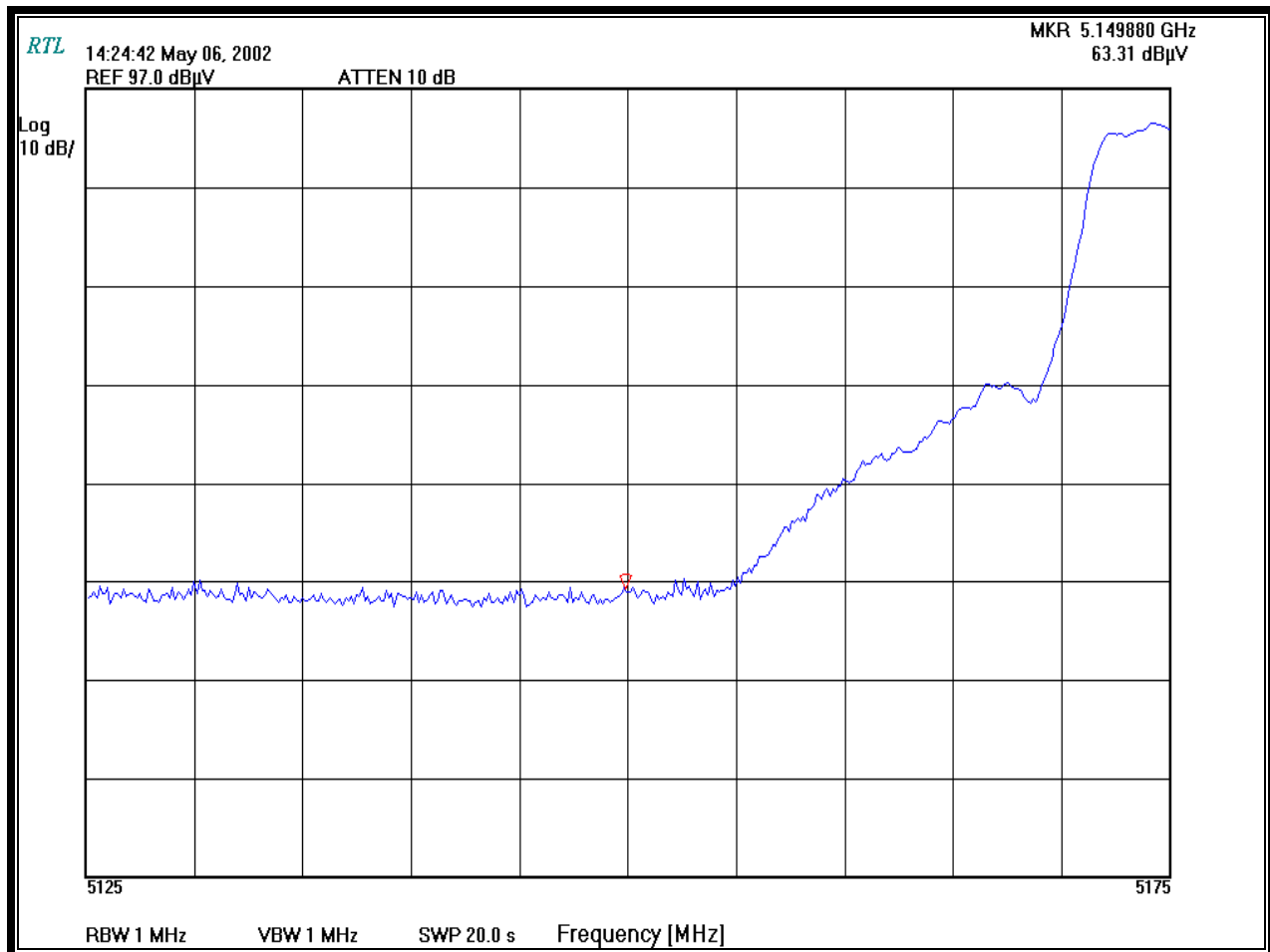
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180 MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: DIPOLE
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-2: LOWER BAND EDGE: PEAK MEASUREMENT CHANNEL 36 (DIPOLE)



TEST PERSONNEL:

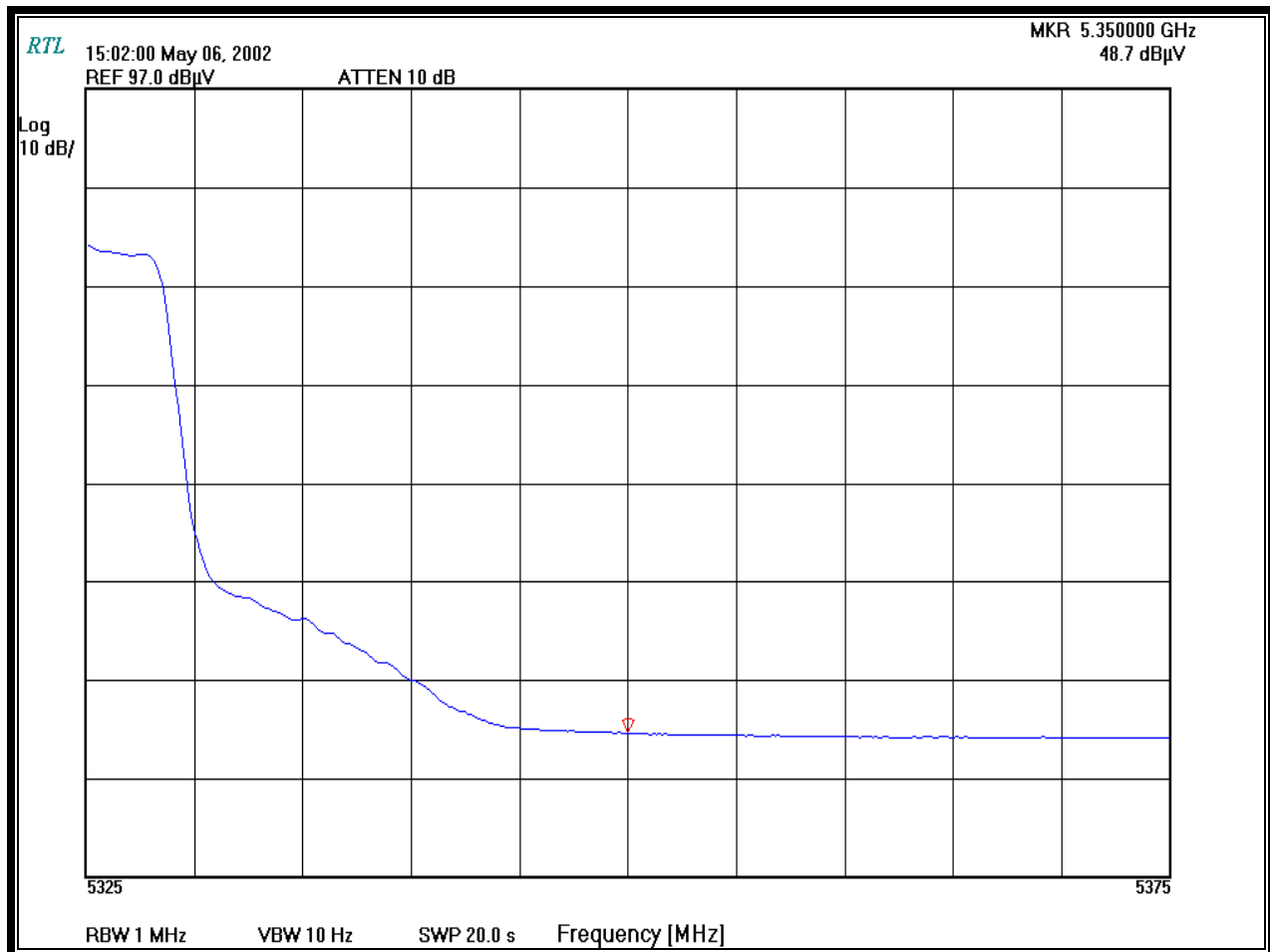
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/06/2002
DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320 MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 10Hz
SWEEP TIME: 20.0s
SPAN: 50 MHz
ANTENNA: DIPOLE
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-3: UPPER BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 64 (DIPOLE)



TEST PERSONNEL:

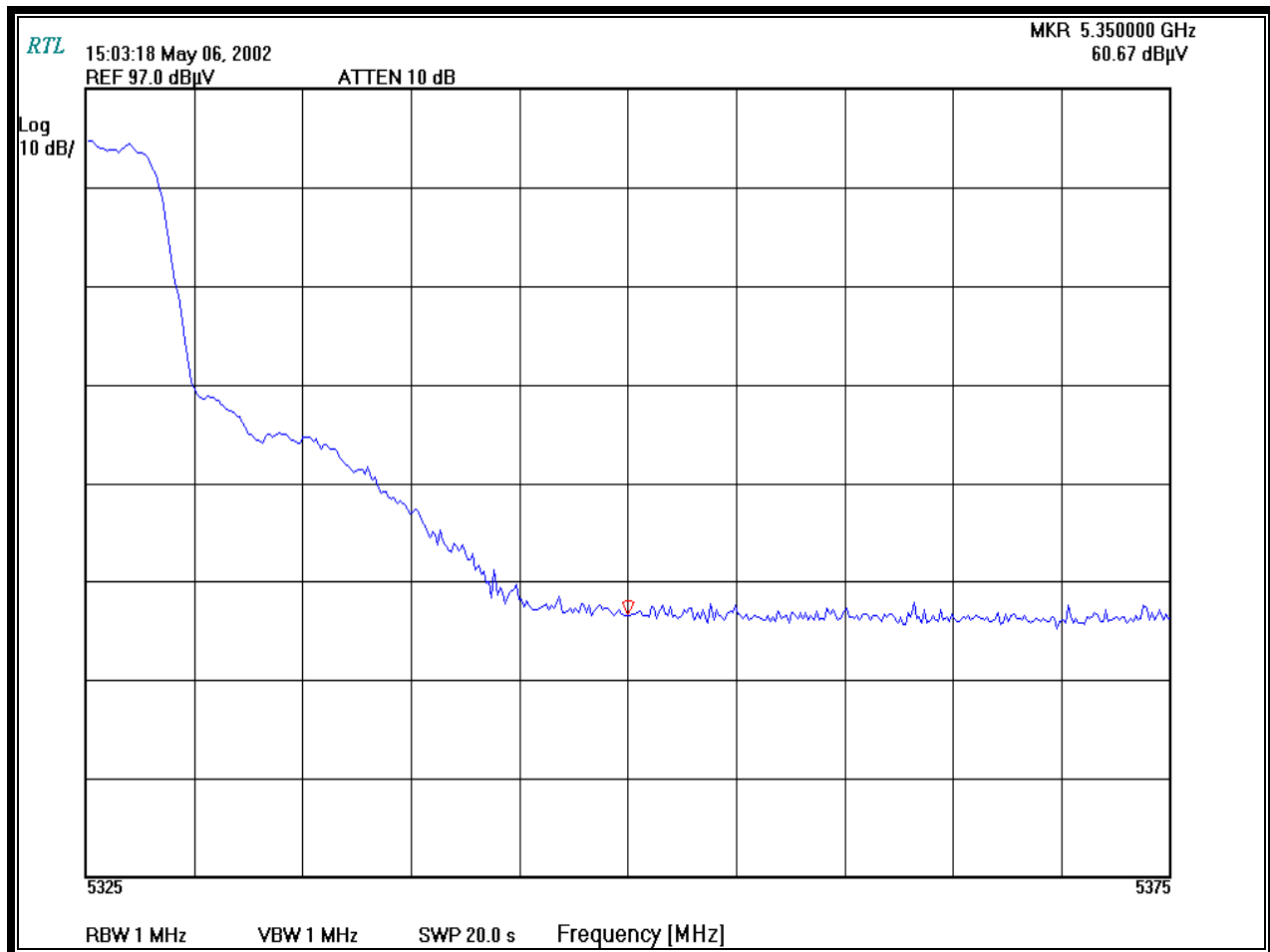
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/06/2002
DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
SWEEP TIME: 20.0s
SPAN: 50 MHz
ANTENNA: DIPOLE
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-4: UPPER BAND EDGE: PEAK AMPLITUDE FOR CHANNEL 64 (DIPOLE)



TEST PERSONNEL:

RACHID SEHB

5/06/2002

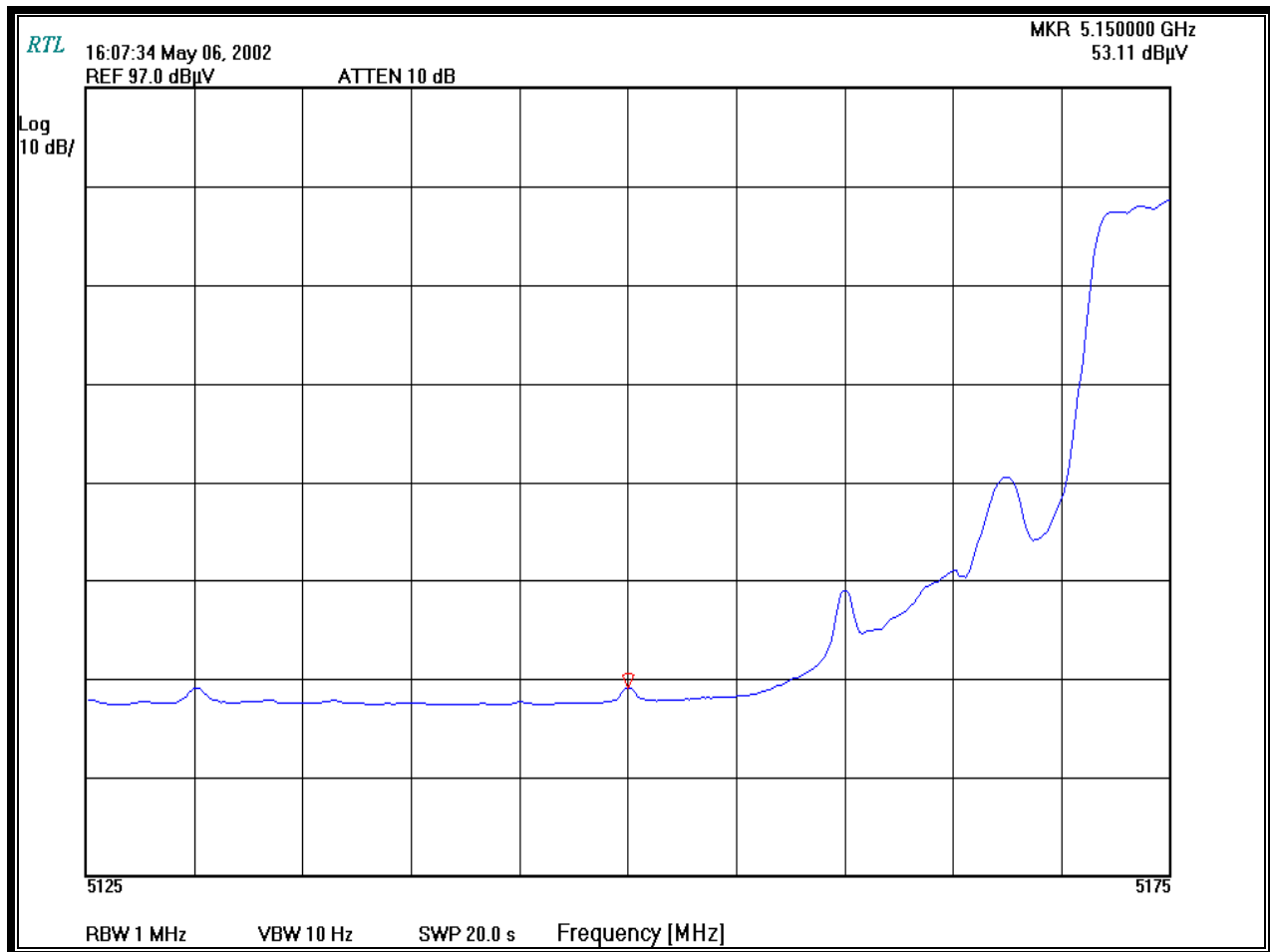
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 10Hz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: PATCH
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-5: LOWER BAND EDGE: AVERAGE MEASUREMENT CHANNEL 36 (PATCH)



TEST PERSONNEL:

R/ACHID SEHB

5/06/2002

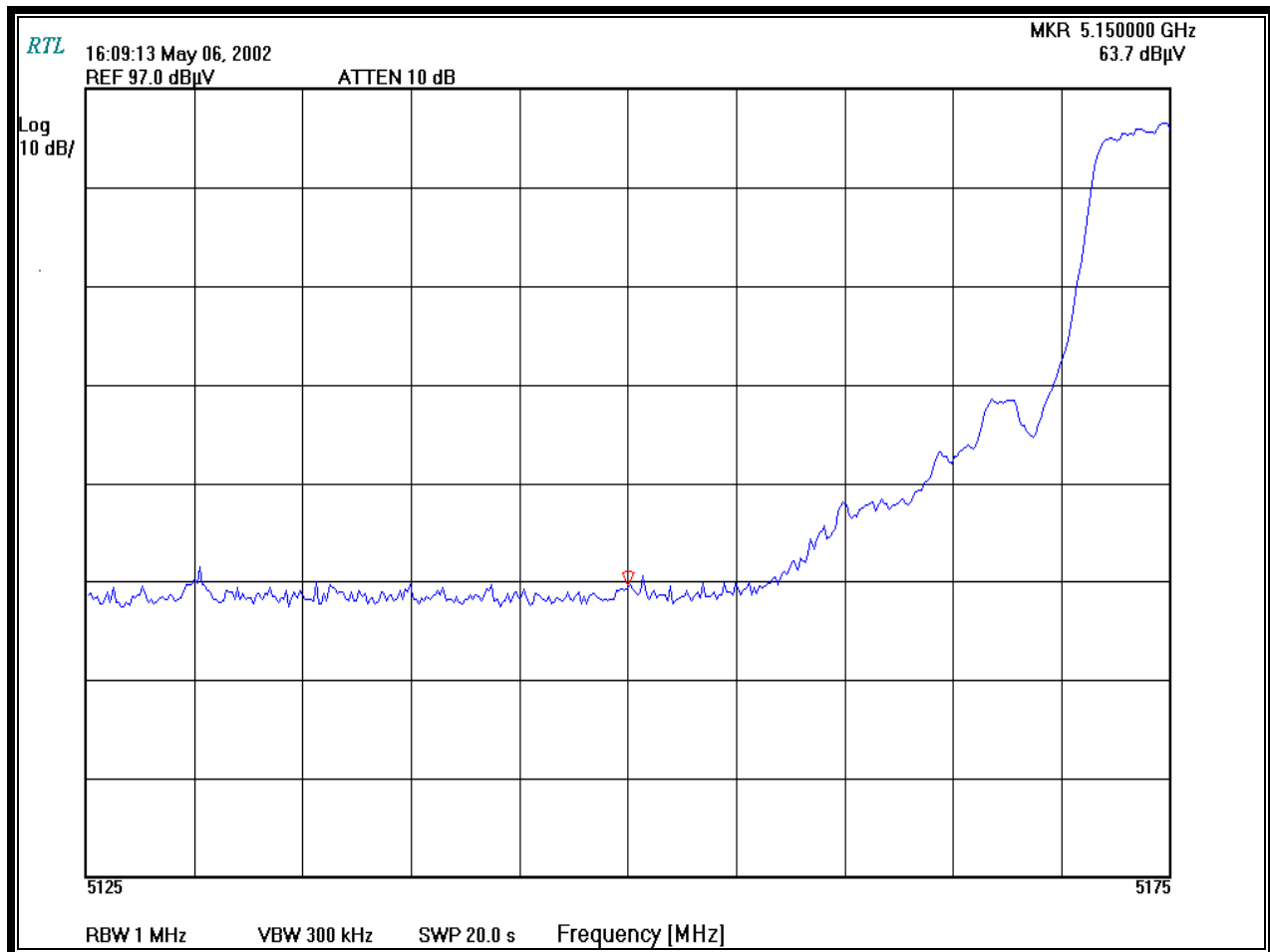
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180 MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: PATCH
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-6: LOWER BAND EDGE: PEAK MEASUREMENT CHANNEL 36 (PATCH)



TEST PERSONNEL:

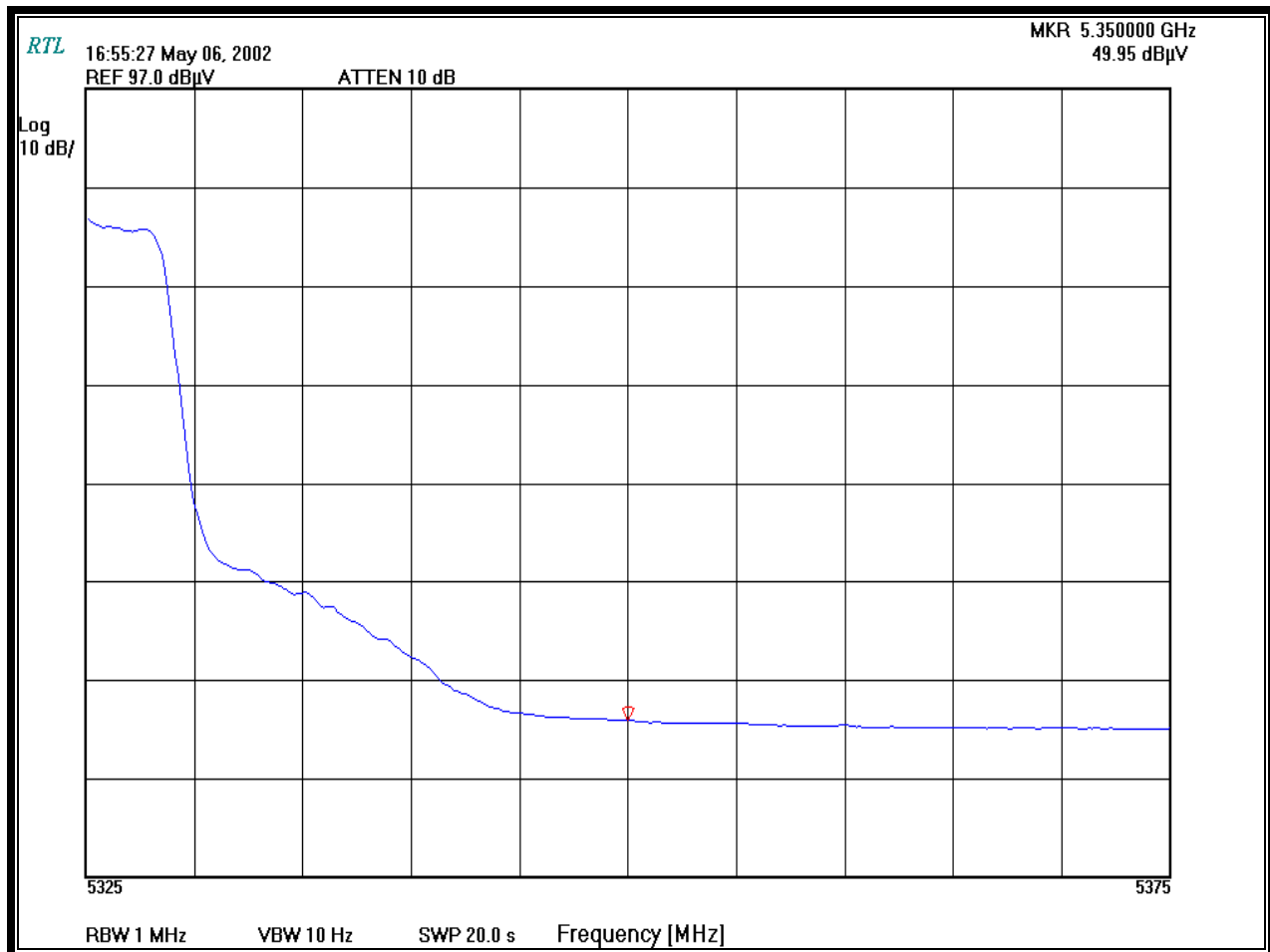
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/06/2002
DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320 MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: PATCH
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-7: UPPER BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 64 (PATCH)



TEST PERSONNEL:

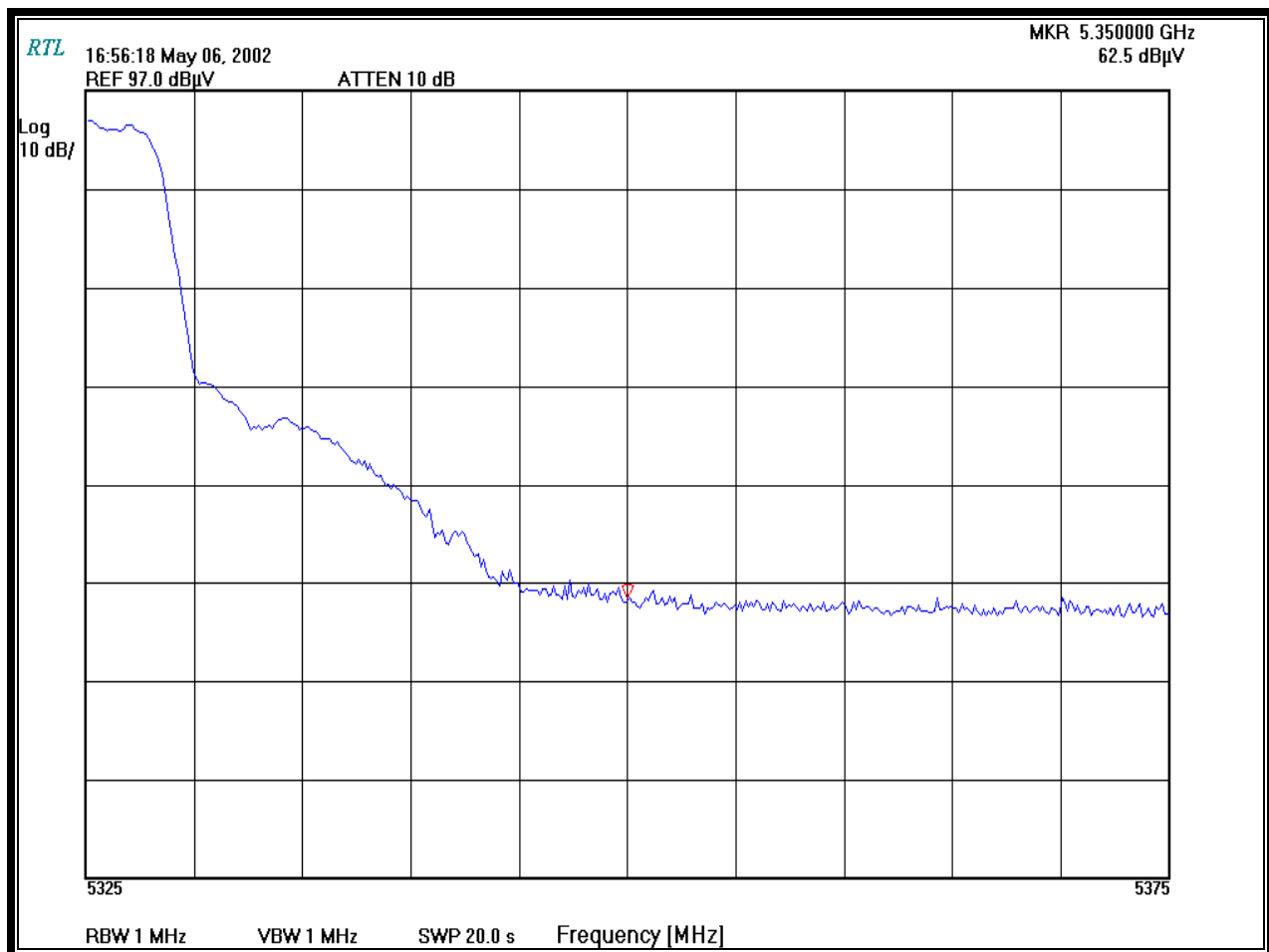
RACHID SEHB
TEST ENGINEER


SIGNATURE

5/06/2002
DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 10Hz
SWEEP TIME: 20.0s
SPAN: 50MHz
ANTENNA: PATCH
MEASUREMENT METHOD: ABSOLUTE MEASUREMENT

PLOT 7-8: UPPER BAND EDGE: PEAK AMPLITUDE FOR CHANNEL 64 (PATCH)



TEST PERSONNEL:

RACHID SEHB

5/06/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

8 CONDUCTED LIMITS - § 15.207/15.407(B)6

8.1 CONDUCTED EMISSIONS TEST PROCEDURES

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

8.2 CONDUCTED EMISSIONS TEST DATA

TABLE 8-1 CONDUCTED EMISSION L1

Temperature: 76°F					Humidity: 39%				Pass/ Fail
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	
0.463	Pk	38.1	0.8	38.9	48.0	-9.1	48.0	-9.1	Pass
0.529	Pk	34.3	0.7	35.0	48.0	-13.0	48.0	-13.0	Pass
3.700	Pk	25.0	1.4	26.4	48.0	-21.6	48.0	-21.6	Pass
10.280	Pk	23.7	2.1	25.8	48.0	-22.2	48.0	-22.2	Pass
14.220	Pk	22.7	2.6	25.3	48.0	-22.7	48.0	-22.7	Pass
24.840	Pk	19.3	3.4	22.7	48.0	-25.3	48.0	-25.3	Pass

TABLE 8-2 CONDUCTED EMISSION L2

Temperature: 76°F					Humidity: 39%				Pass/ Fail
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	
0.464	Pk	38.3	0.8	39.1	48.0	-8.9	48.0	-8.9	Pass
0.529	Pk	36.5	0.7	37.2	48.0	-10.8	48.0	-10.8	Pass
1.150	Pk	26.5	0.8	27.3	48.0	-20.7	48.0	-20.7	Pass
3.550	Pk	28.1	1.4	29.5	48.0	-18.5	48.0	-18.5	Pass
14.460	Pk	22.0	2.1	24.1	48.0	-23.9	48.0	-23.9	Pass
24.550	Pk	18.8	3.4	22.2	48.0	-25.8	48.0	-25.8	Pass

TEST PERSONNEL:

RACHID SEHB
TEST ENGINEER



SIGNATURE

5/07/2002
DATE OF TEST

9 RADIATED EMISSION LIMITS RECEIVER/DIGITAL INTERFACE - §15.209

9.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The IF, LO and up to the 2nd LO were investigated and tested. Channels 36, 52, and 62 were tested and investigated in the transmitting and receiving mode between 10kHz and 1GHz. The worst -case channel 36 in both modes is presented in the table below.

9.2 RADIATED EMISSION LIMITS TEST DATA

TABLE 9-1: RADIATED EMISSIONS TRANSMITTING CH 36

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
139.996	Qp	H	135	2.0	42.9	-10.9	32.0	43.5	-11.5
159.998	Qp	H	125	2.0	42.4	-11.6	30.8	43.5	-12.7
209.998	Qp	H	210	1.6	43.6	-10.8	32.8	43.5	-10.7
239.998	Qp	H	135	1.2	51.8	-9.0	42.8	46.0	-3.2
244.998	Qp	H	315	1.2	45.4	-8.4	37.0	46.0	-9.0
279.998	Qp	H	135	1.2	46.3	-6.6	39.7	46.0	-6.3
454.996	Qp	H	180	1.0	36.9	-1.1	35.8	46.0	-10.2
489.996	Qp	V	270	1.0	44.9	-0.6	44.3	46.0	-1.7

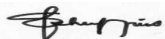
Qp: RES. =100 kHz, VID= 100 kHz

TABLE 9-2: RADIATED EMISSIONS RECEIVING CH 36

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
140.000	Qp	H	315	1.0	42.0	-10.9	31.1	43.5	-12.4
160.000	Qp	H	310	1.0	42.3	-11.6	30.7	43.5	-12.8
240.001	Qp	H	325	1.2	53.2	-9.0	44.2	46.0	-1.8
245.000	Qp	H	315	1.0	43.8	-8.4	35.4	46.0	-10.6
249.989	Qp	H	315	1.0	44.4	-7.9	36.5	46.0	-9.5
289.986	Qp	V	170	1.0	38.6	-6.9	31.7	46.0	-14.3
479.998	Qp	V	135	1.0	42.1	-1.1	41.0	46.0	-5.0
534.998	Qp	H	315	1.0	36.0	0.9	36.9	46.0	-9.1

Qp: RES. =100 kHz, VID= 100 kHz

TEST PERSONNEL:

Franck Schuppiss Test Technician/Engineer	 Signature	8/06/2002 Date Of Test
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10 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.407(B)

10.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES

Antenna spurious emission per FCC 15.407(b) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1 MHz, and the video bandwidth set at 1 MHz. The modulated carrier was identified at 5180 MHz for Channel 36, 5260MHz for Channel 52 and 5320MHz for Channel 64. No other harmonics or spurs were found above the -27dBm/Mhz from 9kHz to the carriers 10th harmonic. All channels were investigated and tested. See antenna conducted spurious noise table Channels 36, 52, and 64.

10.2 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST DATA

TABLE 10-1: ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 36

Frequency (MHz)	Spurious level (dBm)
3645.860	-52.3
3894.440	-55.1
4367.760	-55.9
10317.820	-54.7

TEST PERSONNEL:

RACHID SEHB
TEST ENGINEER

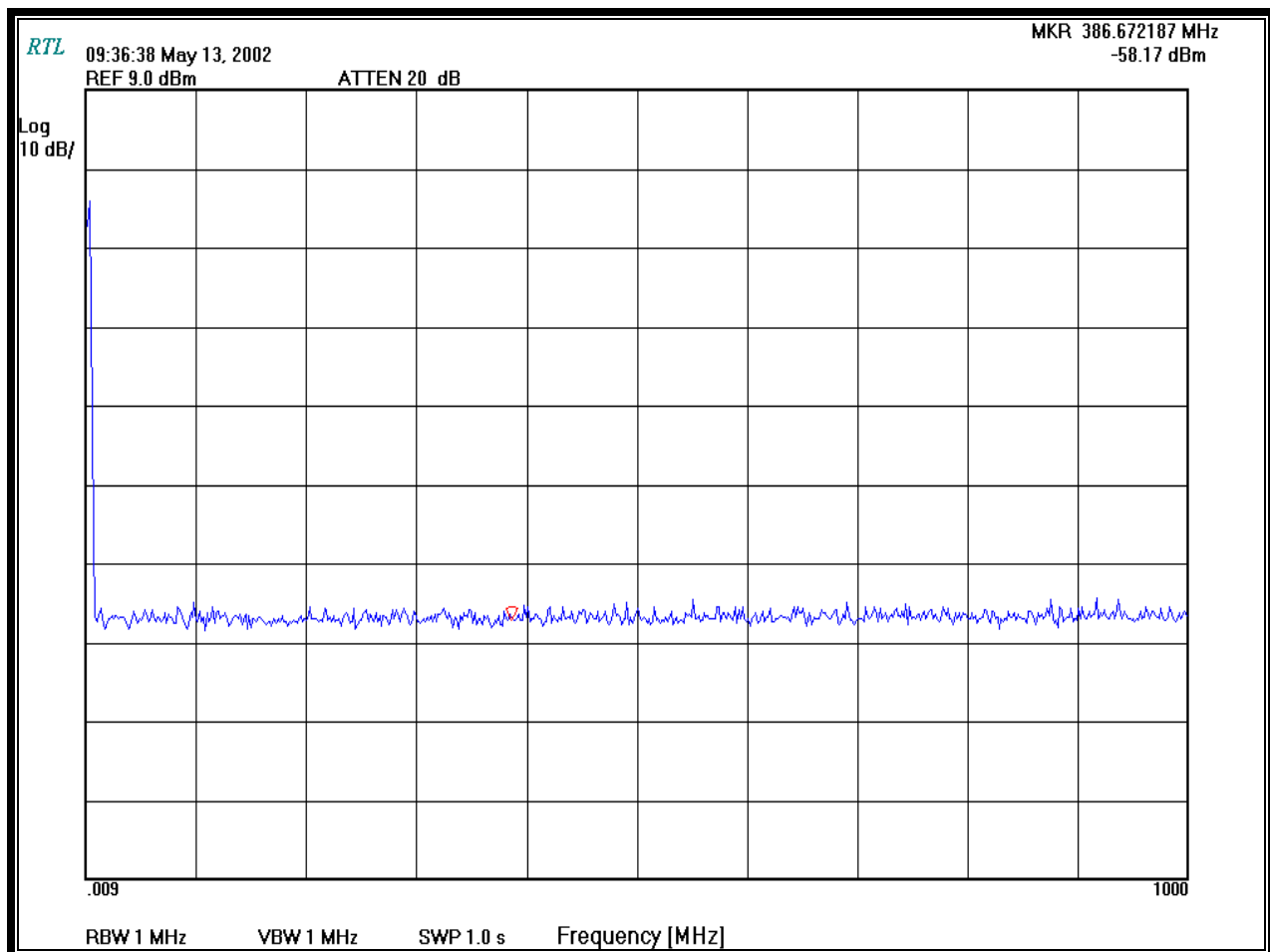

SIGNATURE

5/07/2002
DATE OF TEST

10.3 CONDUCTED ANTENNA SPURIOUS NOISE PLOTS CHANNEL 36

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-1: CONDUCTED SPURIOUS AT THE ANTENNA PORT 9KHz TO 1GHz: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

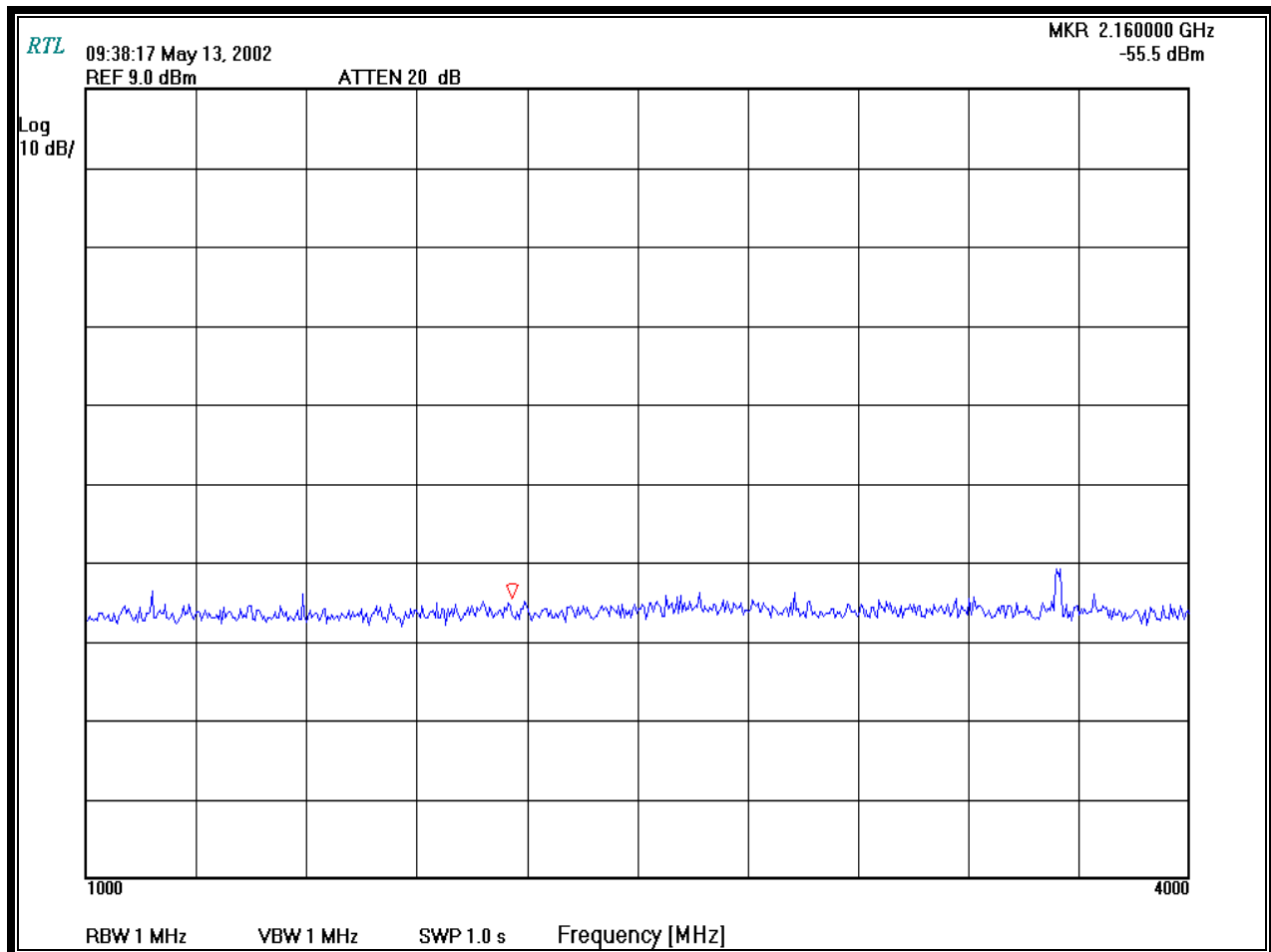
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-2: CONDUCTED SPURIOUS AT THE ANTENNA PORT 1GHz TO 4GHz: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

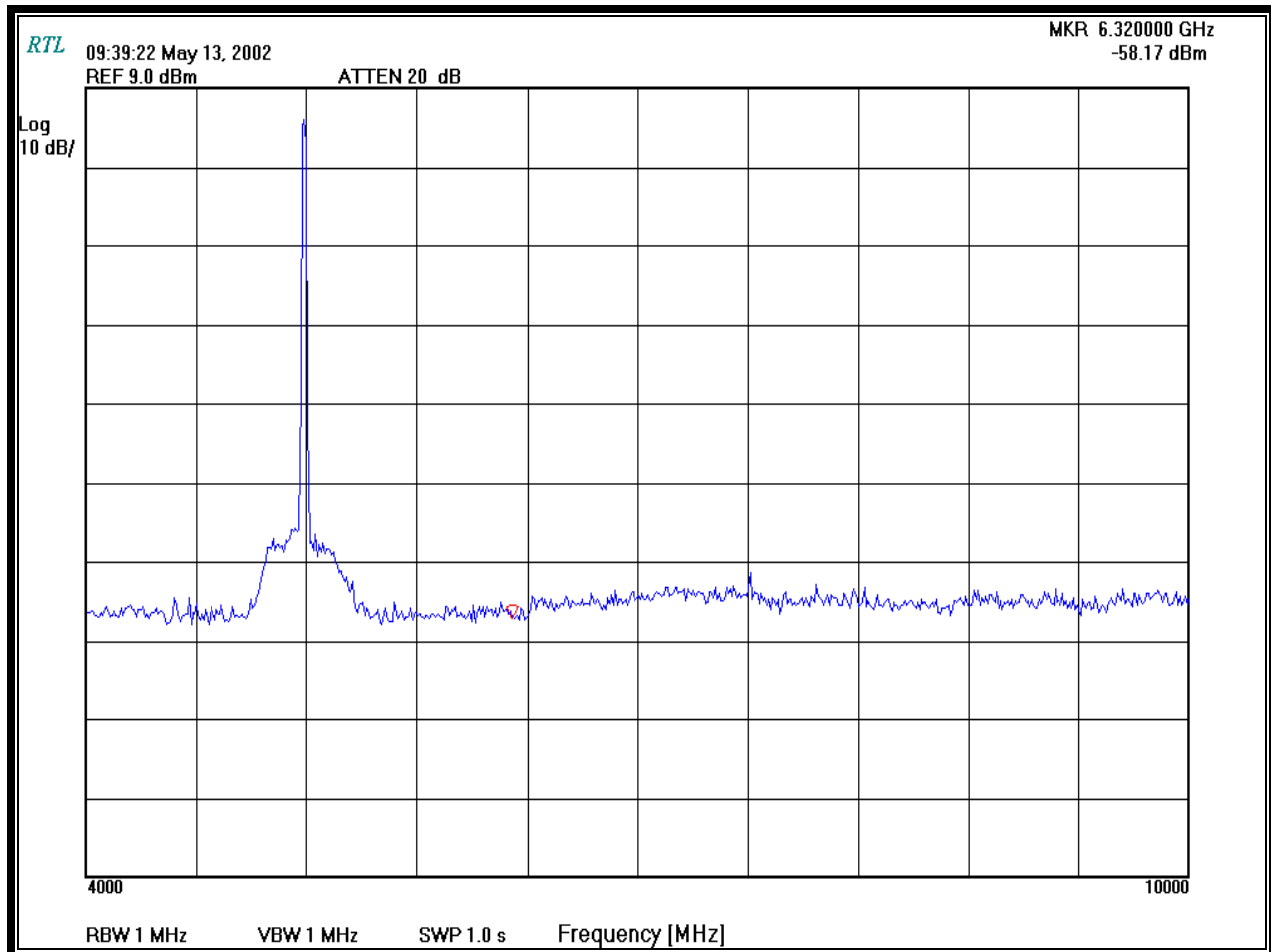
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-3: CONDUCTED SPURIOUS AT THE ANTENNA PORT 4GHz TO 10GHz: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

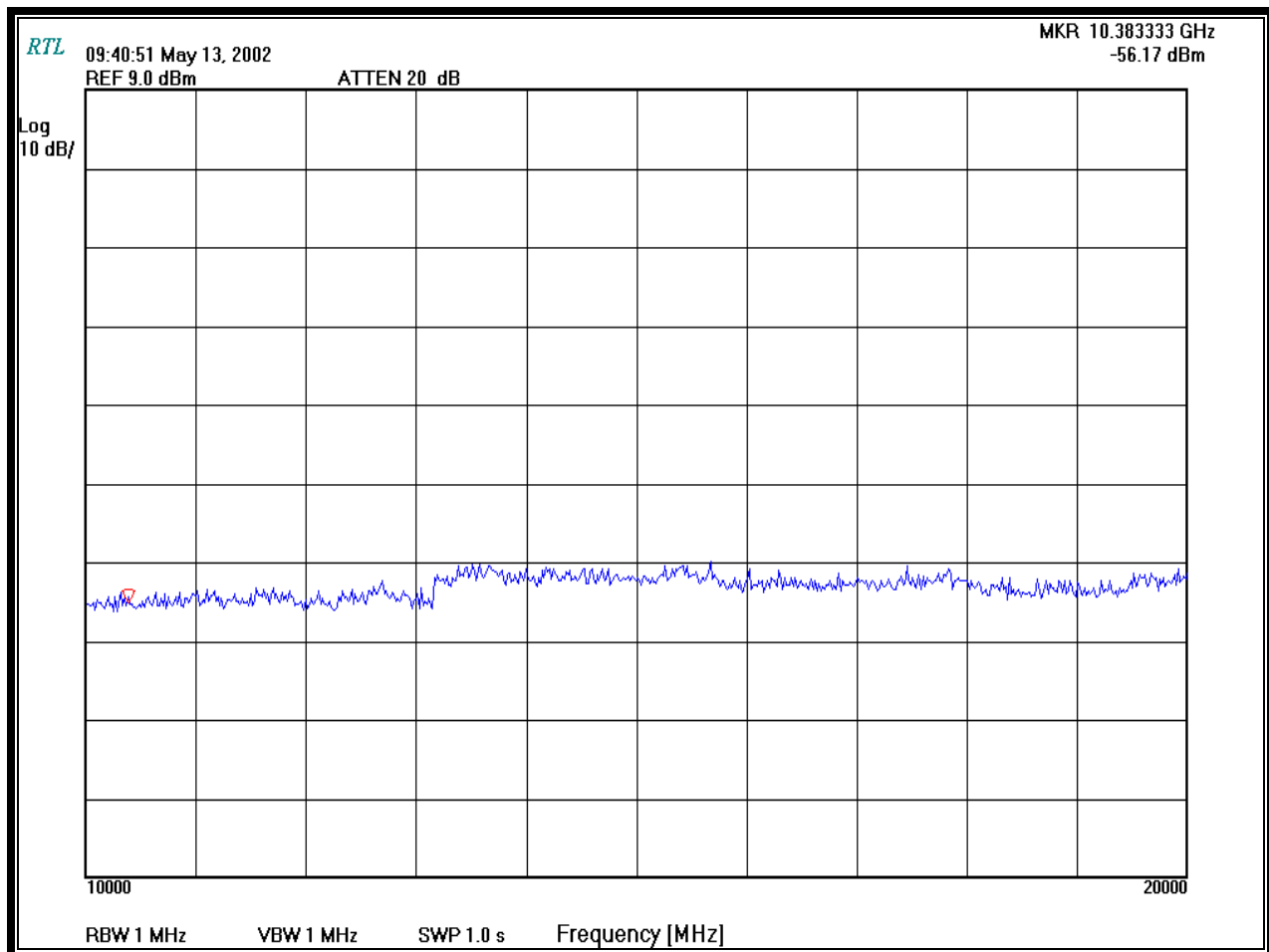
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-4: CONDUCTED SPURIOUS AT THE ANTENNA PORT 10GHz TO 20GHz: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

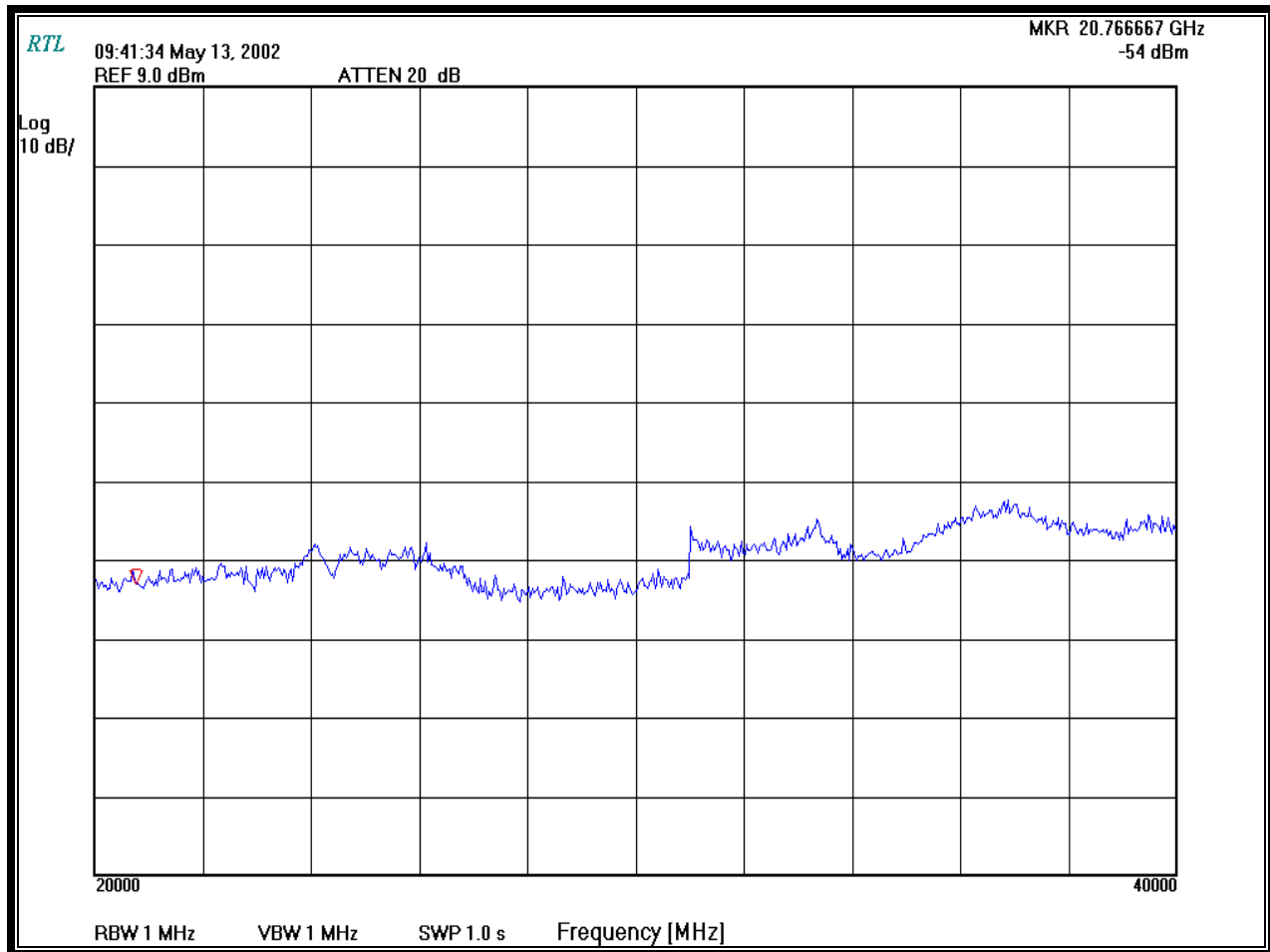
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 36
CHANNEL FREQUENCY: 5180MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-5: CONDUCTED SPURIOUS AT THE ANTENNA PORT 20GHz TO 40GHz: CHANNEL 36



TEST PERSONNEL:

RACHID SEHB

5/13/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 10-2: ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 52

Frequency (MHz)	Spurious level (dBm)
3724.260	-53.4
4489.900	-63.5
10652.18	NF
15978.27	NF
21304.36	NF

TEST PERSONNEL:

RACHID SEHB



5/08/2002

TEST ENGINEER

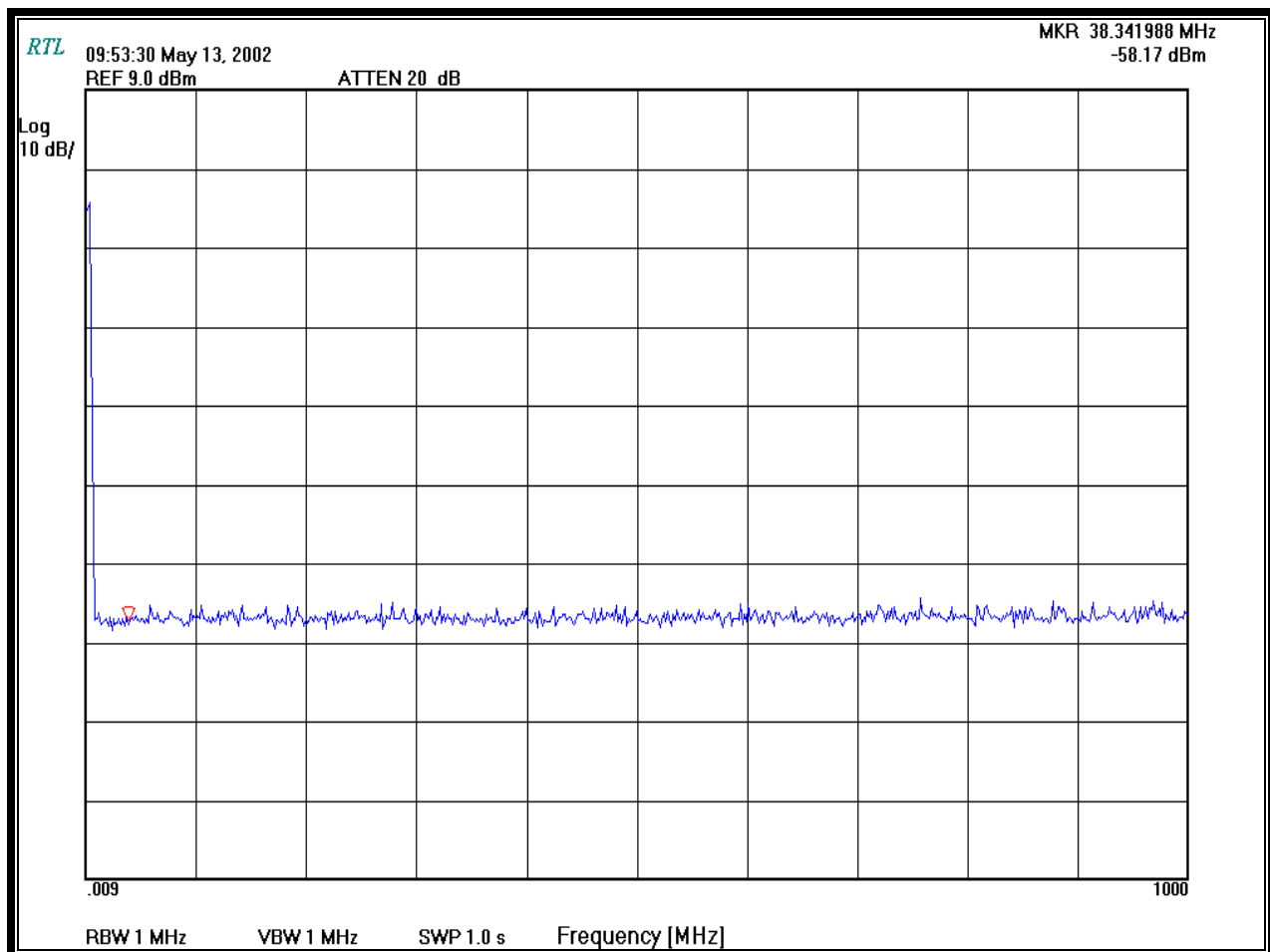
SIGNATURE

DATE OF TEST

10.4 CONDUCTED ANTENNA SPURIOUS NOISE PLOTS CHANNEL 52

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-6: CONDUCTED SPURIOUS AT THE ANTENNA PORT 30 MHz TO 1GHz: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

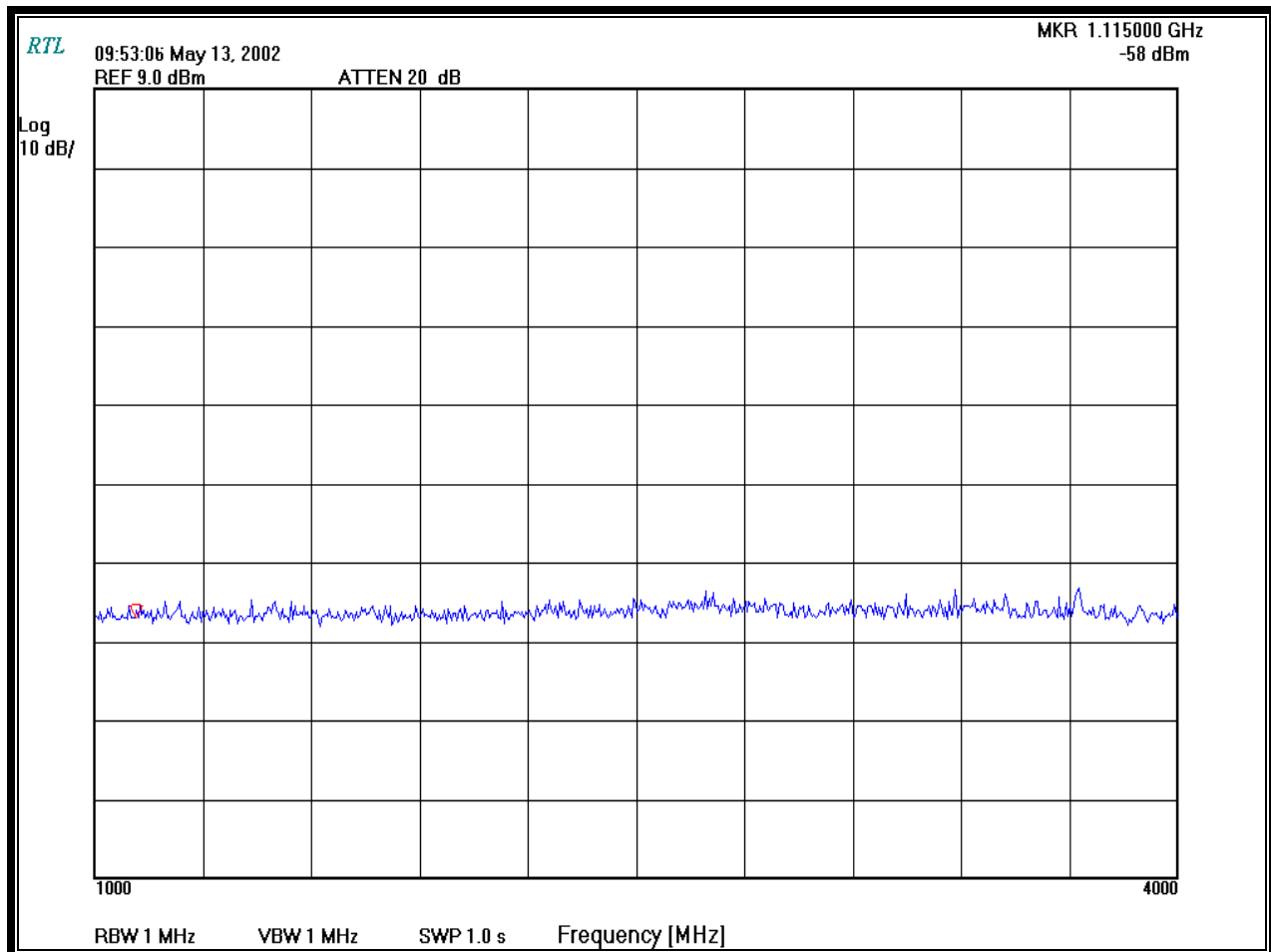
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-7: CONDUCTED SPURIOUS AT THE ANTENNA PORT 1 GHz TO 4 GHz: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

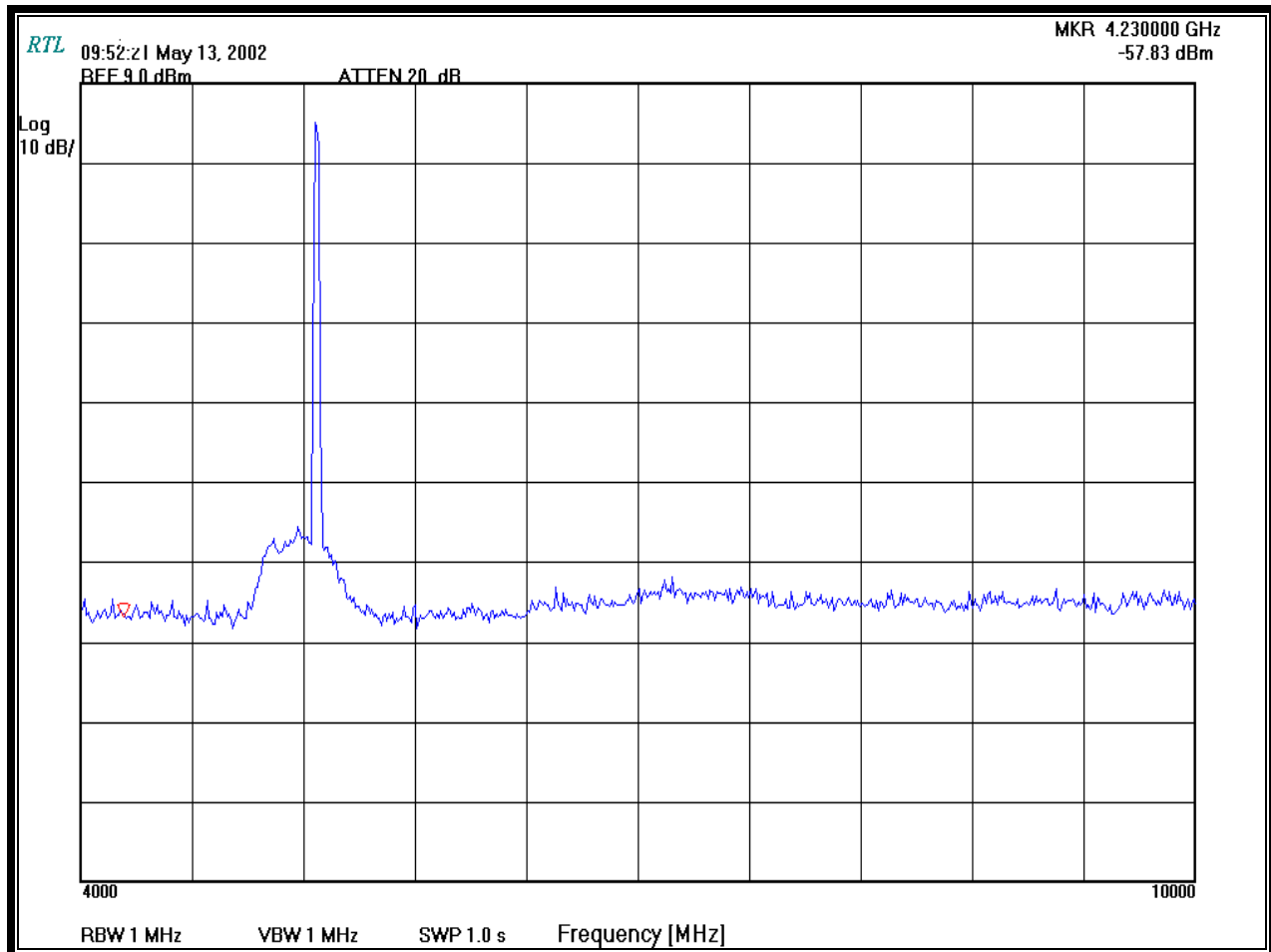
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-8: CONDUCTED SPURIOUS AT THE ANTENNA PORT 4 GHz TO 10 GHz: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

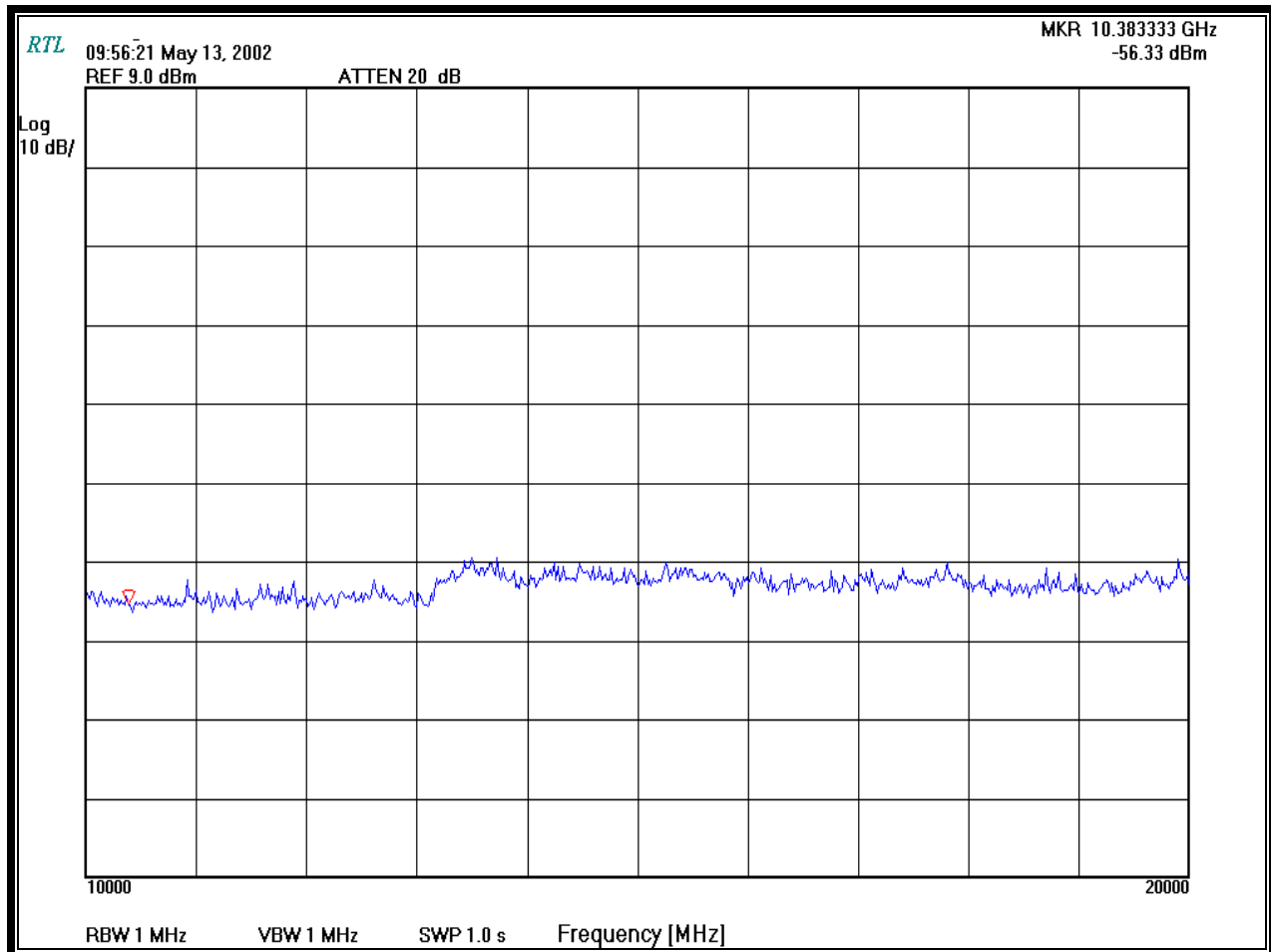
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-9: CONDUCTED SPURIOUS AT THE ANTENNA PORT 10GHz TO 20GHz: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

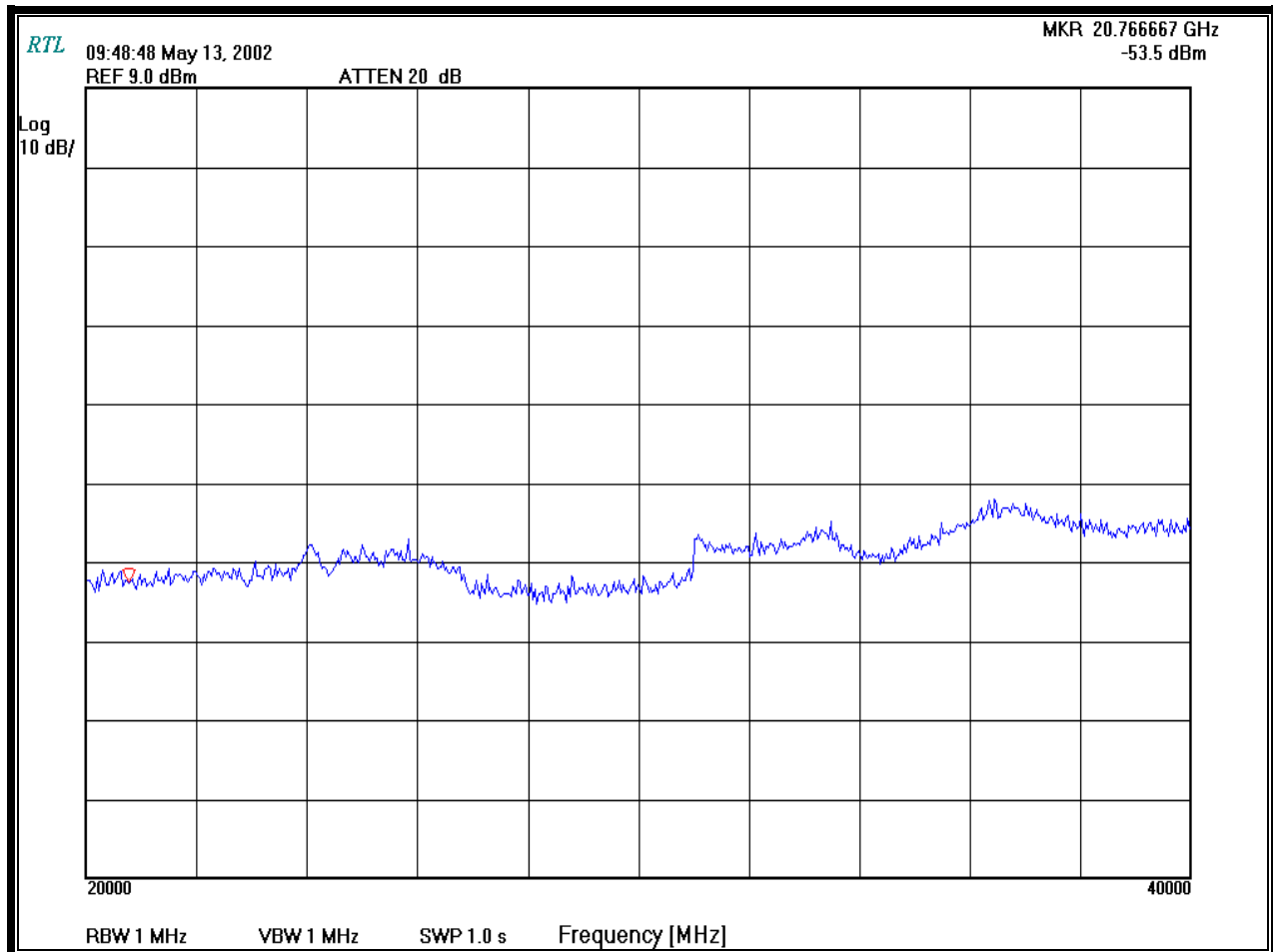
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 52
CHANNEL FREQUENCY: 5260MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-10: CONDUCTED SPURIOUS AT THE ANTENNA PORT 20 GHz TO 40 GHz: CHANNEL 52



TEST PERSONNEL:

RACHID SEHB

5/13/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 10-3: ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 64

Frequency (MHz)	Spurious level (dBm)
3789.970	-54.3
4549.770	-56.2
10616.33	NF
15978.190	NF
20304.280	NF

NF: Spectrum analyzer noise floor

TEST PERSONNEL:

RACHID SEHB



5/08/2002

Test Engineer

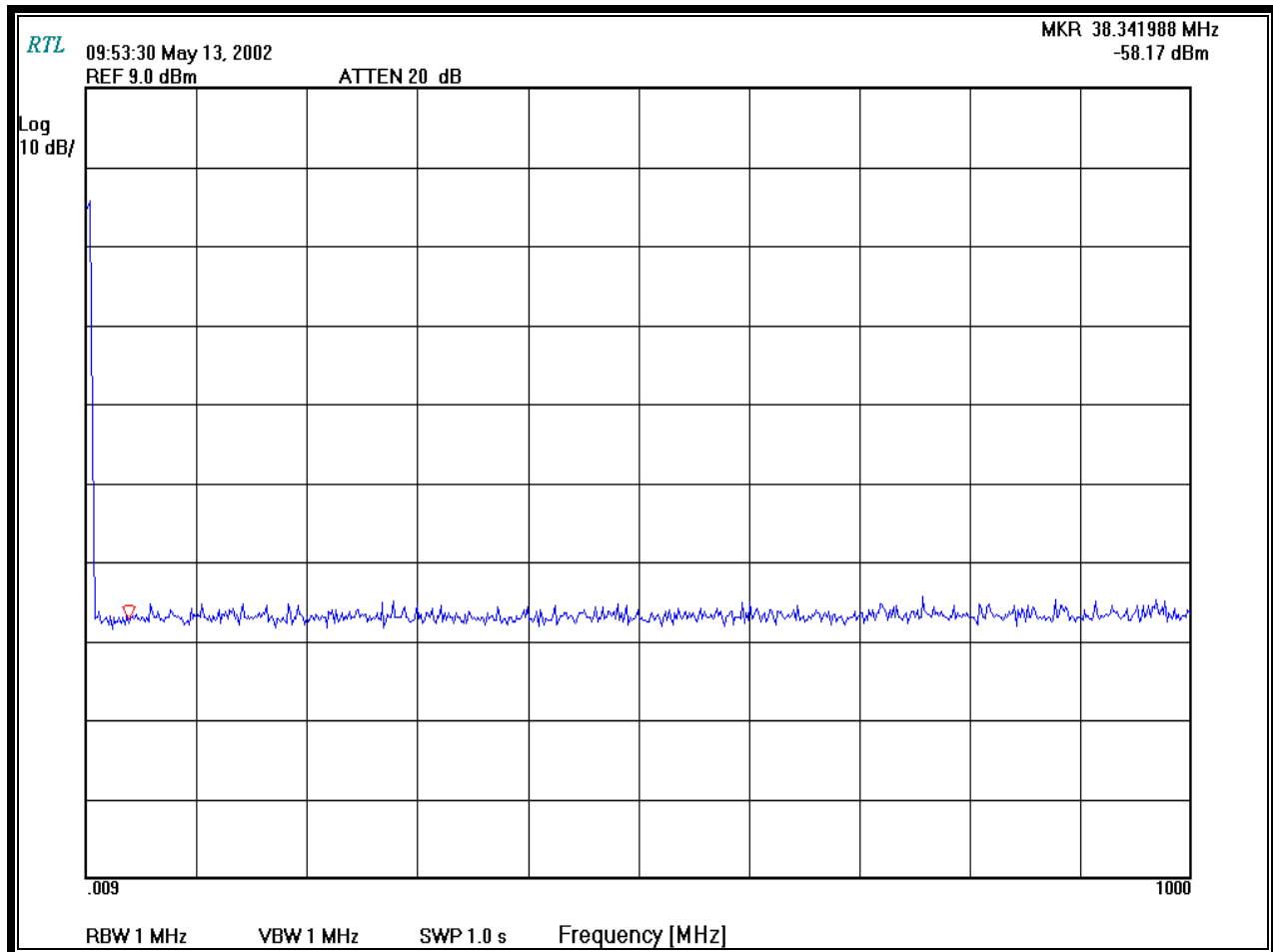
Signature

Date Of Test

10.5 CONDUCTED ANTENNA SPURIOUS NOISE PLOTS CHANNEL 64

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-11: CONDUCTED SPURIOUS AT THE ANTENNA PORT 30MHz TO 1GHz: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

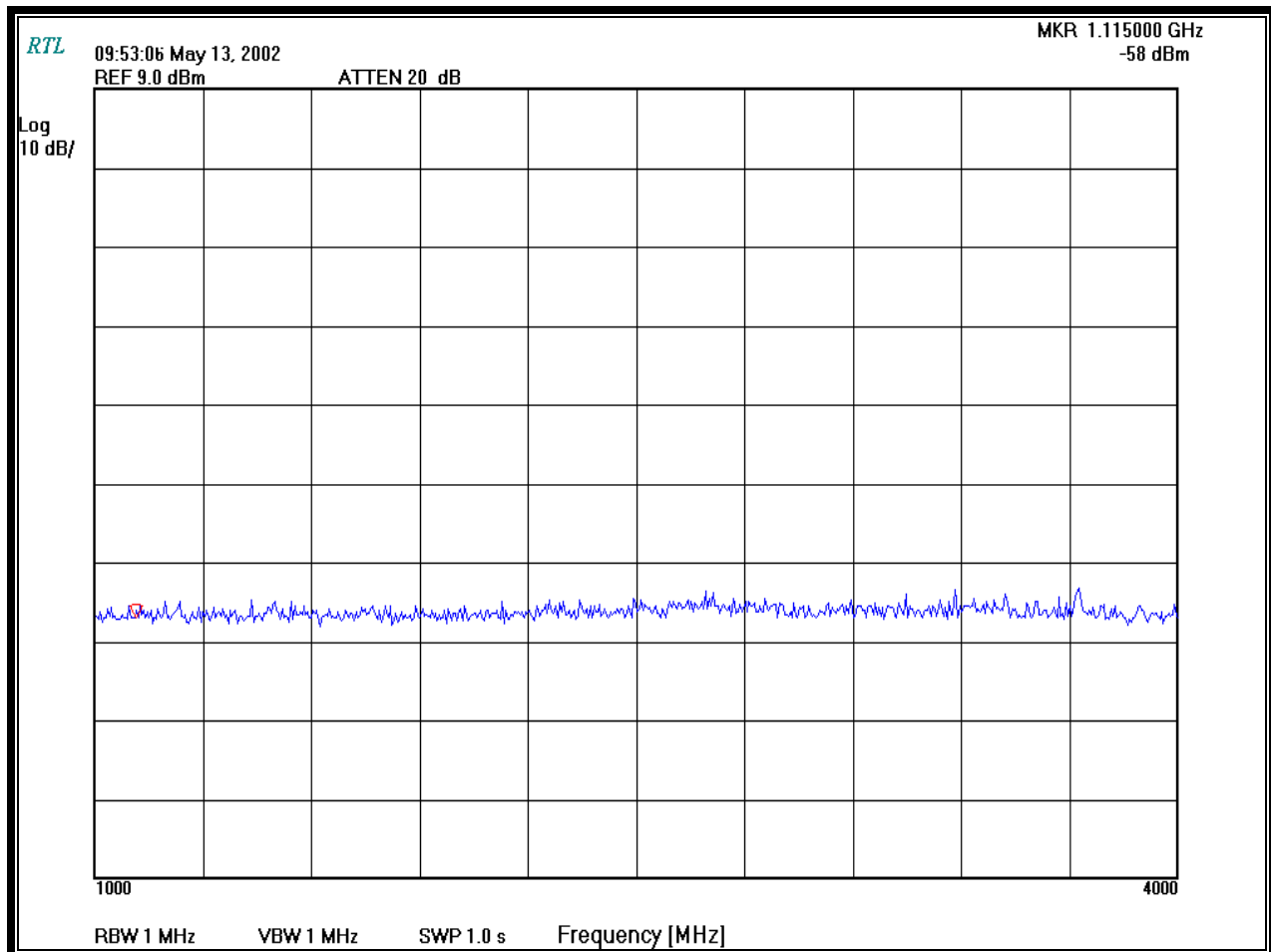
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-12: CONDUCTED SPURIOUS AT THE ANTENNA PORT 1GHz TO 4 GHz: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

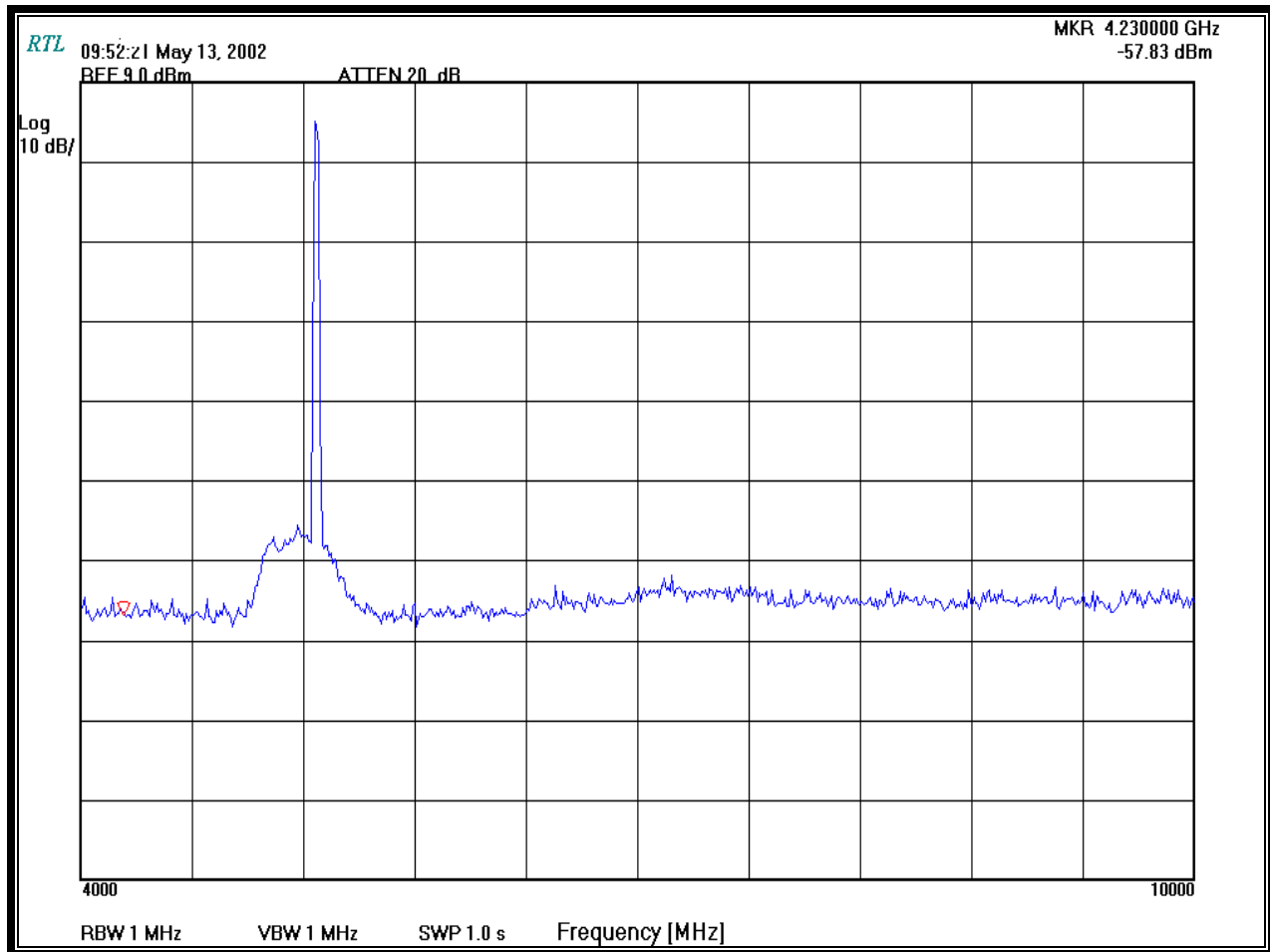
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-13: CONDUCTED SPURIOUS AT THE ANTENNA PORT 4 GHz TO 10 GHz: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

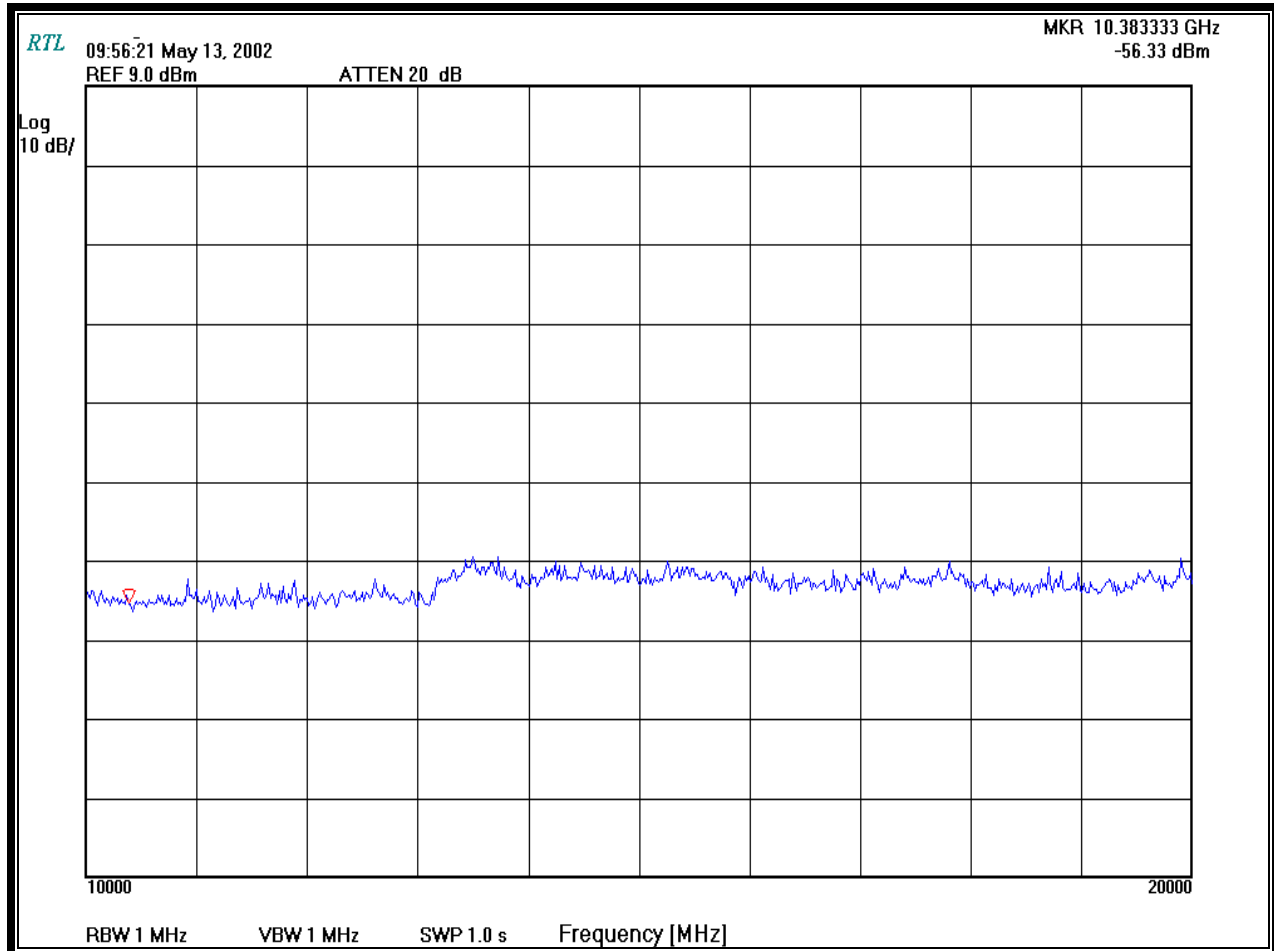
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-14: CONDUCTED SPURIOUS AT THE ANTENNA PORT 10 GHz TO 20 GHz: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

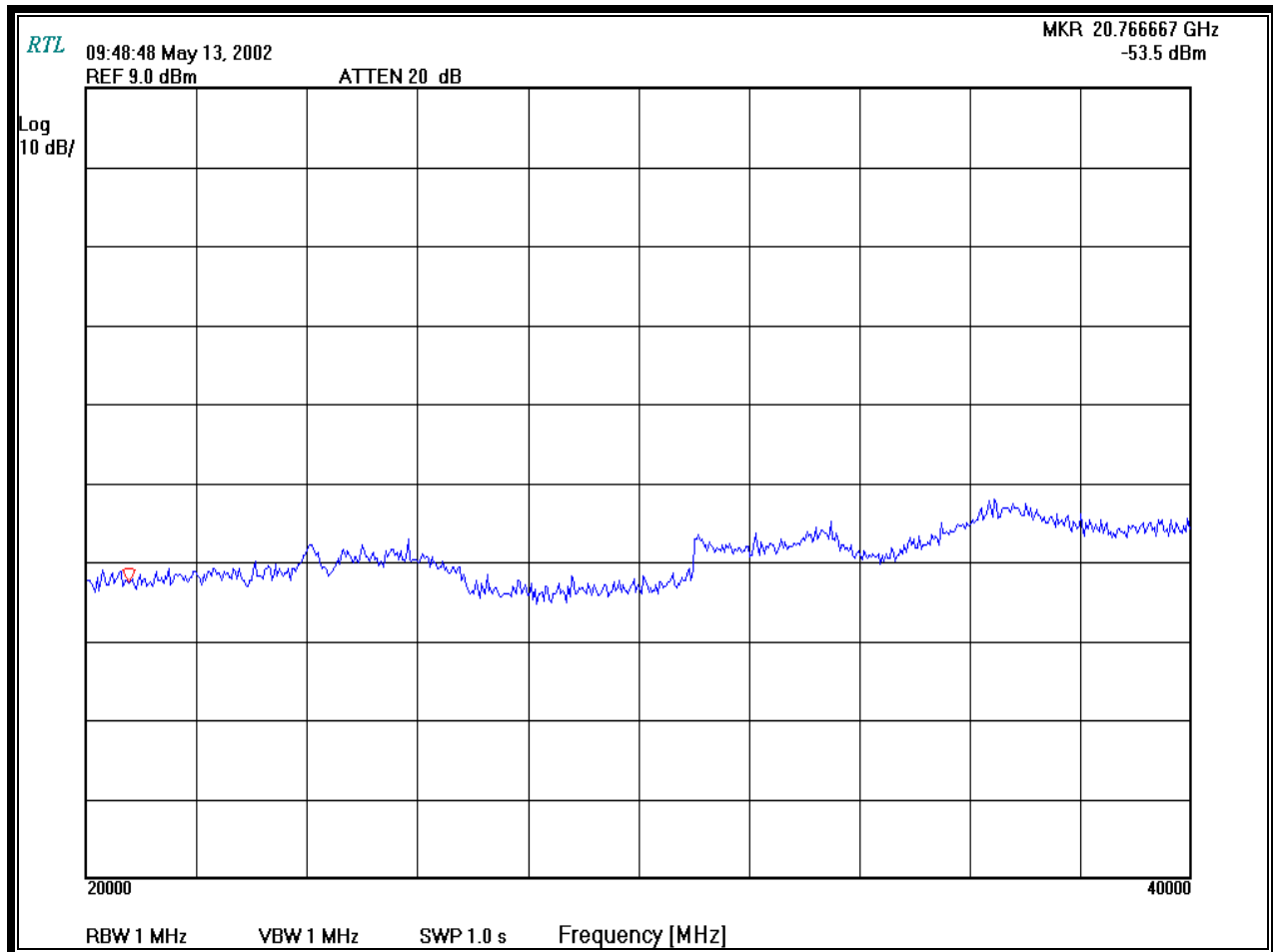
TEST ENGINEER

SIGNATURE

DATE OF TEST

CHANNEL NUMBER: 64
CHANNEL FREQUENCY: 5320MHz
RESOLUTION BANDWIDTH: 1MHz
VIDEO BANDWIDTH: 1MHz
MEASUREMENT METHOD: PEAK

PLOT 10-15: CONDUCTED SPURIOUS AT THE ANTENNA PORT 20 GHz TO 40 GHz: CHANNEL 64



TEST PERSONNEL:

RACHID SEHB

5/13/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

11 RADIATED EMISSION LIMITS (GENERAL REQUIREMENTS) - §15.209, 15.407(B)

11.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested in the X-Y, X-Z and Y-Z orthogonal plane.

11.2 TEST EQUIPMENT USED FOR TESTING

TABLE 11-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
901215	HP	8596EM	Spectrum Analyzer (9kHz – 12.8 GHz)	3826A00144
900772	EMCO	3161-02	Horn ANTENNA (2-4 GHz)	900772
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900323	EMCO	3160-7	Horn Antennas (8,2-12,4 GHz)	9605-1054
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051
900723	Miteq	NA	AMP 100MHz-26GHz	NA
900791	Schaffner - Chase	CBL6112	Antenna (25 MHz - 2 GHz)	2099

11.3 RADIATED EMISSION LIMITS TEST DATA

TABLE 11-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 36) DIPOLE

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
15540.00	Av	V	20	1.4	20 dB < the limit			
20720.00	AV	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 36) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
4409.96	Av	-49.8	1.0	9.2	-37.5
10360.00	AV	20 dB < the limit			
25900.00	AV	20 dB < the limit			
31080.00	Av	20 dB < the limit			
36260.00	Av	20 dB < the limit			
41440.00	Av	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 11-4: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 52) DIPOLE

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
4500.010	Av	V	10	1.4	34.4	14.3	48.7	54.0
4500.010	Pk	V	10	1.4	43.3	14.3	57.6	
15780.00	Av	V	20	1.4	20 dB < the limit			
21040.00	Av	V	20	1.4	20 dB < the limit			
31560.00	Av	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-5: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 52) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
10520.00	AV	20 dB < the limit			
26300.00	AV	20 dB < the limit			
36820.00	AV	20 dB < the limit			
42080.00	Av	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 11-6: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 64) DIPOLE

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
4550.160	Av	V	10	1.4	39.6	12.1	51.7	54.0
4550.210	Pk	V	10	1.4	47.5	12.1	59.5	
10640.00	Av	V	20	1.4	20 dB < the limit			
15960.00	Av	V	20	1.4	20 dB < the limit			
21280.00	Av	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-7: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 64) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
26600.00	Av	20 dB < the limit			
31920.00	AV	20 dB < the limit			
37240.00	AV	20 dB < the limit			
42560.00	AV	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 11-8: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 36) PATCH

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
4409.96	Av	V	5	1.5	34.2	14.3	48.5	54.0
4409.96	Pk	V	5	1.5	43.5	14.3	57.8	
15540.00	Av	V	20	1.4	20 dB < the limit			
20720.00	AV	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-9: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 36) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
10360.00	AV	20 dB < the limit			
25900.00	AV	20 dB < the limit			
31080.00	Av	20 dB < the limit			
36260.00	Av	20 dB < the limit			
41440.00	Av	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 11-10: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 52) PATCH

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
4500.010	Av	V	10	1.4	34.6	14.3	48.9	54.0
4500.010	Pk	V	10	1.4	43.3	14.3	57.6	
15780.00	Av	V	20	1.4	20 dB < the limit			
21040.00	Av	V	20	1.4	20 dB < the limit			
31560.00	Av	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-11: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 52) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
10520.00	AV	20 dB < the limit			
26300.00	AV	20 dB < the limit			
36820.00	AV	20 dB < the limit			
42080.00	Av	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

TABLE 11-12: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 64) PATCH

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
4550.160	Av	V	5	1.4	35.5	14.3	49.8	54.0
4550.210	Pk	V	5	1.4	41.0	14.3	55.3	
10640.00	Av	V	20	1.4	20 dB < the limit			
15960.00	Av	V	20	1.4	20 dB < the limit			
21280.00	Av	V	20	1.4	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TABLE 11-13: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 64) (OUTSIDE RESTRICTED BAND)

Emission Frequency (MHz)	Test Detector	Signal Generator (dBm)	Cable Loss* (dB)	TX Antenna Gain (dBi)	Level Corrected (dBm)
26600.00	Av	20 dB < the limit			
31920.00	AV	20 dB < the limit			
37240.00	AV	20 dB < the limit			
42560.00	AV	20 dB < the limit			

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB



5/09/2002

TEST ENGINEER

SIGNATURE

DATE OF TEST

12 CONCLUSION

Test Lab:		Applicant Information:	
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170		CISCO Systems, Inc. 3875 Embassy Parkway Suite 350 Akron, OH 44333	
Phone: 703-689-0368 Fax: 703-689-2056 Web Site: www.rheintech.com		Contact: Jim Nicholson Phone: 330-664-7362 Fax: 330-664-7301	
FCC ID:	LDK102045	GRANTEE FRN NUMBER:	0004968939
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2002109
MODEL(S):	AIR-RM20A-A-K9	RTL QUOTE NUMBER:	QRTL02-462
DATE OF TEST REPORT:	May 15, 2002		
FCC Classification:	NII-Unlicensed National Information Infrastructure TX		
FCC Rule Part(s):	Part 15 subpart E Part 15.407: Operation within the bands 5.15–5.35 GHz and 5.725–5.825 GHz		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Freq. Tolerance	Emission Designator
5180-5250	0.025	N/A	N/A
5250-5320	0.037	N/A	N/A

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15 and Industry Canada RSS-210.

Signature: 

Date: May 15, 2002

Typed/Printed Name: Desmond A. Fraser

Position: President