

## 4. TEST TYPES AND RESULTS (FOR PART 802.11a)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS30	847793/022	Mar. 10, 2004
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	828075/003	July 08, 2004
ROHDE & SCHWARZ 200-A Four-line V-Network	ENV4200	830326/018	Oct. 30, 2003
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Nov. 29, 2003
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/018	Nov. 29, 2003
EMCO-L.I.S.N. (for peripheral)	3825/2	9003-1627	July 08, 2004
Software	Cond-V2M3	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C05.01	May. 23, 2004
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-305	Feb. 23, 2004
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-306	Feb. 23, 2004

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. “\*”: These equipment are used for conducted telecom port test only (if tested).
  3. The test was performed in ADT Shielded Room No. 5.
  4. The VCCI Site Registration No. is C-1093.



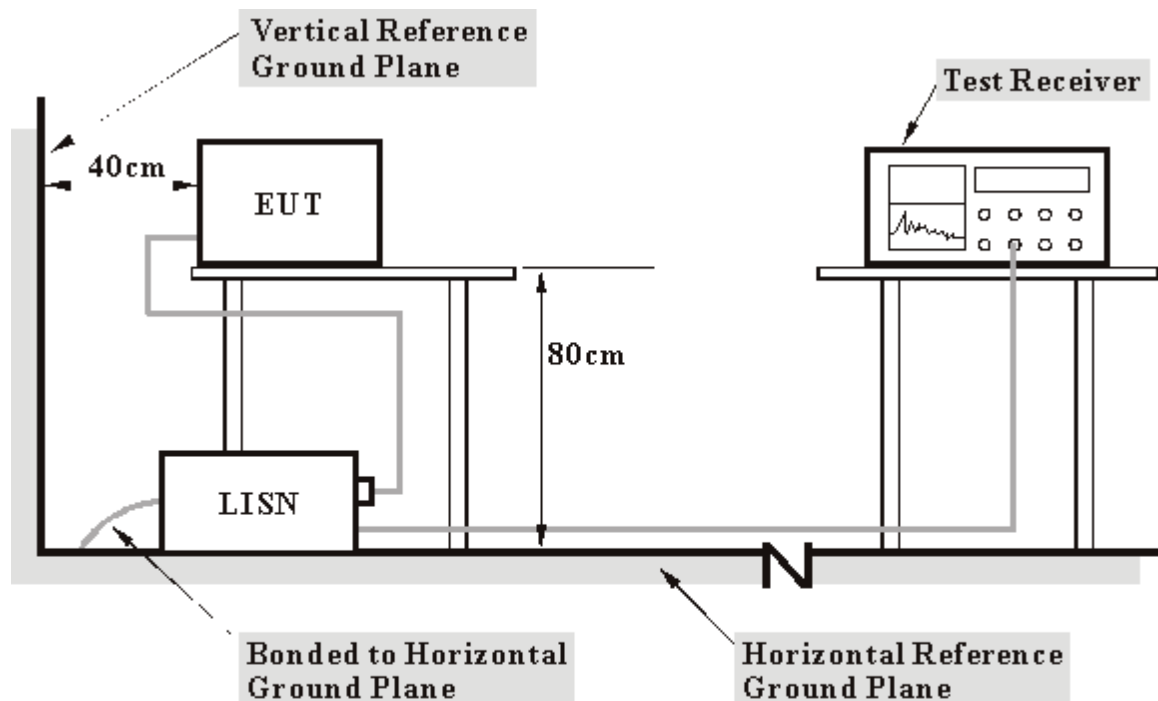
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



- Note:** 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

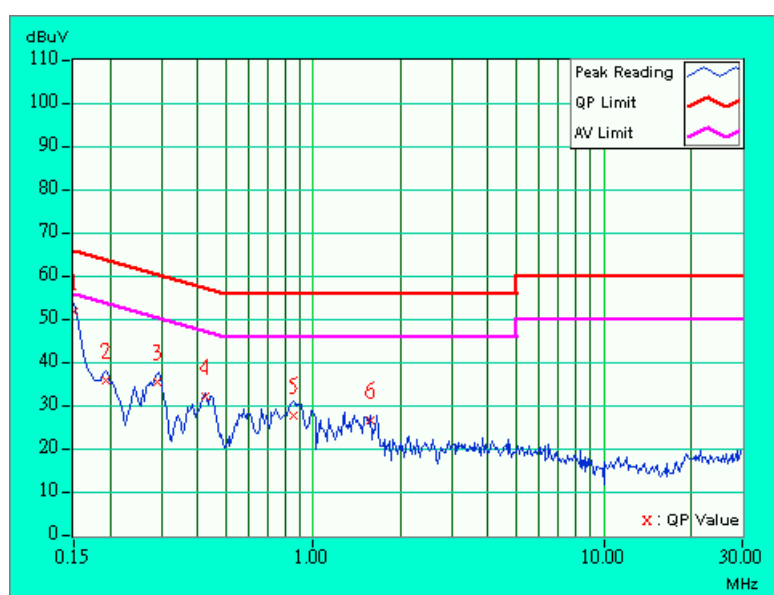
Same as 4.1.6

## 4.1.7 TEST RESULTS

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 991 hPa	<b>PHASE</b>	Line (L)
<b>TESTED BY</b>	Gary Chang		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.15	51.59	-	51.74	-	66.00	56.00	-14.26	-
2	0.193	0.19	35.44	-	35.63	-	63.91	53.91	-28.27	-
3	0.291	0.20	35.18	-	35.38	-	60.51	50.51	-25.13	-
4	0.423	0.20	31.69	-	31.89	-	57.38	47.38	-25.49	-
5	0.857	0.28	27.36	-	27.64	-	56.00	46.00	-28.36	-
6	1.566	0.36	26.26	-	26.62	-	56.00	46.00	-29.38	-

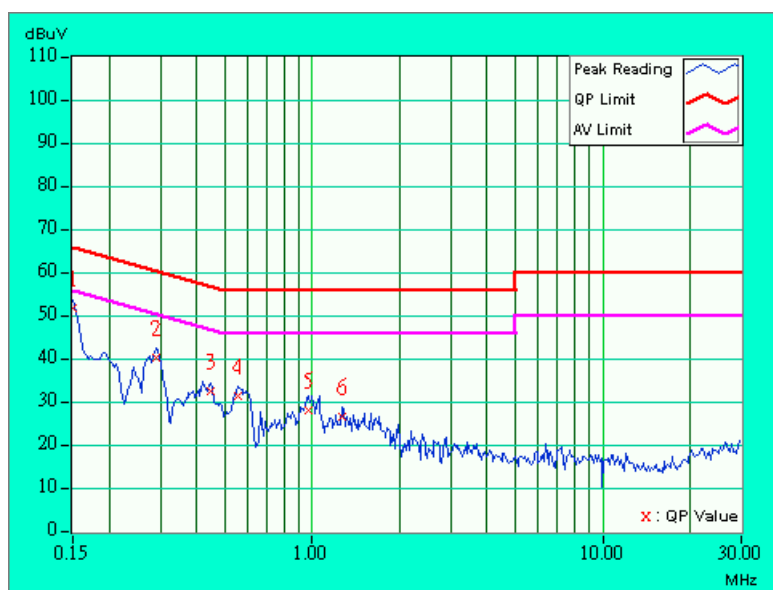
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 991 hPa	<b>PHASE</b>	Neutral (N)
<b>TESTED BY</b>	Gary Chang		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.15	51.67	-	51.82	-	66.00	56.00	-14.18	-
2	0.291	0.20	40.06	-	40.26	-	60.51	50.51	-20.25	-
3	0.447	0.21	32.33	-	32.54	-	56.93	46.93	-24.40	-
4	0.556	0.23	31.18	-	31.41	-	56.00	46.00	-24.59	-
5	0.970	0.30	27.74	-	28.04	-	56.00	46.00	-27.96	-
6	1.262	0.33	26.39	-	26.72	-	56.00	46.00	-29.28	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



#### 4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/m) *note 3
5150~5250	-27	73.3
5250~5350	-27	73.3
5725~5825	-27 *note 1	73.3
	-17 *note 2	83.3

**NOTE:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts)}$$



## 4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
* HP Spectrum Analyzer	8590L	3544A01176	Jun. 10, 2004
* HP Preamplifier	8447D	2944A08485	May. 01, 2004
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01292	Aug. 13, 2004
ROHDE & SCHWARZ TEST RECEIVER	ESI7	838496/016	Feb. 23, 2004
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 13, 2004
SCHAFFNER Tunable Dipole Antenna	VHBA 9123	459	Nov. 22, 2003
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
* CHASE BILOG Antenna	CBL6112A	2221	July 26, 2004
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	Jun 30, 2004
* EMCO Horn Antenna	3115	9312-4192	Mar. 23 2004
* EMCO Turn Table	1060	1115	NA
* CHANCE Tower	CM-AT40	CM-A010	NA
* Software	ADT_Radiated_V5.14	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Jan. 05. 2004
* TIMES RF cable	LMR-600	CABLE-ST5-01	Jan. 05. 2004

**NOTE:** 1.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "\*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. 5.
5. The VCCI Site Registration No. is R-1039.





#### 4.2.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

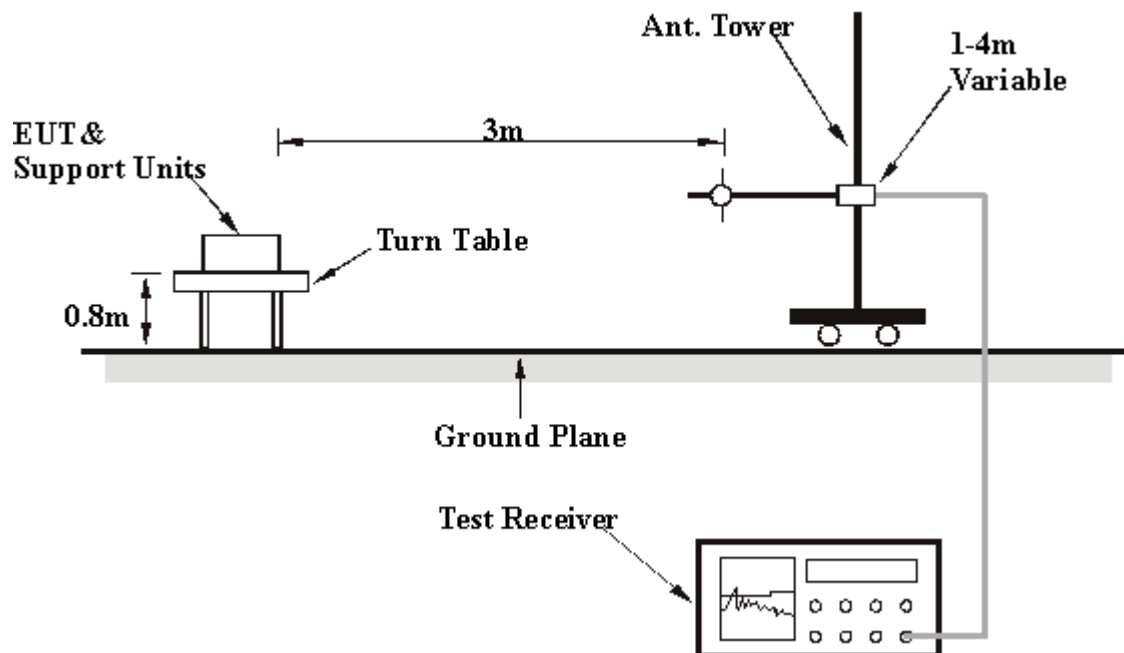
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.6 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.2.7 EUT OPERATING CONDITIONS

Same as 4.1.6

## 4.2.8 TEST RESULTS

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>FREQUENCY RANGE</b>	Below 1000MHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	86.04	25.2 QP	40.00	-14.80	2.00 H	172	15.80	9.40
2	250.94	37.8 QP	46.00	-8.20	1.25 H	172	24.40	13.40
3	270.34	34.7 QP	46.00	-11.30	1.25 H	136	20.50	14.10
4	351.18	35.3 QP	46.00	-10.70	1.25 H	154	18.80	16.50
5	375.97	34.7 QP	46.00	-11.30	1.00 H	88	17.60	17.10
6	451.41	36.8 QP	46.00	-9.20	2.00 H	190	17.50	19.30
7	500.99	37.3 QP	46.00	-8.70	1.00 H	178	17.30	20.00
8	631.40	37.8 QP	46.00	-8.20	1.25 H	124	14.80	23.00
9	641.10	35.4 QP	46.00	-10.60	1.25 H	148	12.30	23.10
10	720.86	33.7 QP	46.00	-12.30	1.75 H	190	9.20	24.60
11	760.73	32.5 QP	46.00	-13.50	1.00 H	154	7.10	25.40
12	811.39	36.9 QP	46.00	-9.10	2.00 H	166	11.20	25.70
13	841.57	30.3 QP	46.00	-15.70	1.00 H	118	4.30	26.10
14	900.84	35.6 QP	46.00	-10.40	1.00 H	130	8.40	27.10
15	991.38	35.8 QP	54.00	-18.20	1.00 H	280	7.90	27.90

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>FREQUENCY RANGE</b>	Below 1000MHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Steven Lu		

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.70	38.4 QP	40.00	-1.60	1.00 V	190	24.10	14.30
2	86.04	36.2 QP	40.00	-3.80	1.50 V	136	26.80	9.40
3	142.09	33.7 QP	43.50	-9.80	1.00 V	142	19.80	13.80
4	250.94	37.7 QP	46.00	-8.30	1.00 V	52	24.30	13.40
5	270.34	34.8 QP	46.00	-11.20	1.75 V	184	20.60	14.10
6	351.18	37.0 QP	46.00	-9.00	1.00 V	166	20.60	16.50
7	375.97	35.6 QP	46.00	-10.40	1.00 V	184	18.50	17.10
8	451.41	38.3 QP	46.00	-7.70	1.25 V	268	19.00	19.30
9	500.99	36.4 QP	46.00	-9.60	1.00 V	112	16.40	20.00
10	631.40	39.3 QP	46.00	-6.70	1.00 V	82	16.20	23.00
11	641.10	35.9 QP	46.00	-10.10	1.00 V	214	12.70	23.10
12	720.86	36.8 QP	46.00	-9.20	1.00 V	286	12.30	24.60
13	811.39	40.4 QP	46.00	-5.60	1.25 V	238	14.60	25.70
14	900.84	36.1 QP	46.00	-9.90	1.25 V	136	9.00	27.10
15	991.38	38.3 QP	54.00	-15.70	1.00 V	118	10.40	27.90

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	1
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Hardaway Lee		

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5180.00	93.3PK			1.11 H	174	57.10	36.20
1	*5180.00	84.6AV			1.11 H	174	48.40	36.20
2	10360.00	56.6 PK	73.30	-16.70	1.25 H	227	12.10	44.50

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5150.00	59.1 PK	74.00	-14.90	1.37 V	315	22.90	36.20
1	#5150.00	50.4 AV	54.00	-3.60	1.37 V	315	14.20	36.20
2	*5180.00	102.8 PK	68.30	34.50	1.37 V	315	66.60	36.20
2	*5180.00	94.1 AV	54.00	40.10	1.37 V	315	57.90	36.20
3	10360.00	59.0 PK	73.30	-14.30	1.56 V	294	14.50	44.50

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “\*” : Fundamental frequency
6. “#” : The radiated frequency falling in the restricted band.

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	4
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Gary Chang		

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	96.67PK			1.28 H	210	60.37	36.30
1	*5240.00	88.17AV			1.28 H	210	51.87	36.30
2	10480.00	57.8 PK	73.30	-15.50	1.17 H	31	13.10	44.70

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5240.00	107.47PK			1.08 V	31	71.17	36.30
1	*5240.00	97.47 AV			1.08 V	31	61.17	36.30
2	10480.00	57.9 PK	73.30	-15.40	1.22 V	348	13.20	44.70

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. "\*" : Fundamental frequency
6. "# " : The radiated frequency falling in the restricted band.



<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	5
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Gary Chang		

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5260.00	102.2 PK			1.28 H	209	65.90	36.40
1	*5260.00	93.3 AV			1.28 H	209	57.00	36.40
2	10520.00	57.0 PK	73.30	-16.30	1.15 H	342	12.20	44.80

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5260.00	113.4 PK			1.13 V	62	77.00	36.40
1	*5260.00	103.4 AV			1.13 V	62	67.00	36.40
2	10520.00	64.0 PK	73.30	-9.30	1.30 V	62	19.20	44.80

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. "\*" : Fundamental frequency
6. "# " : The radiated frequency falling in the restricted band.



<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	8
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Gary Chang		

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5320.00	101.2 PK			1.01 H	204	64.80	36.40
1	*5320.00	92.5 AV			1.01 H	204	56.10	36.40
2	#10640.00	46.2 PK	74.00	-27.80	1.08 H	24	1.10	45.10

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5320.00	111.8 PK			1.06 V	306	75.40	36.40
1	*5320.00	103.0 AV			1.06 V	306	66.60	36.40
2	#5350.00	59.20 PK	74.00	-14.80	1.06 V	306	22.70	36.50
2	#5350.00	50.40 AV	54.00	-3.60	1.06 V	306	13.90	36.50
3	#10640.00	57.5 PK	74.00	-16.50	1.14 V	241	12.40	45.10
3	#10640.00	45.7 AV	54.00	-8.30	1.14 V	241	0.60	45.10

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “\*” : Fundamental frequency
6. “#” : The radiated frequency falling in the restricted band.



<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	9
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Gary Chang		

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5715.00	61.1 PK	73.30	-12.20	1.34 H	195	24.00	37.10
2	5725.00	69.5 PK	83.30	-13.80	1.34 H	195	32.40	37.10
3	*5745.00	98.4 PK			1.34 H	195	61.30	37.10
3	*5745.00	90.7 AV			1.34 H	195	53.60	37.10
4	#11409.00	56.6 PK	74.00	-17.40	1.18 H	52	10.80	45.80
4	#11409.00	46.0 AV	54.00	-8.00	1.18 H	52	0.20	45.80

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5715.00	62.1 PK	73.30	-11.20	1.02 V	179	25.00	37.10
2	5725.00	74.9 PK	83.30	-8.40	1.02 V	179	37.80	37.10
3	*5745.00	105.2 PK			1.02 V	179	68.10	37.10
3	*5745.00	96.4 AV			1.02 V	179	59.20	37.10
4	#11409.00	56.2 PK	74.00	-17.80	1.35 V	14	10.40	45.80
4	#11409.00	45.4 AV	54.00	-8.60	1.35 V	14	-0.40	45.80

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “\*” : Fundamental frequency
6. “#” : The radiated frequency falling in the restricted band.

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
		<b>CHANNEL</b>	12
<b>FREQUENCY RANGE</b>	Above 1000 MHz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz
<b>TESTED BY</b>	Gary Chang		

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5805.00	99.0 PK			1.57 H	195	61.80	37.20
1	*5805.00	89.5 AV			1.57 H	195	52.30	37.20
2	5825.00	68.3 PK	83.30	-15.00	1.57 H	195	31.00	37.30
3	5835.00	58.3 PK	73.30	-15.00	1.57 H	195	21.00	37.30
4	#11609.00	54.9 PK	74.00	-19.10	1.42 H	352	9.20	45.60
4	#11609.00	44.9 AV	54.00	-9.10	1.42 H	352	-0.80	45.60

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5805.00	109.3 PK			1.12 V	255	72.10	37.20
1	*5805.00	99.7 AV			1.12 V	255	62.50	37.20
2	5825.00	75.1 PK	83.30	-8.20	1.12 V	255	37.80	37.30
3	5835.00	63.3 PK	73.30	-10.00	1.12 V	255	26.00	37.30
4	#11609.00	57.2 PK	74.00	-16.80	1.56 V	7	11.50	45.60
4	#11609.00	45.4 AV	54.00	-8.60	1.56 V	7	-0.30	45.60

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. "\*" : Fundamental frequency
6. "# " : The radiated frequency falling in the restricted band.

### 4.3 PEAK TRANSMIT POWER MEASUREMENT

#### 4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35 GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825 GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

**Note:** Where B is the 26dB emission bandwidth in MHz.

#### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set span to encompass the entire emission bandwidth of the signal.
3. Set RBW to 1MHz, VBW to 300kHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



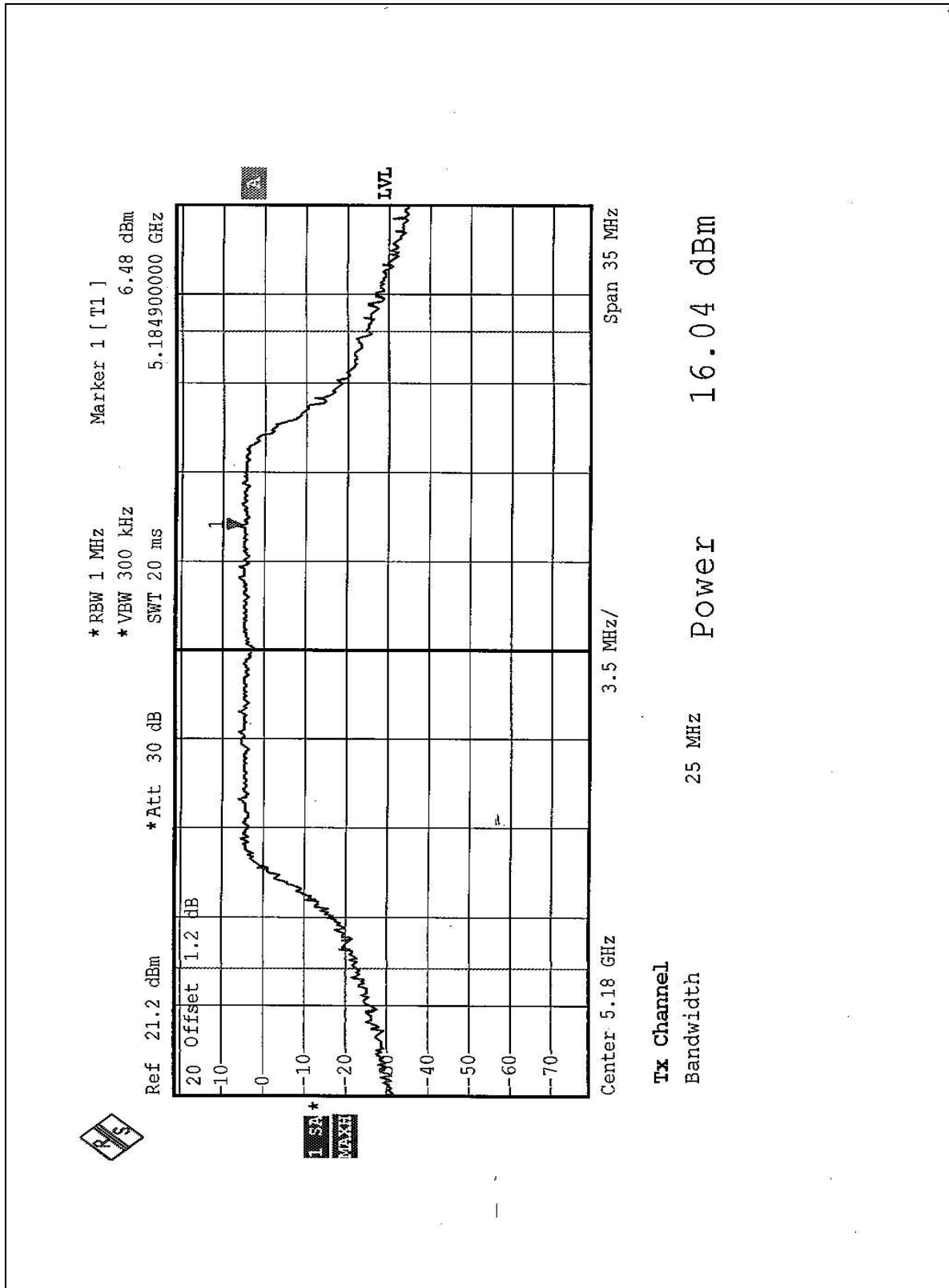
## 4.3.7 TEST RESULTS

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 65%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Cody Chang		

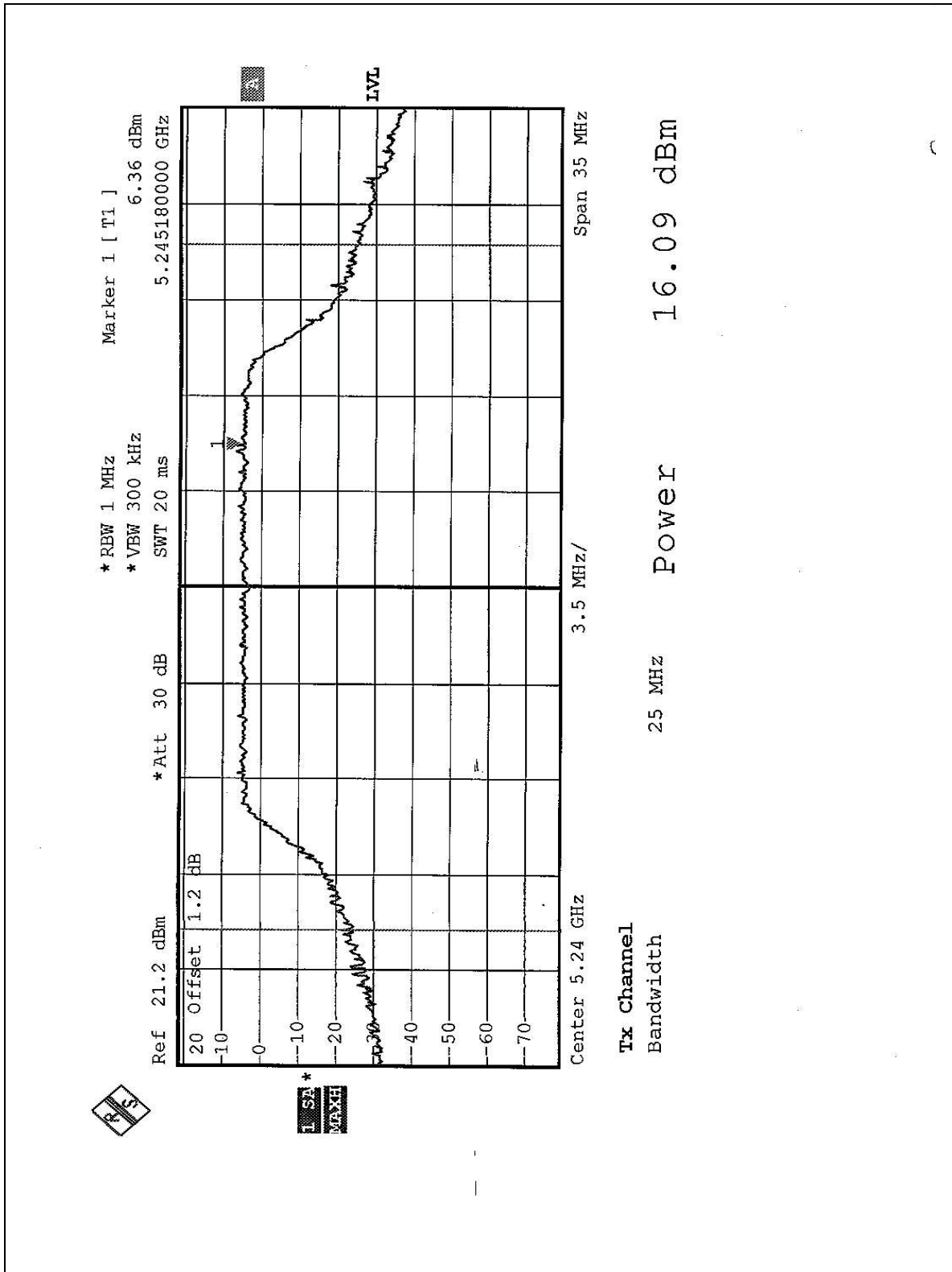
<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>26dBc Occupied Bandwidth (MHz)</b>	<b>PASS/FAIL</b>
1	5180	16.04	17.00	24.08	PASS
4	5240	16.09	17.00	23.76	PASS
5	5260	17.05	24.00	23.52	PASS
8	5320	17.07	24.00	23.68	PASS
9	5745	17.12	30.00	25.44	PASS
12	5805	16.97	30.00	24.96	PASS

**NOTE:** The 26dBc Occupied Bandwidth plot, please refer to the following pages.

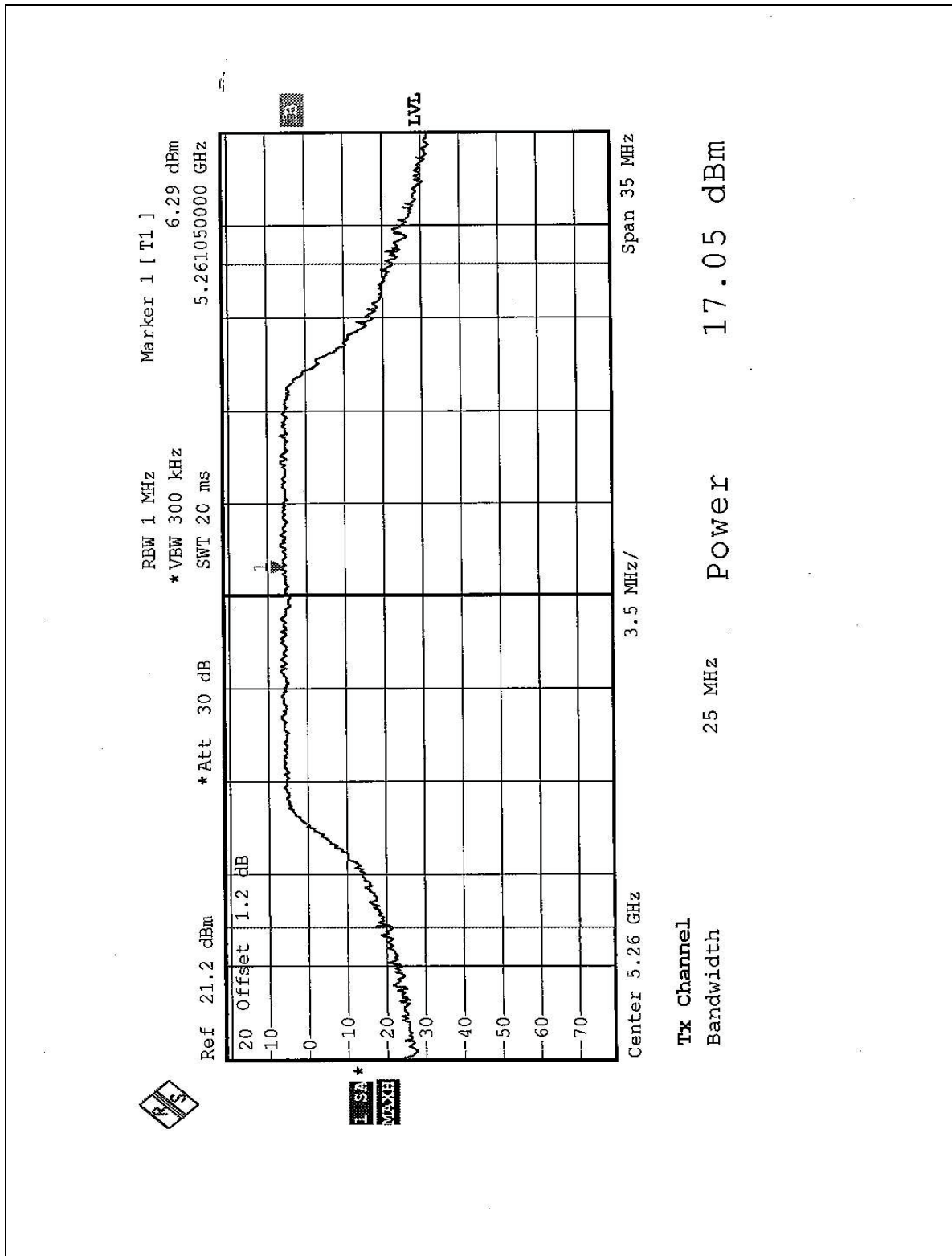
## CHANNEL 1



## CHANNEL 4

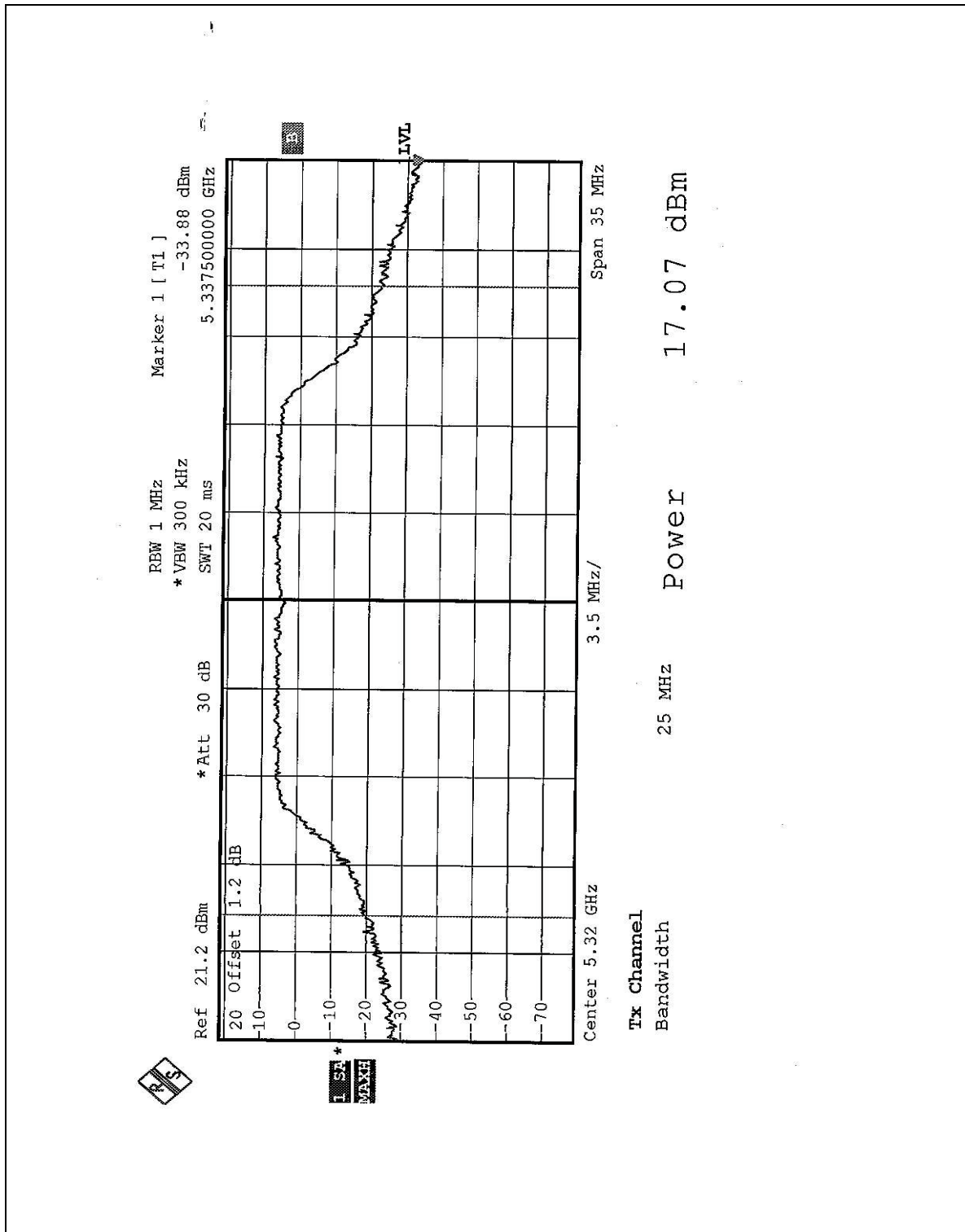


## CHANNEL 5

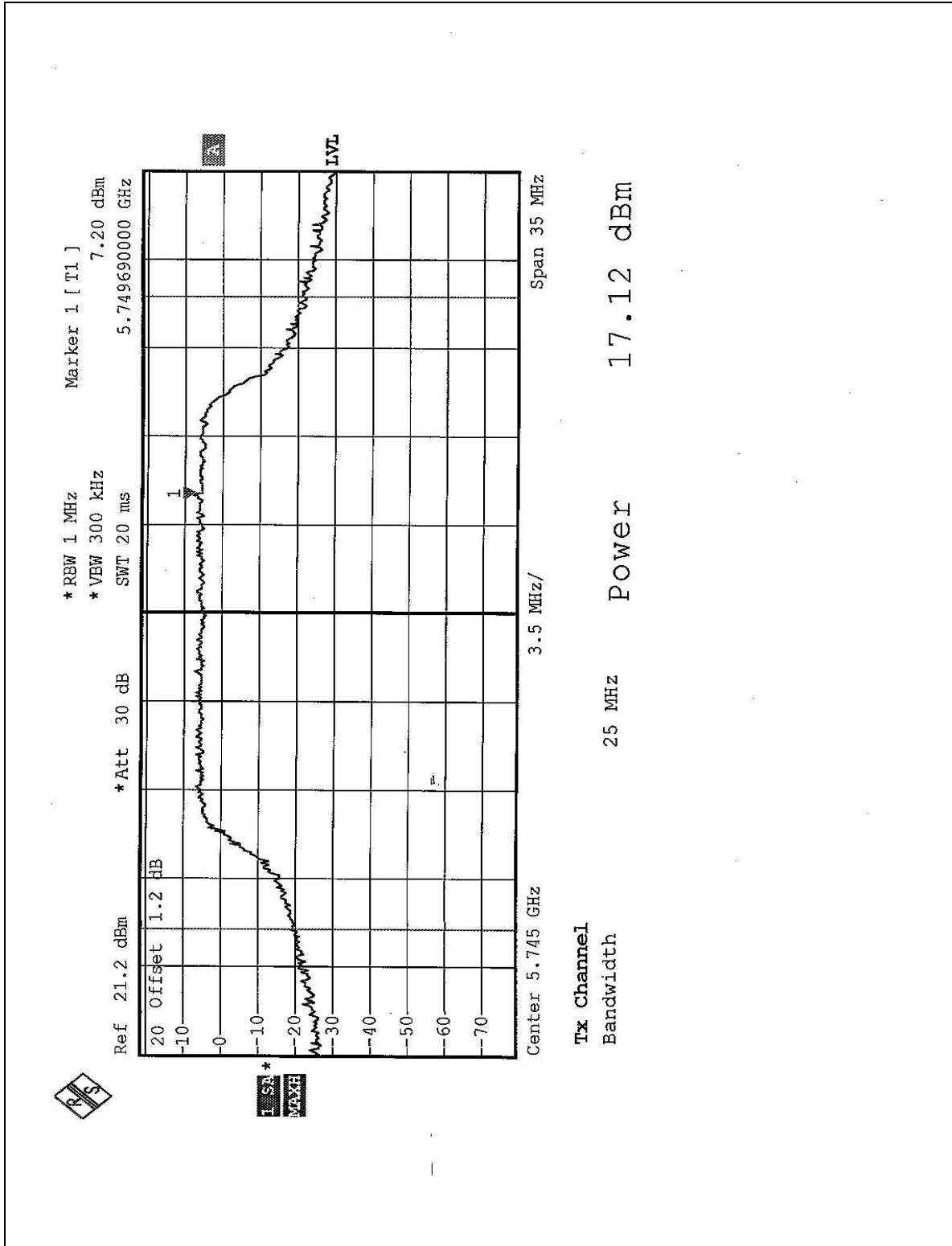




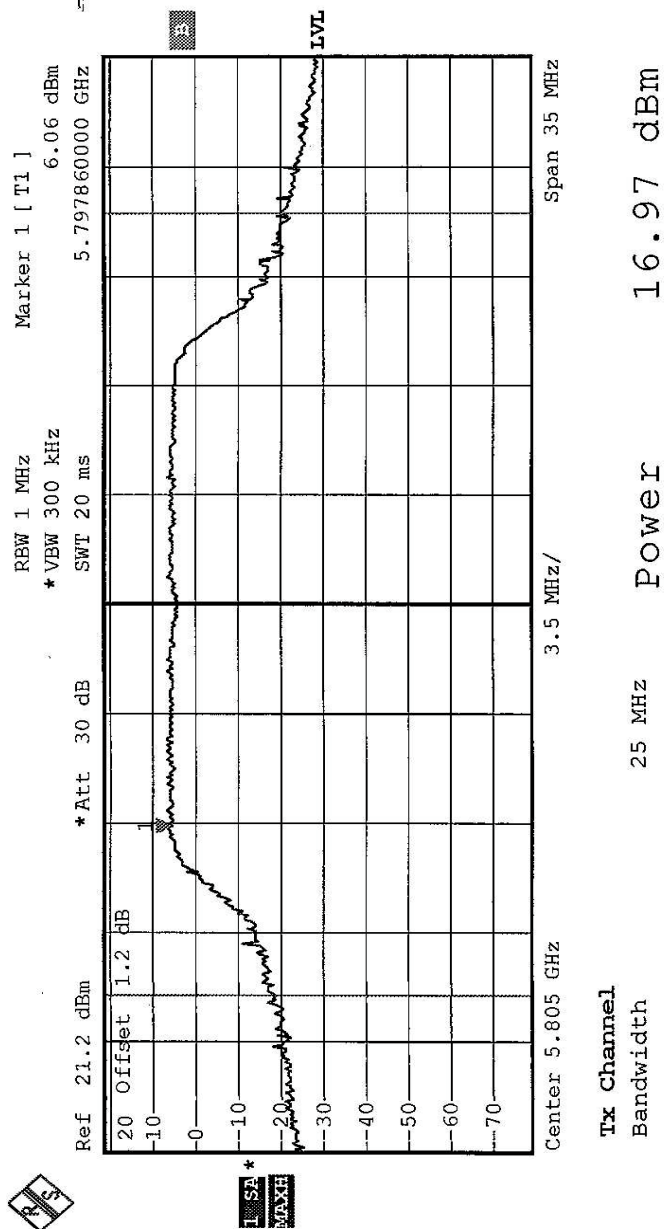
## CHANNEL 8



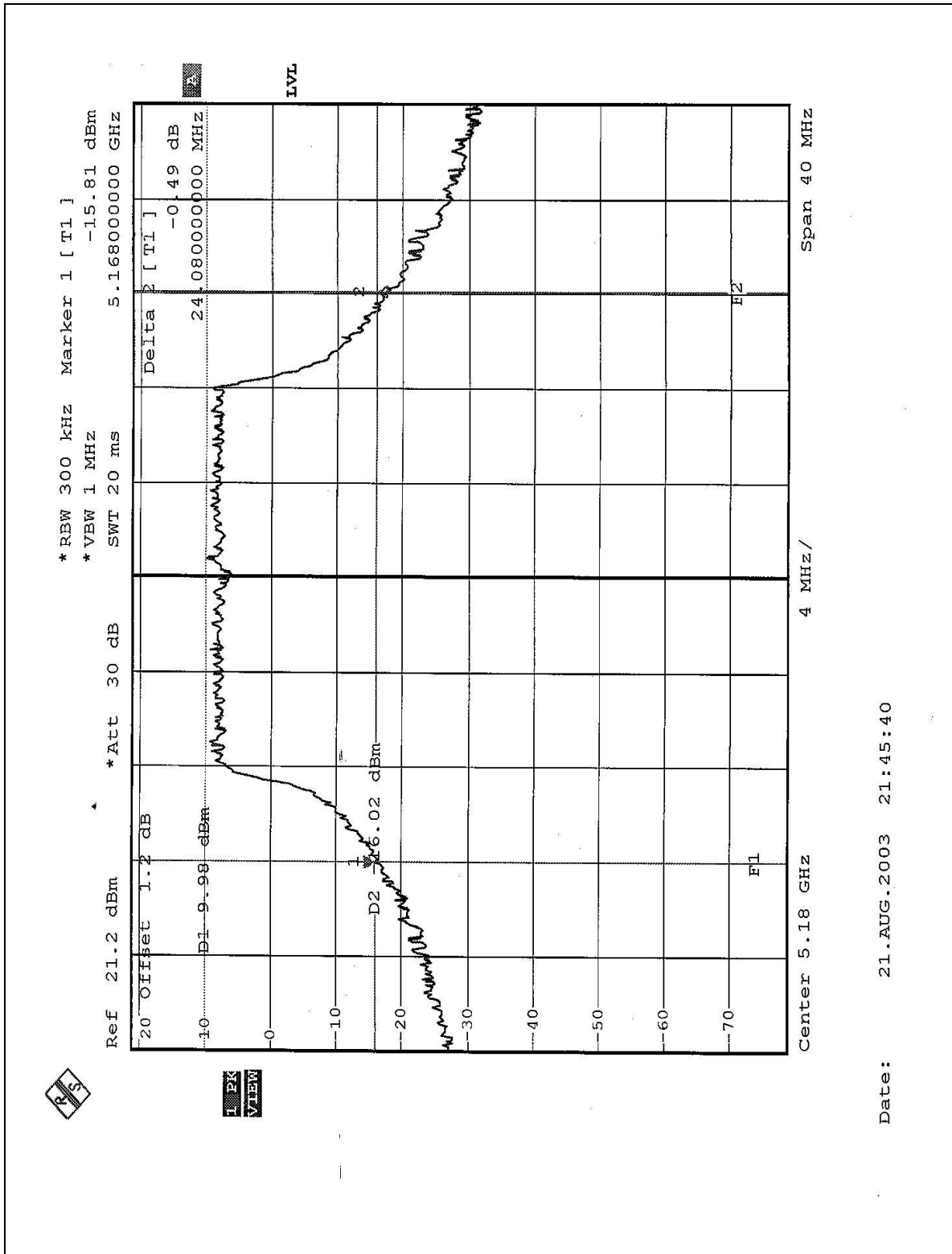
## CHANNEL 9



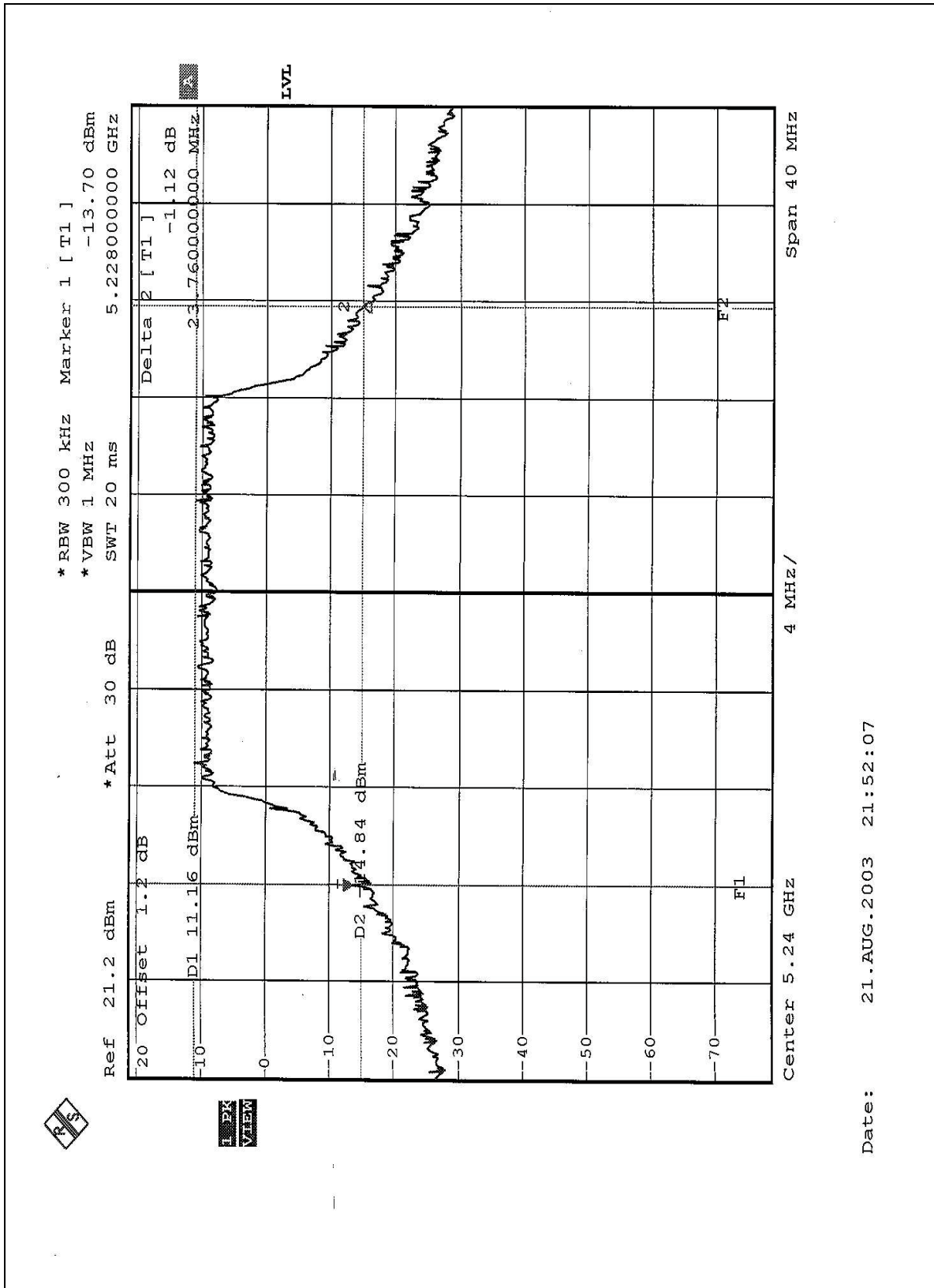
## CHANNEL 12



## CHANNEL 1



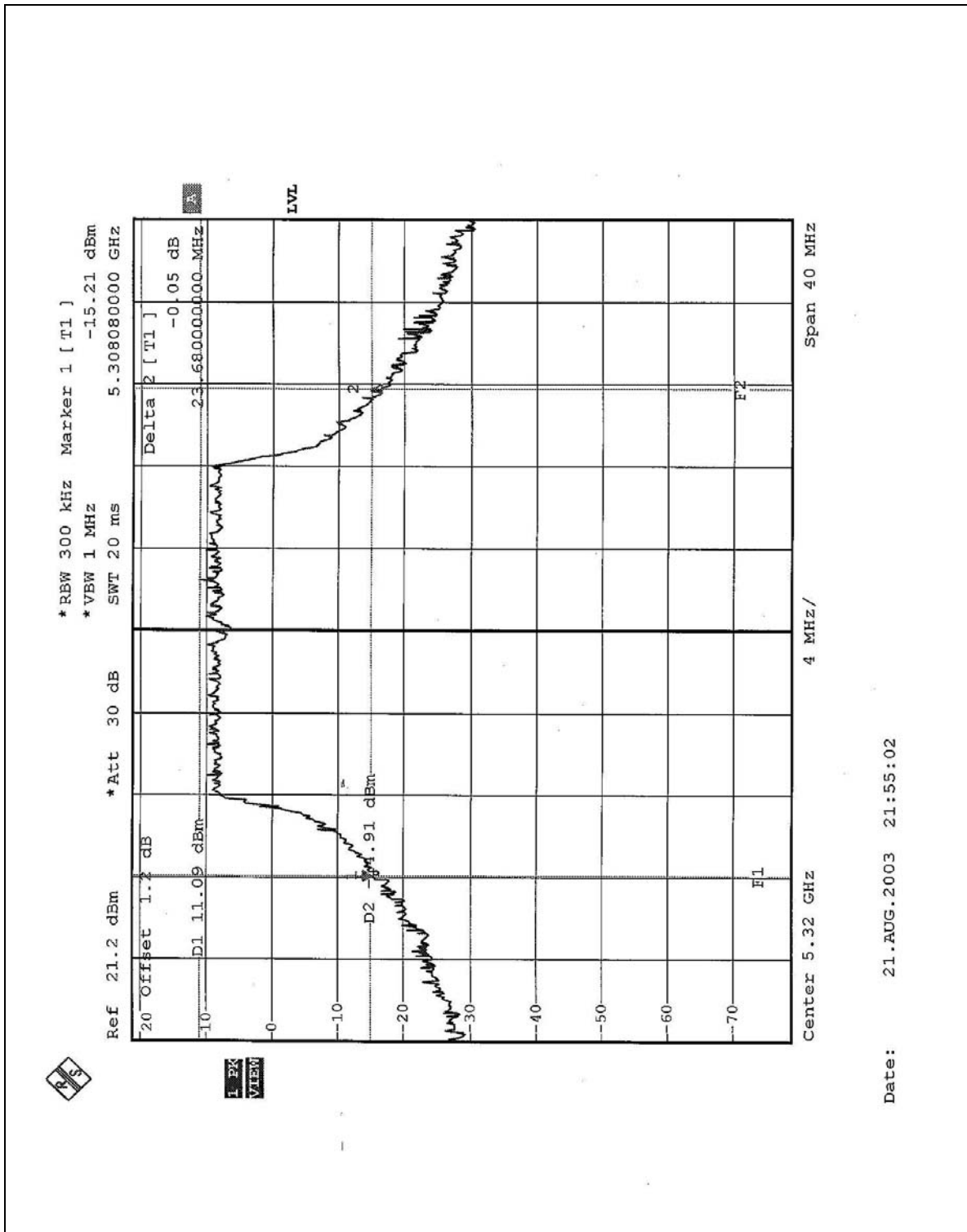
## CHANNEL 4



Date: 21.AUG.2003 21:52:07

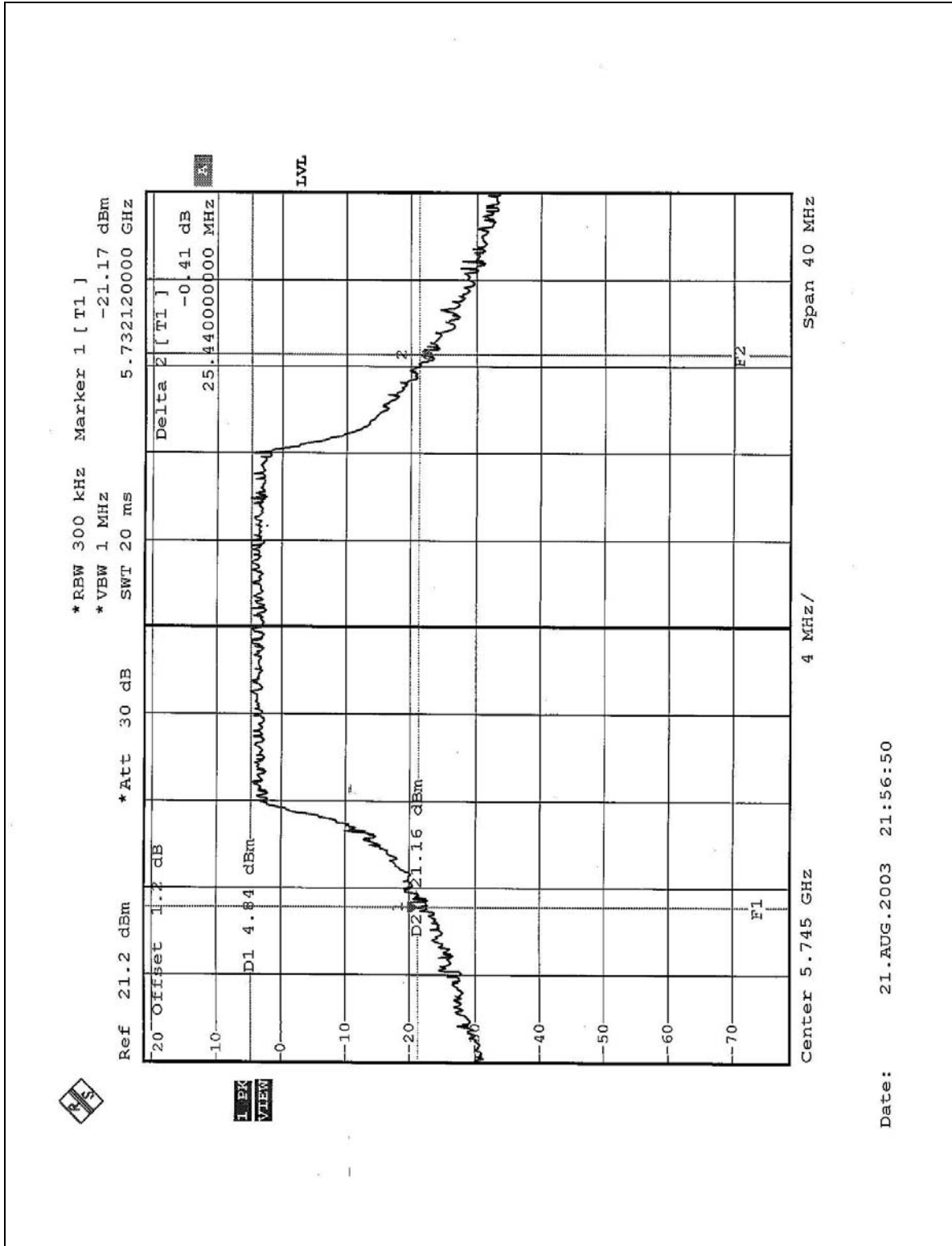
RBW 300 kHz Marker 1 [T1]  
 -14.52 dBm  
 \*VBW 1 MHz  
 SWT 20 ms  
 \*Att 30 dB  
 Ref 21.2 dBm  
 Offset 1.2 dB  
 D1 11.09 dBm  
 D2 11.91 dBm  
 Delta 2 [T1]  
 0.94 dB  
 5.26000000 MHz  
 LVL  
 Span 40 MHz  
 Center 5.26 GHz  
 4 MHz/

## CHANNEL 8



Date: 21.AUG.2003 21:55:02

## CHANNEL 9



Date: 21.AUG.2003 21:56:50



\*RBW 300 kHz Marker 1 [T1]  
 \*VBW 1 MHz -19.13 dBm  
 \*Att 30 dB  
 \*SWT 20 ms  
 5.791800000 GHz

Ref 21.2 dBm  
 20 Offset 1.2 dB  
 D1 6.55 dBm  
 D2 19.45 dBm  
 F1  
 F2

Center 5.805 GHz  
 4 MHz/  
 Span 40 MHz

LVL  
 A

#### 4.4 PEAK POWER EXCURSION MEASUREMENT

##### 4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	13dB
5.25 – 5.35 GHz	13dB
5.725 – 5.825 GHz	13dB

##### 4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE&SCHWARZ SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

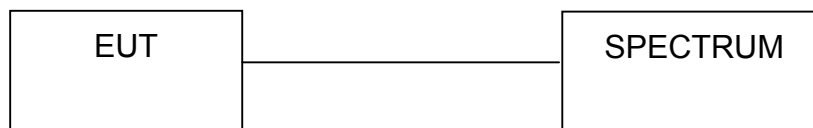
#### 4.4.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum bandwidth span to view the entire spectrum.
3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300KHz).
4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

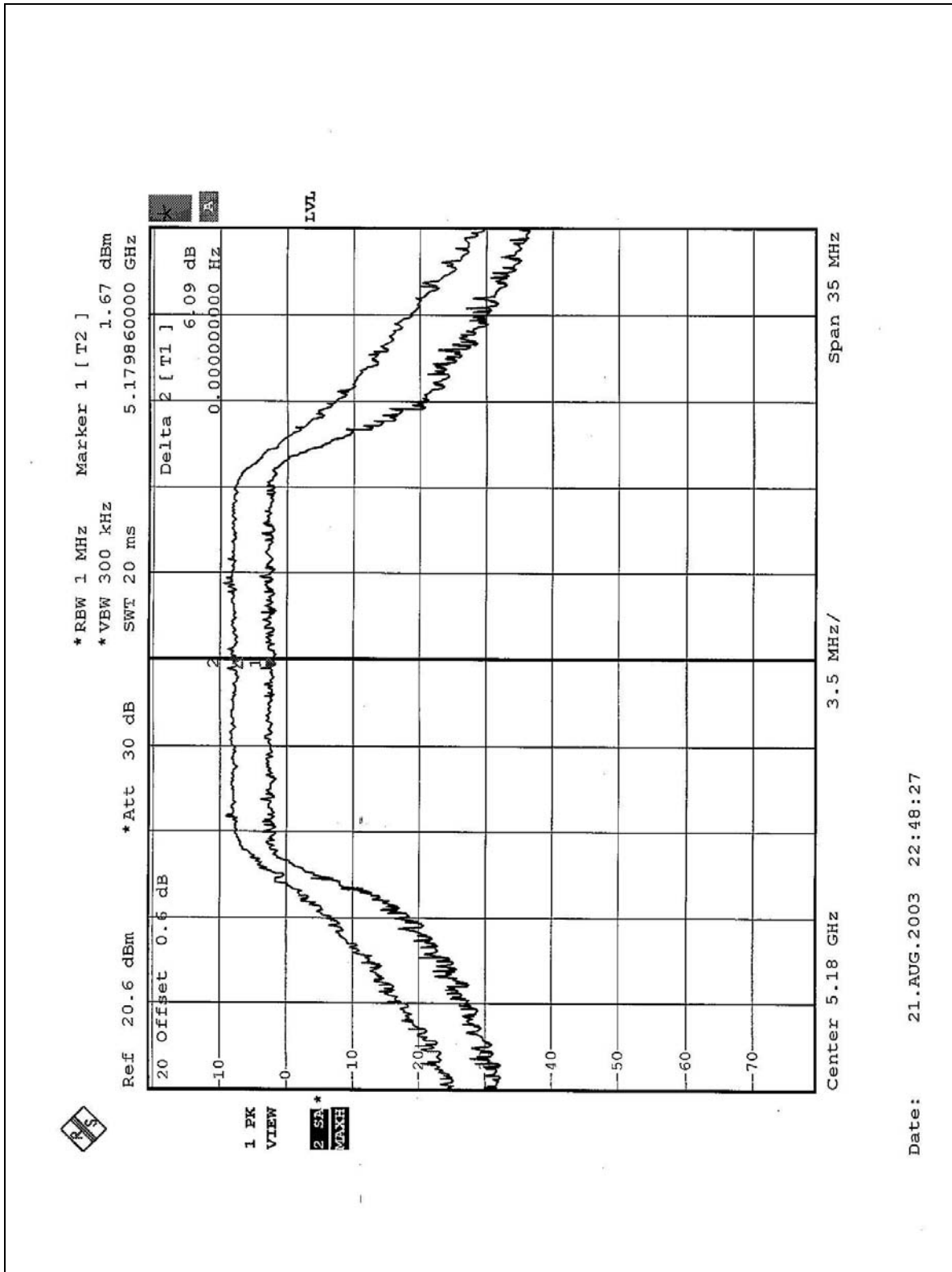


## 4.4.7 TEST RESULTS

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 64%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Cody Chang		

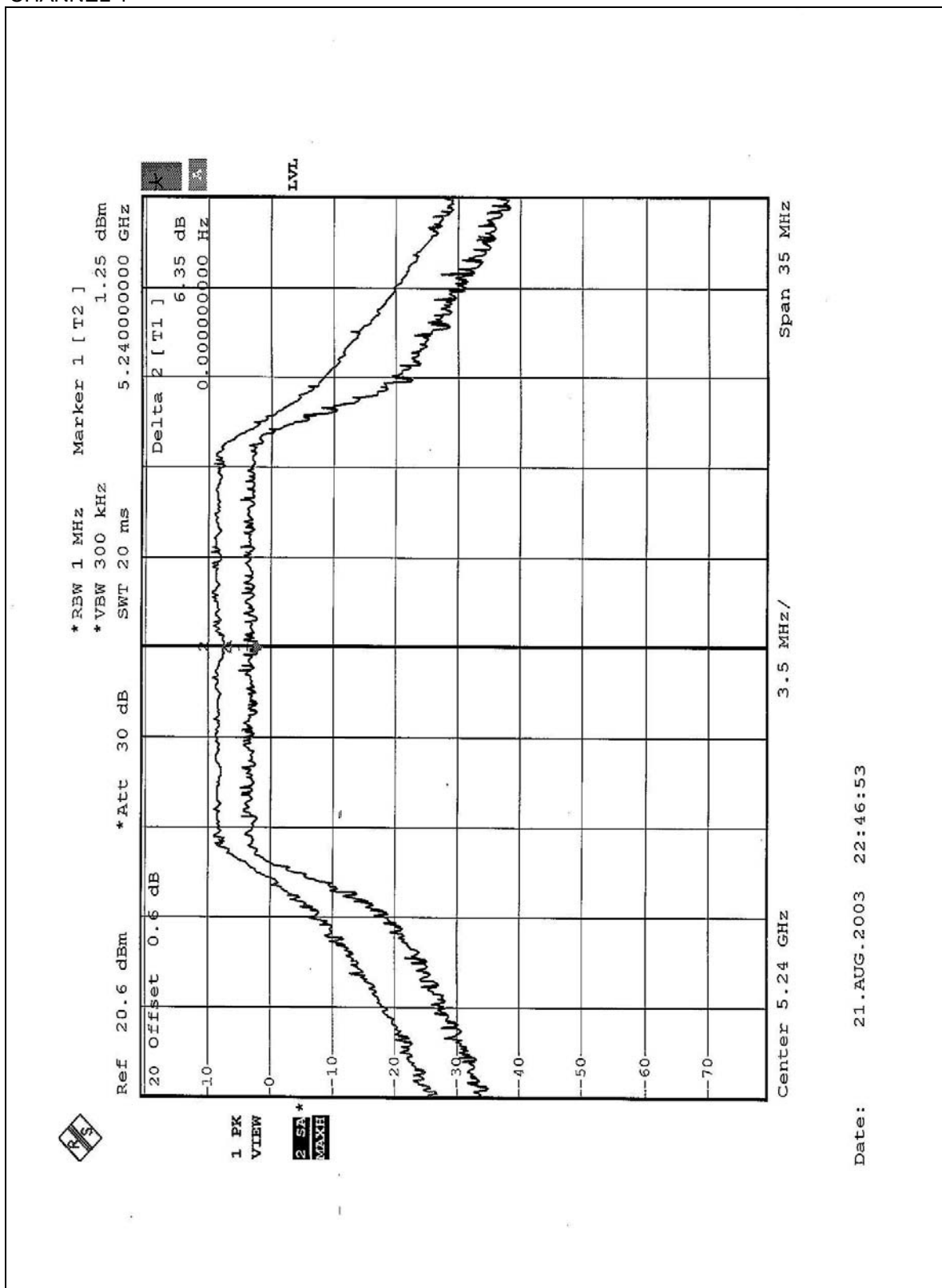
<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER EXCURSION (dB)</b>	<b>PEAK to AVERAGE EXCURSION LIMIT (dB)</b>	<b>PASS/FAIL</b>
1	5180	6.09	13	PASS
4	5240	6.35	13	PASS
5	5260	6.16	13	PASS
8	5320	5.39	13	PASS
9	5745	6.19	13	PASS
12	5805	5.01	13	PASS

## CHANNEL 1



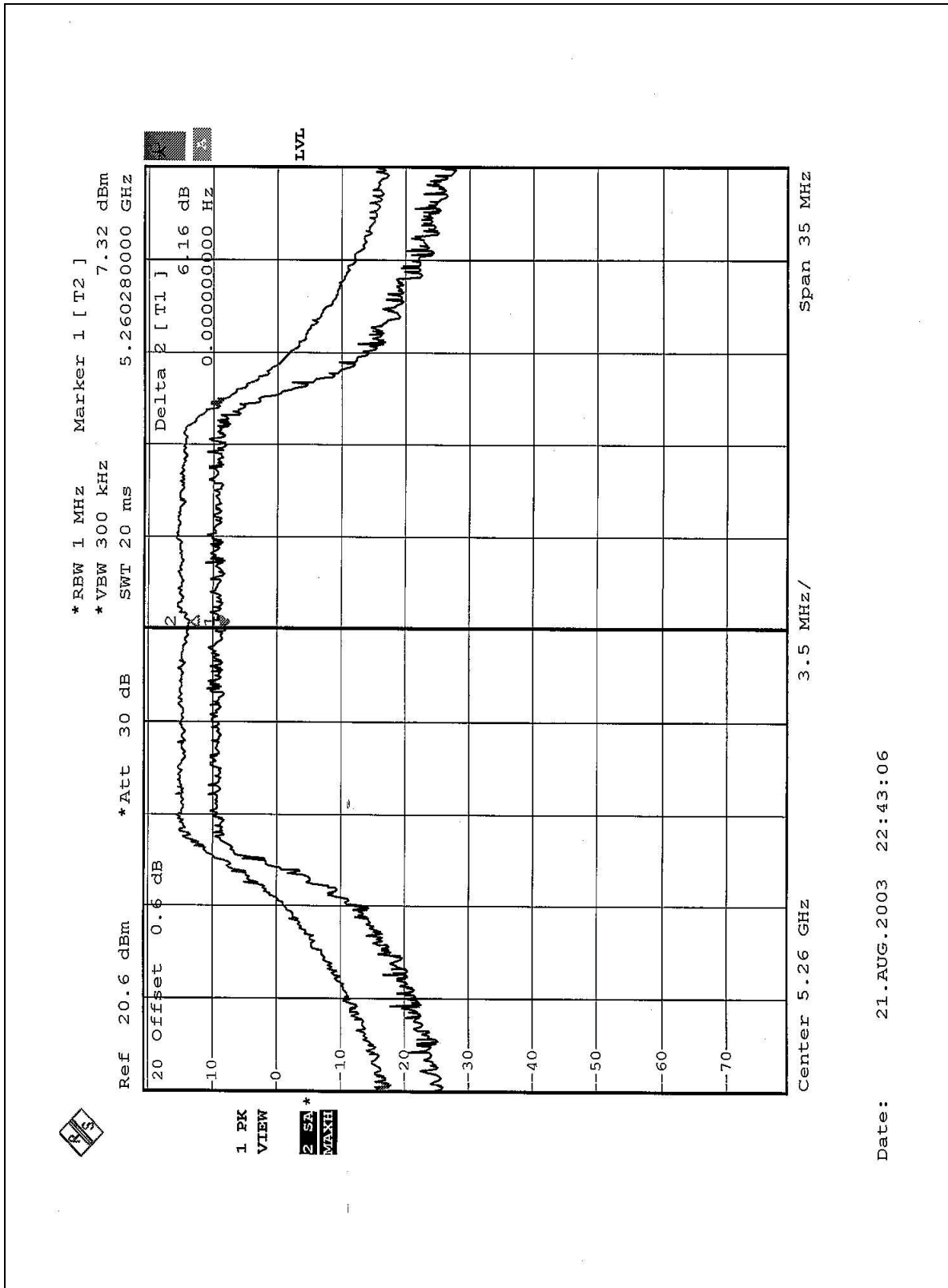
Date: 21.AUG.2003 22:48:27

## CHANNEL 4

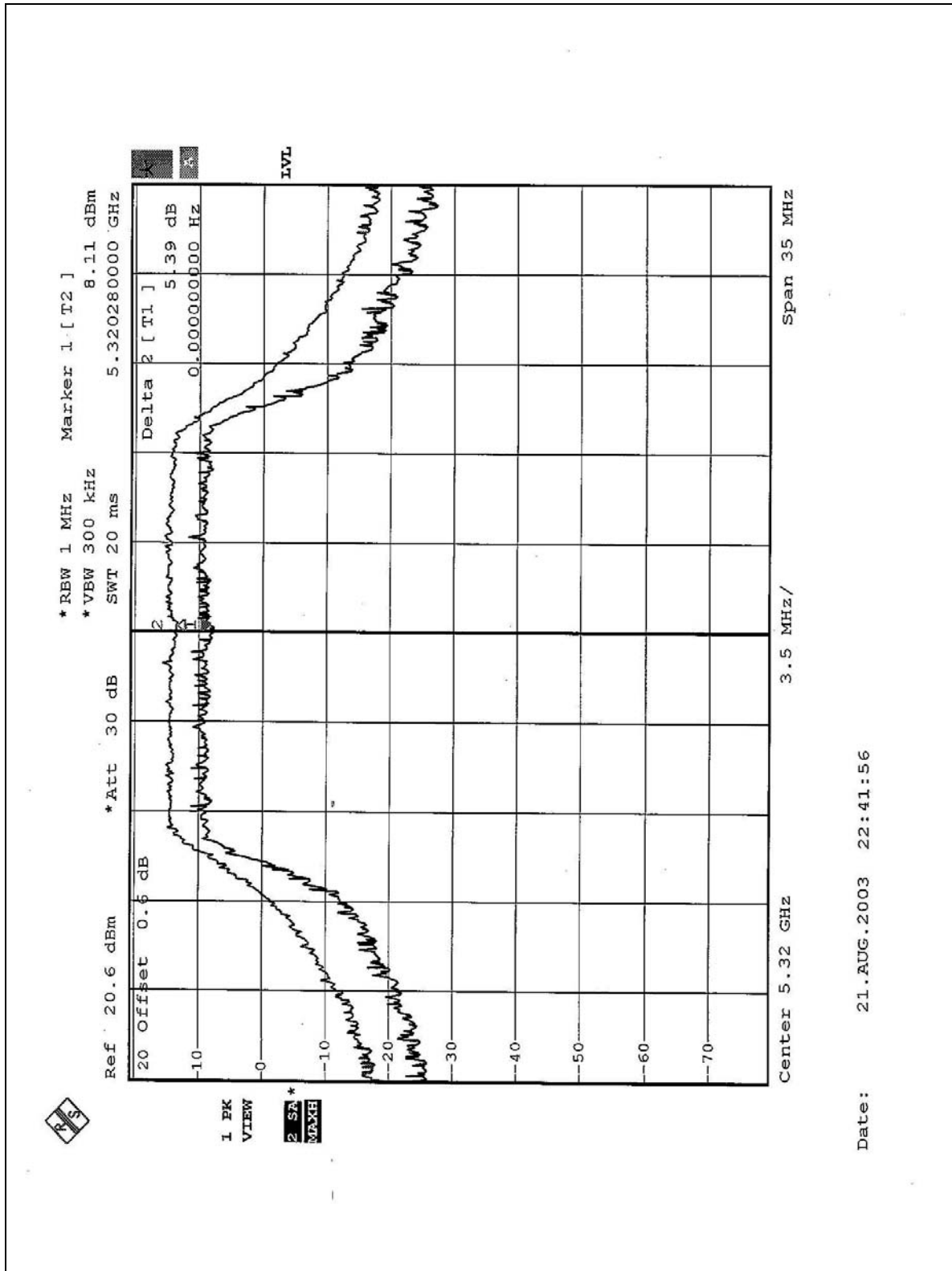


Date: 21.AUG.2003 22:46:53

## CHANNEL 5



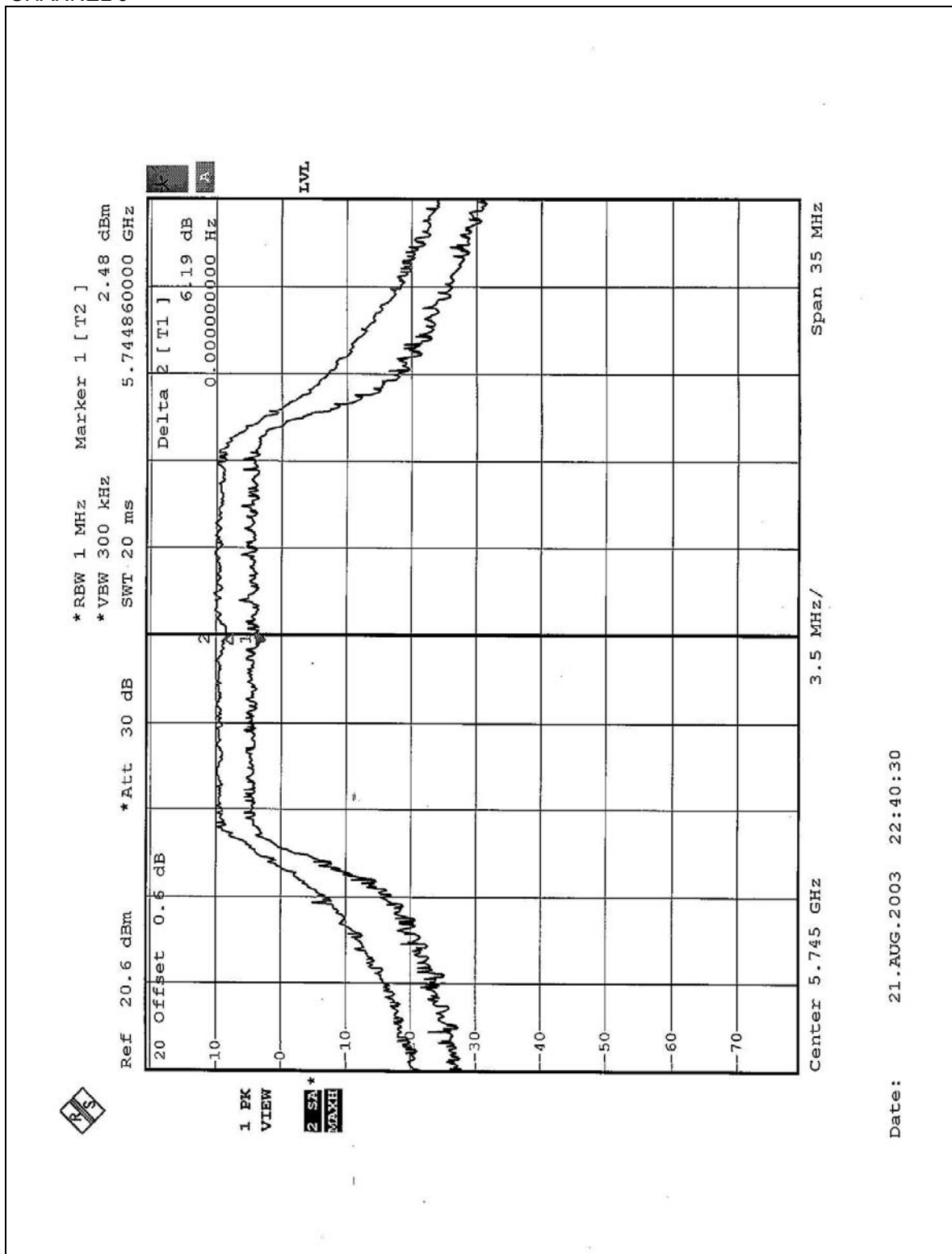
## CHANNEL 8



Date: 21.AUG.2003 22:41:56

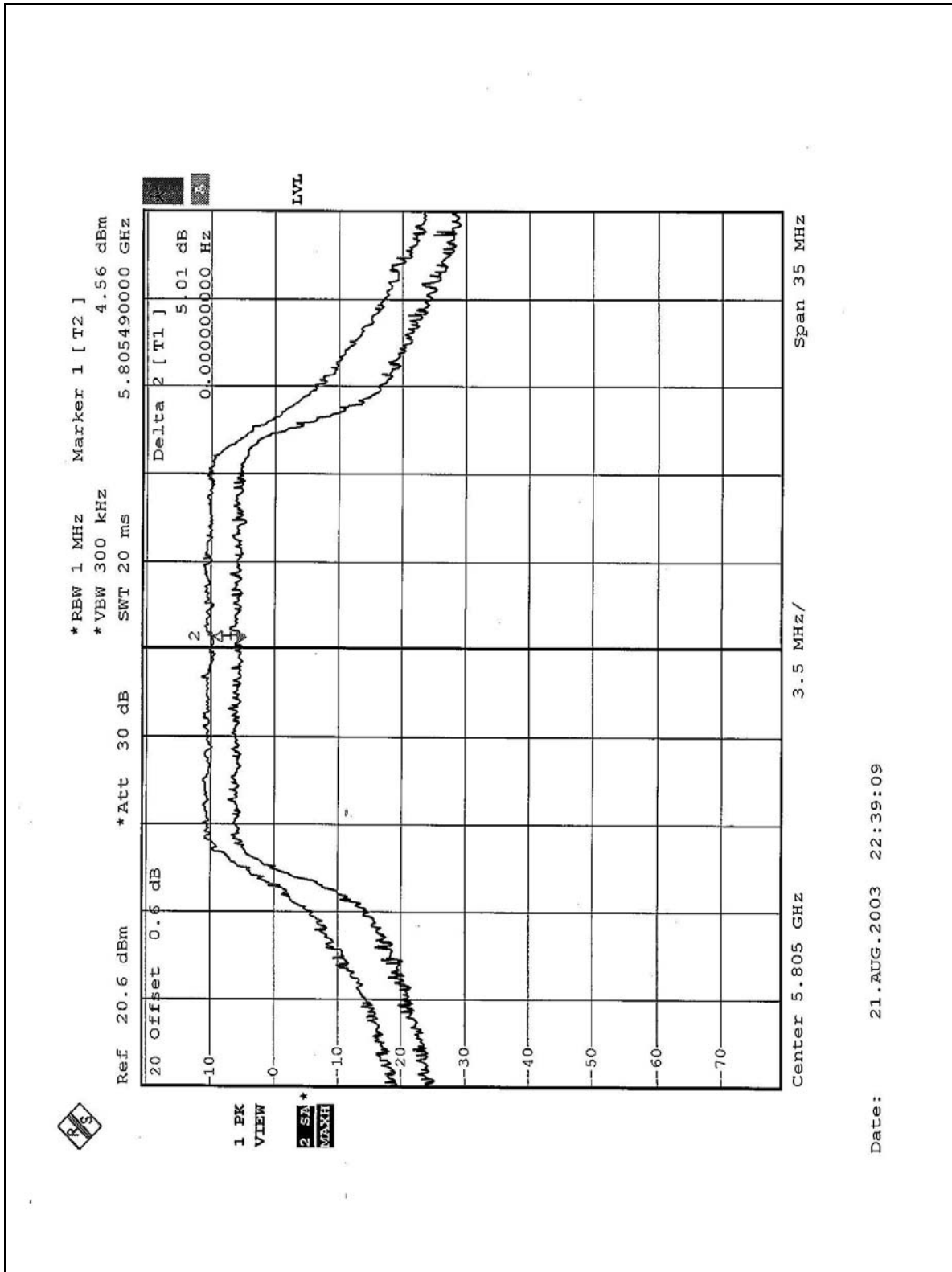


## CHANNEL 9



Date: 21.AUG.2003 22:40:30

## CHANNEL 12



Date: 21.AUG.2003 22:39:09

## 4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	4dBm
5.25 – 5.35 GHz	11dBm
5.725 – 5.825 GHz	17dBm

### 4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE&SCHWARZ SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

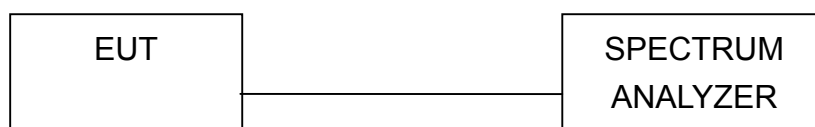
#### 4.5.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITIONS

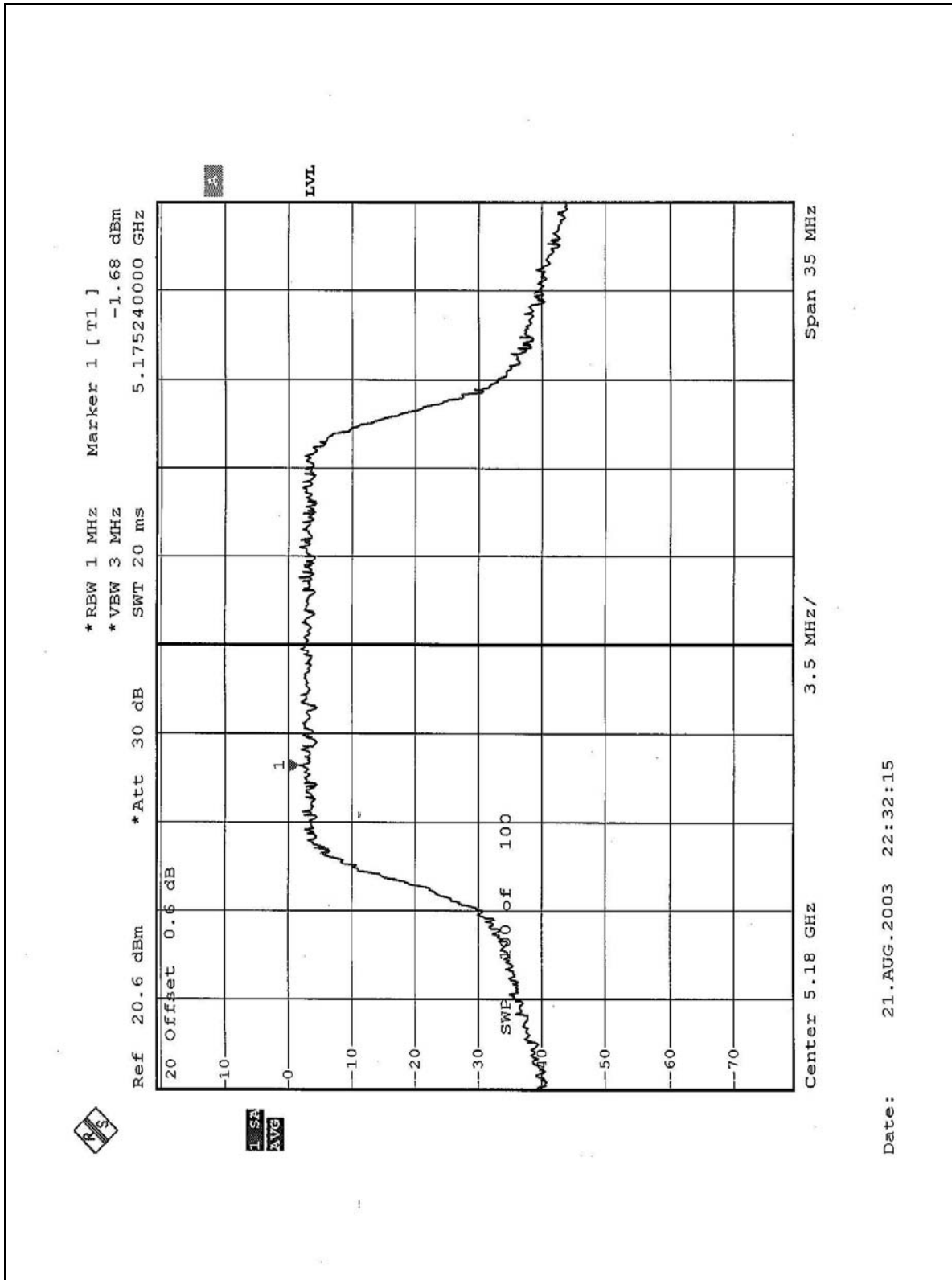
Same as 5.3.6

## 4.5.7 TEST RESULTS

<b>EUT</b>	Tri-Mode Dualband Wireless Router	<b>MODEL</b>	DI-774
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 64%RH, 991 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Cody Chang		

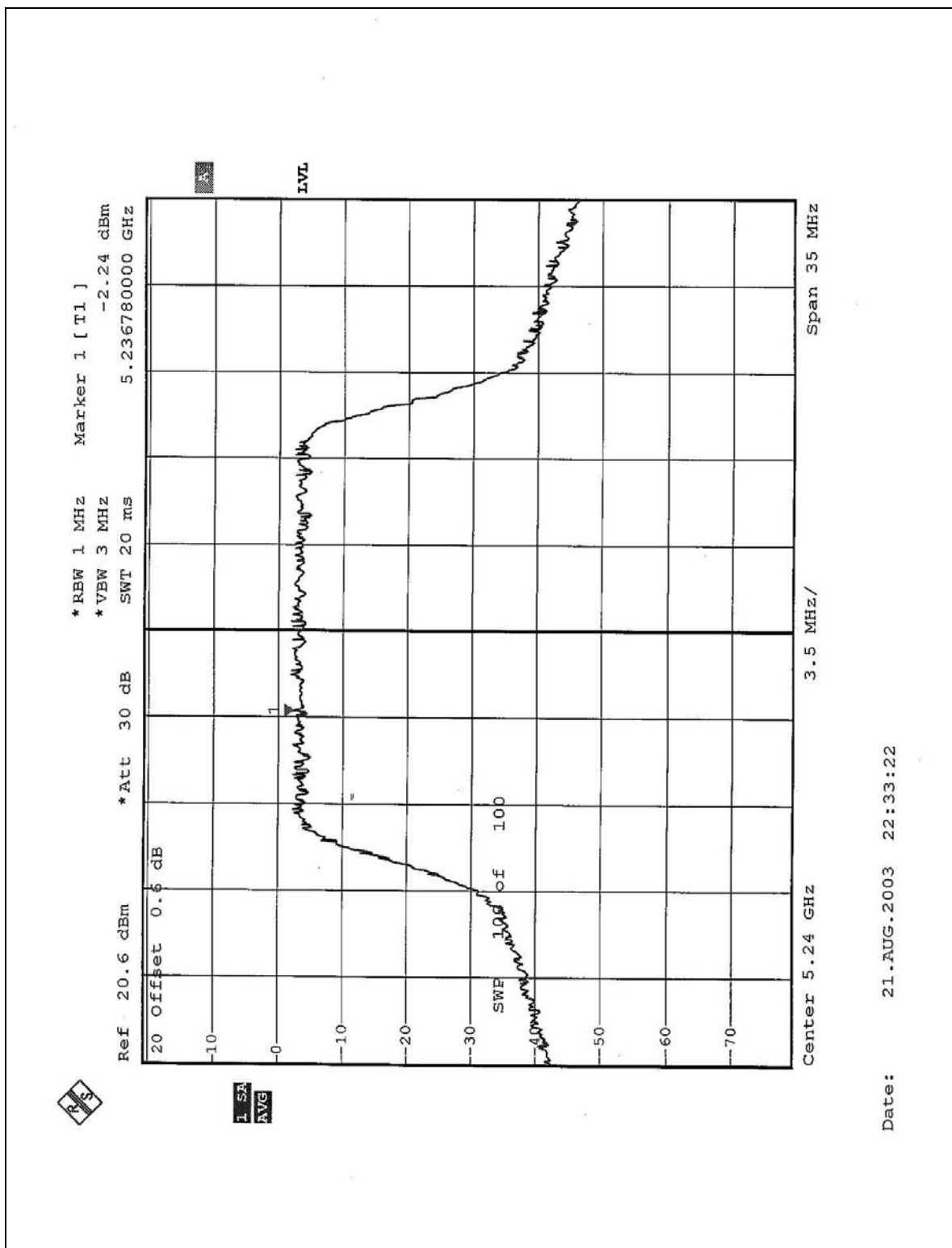
<b>CHANNEL NUMBER</b>	<b>CHANNEL FREQUENCY (MHz )</b>	<b>RF POWER LEVEL IN 1 MHz BW (dBm)</b>	<b>MAXIMUM LIMIT (dBm)</b>	<b>PASS/FAIL</b>
1	5180	-1.68	4	PASS
4	5240	-2.24	4	PASS
5	5260	3.83	11	PASS
8	5320	3.40	11	PASS
9	5745	-1.16	17	PASS
12	5805	-0.36	17	PASS

## CHANNEL 1

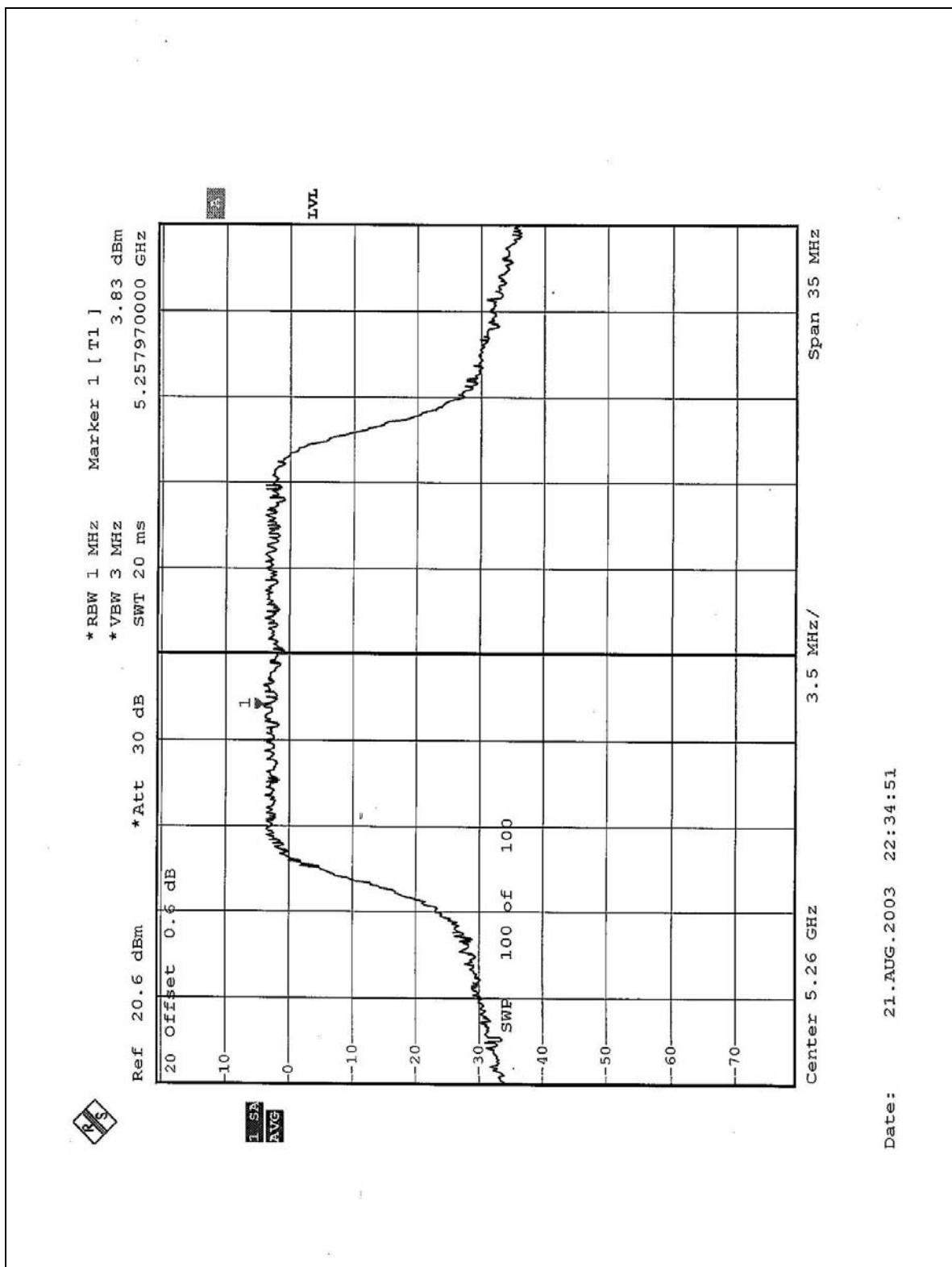


Date: 21.AUG.2003 22:32:15

## CHANNEL 4

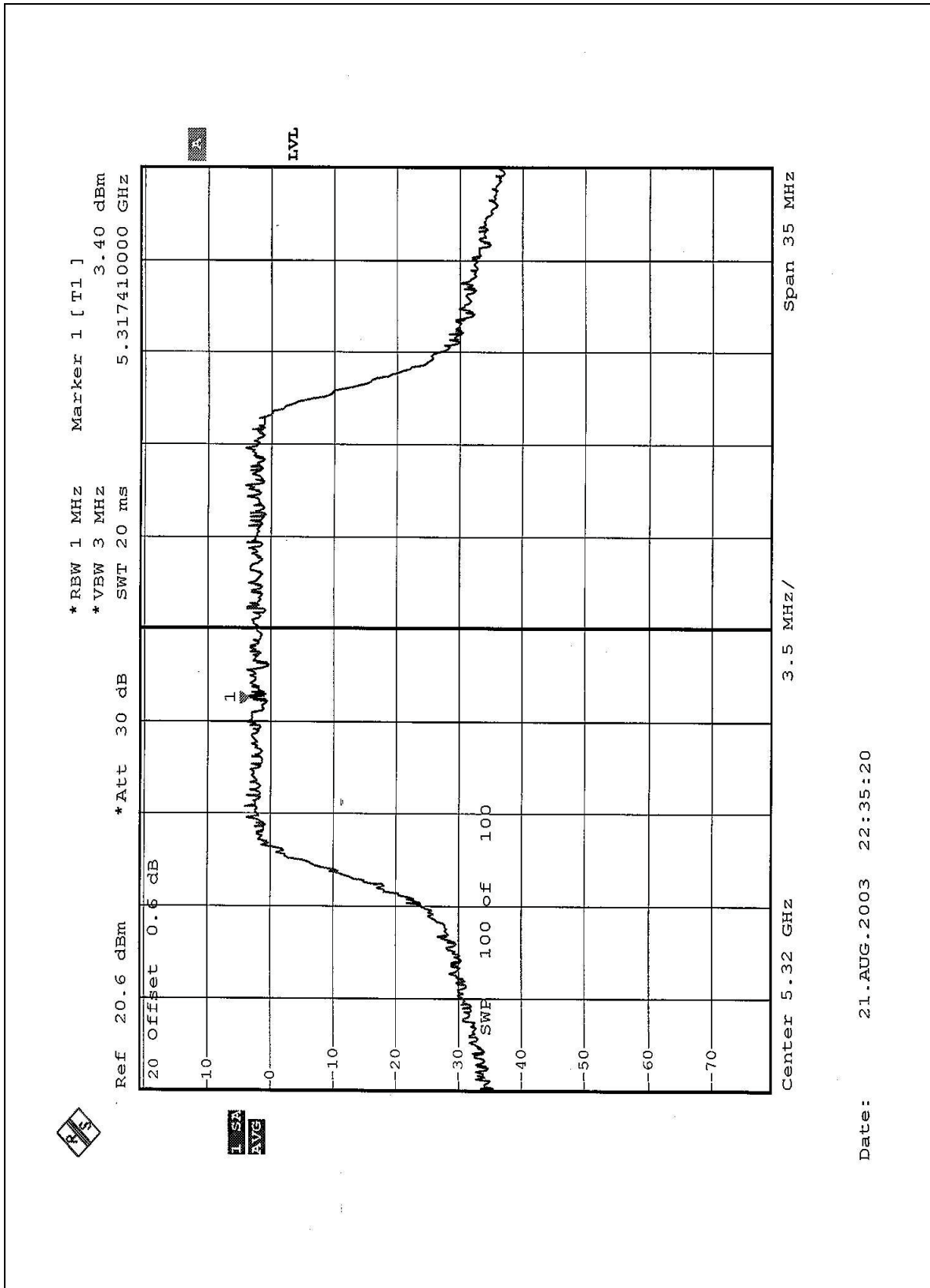


## CHANNEL 5



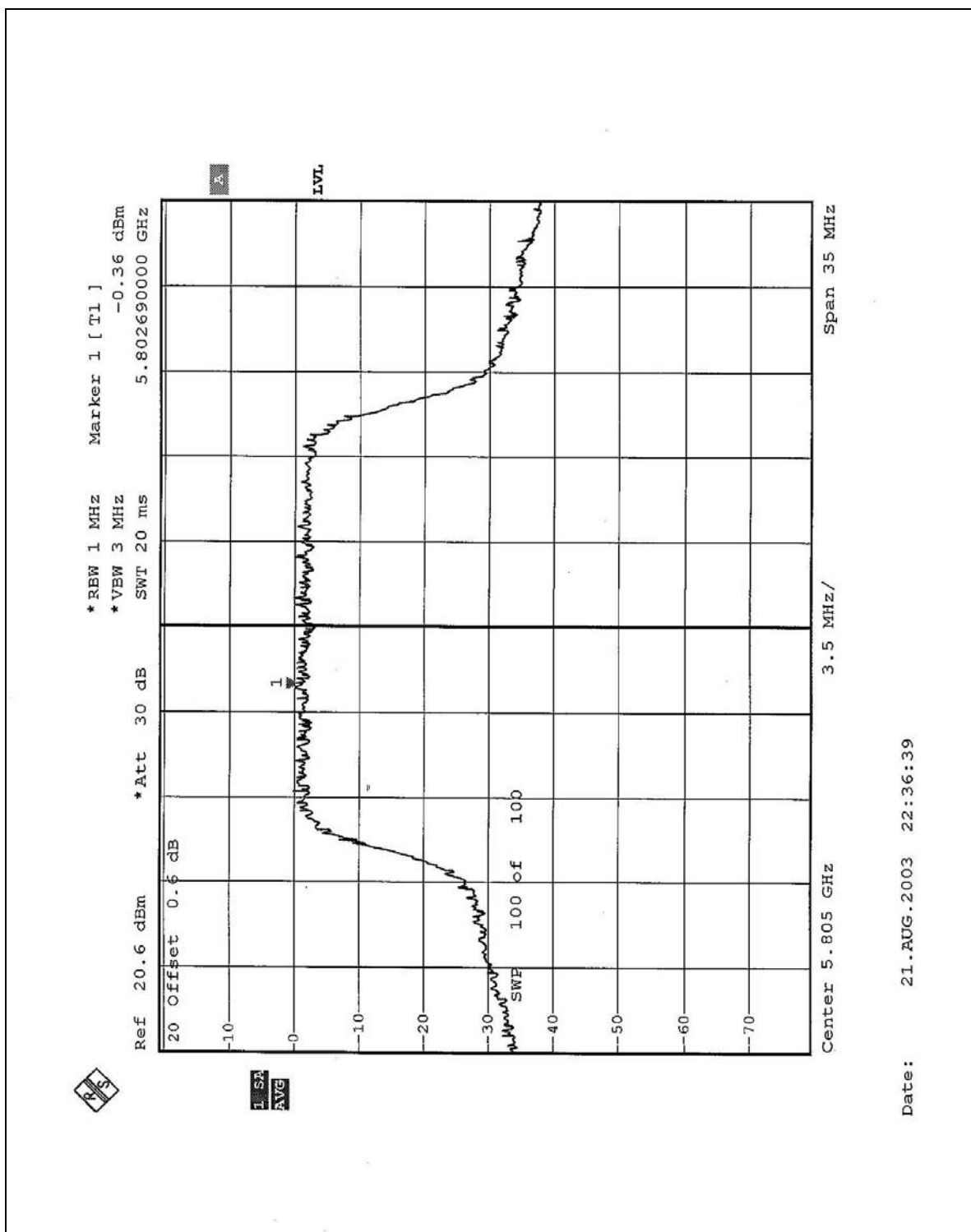


## CHANNEL 8



\*RBW 1 MHz  
 \*VBW 3 MHz  
 \*Att 30 dB  
 \*Marker 1 [T1]  
 -1.16 dBm  
 5.73898000 GHz  
 Ref 20.6 dBm  
 20 Offset 0.5 dB  
 1 SA  
 AVG  
 Center 5.745 GHz  
 Span 35 MHz  
 3.5 MHz/

## CHANNEL 12



## 4.6 FREQUENCY STABILITY

### 4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

### 4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ANRITSU SPECTRUM ANALYZER	MS2667C	M10281	Apr. 10, 2004
WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER	TH-4S-C	W901030	Jul. 17, 2004

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

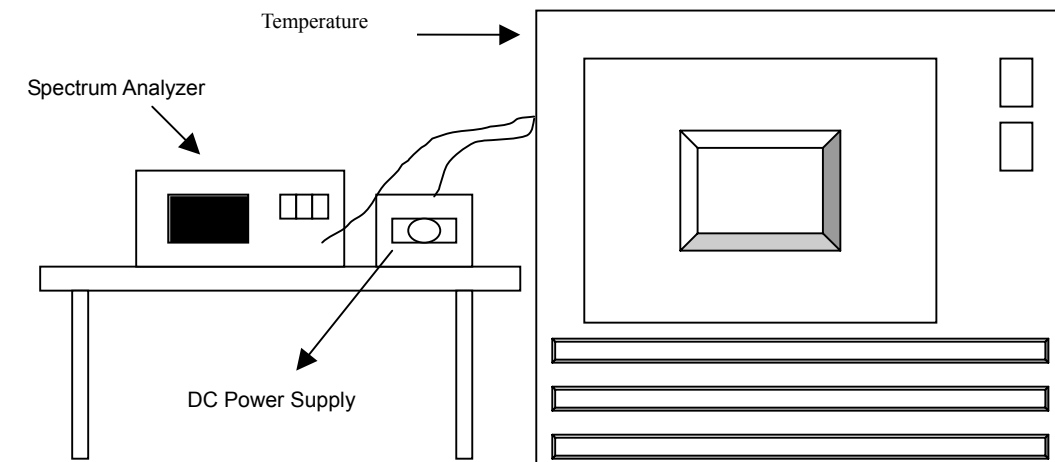
### 4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 TEST SETUP



#### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.1.6

## 4.6.7 TEST RESULTS

Operating frequency: 5320MHz				Limit : $\pm 0.02\%$			
Temp. (°C)	Power supply (VDC)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	93.5	5320.0275	0.0005169	5320.0280	0.0005259	5320.0281	0.0005282
	110	5320.0275	0.0005169	5320.0283	0.0005312	5320.0283	0.0005323
	126.5	5320.0277	0.0005199	5320.0281	0.0005278	5320.0287	0.0005387
40	93.5	5320.0083	0.0001568	5320.0087	0.0001643	5320.0088	0.0001650
	110	5320.0087	0.0001635	5320.0089	0.0001665	5320.0090	0.0001688
	126.5	5320.0088	0.0001658	5320.0088	0.0001658	5320.0091	0.0001718
30	93.5	5320.0045	0.0000838	5320.0039	0.0000726	5320.0043	0.0000801
	110	5320.0039	0.0000741	5320.0039	0.0000741	5320.0041	0.0000771
	126.5	5320.0039	0.0000733	5320.0043	0.0000801	5320.0041	0.0000763
20	93.5	5320.0083	0.0001560	5320.0073	0.0001380	5320.0071	0.0001327
	110	5320.0079	0.0001477	5320.0076	0.0001436	5320.0065	0.0001229
	126.5	5320.0065	0.0001214	5320.0070	0.0001312	5320.0068	0.0001274
10	93.5	5320.0143	0.0002684	5320.0141	0.0002643	5320.0127	0.0002387
	110	5320.0142	0.0002662	5320.1308	0.0024586	5320.1332	0.0025038
	126.5	5320.0141	0.0002643	5320.1268	0.0023835	5320.0132	0.0002474
0	93.5	5320.0291	0.0005474	5320.0282	0.0005305	5320.0277	0.0005211
	110	5320.0289	0.0005436	5320.0275	0.0005173	5320.0281	0.0005286
	126.5	5320.0287	0.0005398	5320.0276	0.0005192	5320.0292	0.0005489
-10	93.5	5320.0424	0.0007974	5320.0425	0.0007992	5320.0422	0.0007936
	110	5320.0427	0.0008030	5320.0424	0.0007974	5320.0425	0.0007992
	126.5	5320.4252	0.0079925	5320.0423	0.0007955	5320.0426	0.0008011
-20	93.5	5320.0599	0.0011252	5320.0593	0.0011147	5320.0591	0.0011102
	110	5320.0596	0.0011203	5320.0589	0.0011079	5320.0596	0.0011199
	126.5	5320.0595	0.0011177	5320.0590	0.0011085	5320.0594	0.0011162
-30	93.5	5320.0820	0.0015414	5320.0860	0.0016165	5320.0800	0.0015038
	110	5320.0800	0.0015038	5320.0820	0.0015414	5320.0820	0.0015414
	126.5	5320.0800	0.0015038	5320.0800	0.0015038	5320.8600	0.0161654

## 4.7 BAND EDGES MEASUREMENT

### 4.7.1 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



#### 4.7.4 TEST RESULTS

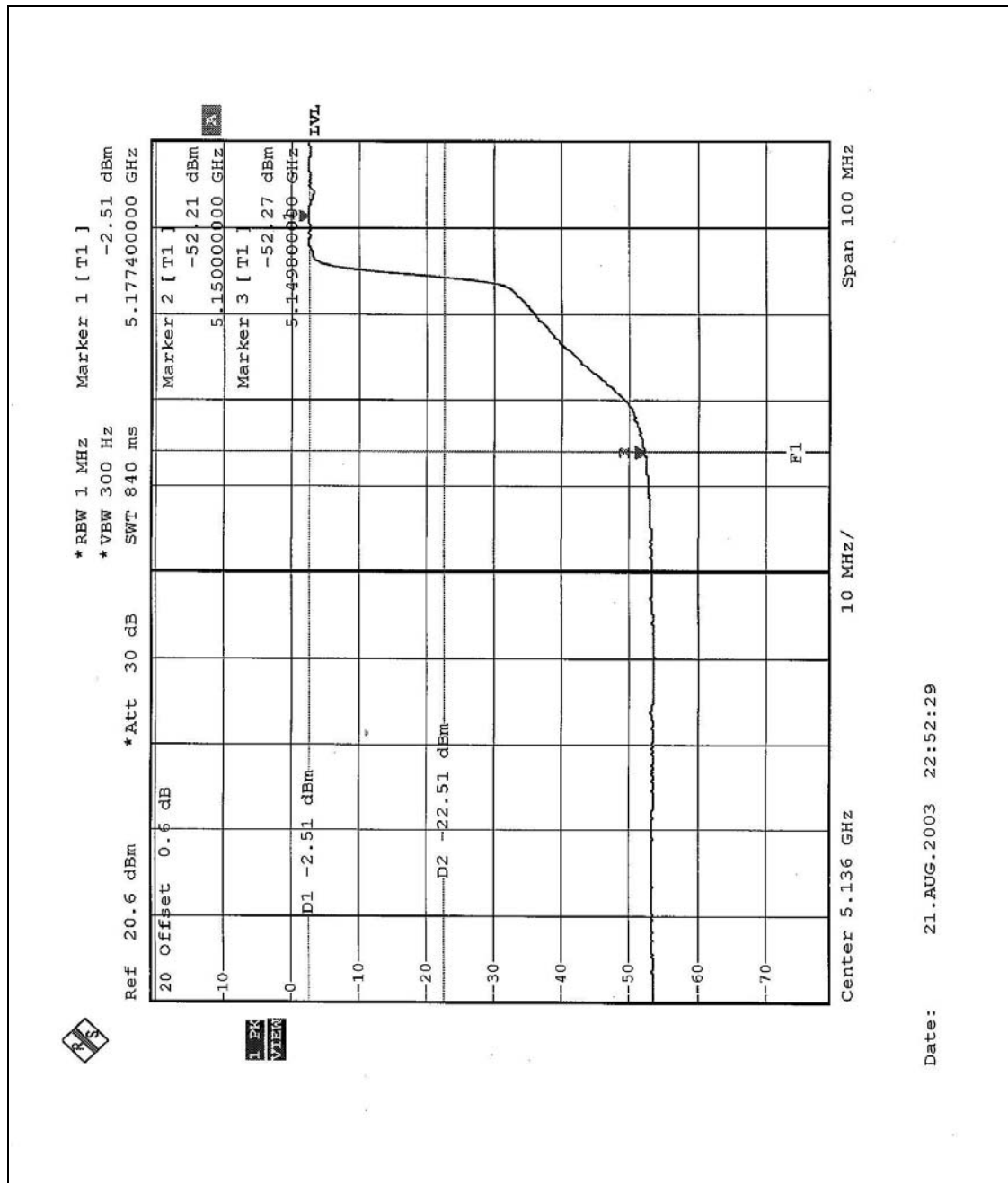
For signals in the restricted bands above and below the 5.15 to 5.35 GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak field strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

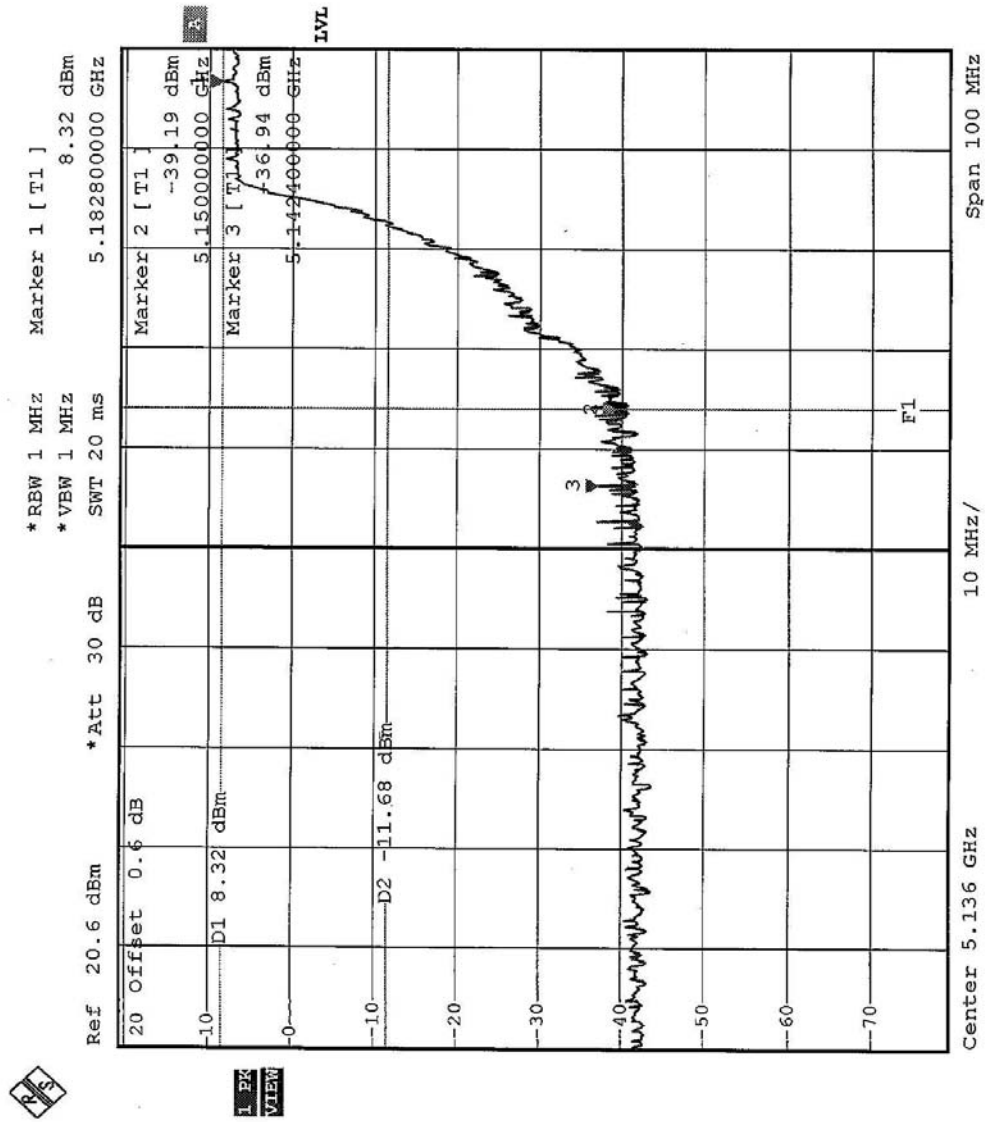
The spectrum plots (Peak RBW=VBW=1MHz; Average RBW=1MHz, VBW=300Hz) are attached on the following 8 pages.



## Channel 1 (5180 MHz)

The band edge emission plot of OFDM technique on the following page shows 49.70dB delta between carrier maximum power and local maximum emission in restrict band (5.1500GHz). The emission of carrier strength list in the test result of channel 1 at the item 5.2.8 (Page 78) is 94.1dBuV/m, so the maximum field strength in restrict band is  $94.1 - 49.7 = 44.40$  dBuV/m which is under 54dBuV/m limit.

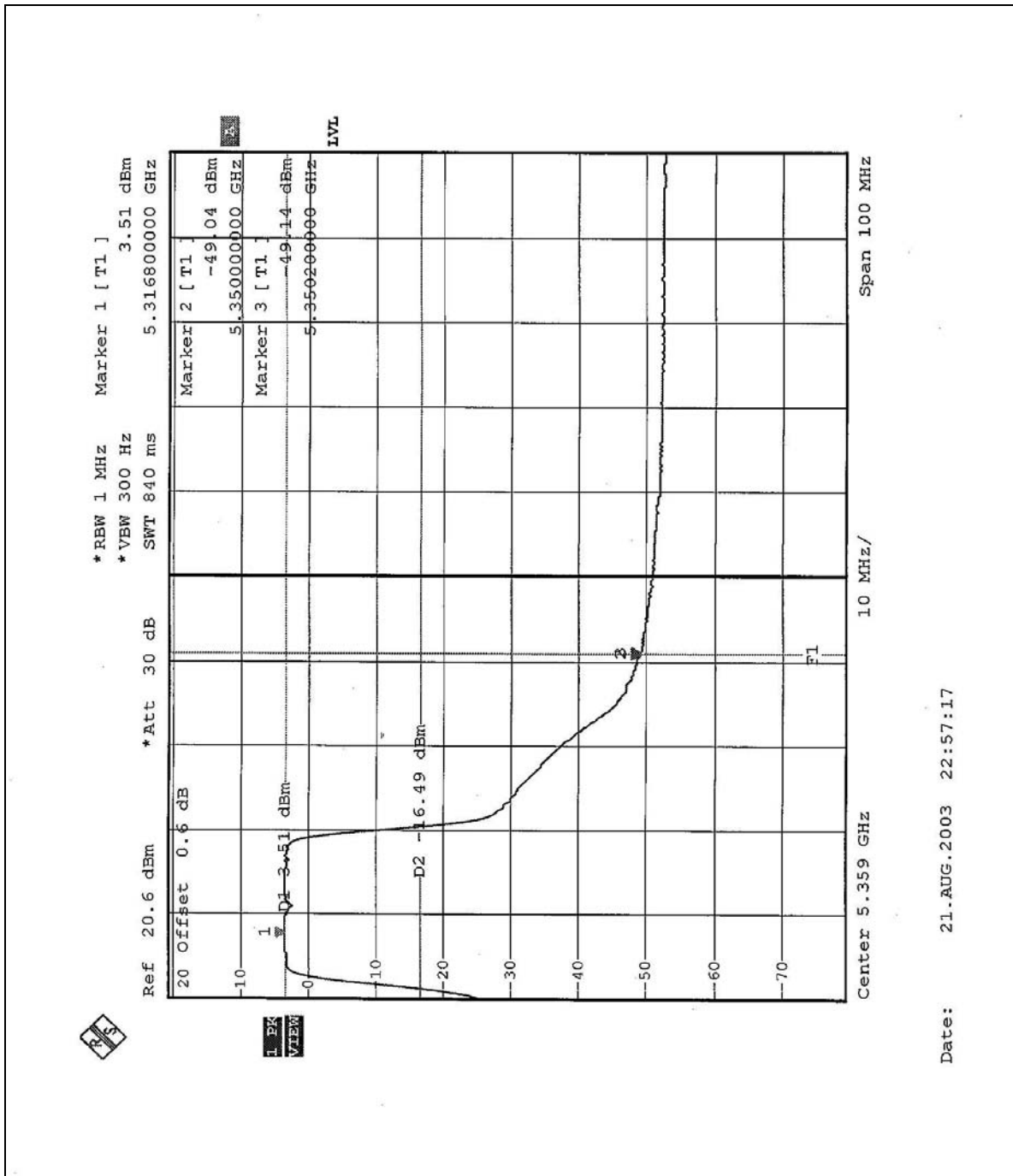


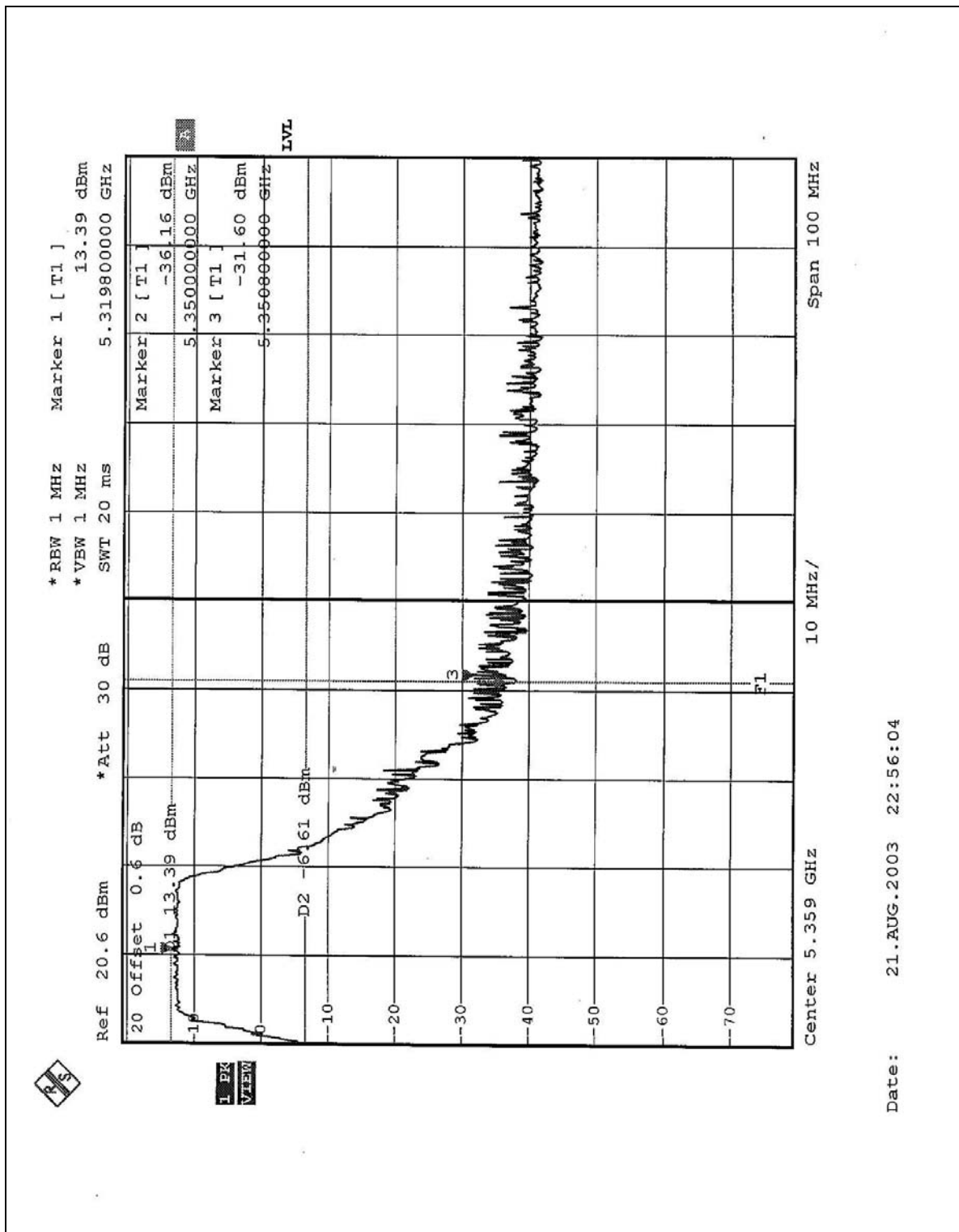


Date: 21.AUG.2003 22:51:52

## Channel 8 (5320 MHz)

The band edge emission plot of OFDM technique on the following page shows 52.55 dB delta between carrier maximum power and local maximum emission in restrict band (5.3500GHz). The emission of carrier strength list in the test result of channel 1 at the item 5.2.8 (Page 81) is 103.0BuV/m, so the maximum field strength in restrict band is  $103.0 - 52.55 = 50.45 \text{ dBuV/m}$  which is under 54dBuV/m limit.





Date: 21.AUG.2003 22:56:04



## **4.8 ANTENNA REQUIREMENT**

### **4.8.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.8.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is Dipole antenna without antenna connector. The maximum Gain of the antenna is 5dBi.

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST





## RADIATED EMISSION TEST





## 6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP, UL
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

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The address and road map of all our labs can be found in our web site also.