4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated On
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.

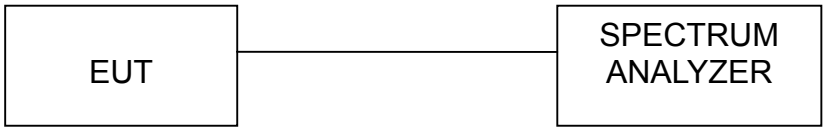
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



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

4.3.6 EUT OPERATING CONDITIONS

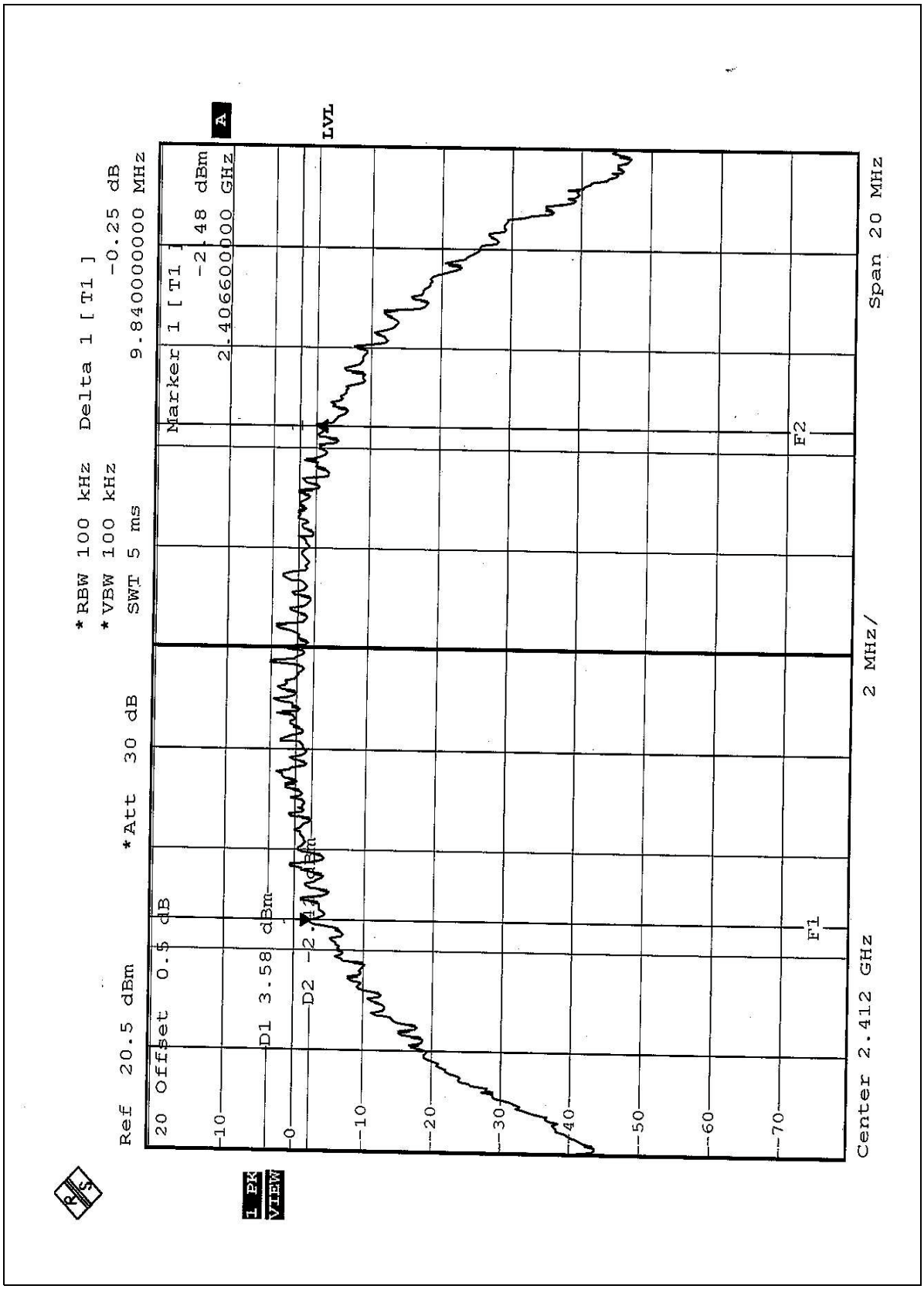
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

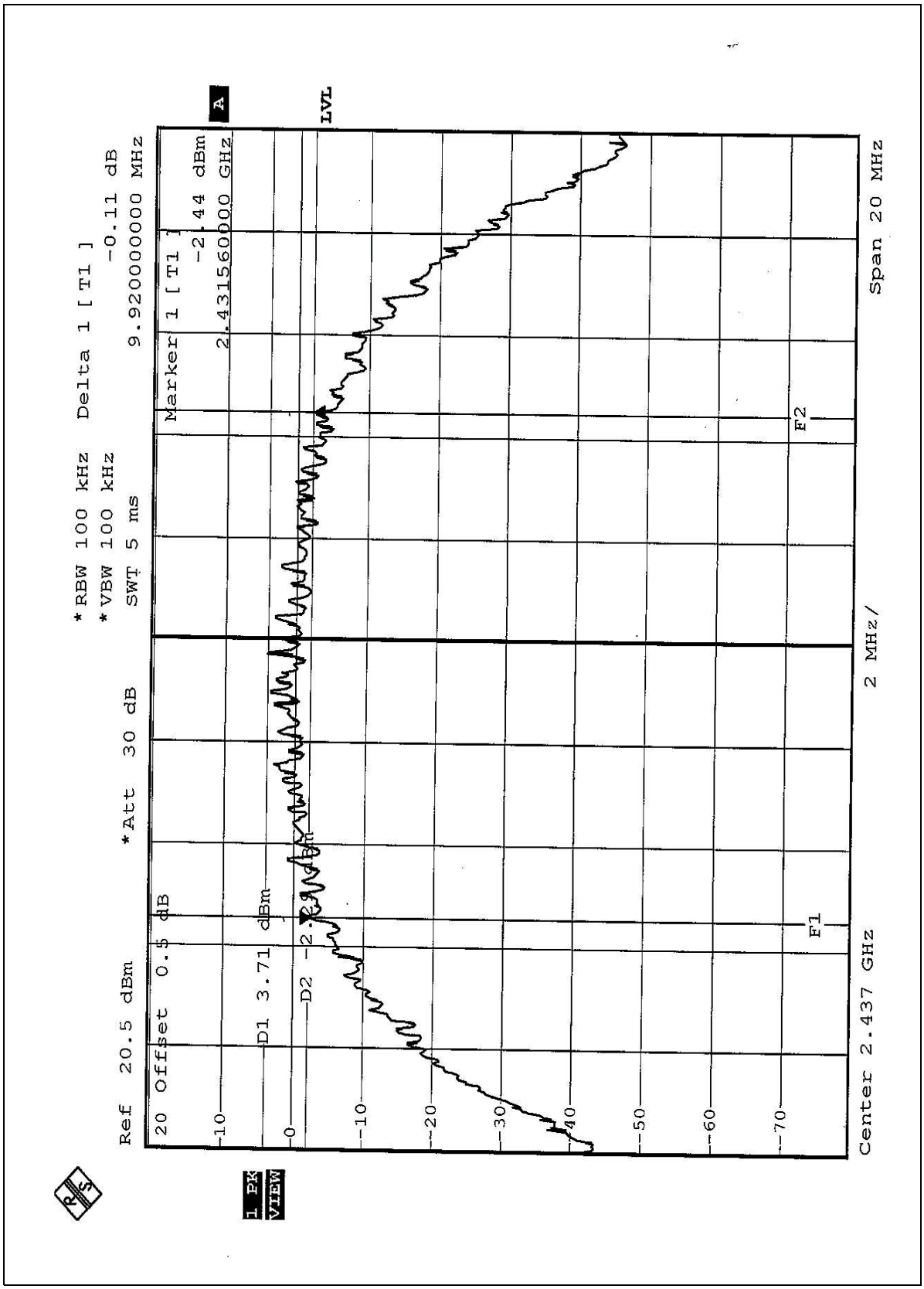
EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	CCK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Jamison Chan	

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.84	0.5	PASS
6	2437	9.92	0.5	PASS
11	2462	9.24	0.5	PASS

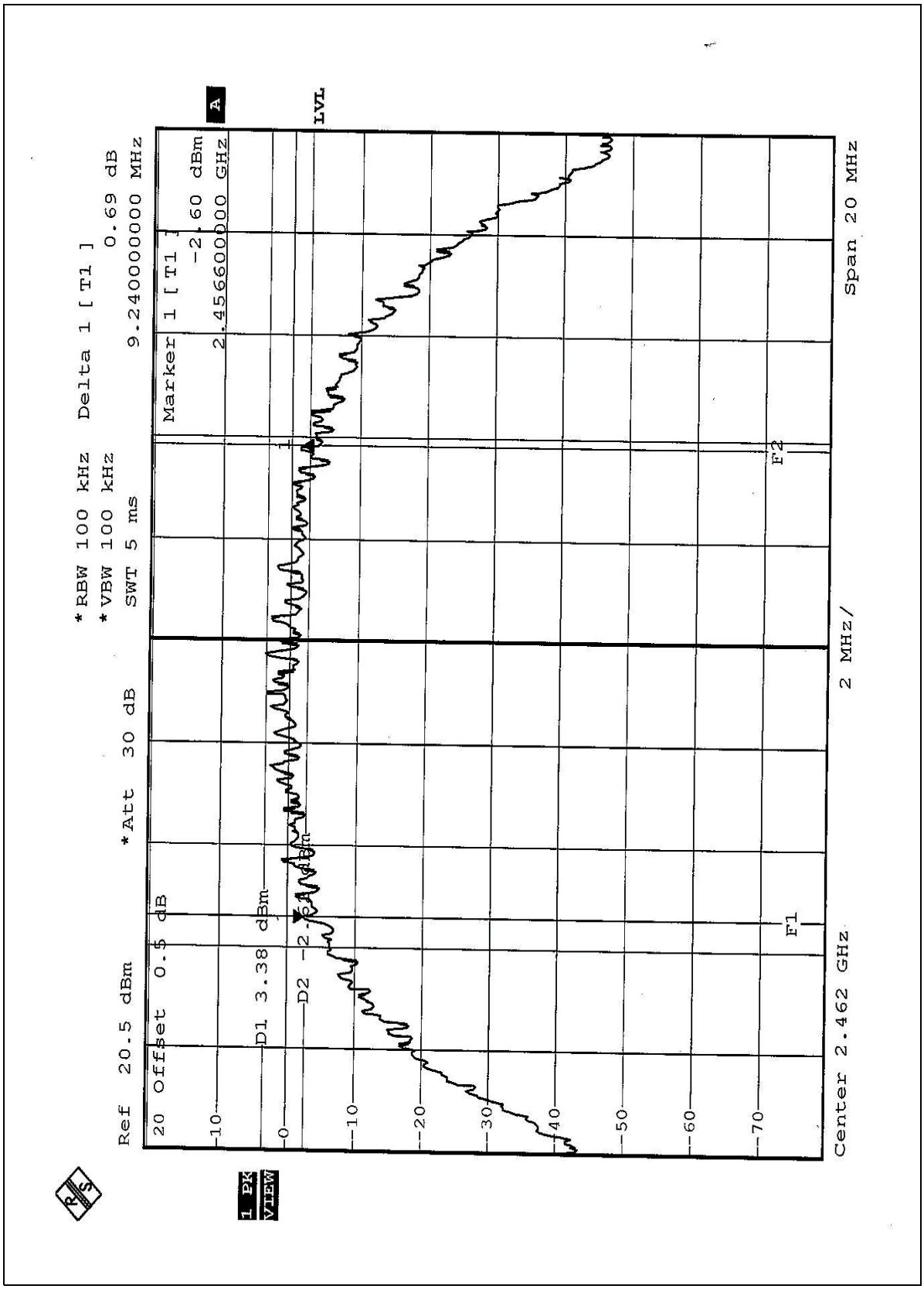
CH1


Ref 20.5 dBm
*Att 30 dB
SWT 5 ms
*RBW 100 kHz
*VBW 100 kHz
Delta 1 [T1] -0.25 dB
9.840000000 MHz
Marker 1 [T1] -2.48 dBm
2.406600000 GHz
20 Offset 0.5 dB
D1 3.58 dBm
D2 -2.14 dBm
LVL
A
1 PK VIEW
F1
F2
Center 2.412 GHz
2 MHz/
Span 20 MHz

CH6


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
SWT 5 ms
*RBW 100 kHz
*VBW 100 kHz
Delta 1 [T1]
-0.11 dB
9.920000000 MHz
Marker 1 [T1]
-2.44 dBm
2.431560000 GHz
D1 3.71 dBm
D2 -2.33 dBm
LVL
A
1 PK
VIEW
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

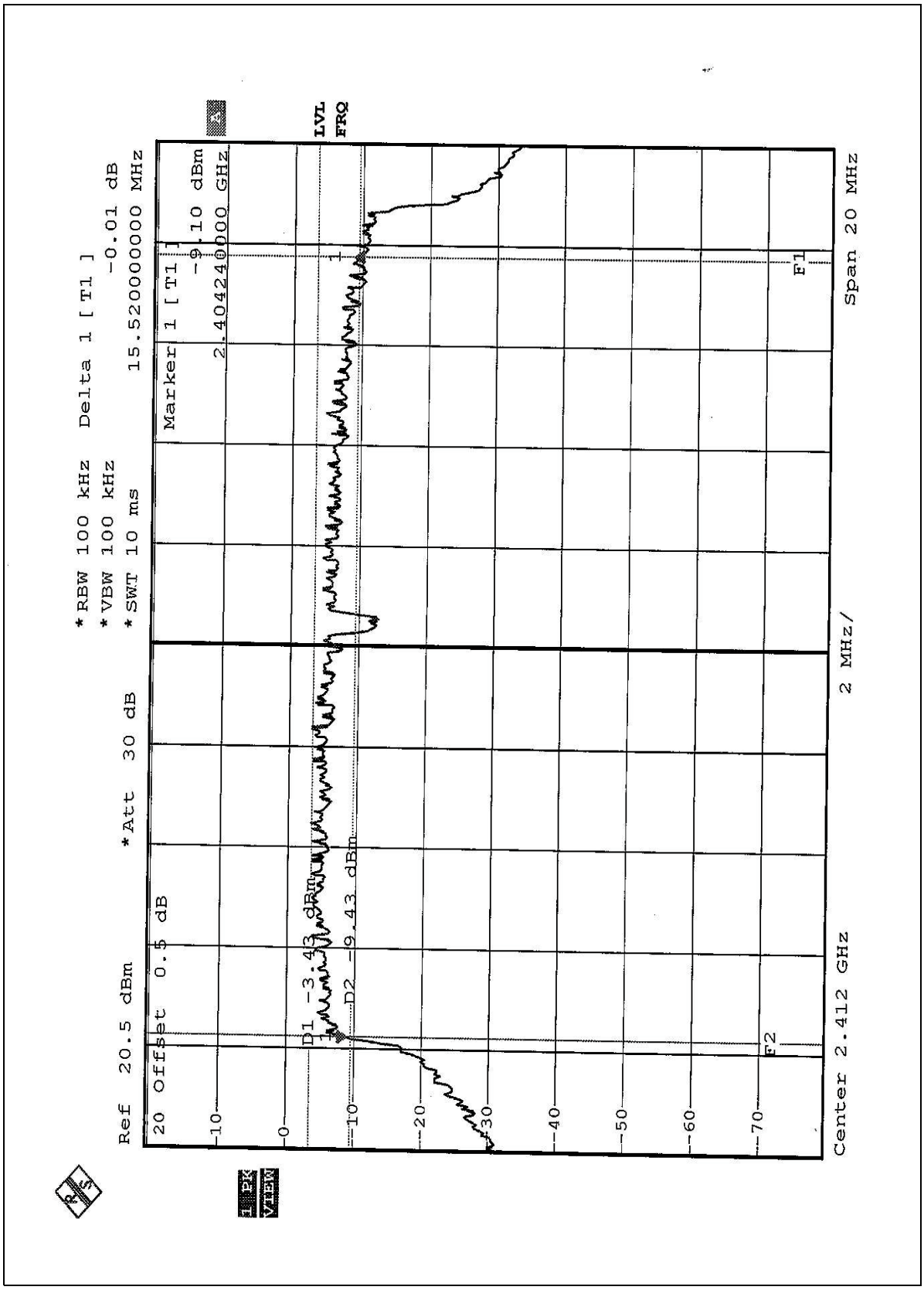
CH11


Ref 20.5 dBm
Att 30 dB
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
0.69 dB
9.240000000 MHz
Marker 1 [T1]
-2.60 dBm
2.456600000 GHz
Span 20 MHz
2 MHz/
Center 2.462 GHz
LVL
F1
F2
D1 3.38 dBm
D2 -2.60 dBm
1 PK VIEW

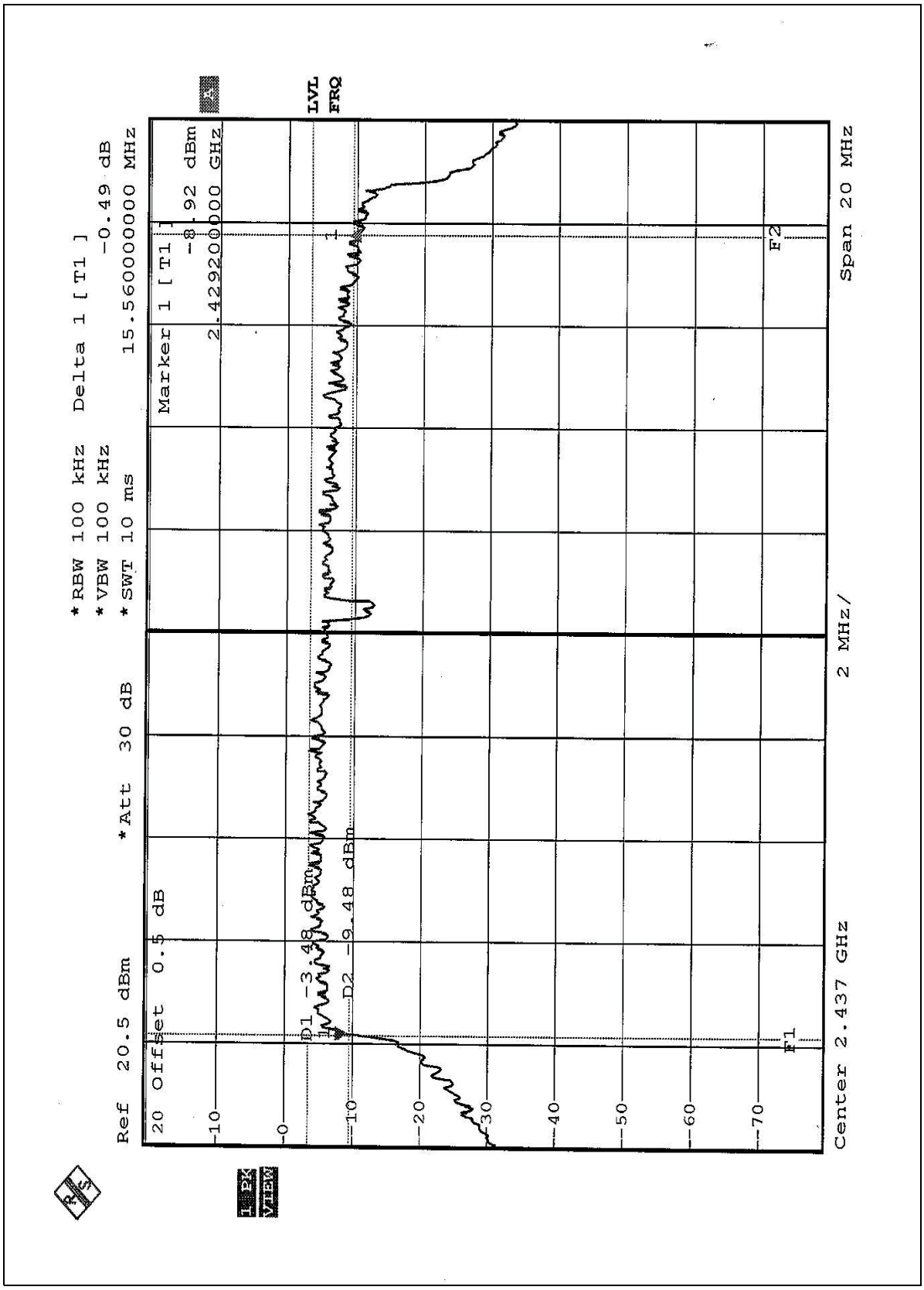
EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	OFDM	**ENVIRONMENTAL CONDITIONS**	23deg. C, 64%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Hardaway Lee	

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	15.52	0.5	PASS
6	2437	15.56	0.5	PASS
11	2462	15.44	0.5	PASS

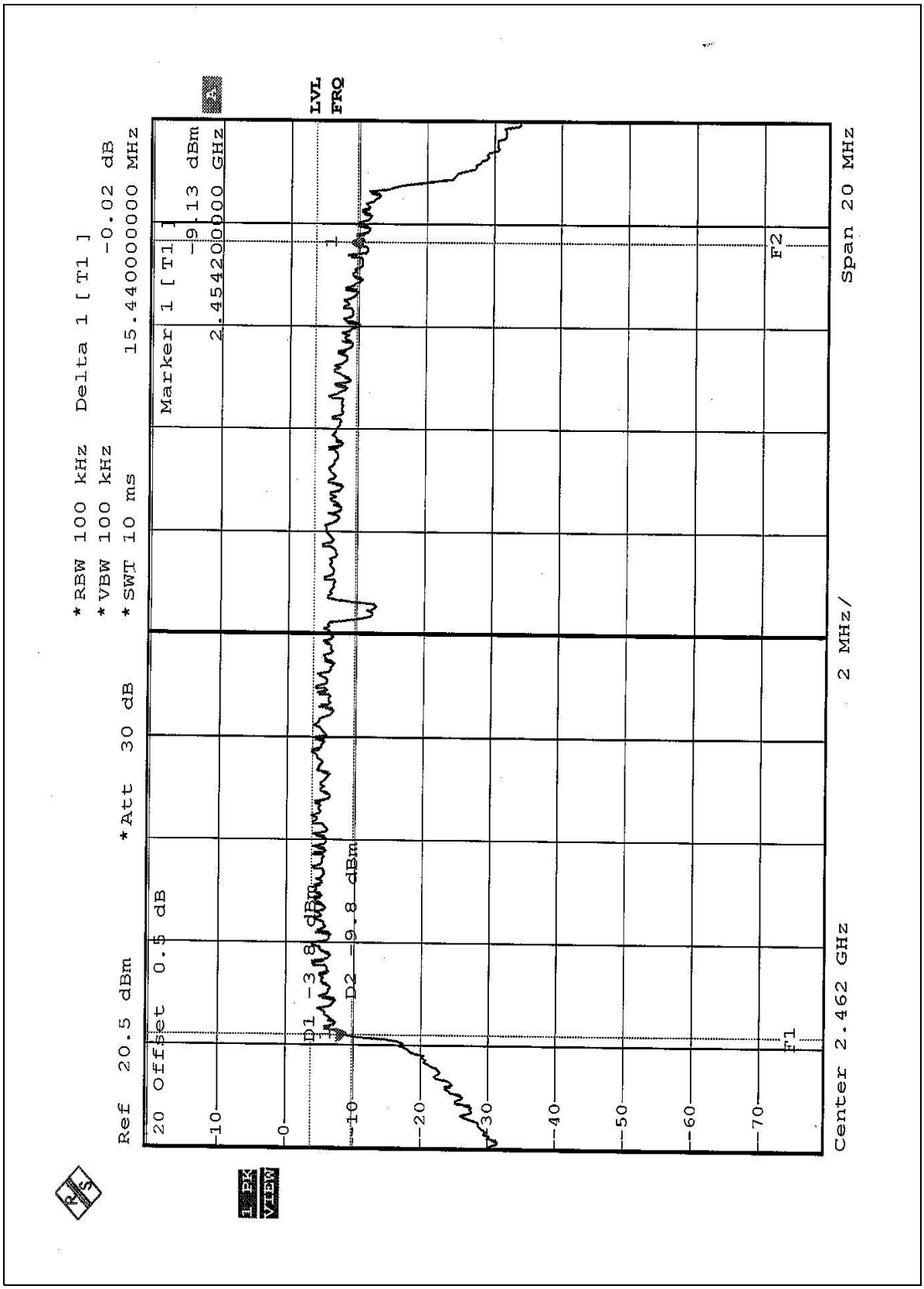
CH1


Ref 20.5 dBm
*Att 30 dB
Offset 0.5 dB
*RBW 100 kHz
*VBW 100 kHz
*SWT 10 ms
Delta 1 [T1]
-0.01 dB
15.520000000 MHz
Marker 1 [T1]
-9.10 dBm
2.404240000 GHz
D1 -3.43 dBm
D2 -9.43 dBm
LVL
FRQ
F1
F2
Center 2.412 GHz
2 MHz/
Span 20 MHz
PK
VIEW

CH6


Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
Delta 1 [T1]
-0.49 dB
15.56000000 MHz
Marker 1 [T1]
-8.92 dBm
2.42920000 GHz
D1 -3.48 dBm
D2 -9.48 dBm
LVL
FRQ
Center 2.437 GHz
2 MHz/
Span 20 MHz
1 PK
VIEW

CH11


Ref 20.5 dBm
Offset 0.5 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
*SWT 10 ms
Delta 1 [T1]
-0.02 dB
15.440000000 MHz
Marker 1 [T1]
-9.13 dBm
2.454200000 GHz
LVL
FRQ
D1 -3.8 dBm
D2 -9.8 dBm
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz
PK
VIEW

4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated On
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004
R&S SIGNAL GENERATOR	SMP04	100011	May 28, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	B048470	Mar. 05, 2004
NARDA DETECTOR	4503A	FSCM99899	NA

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

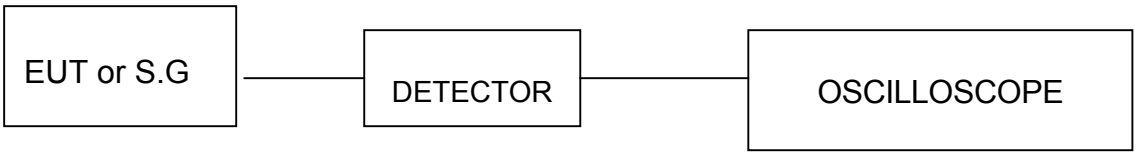
4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator . The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	CCK	**ENVIRONMENTAL CONDITIONS**	23deg. C, 64%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Jamison Chan	

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	15.00	30	PASS
6	2437	15.20	30	PASS
11	2462	15.40	30	PASS

EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	OFDM	**ENVIRONMENTAL CONDITIONS**	23deg. C, 64%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Hardaway Lee	

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	15.00	30	PASS
6	2437	16.00	30	PASS
11	2462	15.20	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated On
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.

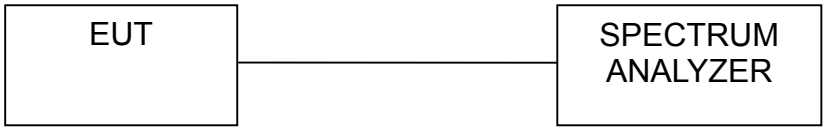
4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded.
The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

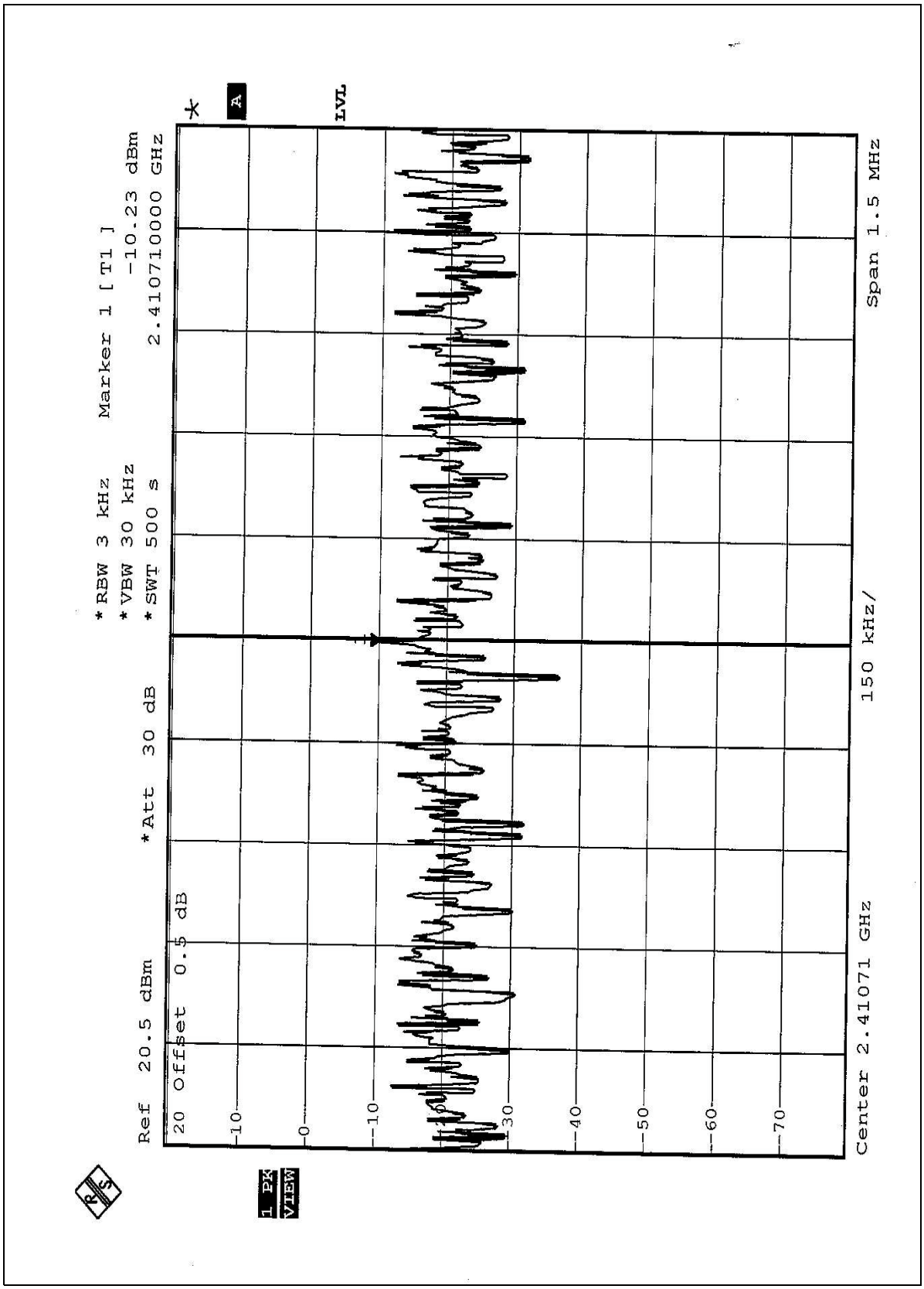
Same as 4.3.6

4.5.7 TEST RESULTS

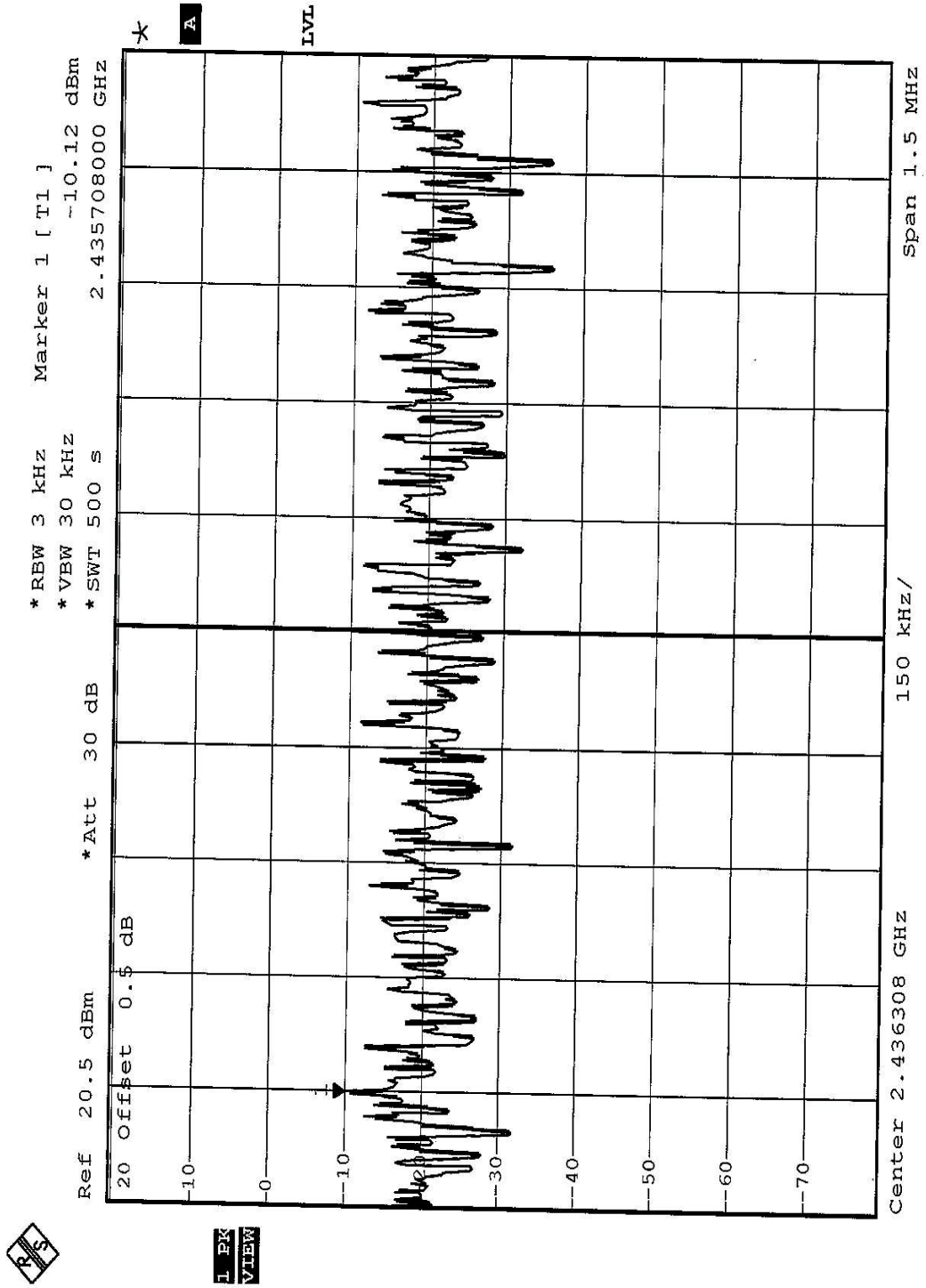
EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	CCK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Jamison Chan	

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-10.23	8	PASS
6	2437	-10.12	8	PASS
11	2462	-10.28	8	PASS

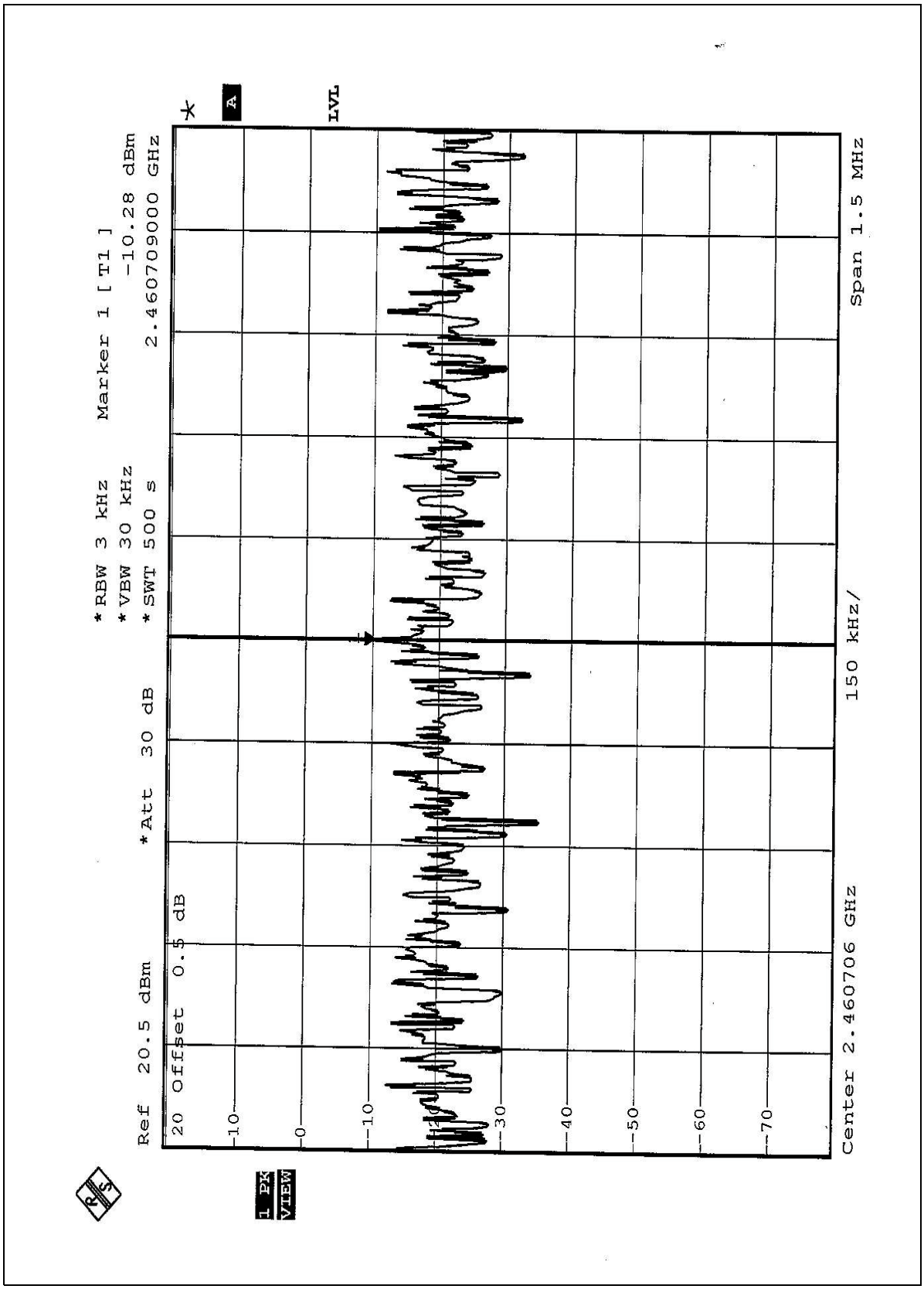
CH1


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-10.23 dBm
2.410710000 GHz
1 PK
VIEW
A
LVL
10
0
-10
-20
-30
-40
-50
-60
-70
Center 2.41071 GHz
150 kHz/
Span 1.5 MHz

CH6


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-10.12 dBm
2.435708000 GHz
1 PK
VIEW
A
LVL
-10
0
-10
-20
-30
-40
-50
-60
-70
Center 2.436308 GHz
150 kHz/
Span 1.5 MHz

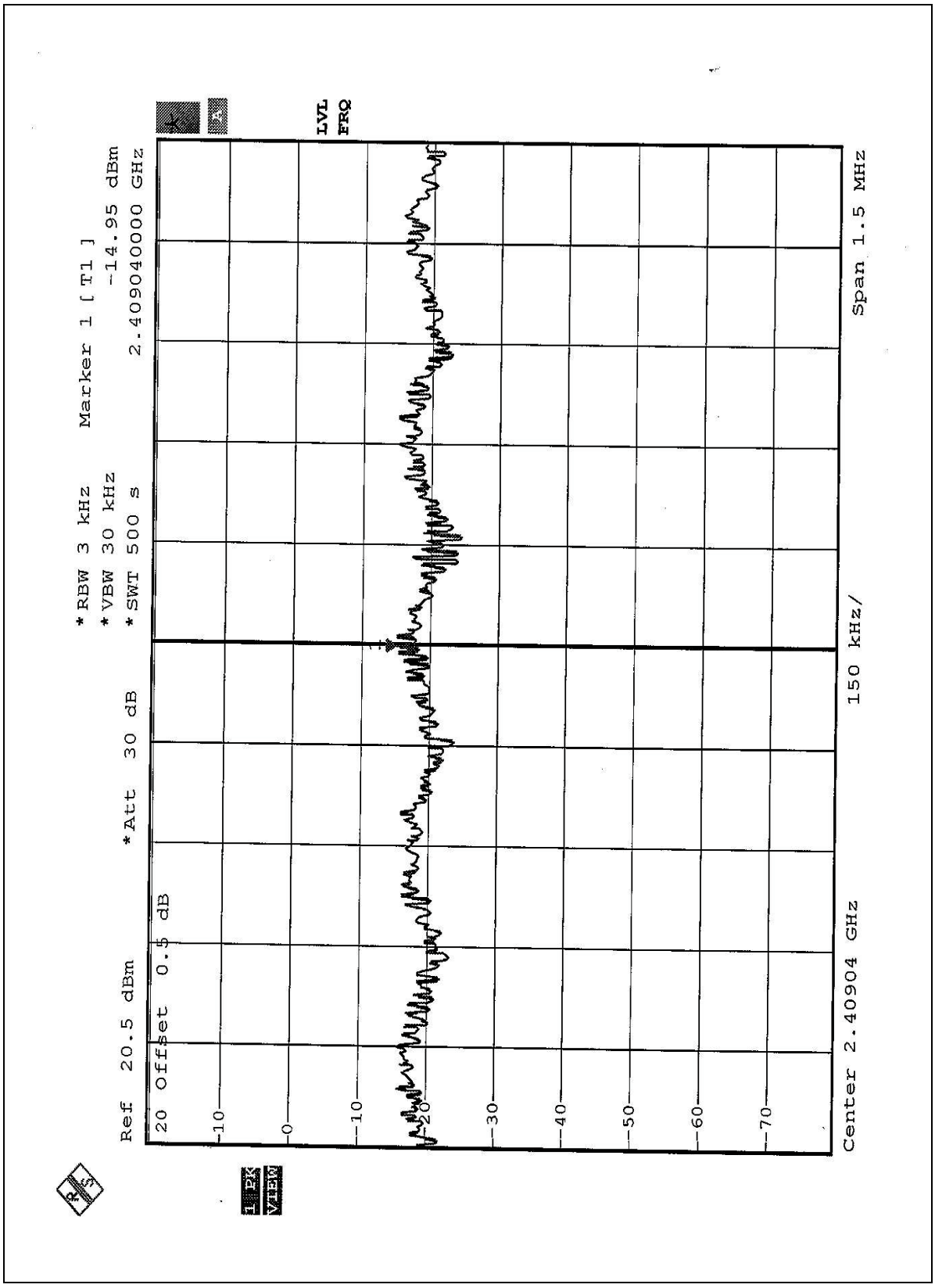
CH11


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-10.28 dBm
2.460709000 GHz
A
LVL
1 PK
VIEW
Center 2.460706 GHz
150 kHz/
Span 1.5 MHz

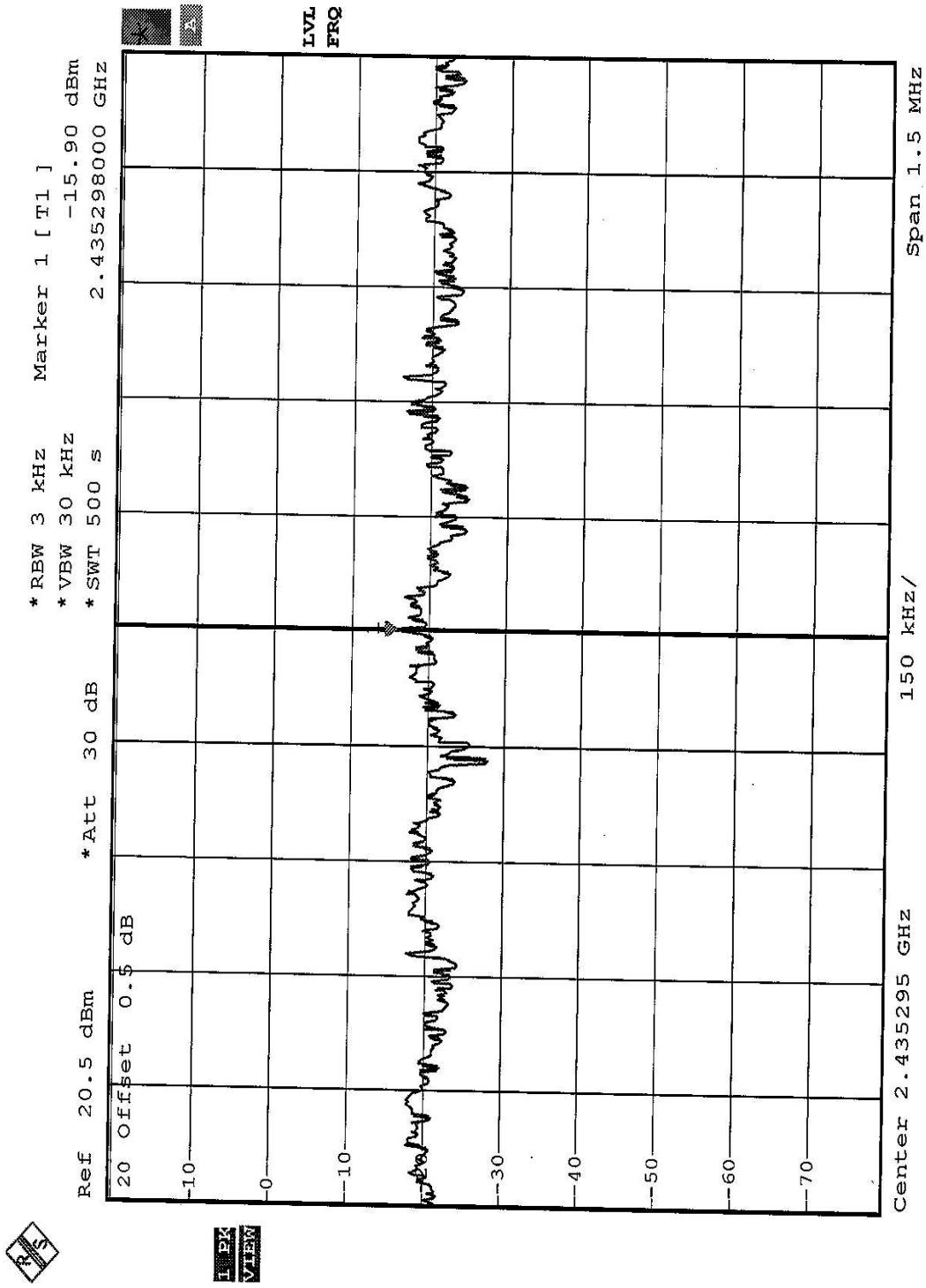
EUT	802.11g Wireless PCI Adapter	**MODEL**	WL VP 2454 NM
MODE	OFDM	**ENVIRONMENTAL CONDITIONS**	23deg. C, 64%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**: Hardaway Lee	

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-14.95	8	PASS
6	2437	-15.90	8	PASS
11	2462	-15.89	8	PASS

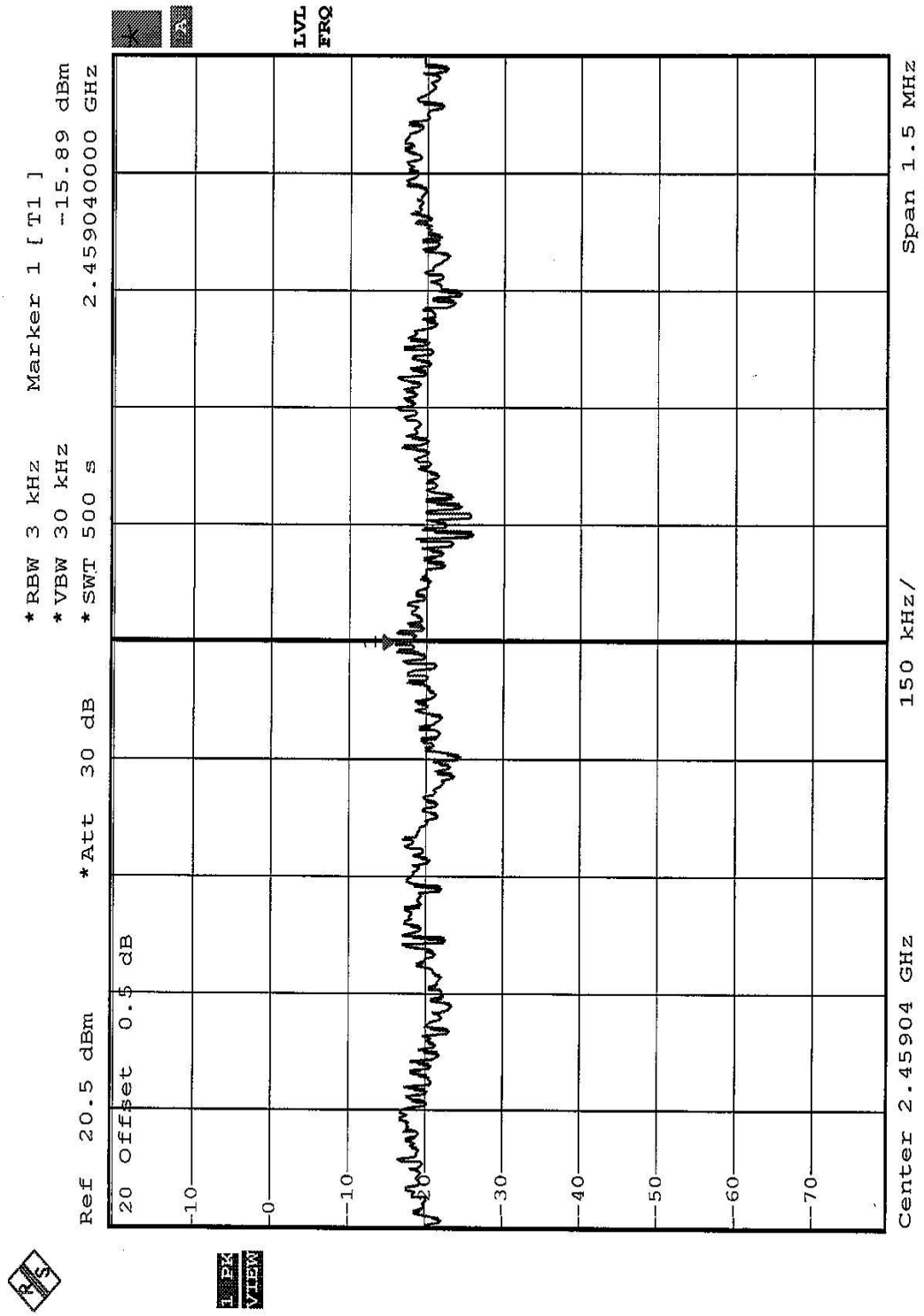
CH1


Ref 20.5 dBm
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-14.95 dBm
2.409040000 GHz
Offset 0.5 dB
Center 2.40904 GHz
150 kHz/
Span 1.5 MHz
LVL
FRQ
1 PK
VIEW

CH6


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-15.90 dBm
2.435298000 GHz
LVL
FRQ
1 PK
VIEW
Center 2.435295 GHz
150 kHz/
Span 1.5 MHz

CH11


Ref 20.5 dBm
20 Offset 0.5 dB
* Att 30 dB
* RBW 3 kHz
* VBW 30 kHz
* SWT 500 s
Marker 1 [T1]
-15.89 dBm
2.459040000 GHz
1 PK
VIEW
LVL
FRQ
Center 2.45904 GHz
150 kHz/
Span 1.5 MHz

4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated On
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.

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 1MHz and 300Hz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

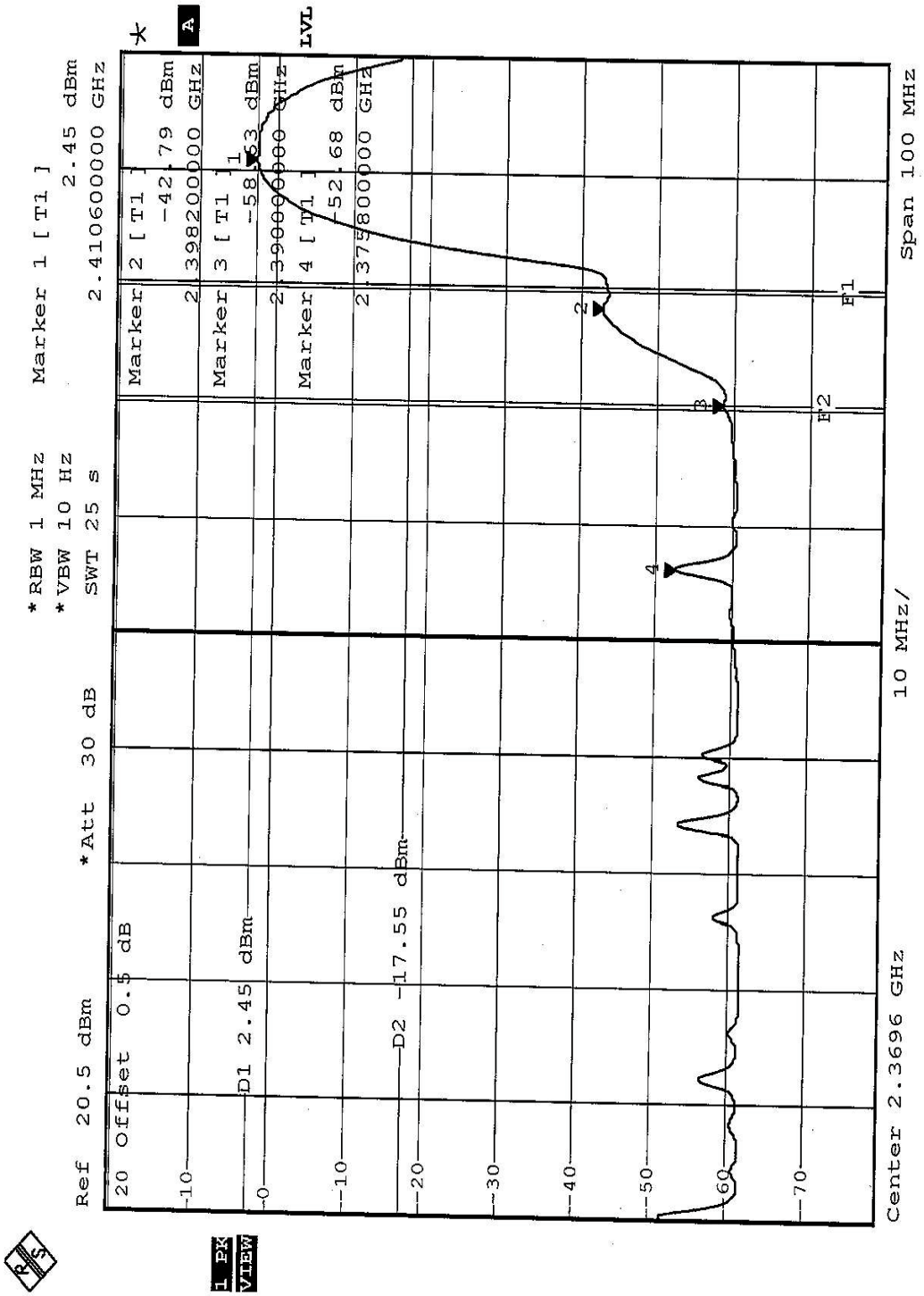
The spectrum plots are attached on the following 8 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

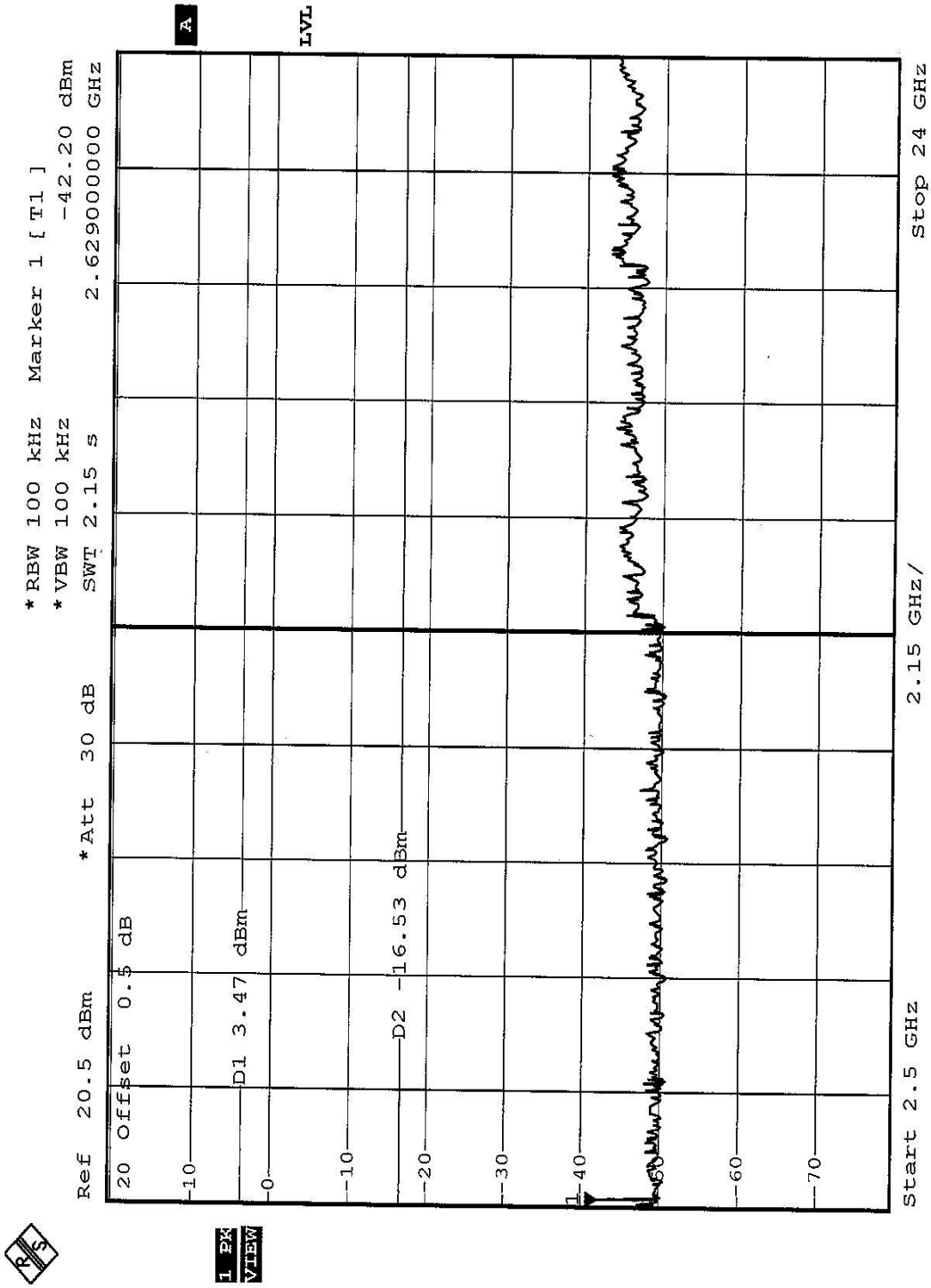
NOTE 1: The band edge emission plot of CCK technique on the following first page shows 54.43dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.46dBuV/m, so the maximum field strength in restrict band is 104.46–54.43=50.03dBuV/m which is under 54dBuV/m limit.

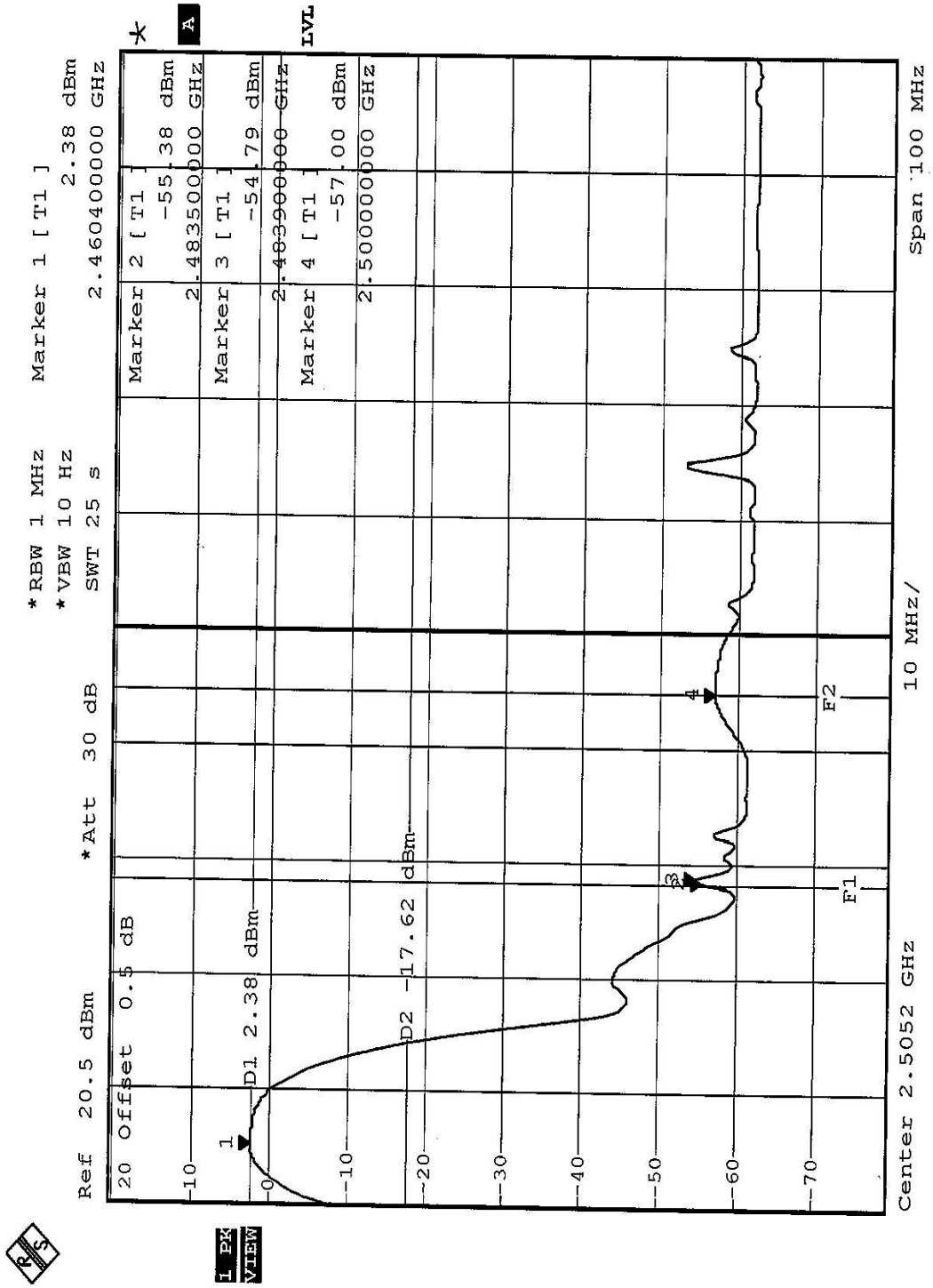
NOTE 2: The band edge emission plot of CCK technique on the following third page shows 52.89dB delta between carrier maximum power and local maximum emission in restrict band (2. 4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 104.15dBuV/m, so the maximum field strength in restrict band is 104.15–52.89=51.26dBuV/m which is under 54dBuV/m limit.

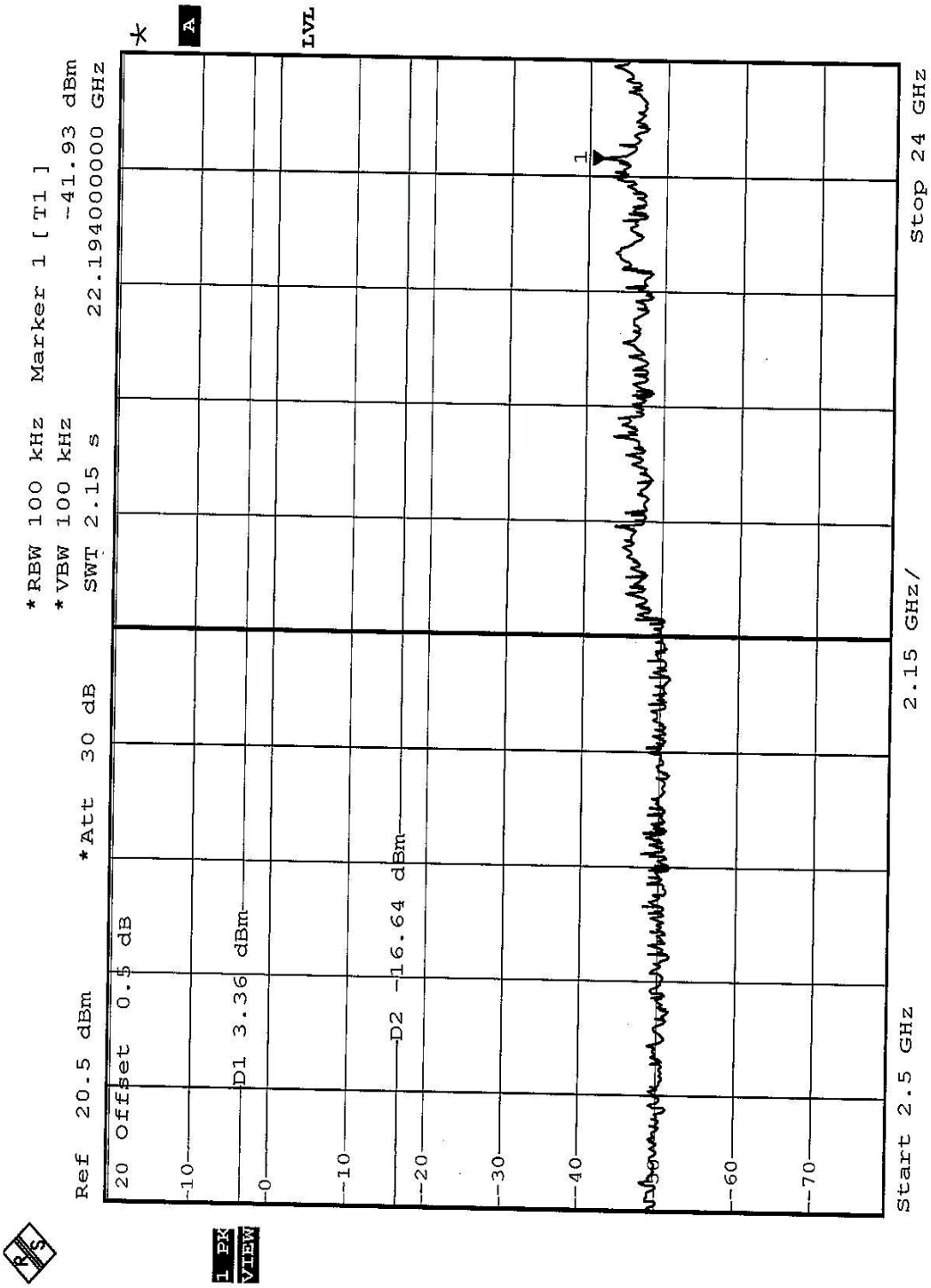
NOTE 3: The band edge emission plot of OFDM technique on the following fifth page shows 56.02dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.41dBuV/m, so the maximum field strength in restrict band is 100.41–56.02=44.39dBuV/m which is under 54dBuV/m limit.

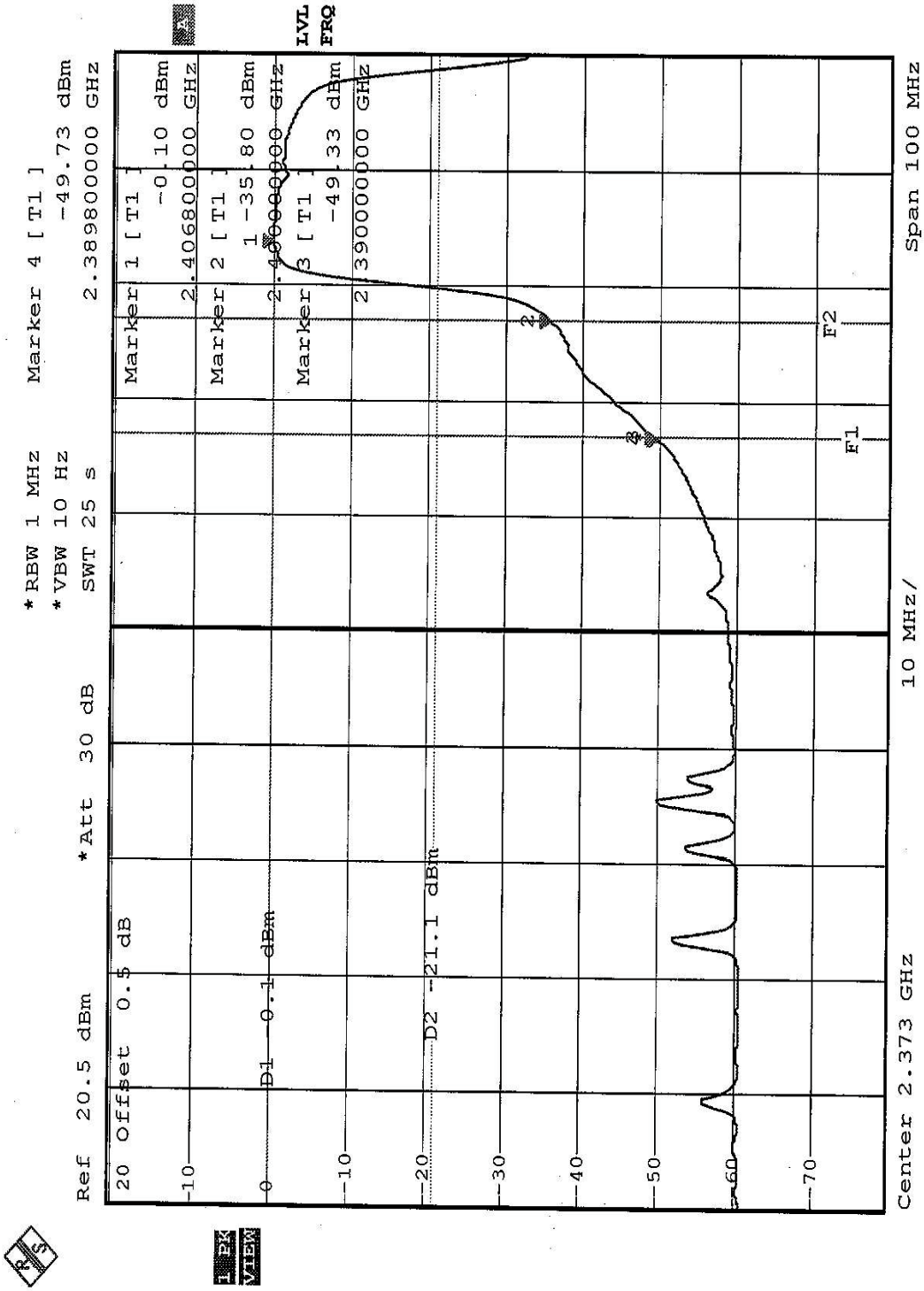
NOTE 4: The band edge emission plot of OFDM technique on the following seventh page shows 48.92dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.9 is 99.72dBuV/m, so the maximum field strength in restrict band is 99.72-48.92=50.80dBuV/m which is under 54dBuV/m limit.

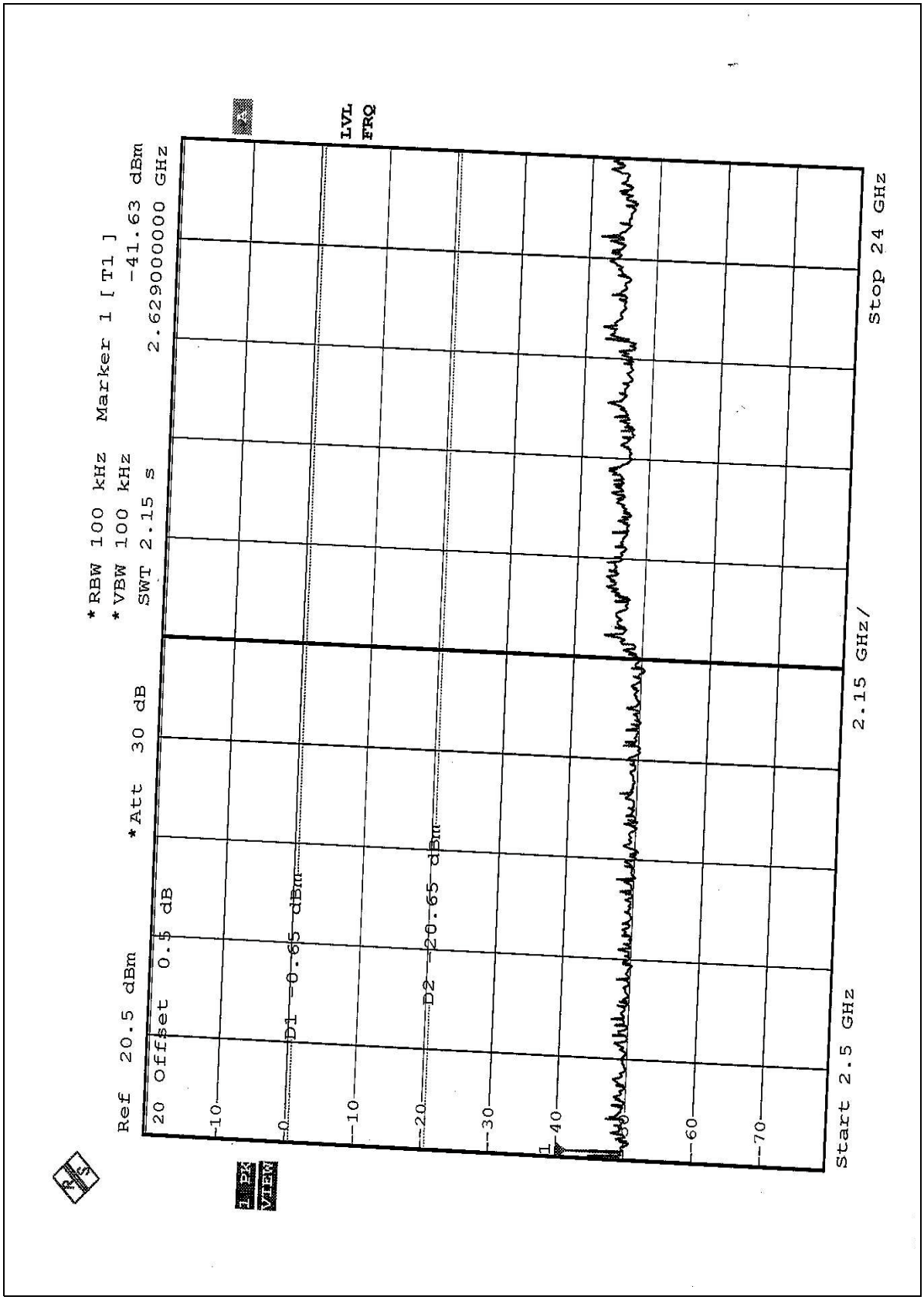

Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 1 [T1]
2.45 dBm
2.41060000 GHz
Marker 2 [T1] -42.79 dBm 2.39820000 GHz
Marker 3 [T1] -58.23 dBm 2.39000000 GHz
Marker 4 [T1] -52.68 dBm 2.37580000 GHz
D1 2.45 dBm
D2 -17.55 dBm
LVL
A
1 PK VIEW
F1
F2
Span 100 MHz
10 MHz/
Center 2.3696 GHz

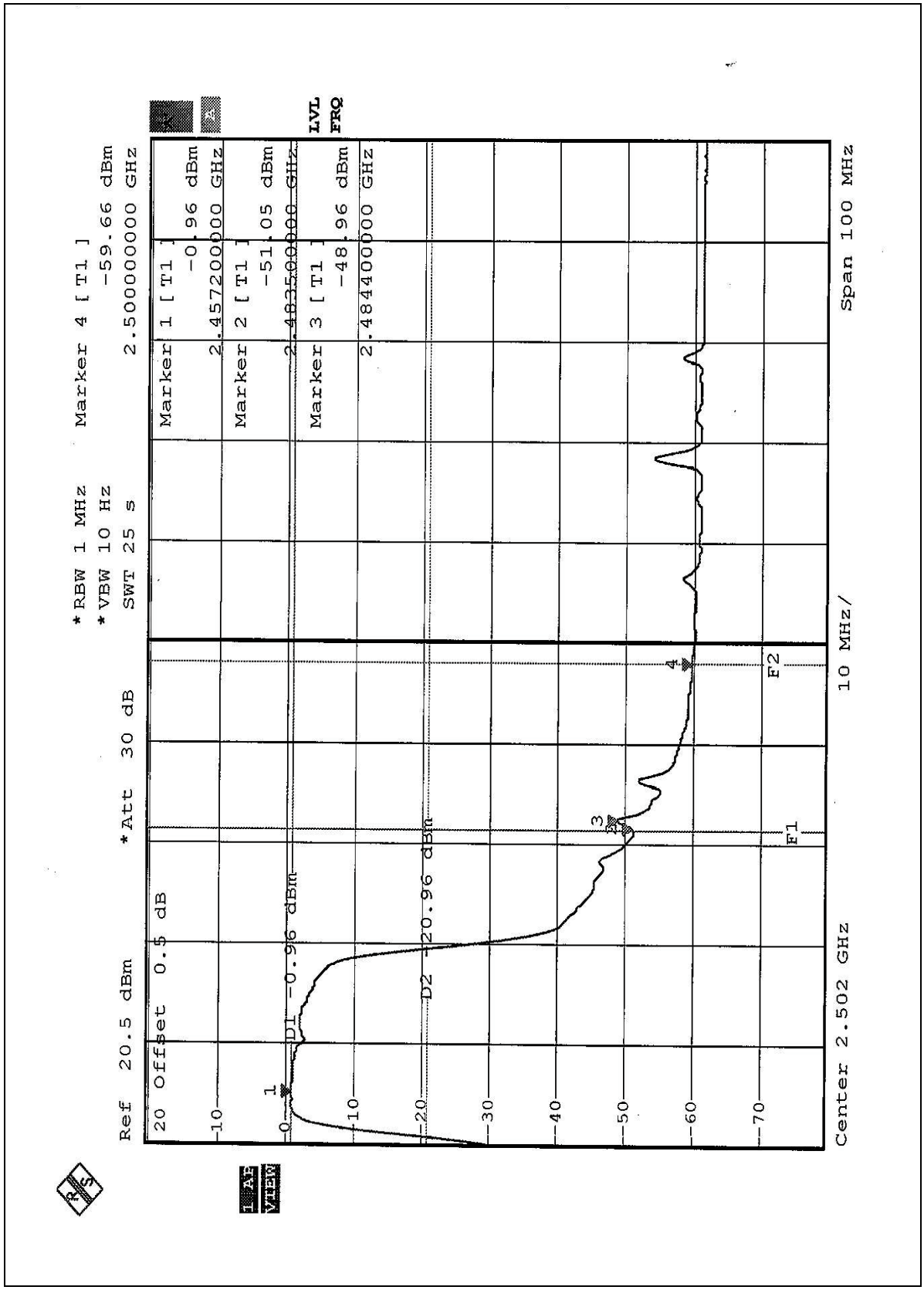

Ref 20.5 dBm
20 Offset 0.5 dB
D1 3.47 dBm
D2 -16.53 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.15 s
Marker 1 [T1]
-42.20 dBm
2.62900000 GHz
A
LVL
1 PK
VBW
Start 2.5 GHz
2.15 GHz/
Stop 24 GHz

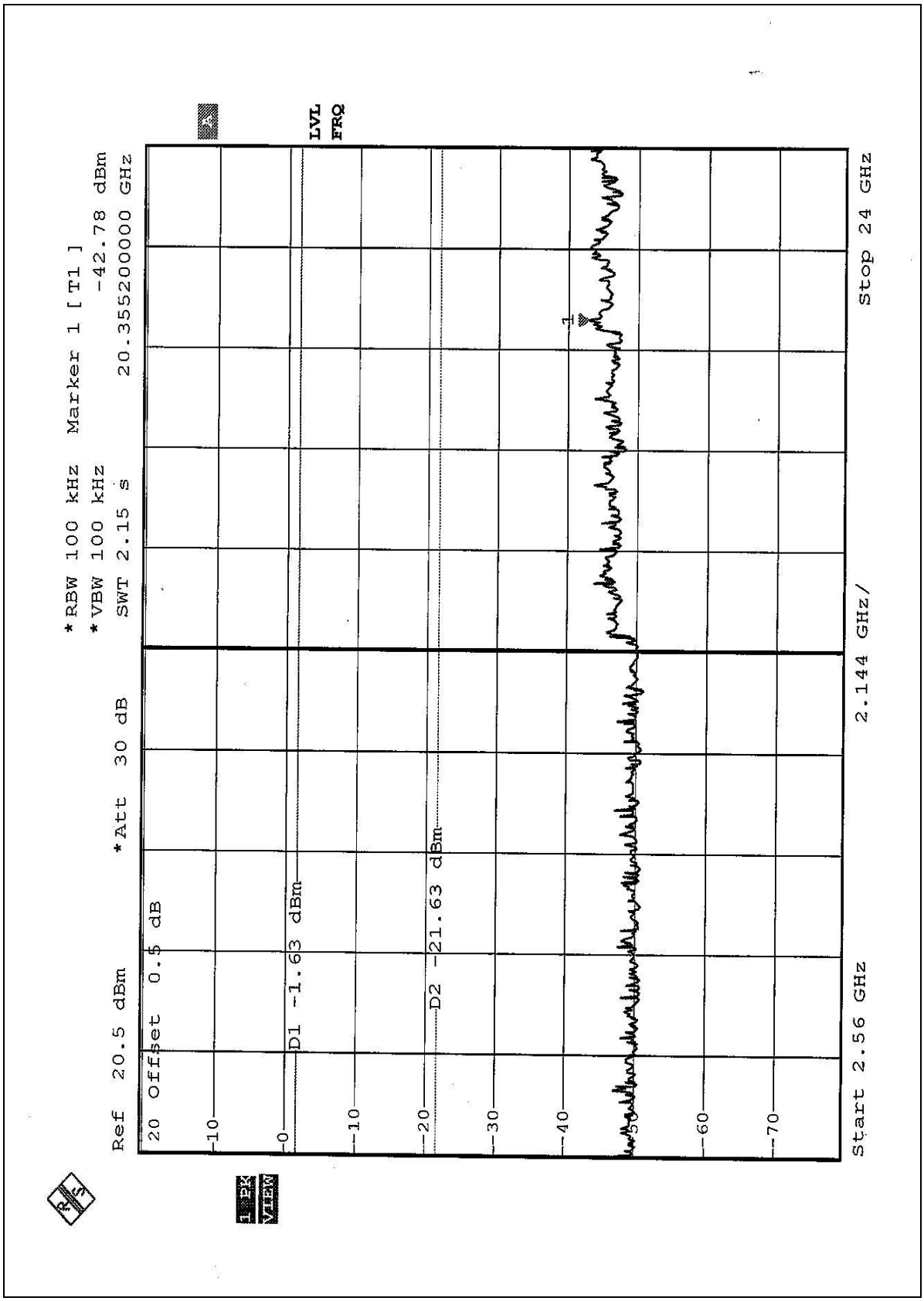

Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 1 [T1]
2.38 dBm
2.460400000 GHz
Marker 2 [T1]
-55.38 dBm
2.483500000 GHz
Marker 3 [T1]
-54.79 dBm
2.483900000 GHz
Marker 4 [T1]
-57.00 dBm
2.500000000 GHz
D1 2.38 dBm
D2 -17.62 dBm
F1
F2
Center 2.5052 GHz
10 MHz/
Span 100 MHz
1 PK
VBW


Ref 20.5 dBm
Offset 0.5 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.15 s
Marker 1 [T1]
-41.93 dBm
22.19400000 GHz
D1 3.36 dBm
D2 -16.64 dBm
1 PK
VIEW
A
LVL
Start 2.5 GHz
2.15 GHz/
Stop 24 GHz


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 4 [T1]
-49.73 dBm
2.38980000 GHz
Marker 1 [T1]
-0.10 dBm
2.40680000 GHz
Marker 2 [T1]
-35.80 dBm
2.40000000 GHz
Marker 3 [T1]
-49.33 dBm
2.39000000 GHz
LVL
FRQ
D1 -0.1 dBm
D2 -21.1 dBm
F1
F2
Center 2.373 GHz
10 MHz/
Span 100 MHz
PK
VBW


Ref 20.5 dBm
*Att 30 dB
20 Offset 0.5 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.15 s
Marker 1 [T1]
-41.63 dBm
2.629000000 GHz
D1 -0.65 dBm
D2 -20.65 dBm
LVL
FRQ
Start 2.5 GHz
2.15 GHz/
Stop 24 GHz


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 4 [T1]
-59.66 dBm
2.50000000 GHz
Marker 1 [T1]
-0.96 dBm
2.45720000 GHz
Marker 2 [T1]
-51.05 dBm
2.48350000 GHz
Marker 3 [T1]
-48.96 dBm
2.48400000 GHz
LVL
FRQ
D1 -0.96 dBm
D2 -20.96 dBm
F1
F2
Center 2.502 GHz
10 MHz/
Span 100 MHz
1 AP
VBW


Ref 20.5 dBm
20 Offset 0.5 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.15 s
Marker 1 [T1]
-42.78 dBm
20.35520000 GHz
D1 -1.63 dBm
D2 -21.63 dBm
LVL
FRQ
1 PK
VLBW
Start 2.56 GHz
2.144 GHz/
Stop 24 GHz

4.7 ANTENNA REQUIREMENT

4.7.1 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 15.247 (b), 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.

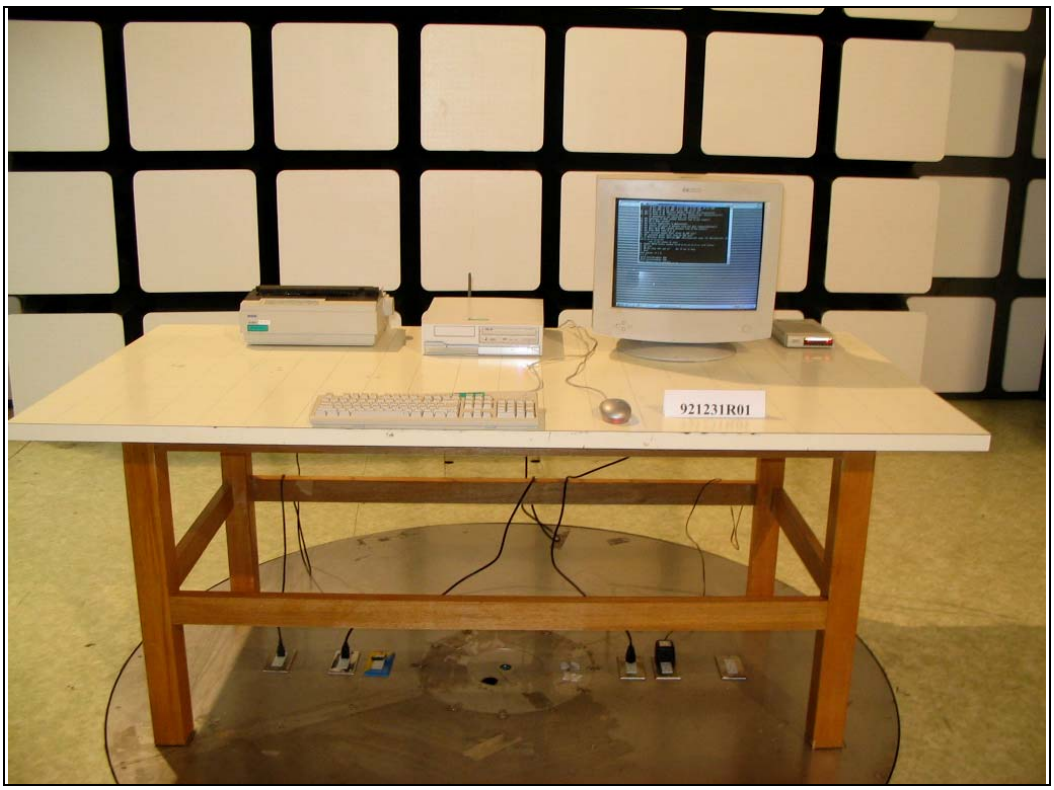
4.7.2 ANTENNA CONNECTED CONSTRUCTION

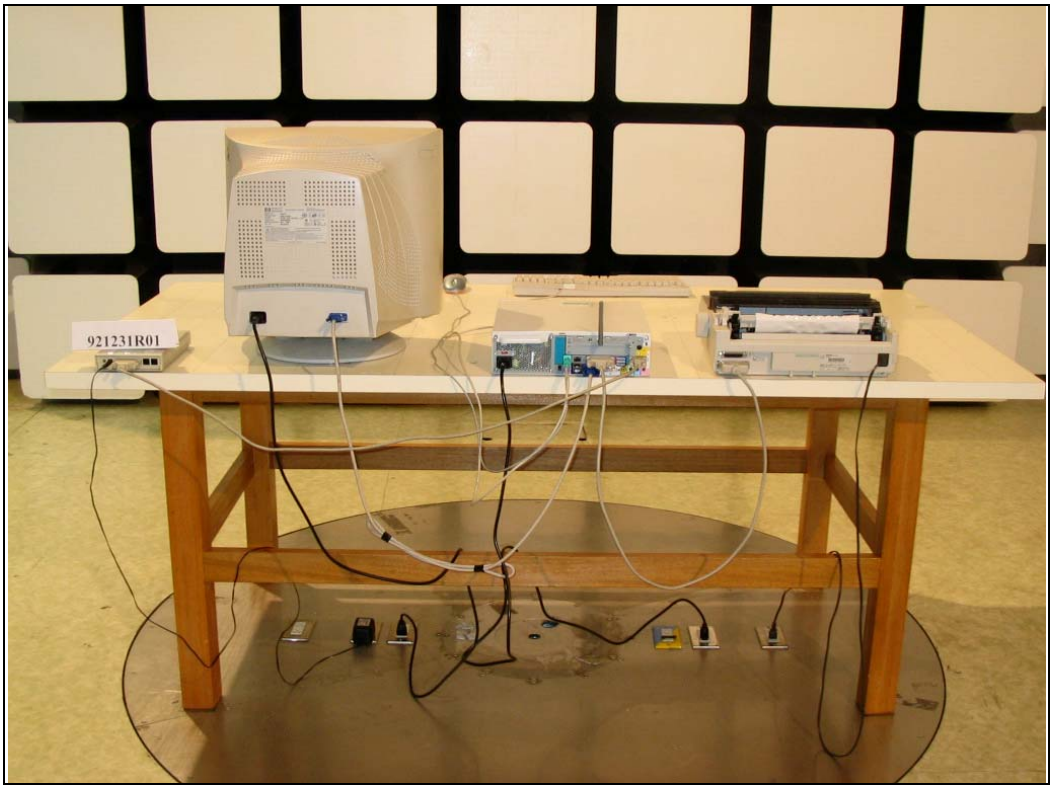
The antenna type used in this product is Dipole antenna with Reverse SMA antenna connector. The maximum Gain of this antenna is 2dBi.

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:

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO
Canada	INDUSTRY CANADA
R.O.C.	CNLA, BSMI

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. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
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Fax: 886-2-26052943

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