## 5.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 5.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

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

### 5.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2005 |

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

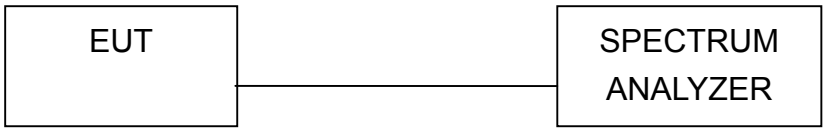
### 5.5.3 TEST PROCEDURES

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.

### 5.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5.5 TEST SETUP




### 5.5.6 EUT OPERATING CONDITIONS

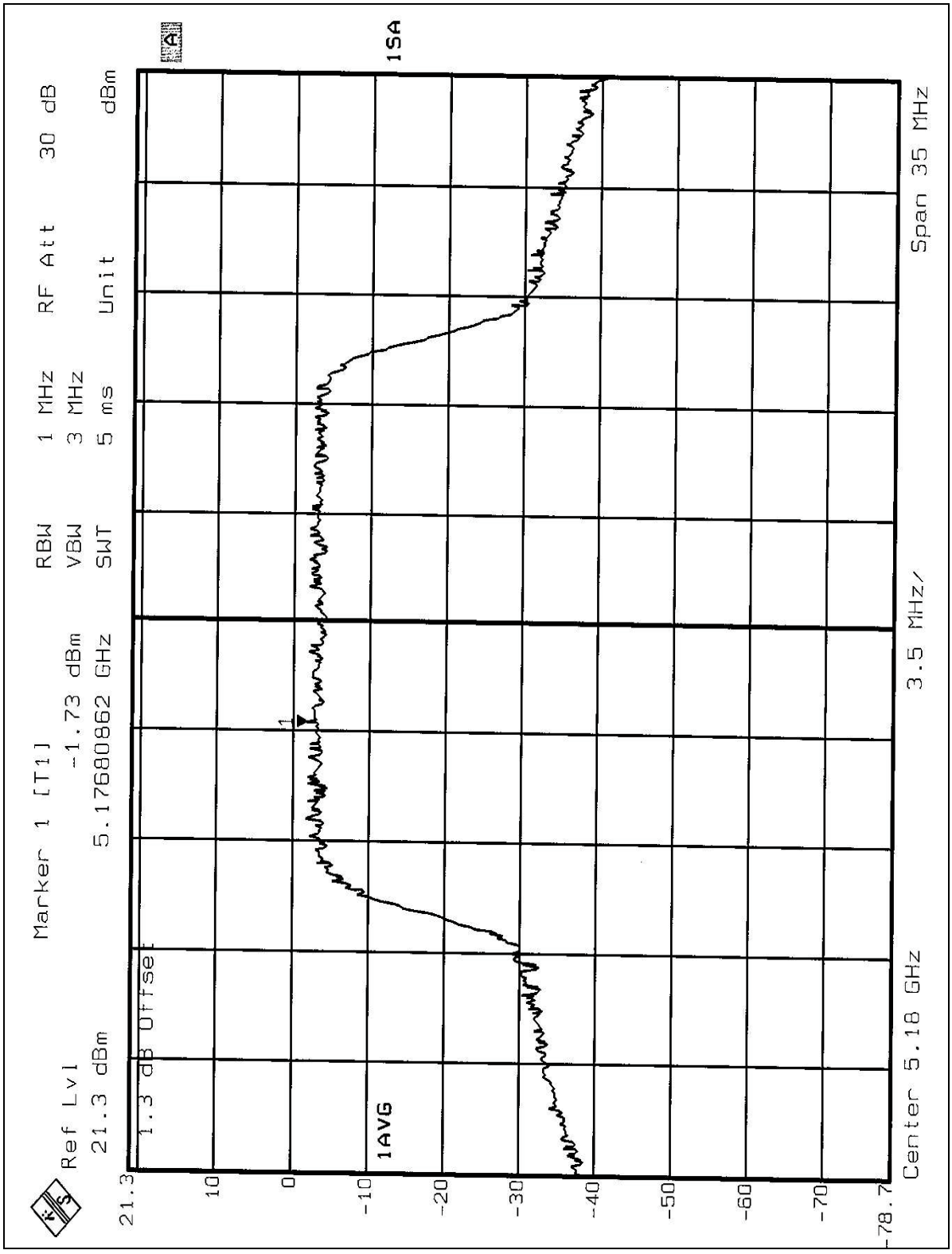
Same as 5.3.6

## 5.5.7 TEST RESULTS

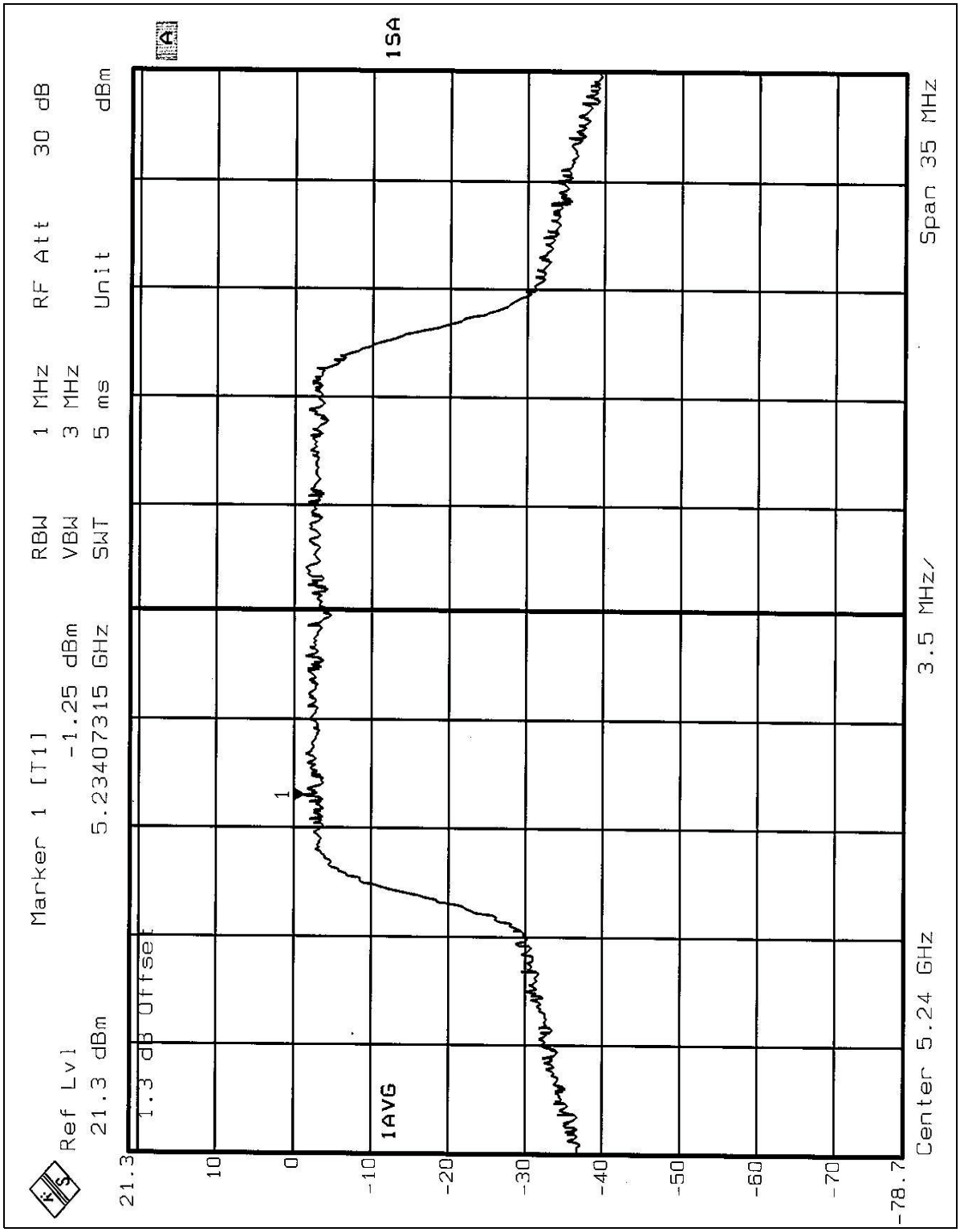
| | | | |
|---|---|---|---|
| **EUT** | Mini- PCI CARD | **MODEL** | WLL4030 |
| **ENVIRONMENTAL CONDITIONS** | 26deg. C, 68%RH, 991hPa | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **MODE** | Normal | **TESTED BY** | Ansen Lei |

| CHANNEL | CHANNEL FREQUENCY (MHz ) | RF POWER LEVEL IN 1MHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---|---|---|---|---|
| 1 | 5180 | -1.73 | 4 | PASS |
| 4 | 5240 | -1.25 | 4 | PASS |
| 5 | 5260 | -0.14 | 11 | PASS |
| 8 | 5320 | 0.01 | 11 | PASS |
| 9 | 5745 | 1.91 | 17 | PASS |
| 12 | 5805 | 1.64 | 17 | PASS |

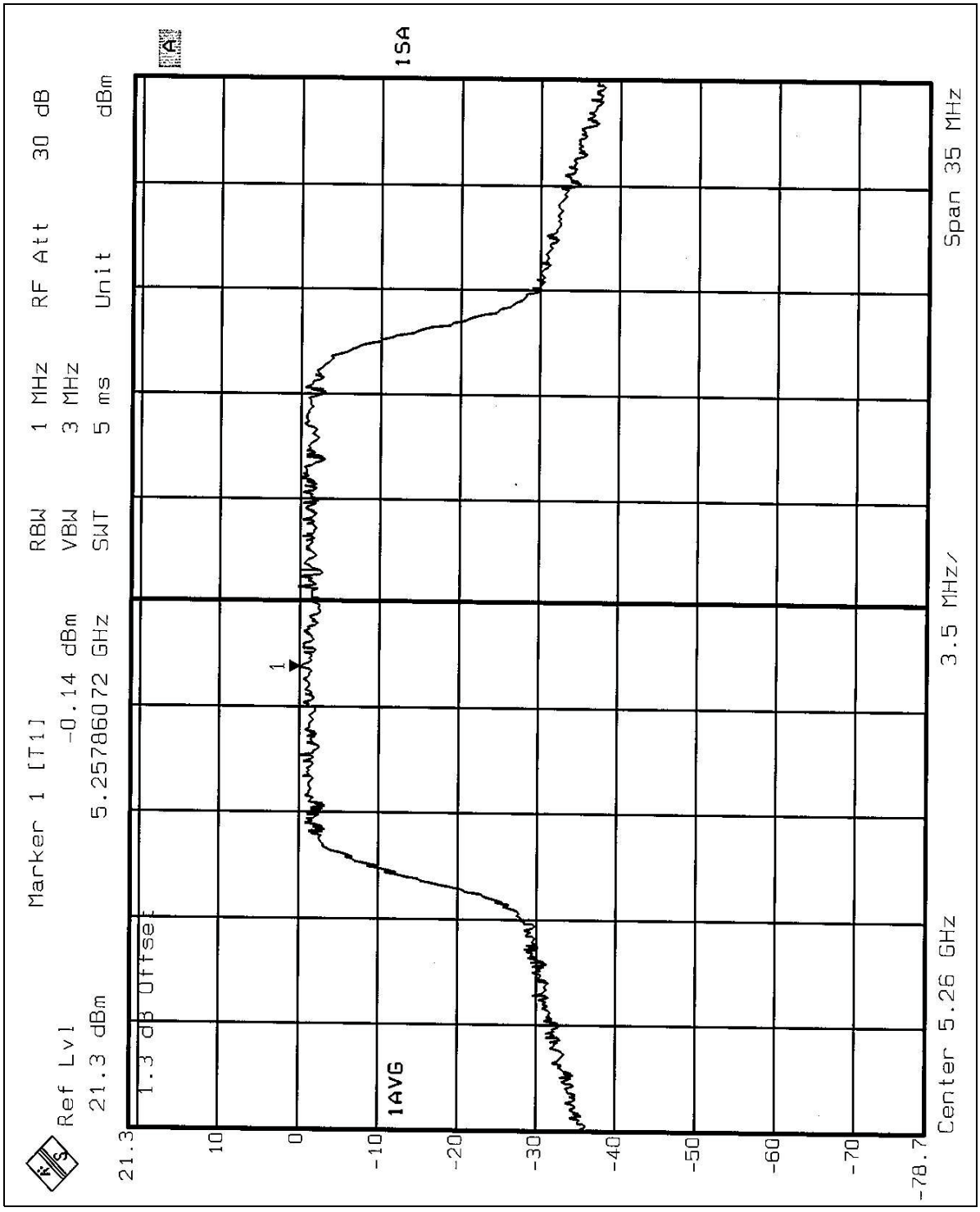
CH1


Marker 1 [T1]
-1.73 dBm
5.17680862 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
Ref Lvl
21.3 dBm
1.3 dB Offset
1SA
1AVG
Center 5.18 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

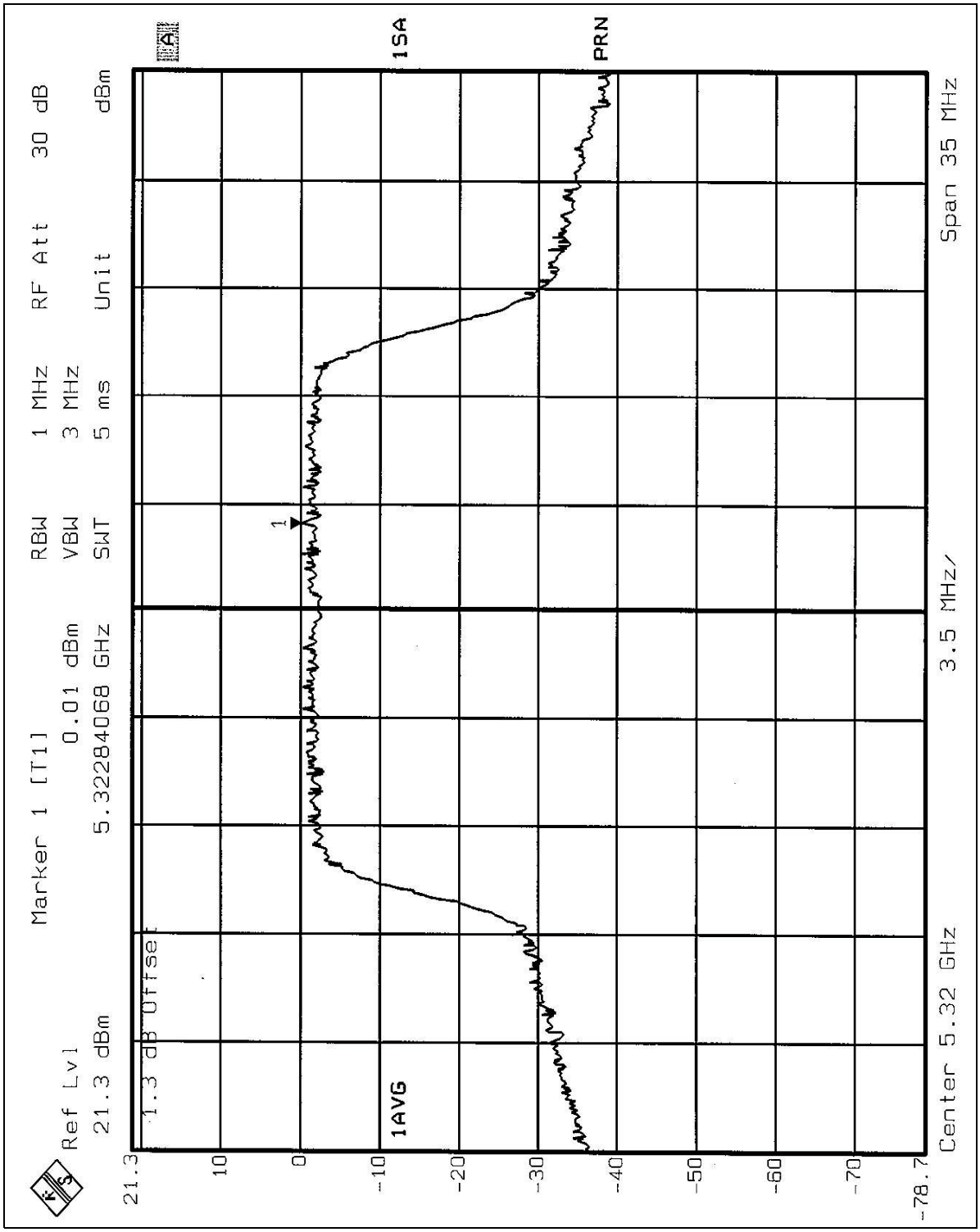
CH4


Agilent
Ref Lvl
21.3 dBm
1.3 dB Offset
Marker 1 [T1]
-1.25 dBm
5.23407315 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1SA
1AVG
Center 5.24 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

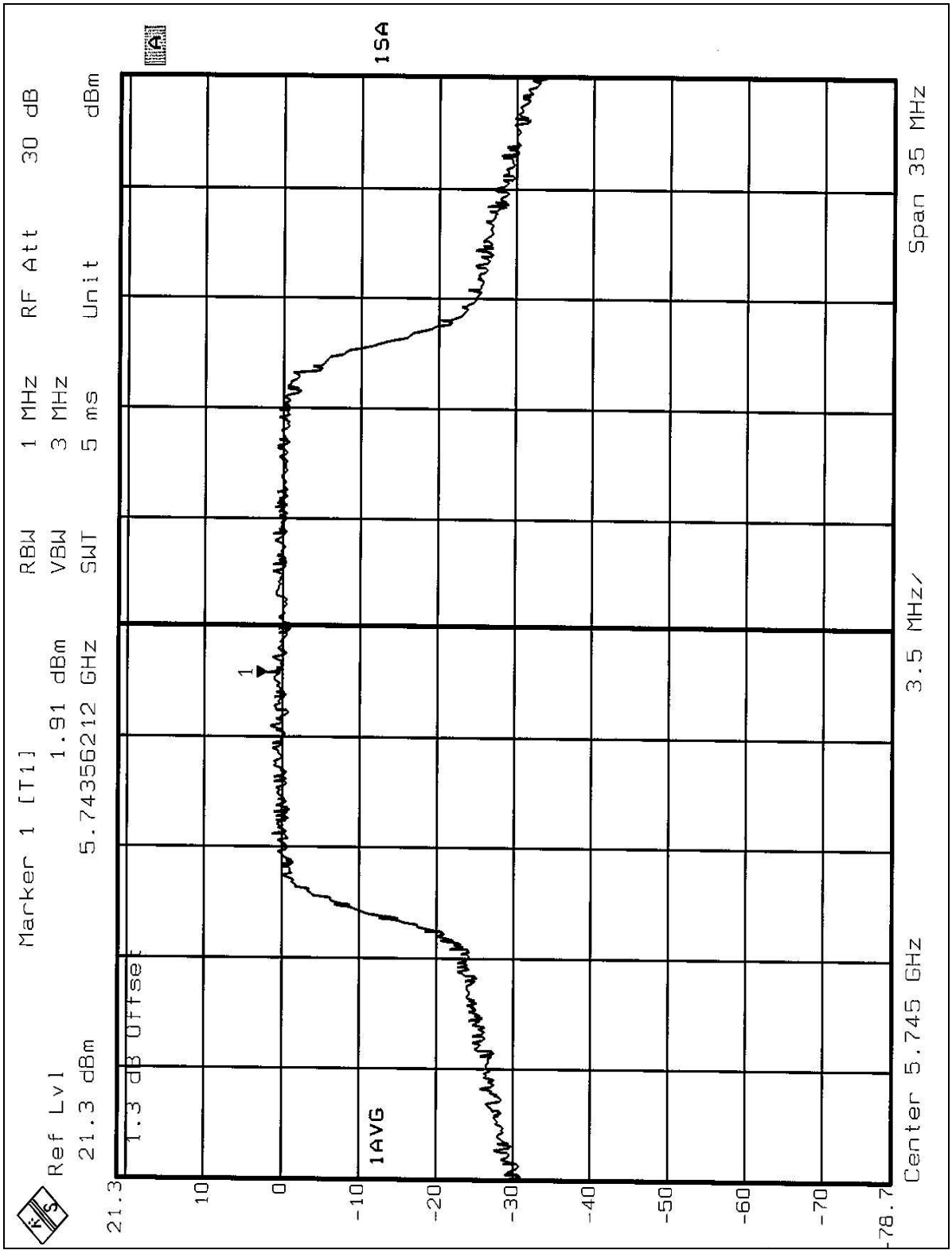
CH5


Marker 1 [T1]
-0.14 dBm
5.25786072 GHz
Ref Lvl
21.3 dBm
1.3 dB Offset
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1SA
1AVG
Center 5.26 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

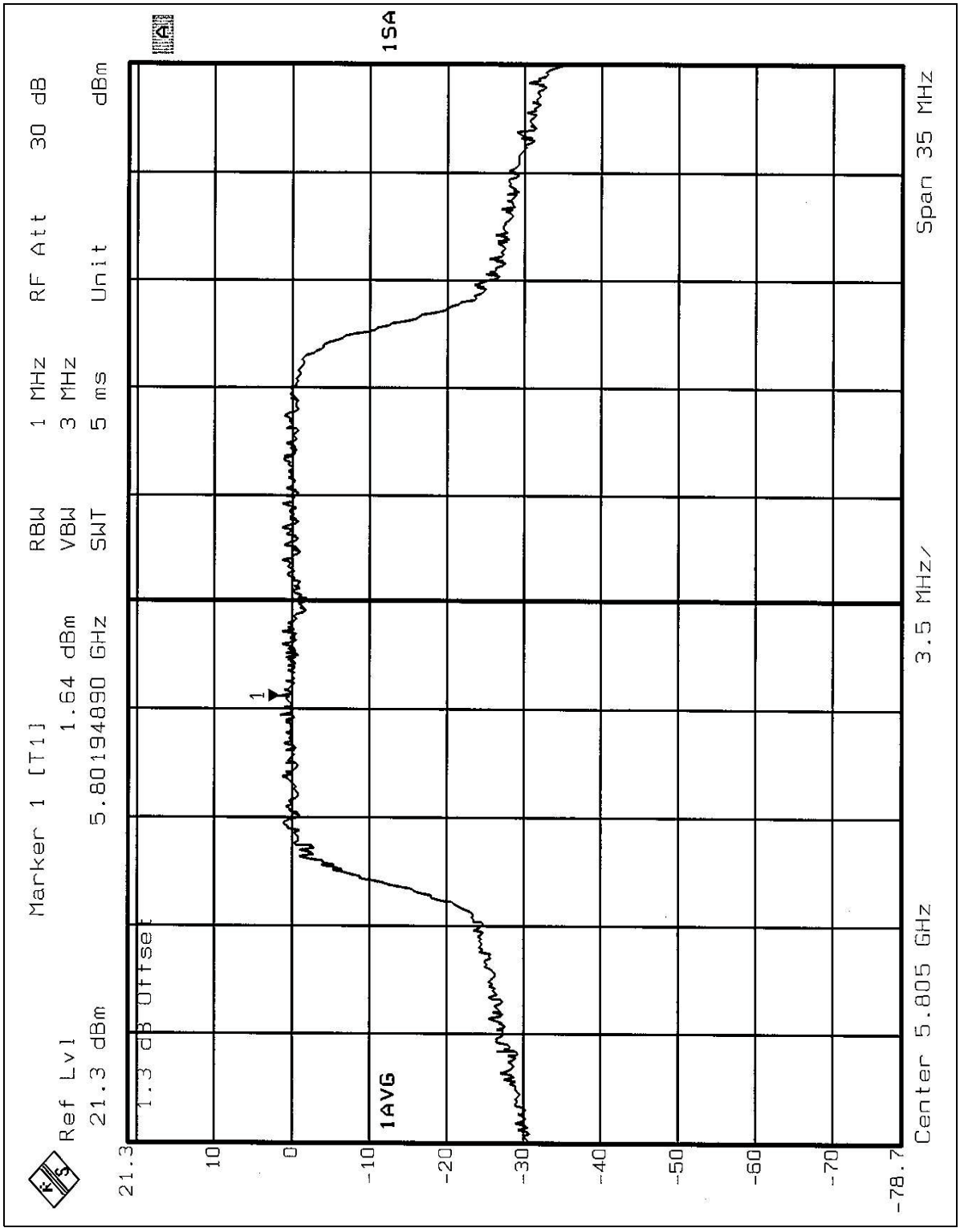
CH8


Marker 1 [T1]
0.01 dBm
5.32284068 GHz
Ref Lvl
21.3 dBm
1.3 dB Offset
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1SA
PRN
1AVG
Center 5.32 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

CH9


Ref Lvl
21.3 dBm
1.3 dB Offset
Marker 1 [T1]
1.91 dBm
5.74356212 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1SA
1AVG
Center 5.745 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

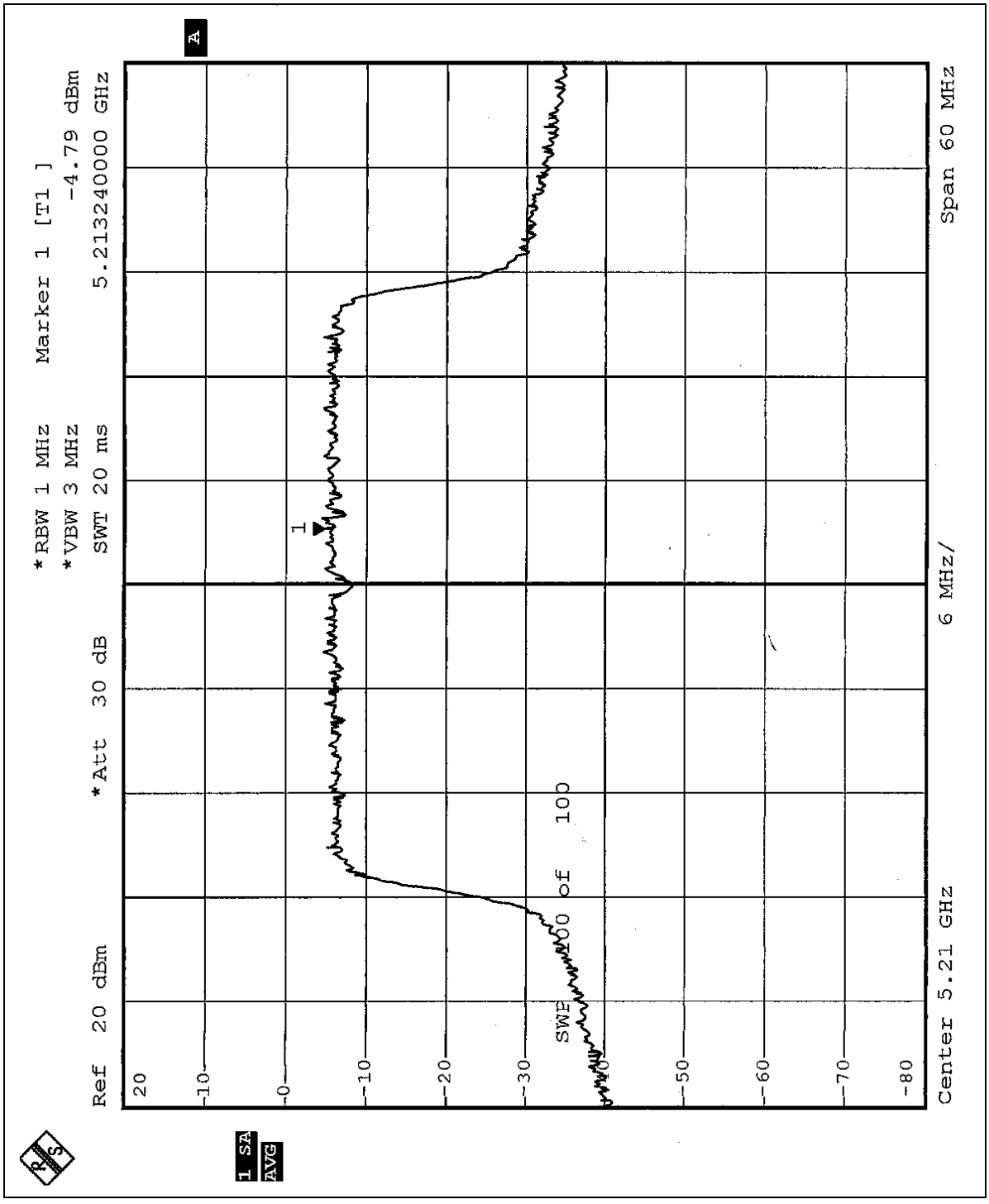
CH12


Marker 1 [T1]
1.64 dBm
5.80194890 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
Ref Lvl
21.3 dBm
1.3 dB Offset
1SA
1AVG
Center 5.805 GHz
3.5 MHz/
Span 35 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

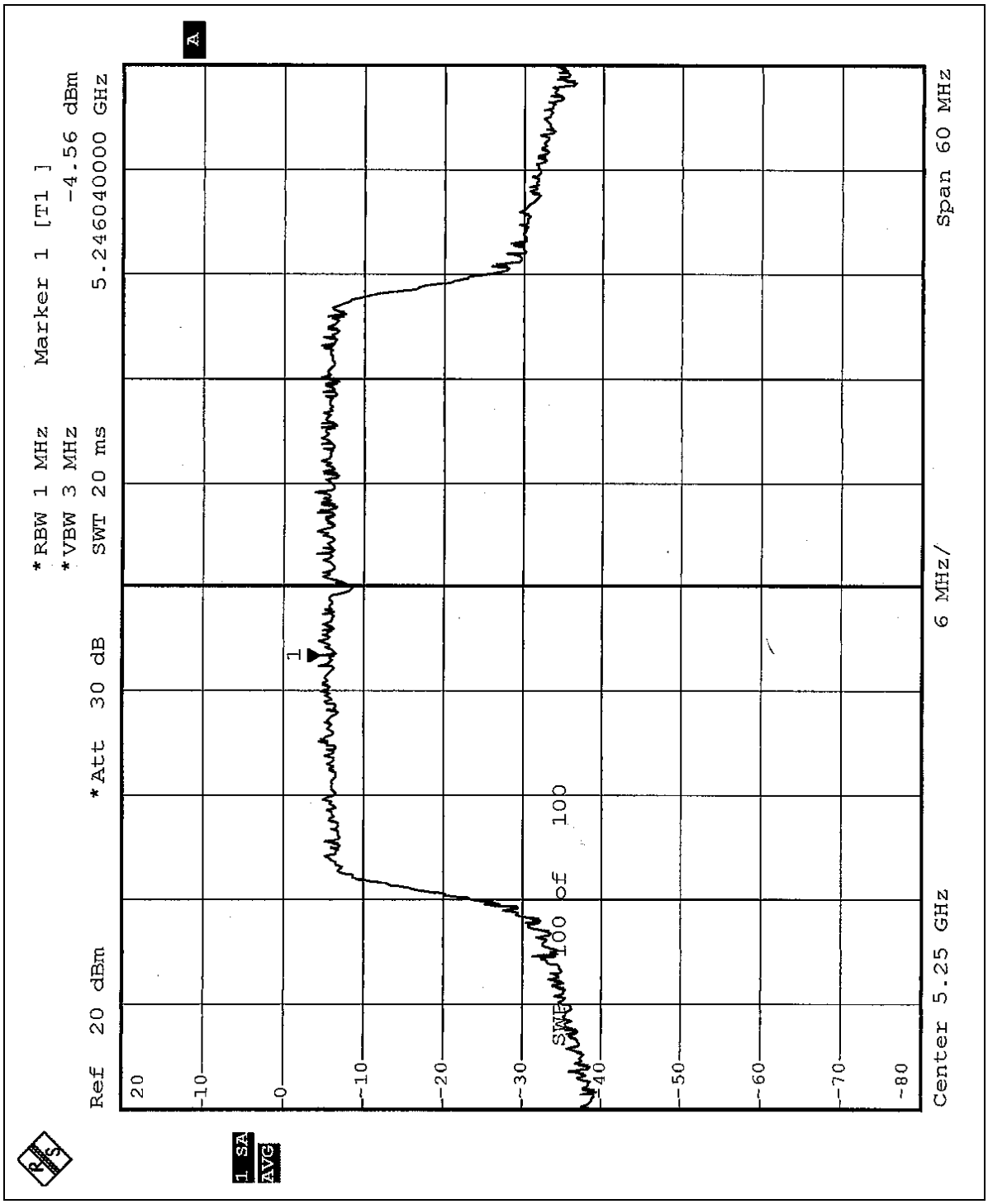
| | | | |
|---|---|---|---|
| **EUT** | Mini- PCI CARD | **MODEL** | WLL4030 |
| **MODE** | Turbo | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **ENVIRONMENTAL CONDITIONS** | 24deg. C, 64%RH, 991hPa | **TESTED BY** | Leo Hung |

| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz ) | RF POWER LEVEL IN 1 MHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---|---|---|---|---|
| 1 | 5210 | -4.79 | 4 | PASS |
| 2 | 5250 | -4.56 | 4 | PASS |
| 3 | 5290 | -4.16 | 11 | PASS |
| 4 | 5760 | -4.90 | 17 | PASS |
| 5 | 5800 | -4.35 | 17 | PASS |

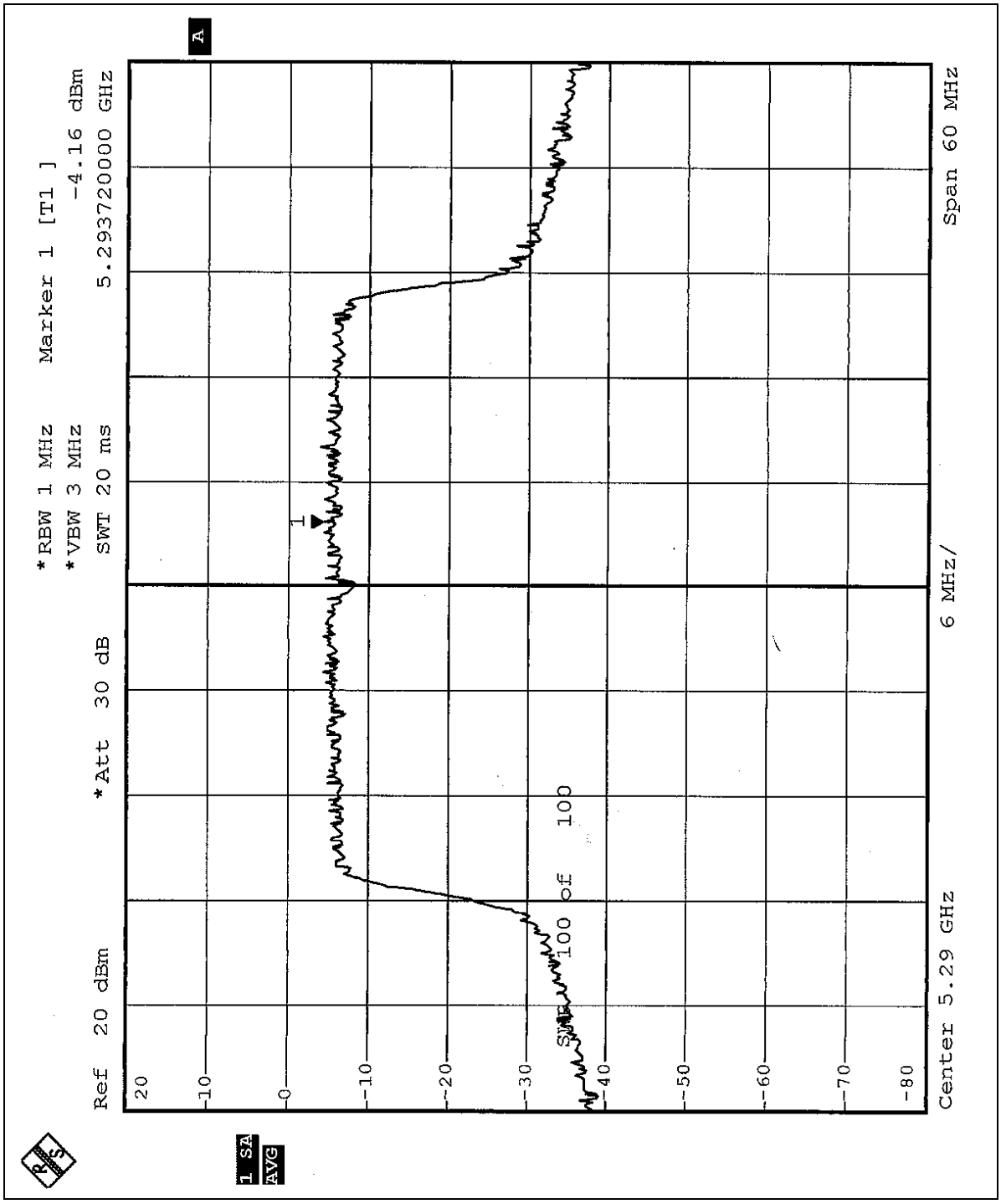
CH 1


A
*RBW 1 MHz
*VBW 3 MHz
Marker 1 [T1 ]
-4.79 dBm
5.213240000 GHz
Ref 20 dBm
*Att 30 dB
SWT 20 ms
Span 60 MHz
6 MHz/
Center 5.21 GHz
1
SWP 100 of 100
1 SA
AVG

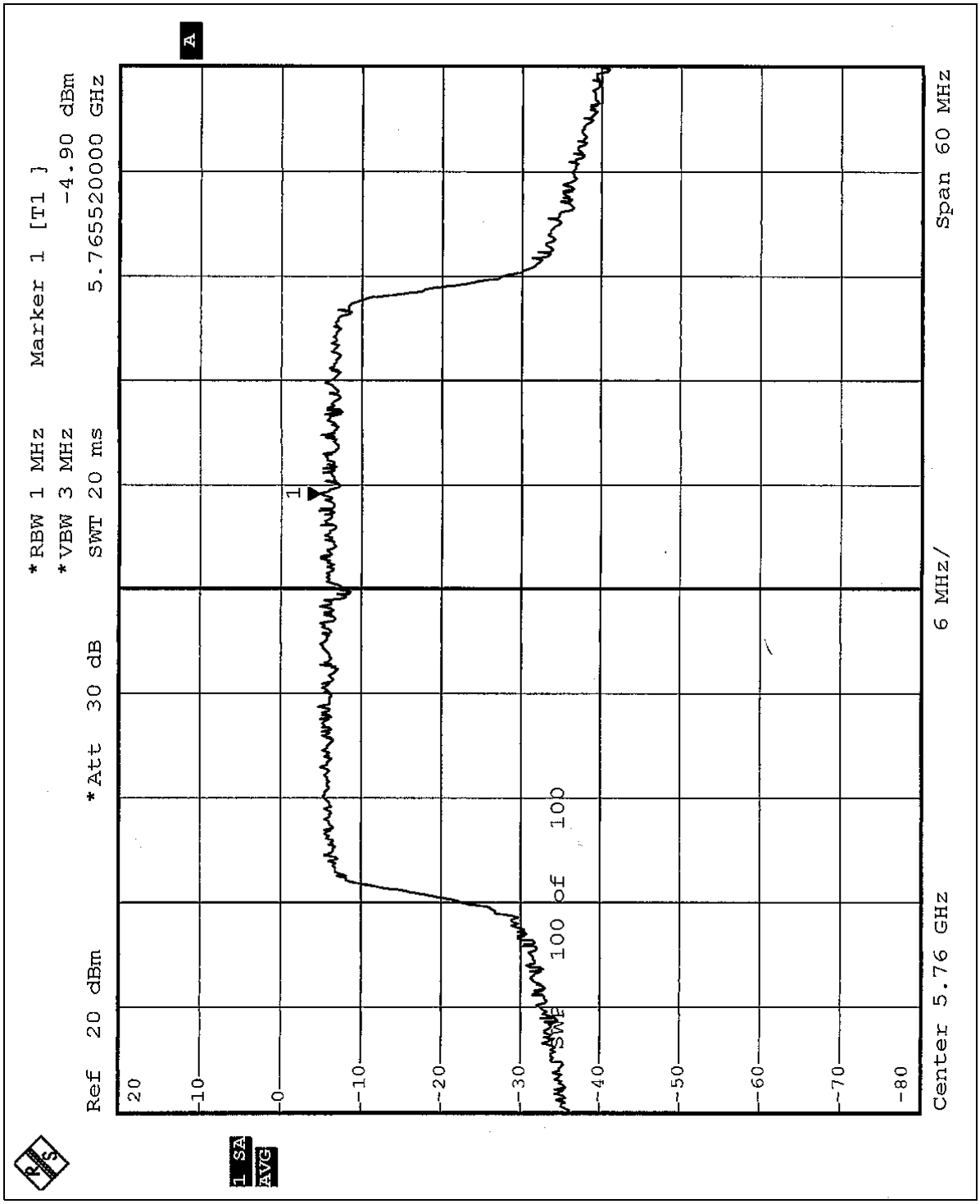
CH 2


A
Marker 1 [T1 ]
-4.56 dBm
5.246040000 GHz
*RBW 1 MHz
*VBW 3 MHz
SWT 20 ms
*Att 30 dB
Ref 20 dBm
Span 60 MHz
6 MHz/
Center 5.25 GHz
1 SA
AVG
SWP 100 of 100

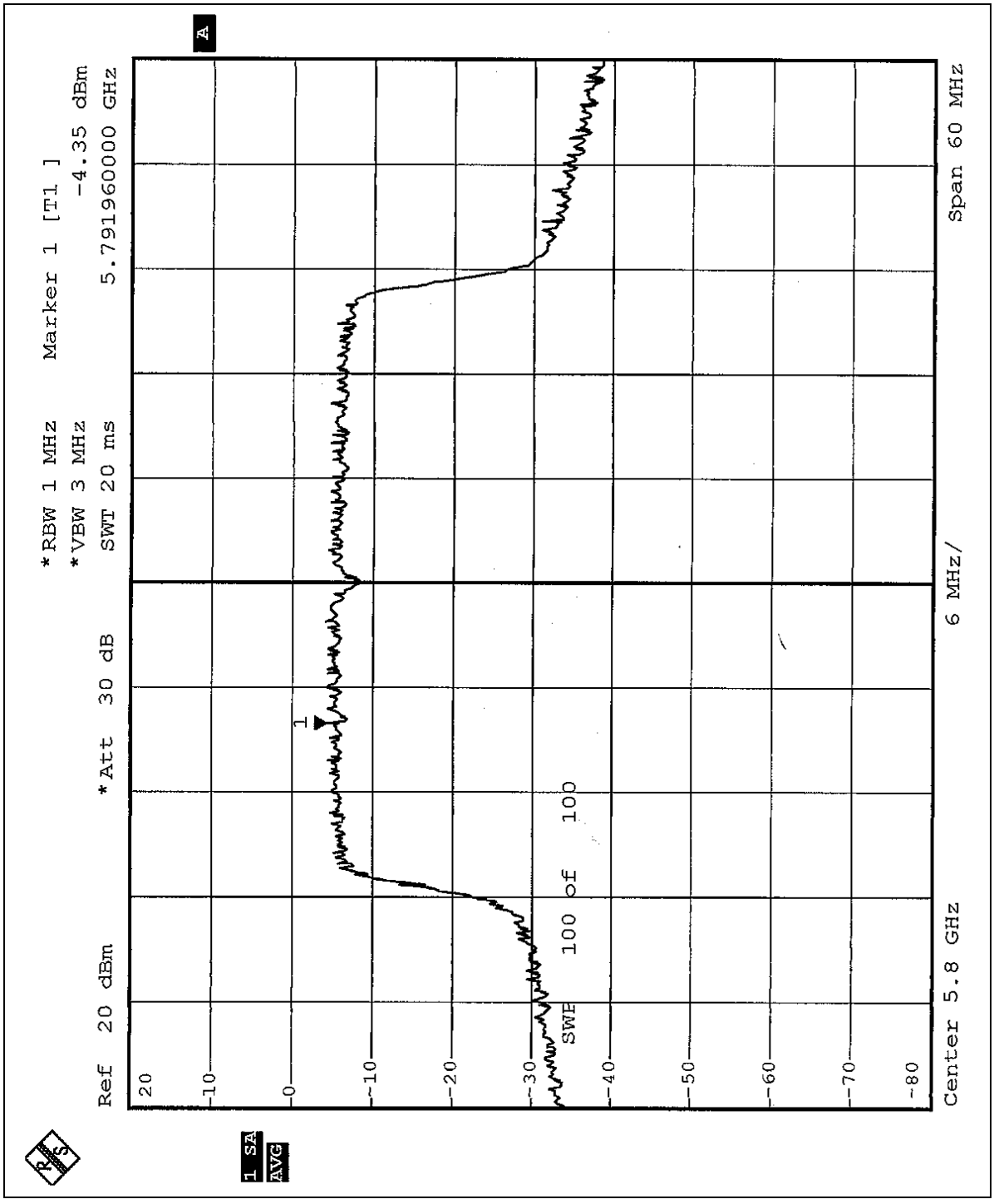
CH 3


A
*RBW 1 MHz
*VBW 3 MHz
*Att 30 dB
SWT 20 ms
Marker 1 [T1 ]
-4.16 dBm
5.293720000 GHz
Ref 20 dBm
Center 5.29 GHz
6 MHz/
Span 60 MHz
1 SA
AVG
100 of 100

CH 4


A
*RBW 1 MHz
*VBW 3 MHz
*Att 30 dB
SWT 20 ms
Marker 1 [T1 ]
-4.90 dBm
5.765520000 GHz
Ref 20 dBm
Center 5.76 GHz
6 MHz/
Span 60 MHz
1 SA
AVG
SWE 100 of 100

CH 5


A
*RBW 1 MHz
*VBW 3 MHz
SWT 20 ms
Marker 1 [T1 ]
-4.35 dBm
5.791960000 GHz
Ref 20 dBm
*Att 30 dB
Center 5.8 GHz
6 MHz/
Span 60 MHz
SWE 100 of 100
1 SA
AVG

## 5.6 FREQUENCY STABILITY

### 5.6.1 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.

### 5.6.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| ANRITSU SPECTRUM ANALYZER | MS2667C | M10281 | Feb. 09, 2005 |
| WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER | TH-4S-C | W981030 | July 18, 2005 |

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

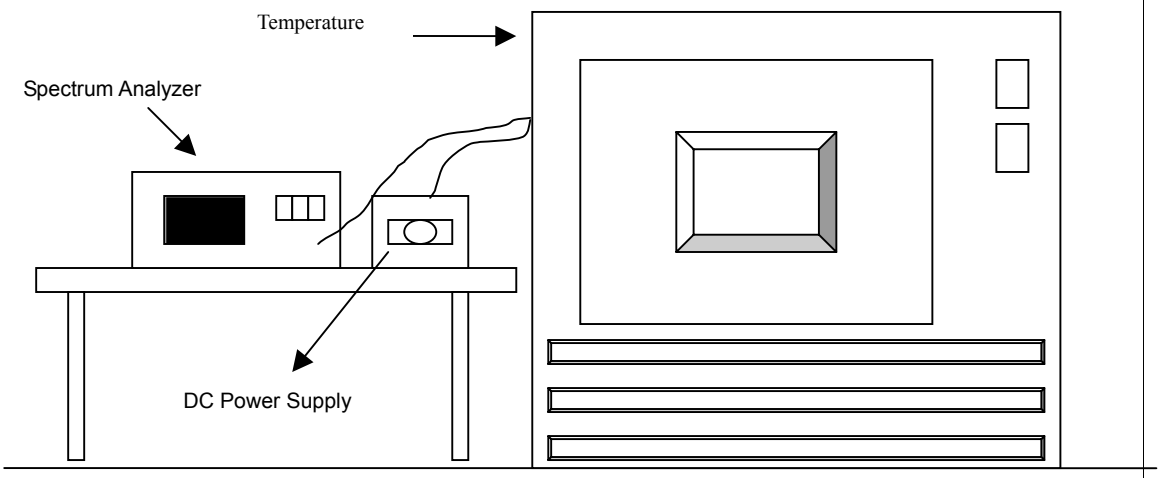
### 5.6.3 TEST PROCEDURE

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.

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

## 5.6.5 TEST SETUP




## 5.6.6 EUT OPERATING CONDITION

Same as Item 4.1.6

## 5.6.7 TEST RESULTS

| Operating frequency: 5320MHz | | | | Limit : ± 0.01% | | | |
|---|---|---|---|---|---|---|---|
| Temp. (℃) | Power supply (Vac) | 2 minute | | 5 minute | | 10 minute | |
| | | (MHz) | (%) | (MHz) | (%) | (MHz) | (%) |
| 50 | 130 | 5320.0708 | 0.0013308 | 5320.0708 | 0.0013308 | 5320.0712 | 0.0013383 |
| | 120 | 5320.0708 | 0.0013308 | 5320.0708 | 0.0013308 | 5320.0712 | 0.0013383 |
| | 102 | 5320.0708 | 0.0013308 | 5320.0708 | 0.0013308 | 5320.0712 | 0.0013383 |
| 40 | 130 | 5320.0422 | 0.0007932 | 5320.0424 | 0.0007970 | 5320.0426 | 0.0008008 |
| | 120 | 5320.0422 | 0.0007932 | 5320.0424 | 0.0007970 | 5320.0426 | 0.0008008 |
| | 102 | 5320.0422 | 0.0007932 | 5320.0424 | 0.0007970 | 5320.0426 | 0.0008008 |
| 30 | 130 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 |
| | 120 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 |
| | 102 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 | 5320.0242 | 0.0004549 |
| 20 | 130 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 |
| | 120 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 |
| | 102 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 | 5320.0142 | 0.0002669 |
| 10 | 130 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 |
| | 120 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 |
| | 102 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 | 5320.0130 | 0.0002444 |
| 0 | 130 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 |
| | 120 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 |
| | 102 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 | 5320.0062 | 0.0001165 |
| -10 | 130 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 |
| | 120 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 |
| | 102 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 | 5320.0070 | 0.0001316 |
| -20 | 130 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 |
| | 120 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 |
| | 102 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 | 5320.0096 | 0.0001805 |
| -30 | 130 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 |
| | 120 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 |
| | 102 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 | 5320.0108 | 0.0002030 |

## 5.7 BAND EDGES MEASUREMENT

### 5.7.1 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2005 |

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

### 5.7.2 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 with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 5.7.3 EUT OPERATING CONDITION

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

### 5.7.4 TEST RESULTS

For signals in the restricted bands above and below the 5.15 to 5.35GHz 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 filed 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=10Hz) are attached on the following pages.

Normal

Channel 1 (5180MHz)
The band edge emission plot on the pages 146 shows 44.24dBc (Peak) / 51.22Bc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 is 98.96dBuV/m, so the maximum field strength in restrict band is 98.50-51.22=47.28dBuV/m which is under 54dBuV/m limit.

Channel 8 (5320MHz)
The band edge emission plot on the pages 147 shows 48.41dBc (Peak) / 52.86dBc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 8 is 97.50dBuV/m, so the maximum field strength in restrict band is 97.50-52.86=44.64dBuV/m which is under 54dBuV/m limit.

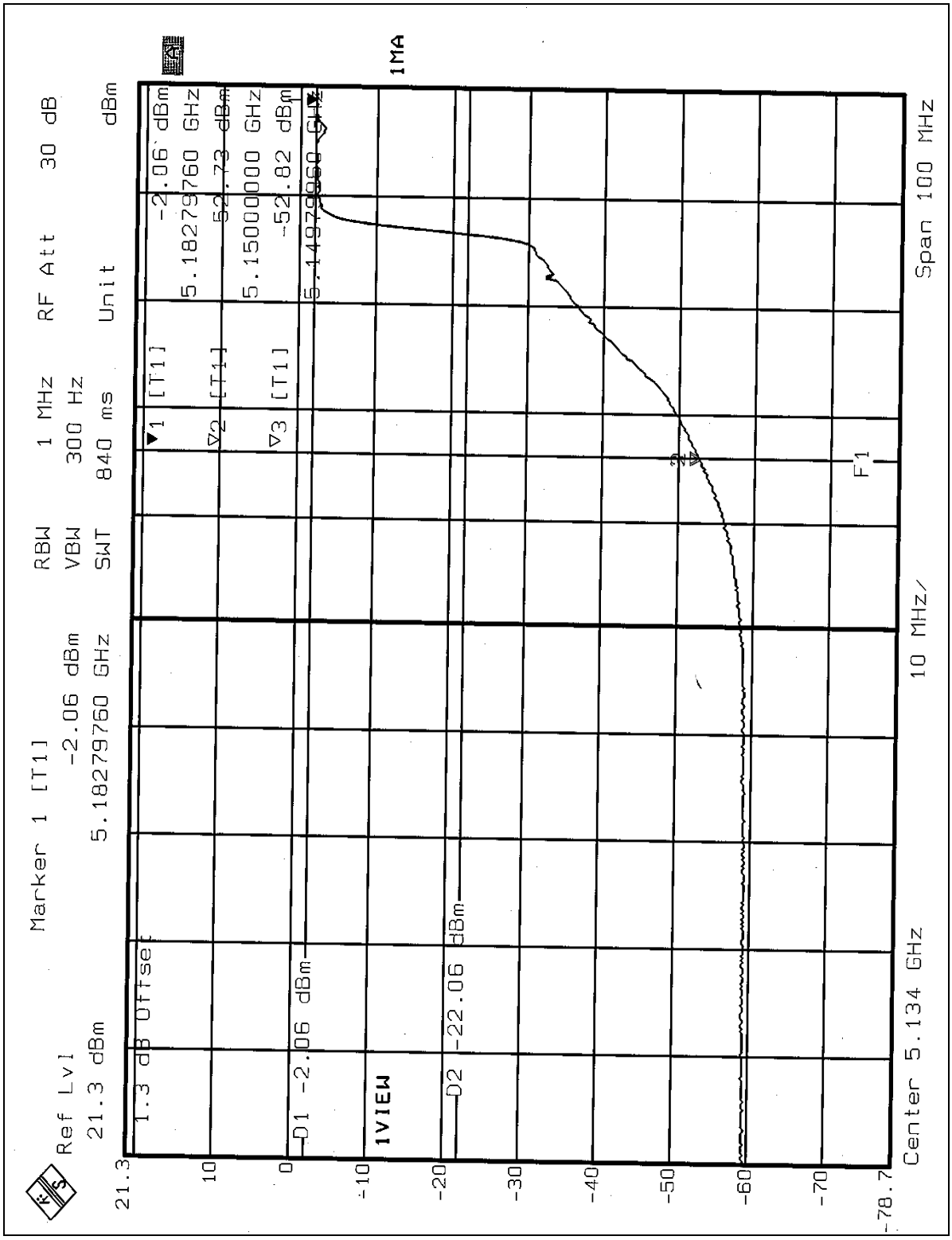
Turbo Mode

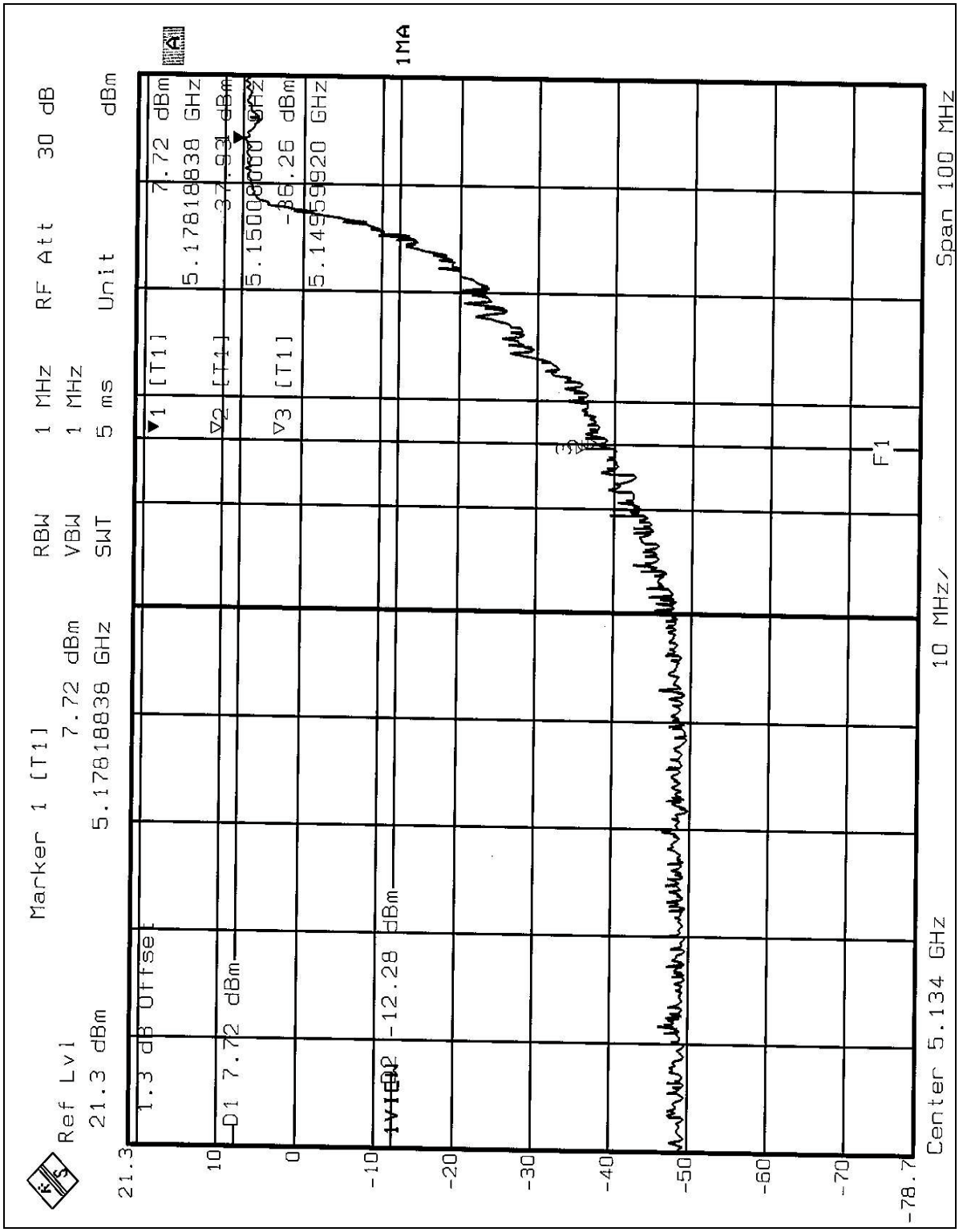
Channel 1 (5210 MHz)

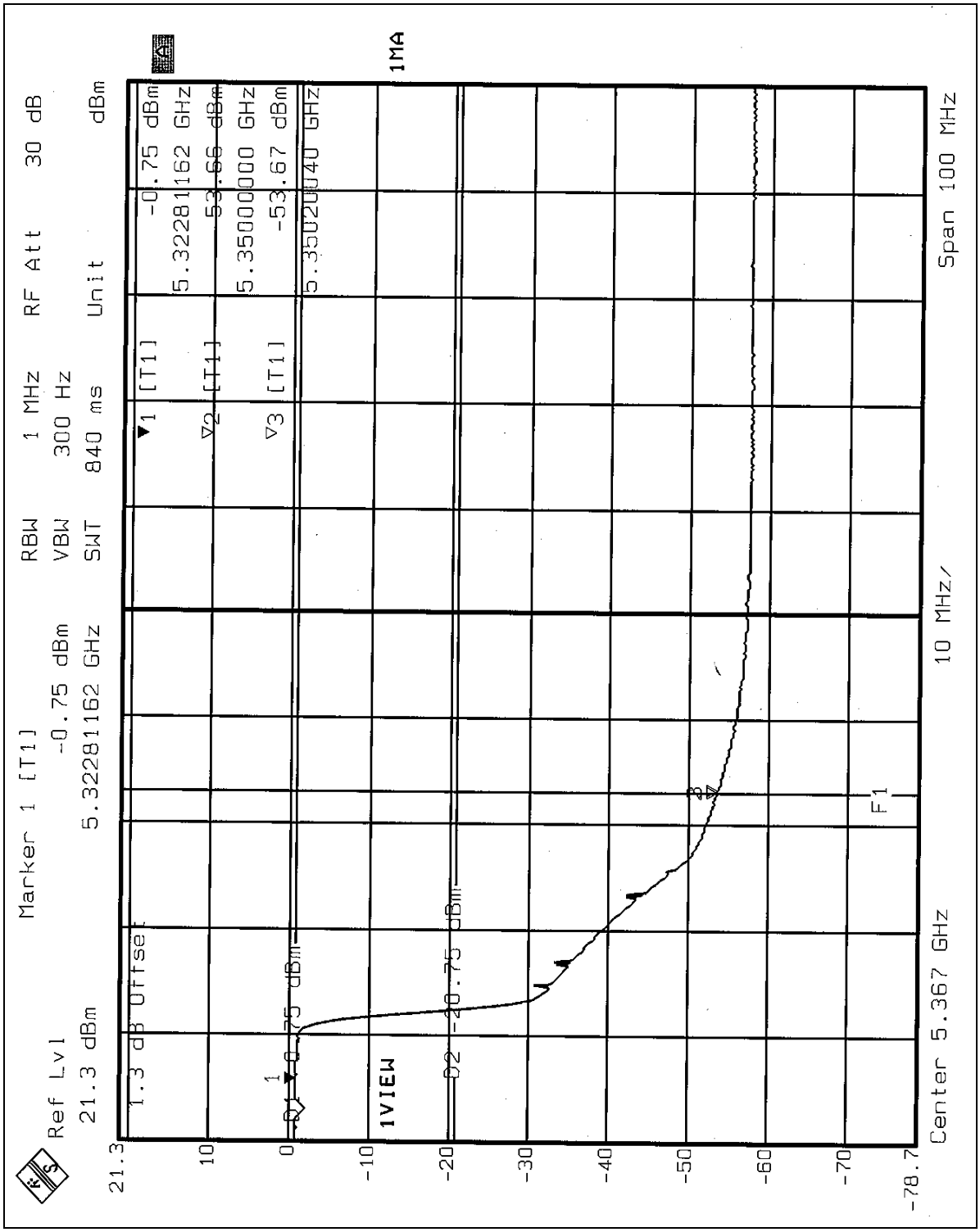
The band edge emission plot on the pages 148 shows 46.83dBc (Average) / 40.84dBc (Peak) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 (trubo mode) is 91.41dBuV/m, so the maximum field strength in restrict band is 91.41-46.83=44.58dBuV/m which is under 54dBuV/m limit.

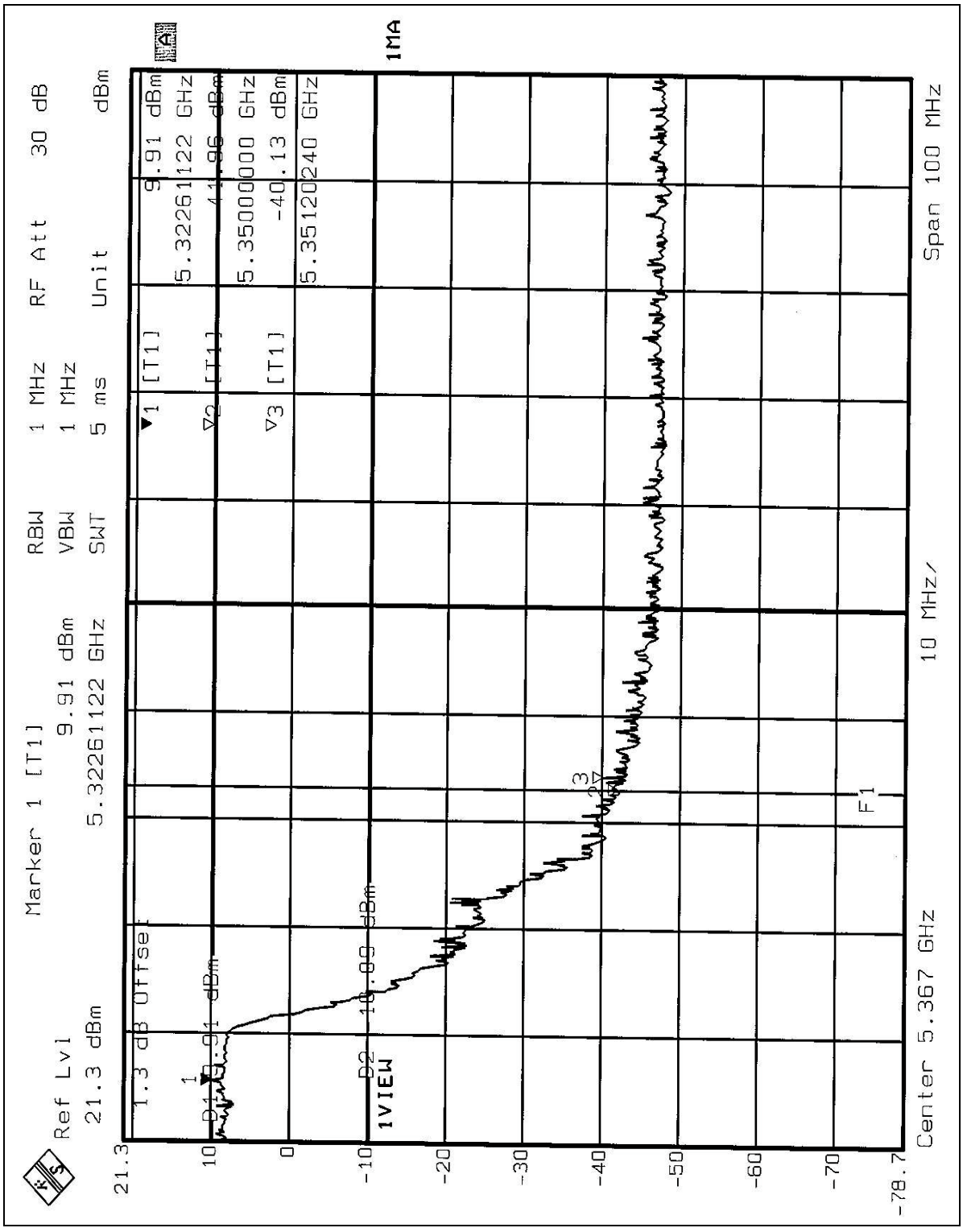
Channel 3 (5290 MHz)

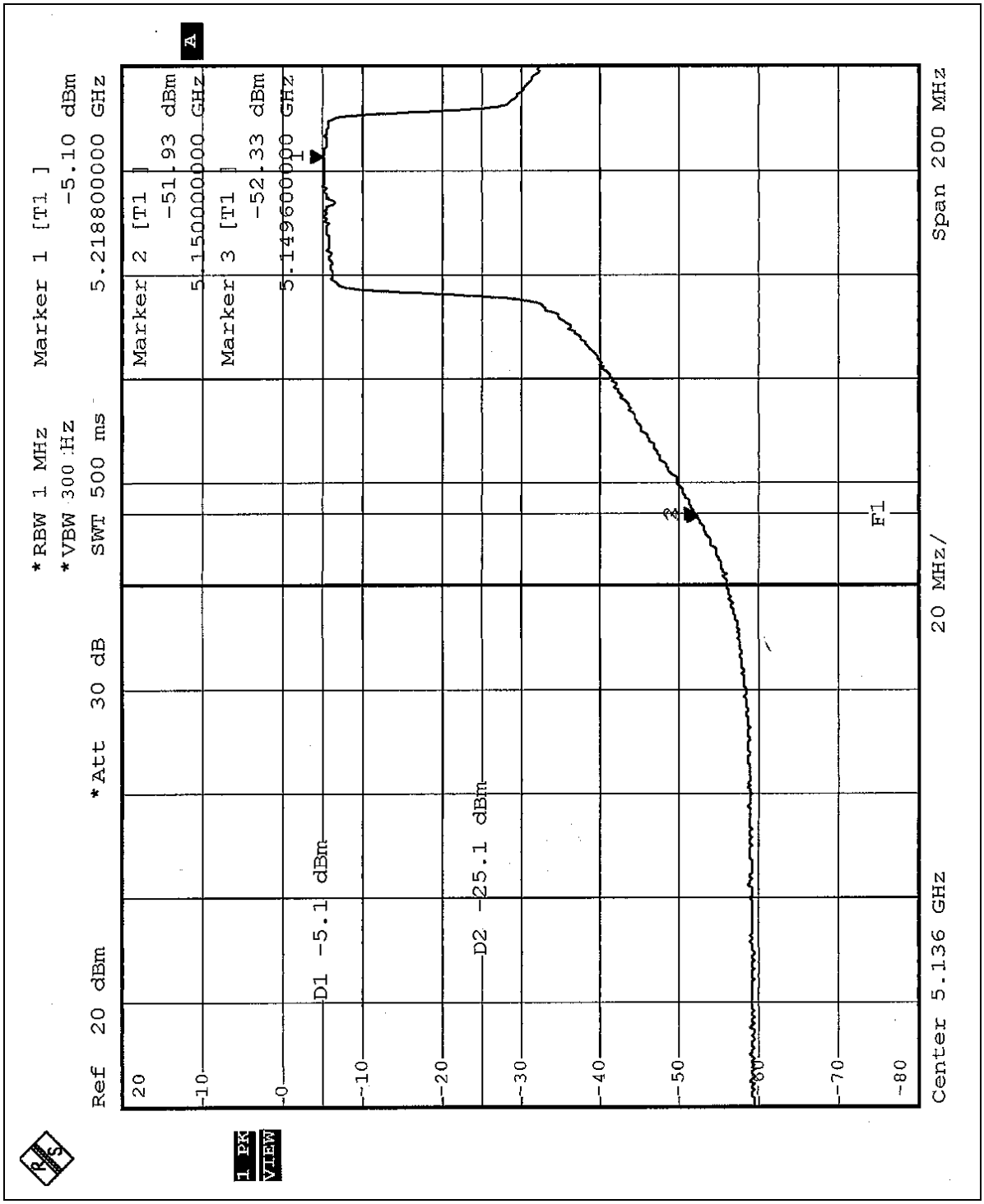
The band edge emission plot on the pages 150 shows 48.62dBc (Average) / 40.83dBc (Peak) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 3 (turbo mode) is 91.37dBuV/m, so the maximum field strength in restrict band is 91.37-48.62=42.75dBuV/m which is under 54dBuV/m limit.

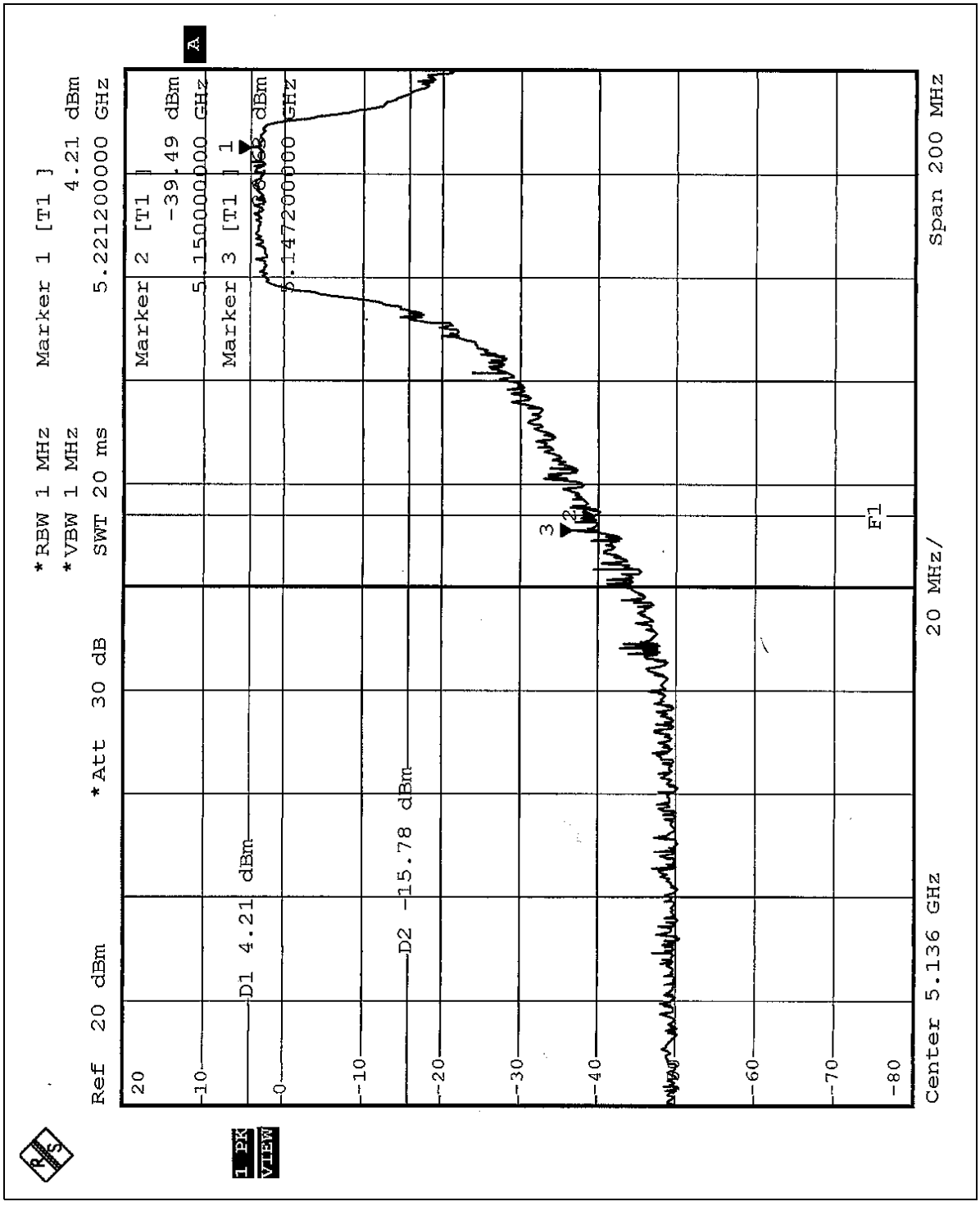

Marker 1 [T1]
-2.06 dBm
5.18279760 GHz
Ref Lvl
21.3 dBm
1.3 dB Offset
RBW 1 MHz
VBW 300 Hz
SWT 840 ms
RF Att 30 dB
Unit dBm
1 [T1] -2.06 dBm 5.18279760 GHz
2 [T1] 52.73 dBm 5.15000000 GHz
3 [T1] -52.82 dBm 5.14979960 GHz
1MA
1VIEW
D1 -2.06 dBm
D2 -22.06 dBm
Center 5.134 GHz
10 MHz/
Span 100 MHz
F1
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7

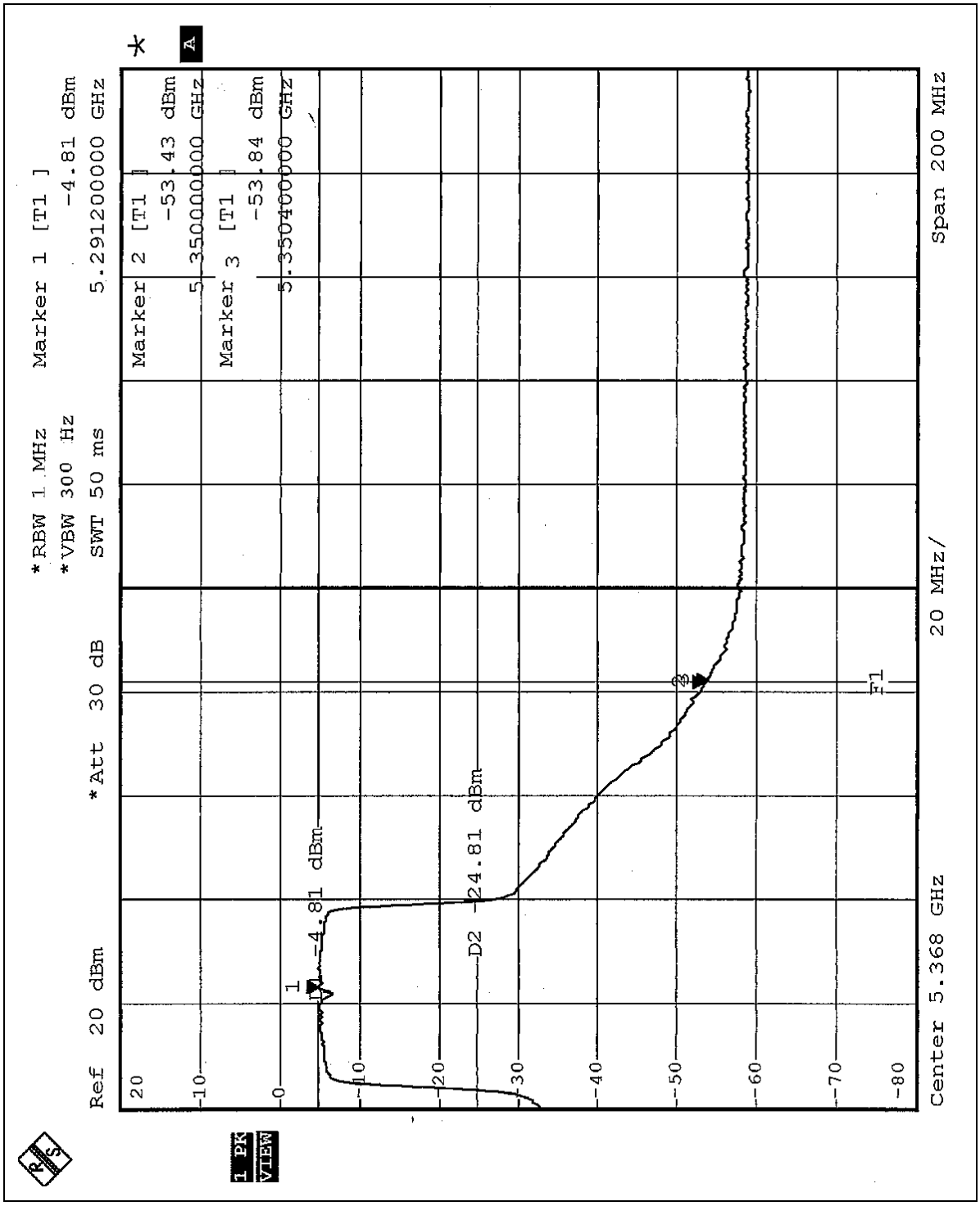

Marker 1 [T1]
7.72 dBm
5.17818838 GHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
Ref Lvl
21.3 dBm
1.3 dB Offset
D1 7.72 dBm
D2 -12.28 dBm
1MA
Center 5.134 GHz
10 MHz/
Span 100 MHz
F1

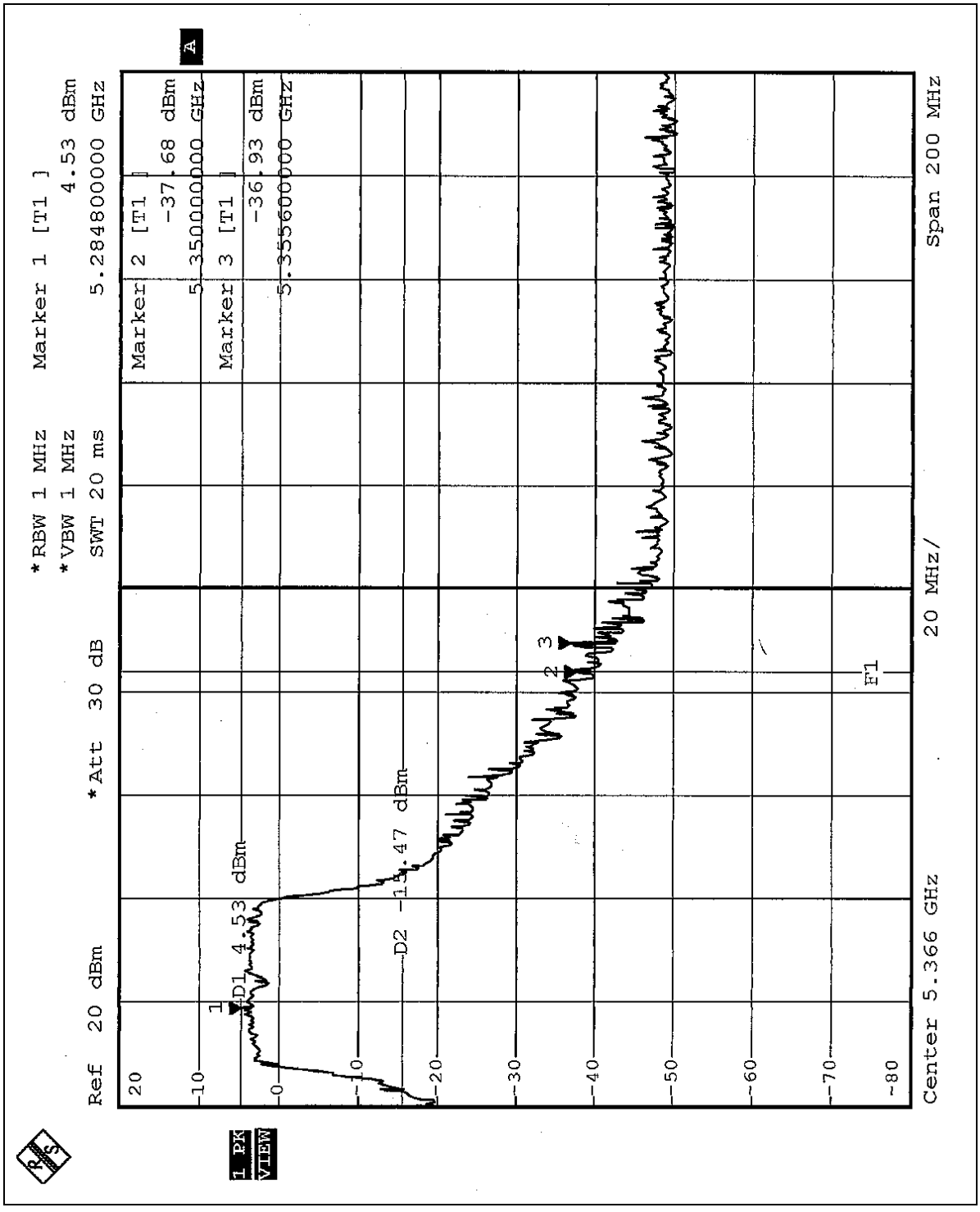

Marker 1 [T1]
-0.75 dBm
5.32281162 GHz
Ref Lvl
21.3 dBm
1.3 dB Offset
RBW 1 MHz
VBW 300 Hz
SWT 840 ms
RF Att 30 dB
Unit dBm
1 [T1] -0.75 dBm 5.32281162 GHz
2 [T1] -53.66 dBm 5.35000000 GHz
3 [T1] -53.67 dBm 5.35020040 GHz
1MA
1VIEW
D1 -0.75 dBm
D2 -40.75 dBm
F1
Center 5.367 GHz
10 MHz/
Span 100 MHz
21.3
10
0
-10
-20
-30
-40
-50
-60
-70
-78.7


Marker 1 [T1]
9.91 dBm
5.32261122 GHz
Ref Lvl
21.3 dBm
1.3 dB Offset
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
Unit dBm
RF Att 30 dB
1 [T1] 9.91 dBm
5.32261122 GHz
2 [T1] 41.86 dBm
5.35000000 GHz
3 [T1] -40.13 dBm
5.35120240 GHz
1MA
1VIEW
Center 5.367 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 300 Hz
SWT 500 ms
Marker 1 [T1 ]
-5.10 dBm
5.218800000 GHz
Marker 2 [T1 ]
-51.93 dBm
5.150000000 GHz
Marker 3 [T1 ]
-52.33 dBm
5.149600000 GHz
Ref 20 dBm
Att 30 dB
D1 -5.1 dBm
D2 -25.1 dBm
Center 5.136 GHz
20 MHz/
Span 200 MHz
1 PK
VIEW


*RBW 1 MHz
*VBW 1 MHz
SWT 20 ms
Marker 1 [T1 ]
4.21 dBm
5.22120000 GHz
Marker 2 [T1 ]
-39.49 dBm
5.15000000 GHz
Marker 3 [T1 ] 1
dBm
GHz
Ref 20 dBm
*Att 30 dB
D1 4.21 dBm
D2 -15.78 dBm
1 PK VIEW
Center 5.136 GHz
20 MHz/
Span 200 MHz
F1


*RBW 1 MHz
*VBW 300 Hz
SWT 50 ms
Marker 1 [T1 ]
-4.81 dBm
5.291200000 GHz
Marker 2 [T1 ]
-53.43 dBm
5.350000000 GHz
Marker 3 [T1 ]
-53.84 dBm
5.350400000 GHz
Ref 20 dBm
*Att 30 dB
Center 5.368 GHz
20 MHz/
Span 200 MHz
D2 -24.81 dBm
1 PK
VIEW


Ref 20 dBm
*Att 30 dB
*VBW 1 MHz
SWT 20 ms
Marker 1 [T1 ]
4.53 dBm
5.284800000 GHz
Marker 2 [T1 ]
-37.68 dBm
5.350000000 GHz
Marker 3 [T1 ]
-36.93 dBm
5.355600000 GHz
D1 4.53 dBm
D2 -15.47 dBm
F1
1 PK
VIEW
Center 5.366 GHz
20 MHz/
Span 200 MHz

## 5.8 ANTENNA REQUIREMENT

### 5.8.1 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.

### 5.8.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product are Inverted F antenna with UFL connector. The maximum Gain of the antenna is 2.55dBi.

# 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST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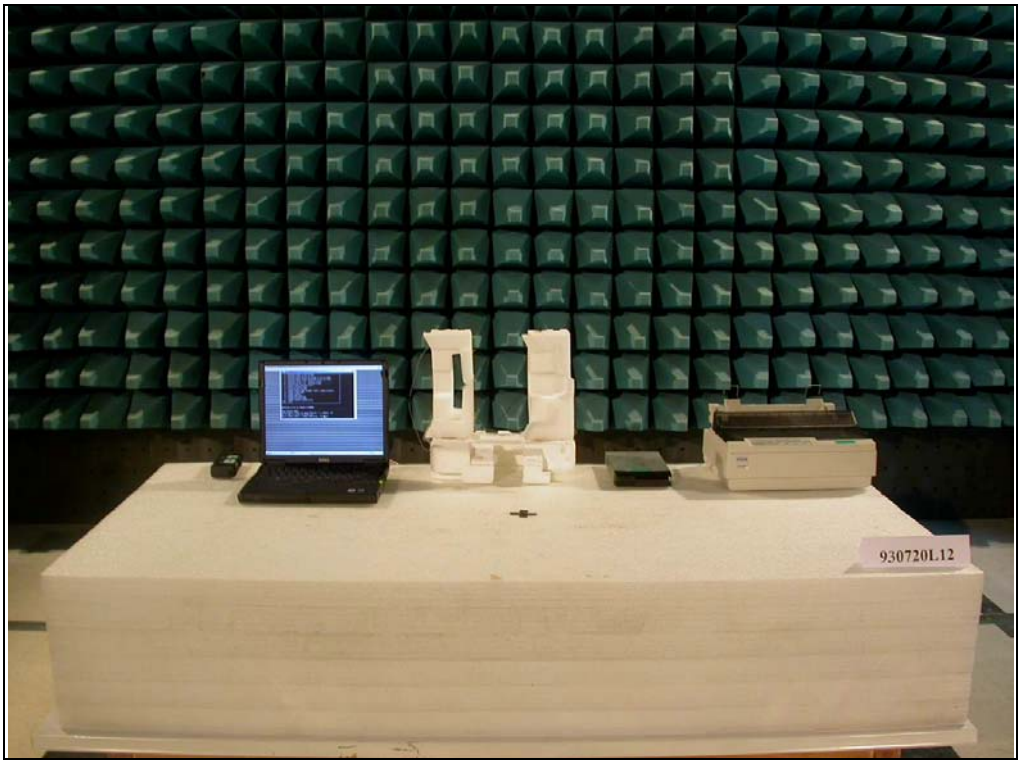
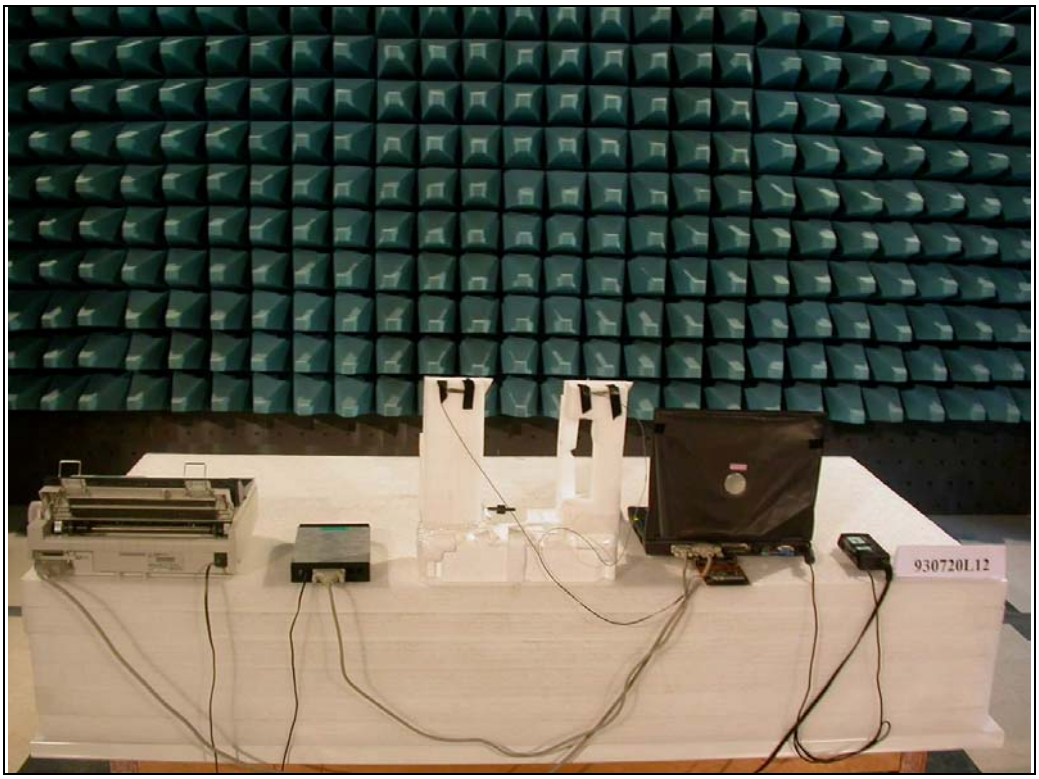
# RADIATED EMISSION TEST

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# 7. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom 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 , A2LA |
| **Germany** | TUV Rheinland |
| **Japan** | VCCI |
| **Norway** | NEMKO |
| **Canada** | INDUSTRY CANADA , CSA |
| **R.O.C.** | CNLA, BSMI, DGT |
| **Netherlands** | Telefication |
| **Singapore** | PSB , GOST-ASIA(MOU) |
| **Russia** | CERTIS(MOU) |

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**:
Tel: 886-2-26052180
Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab**:
Tel: 886-3-5935343
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab**:
Tel: 886-3-3183232
Fax: 886-3-3185050

**Linko RF Lab.**
Tel: 886-3-3270910
Fax: 886-3-3270892

**Email**: service@mail.adt.com.tw
**Web Site**: www.adt.com.tw

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

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